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ILLUSTRATED CATALOGUE

OF

RAILWAY AND MACHINISTS' TOOLS AND SUPPLIES.

MANNING, MAXWELL & MOORE,

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JANUARY, 1894.

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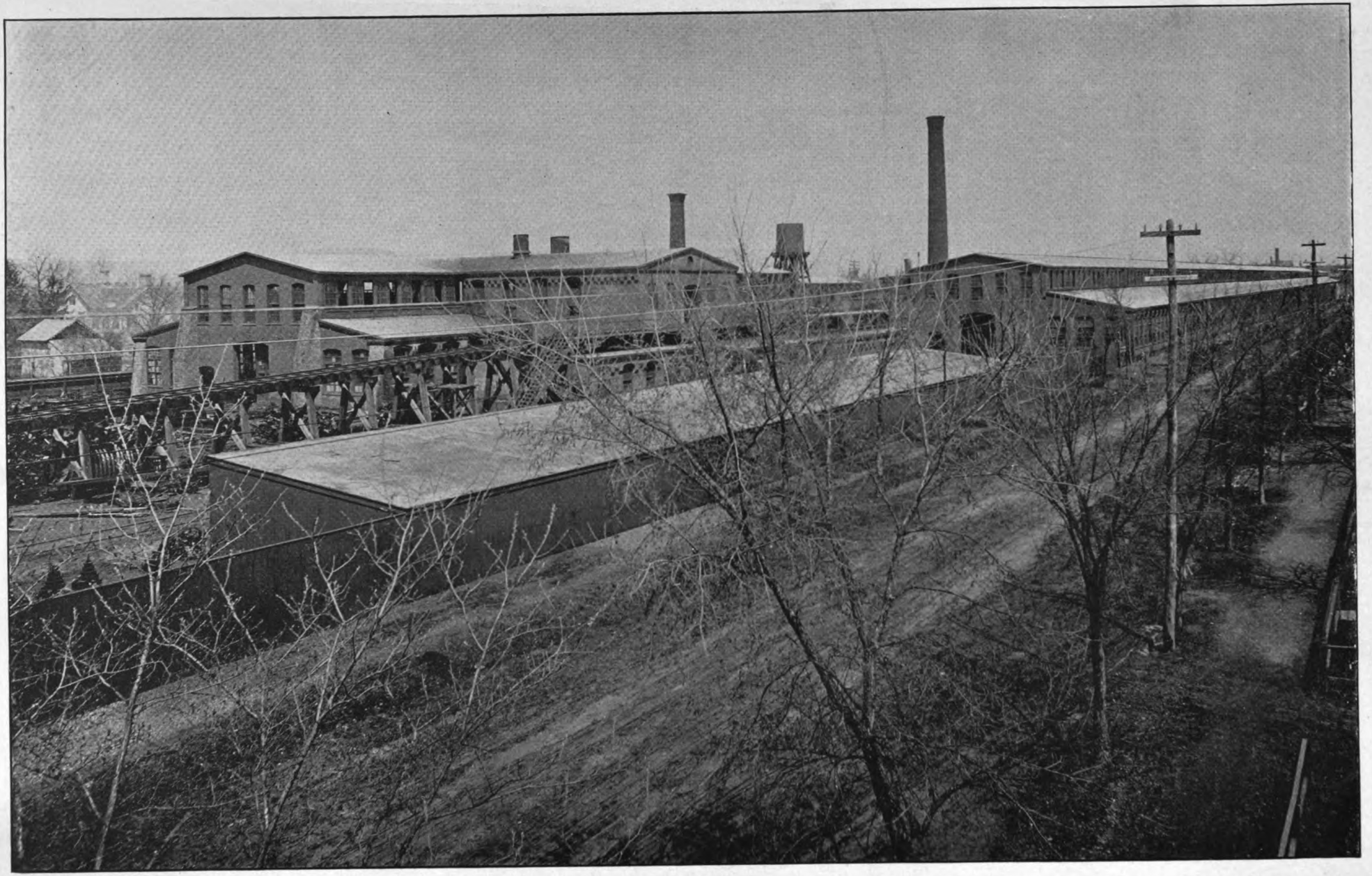
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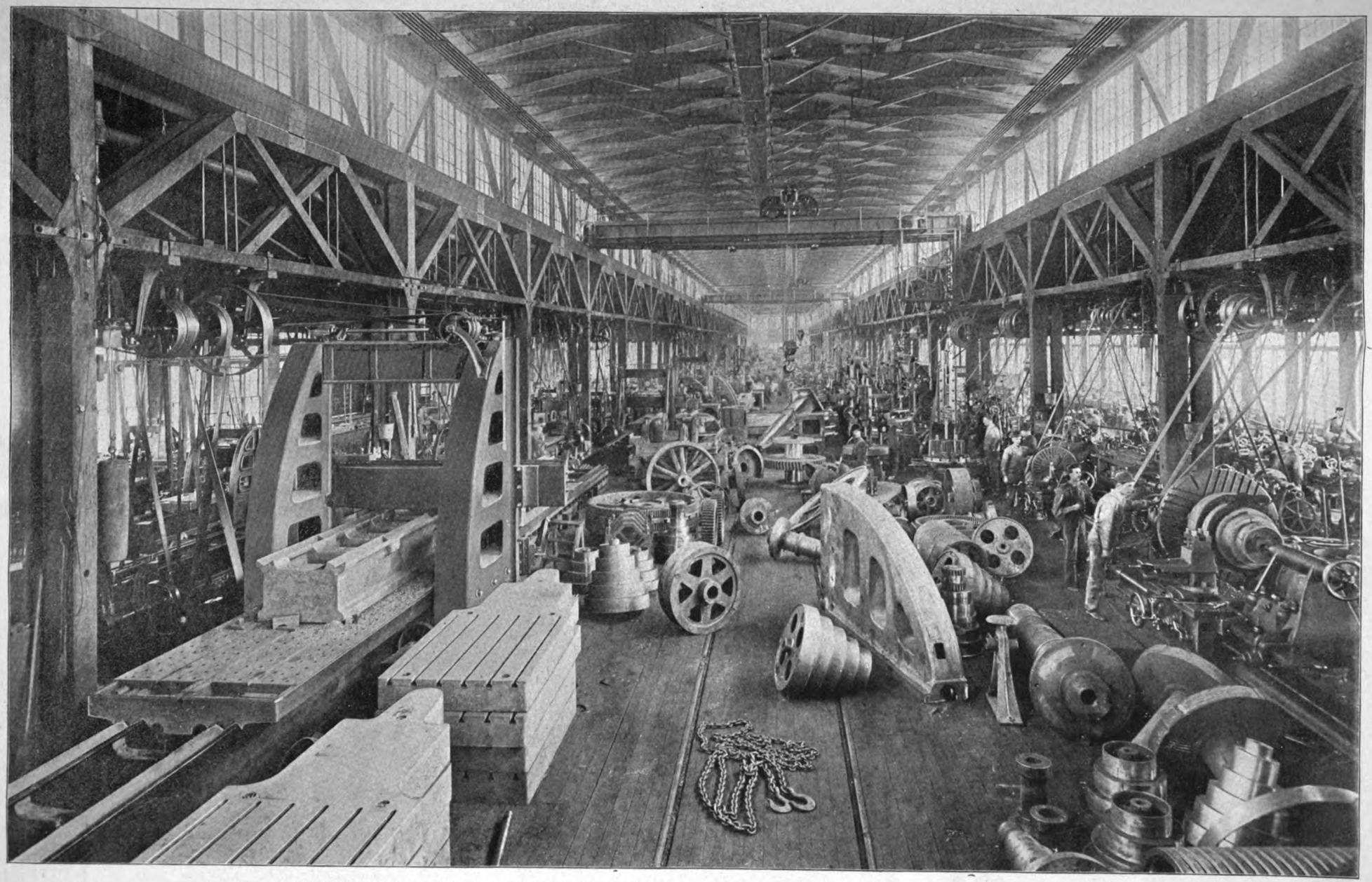
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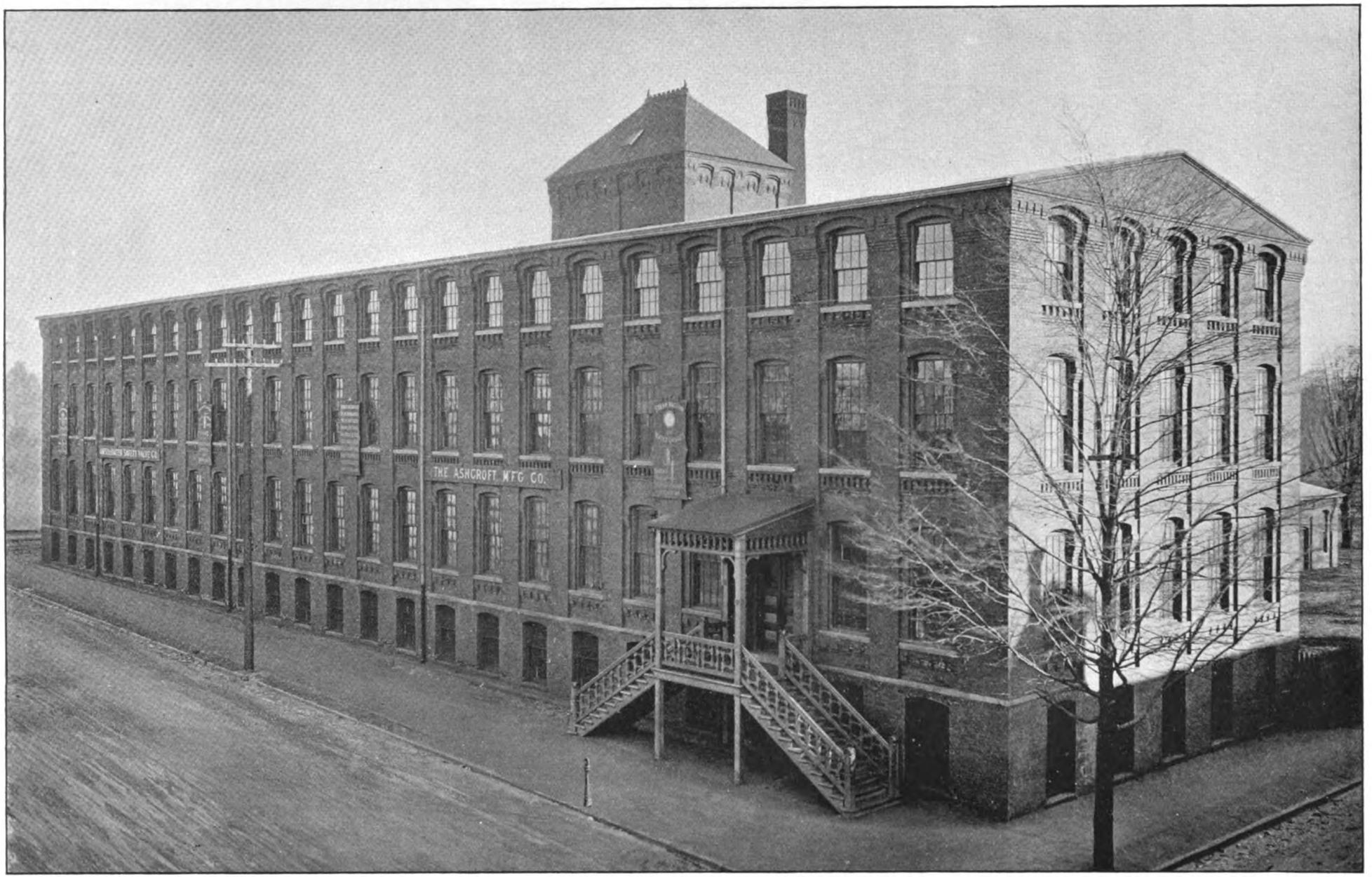
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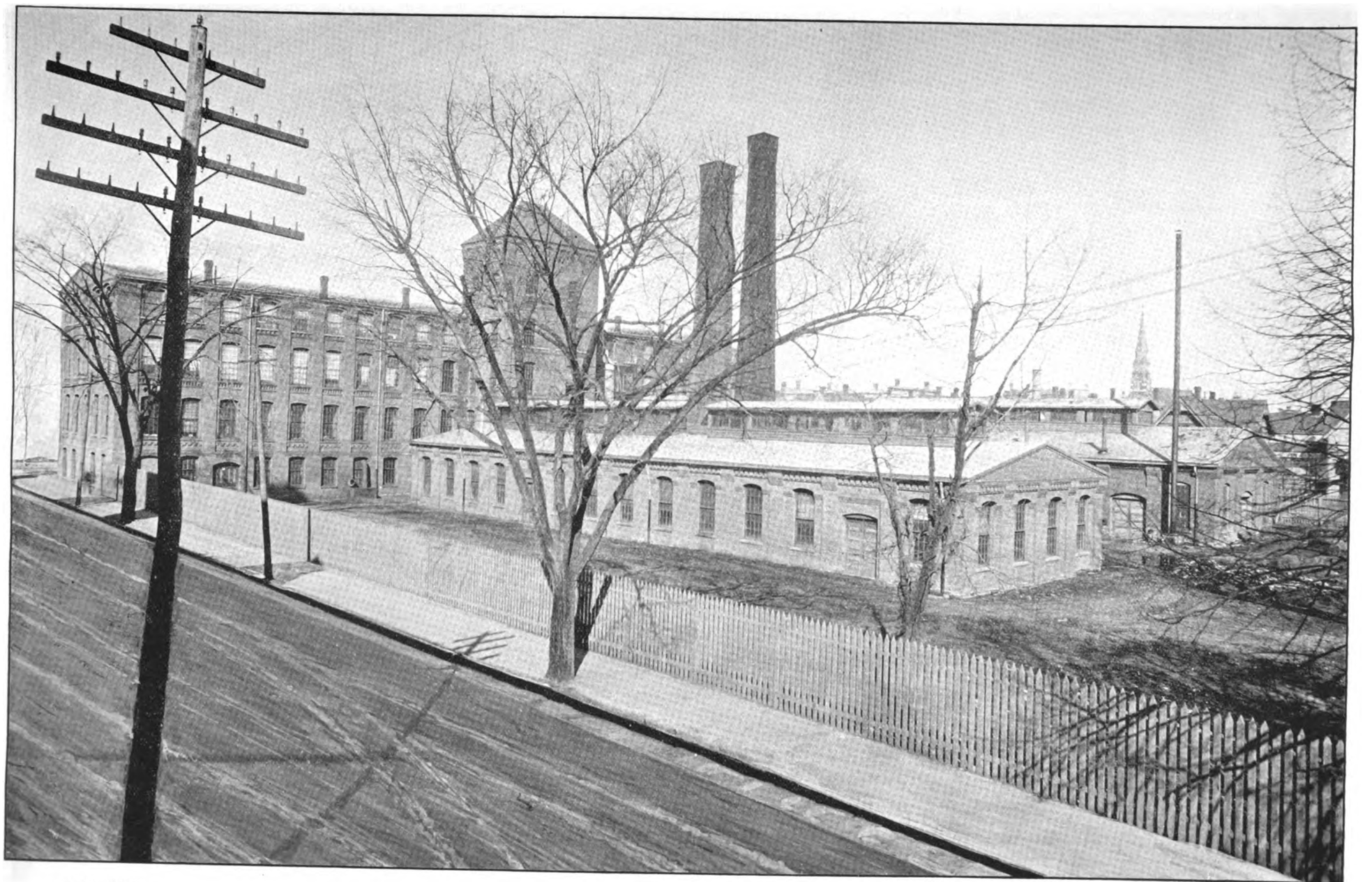
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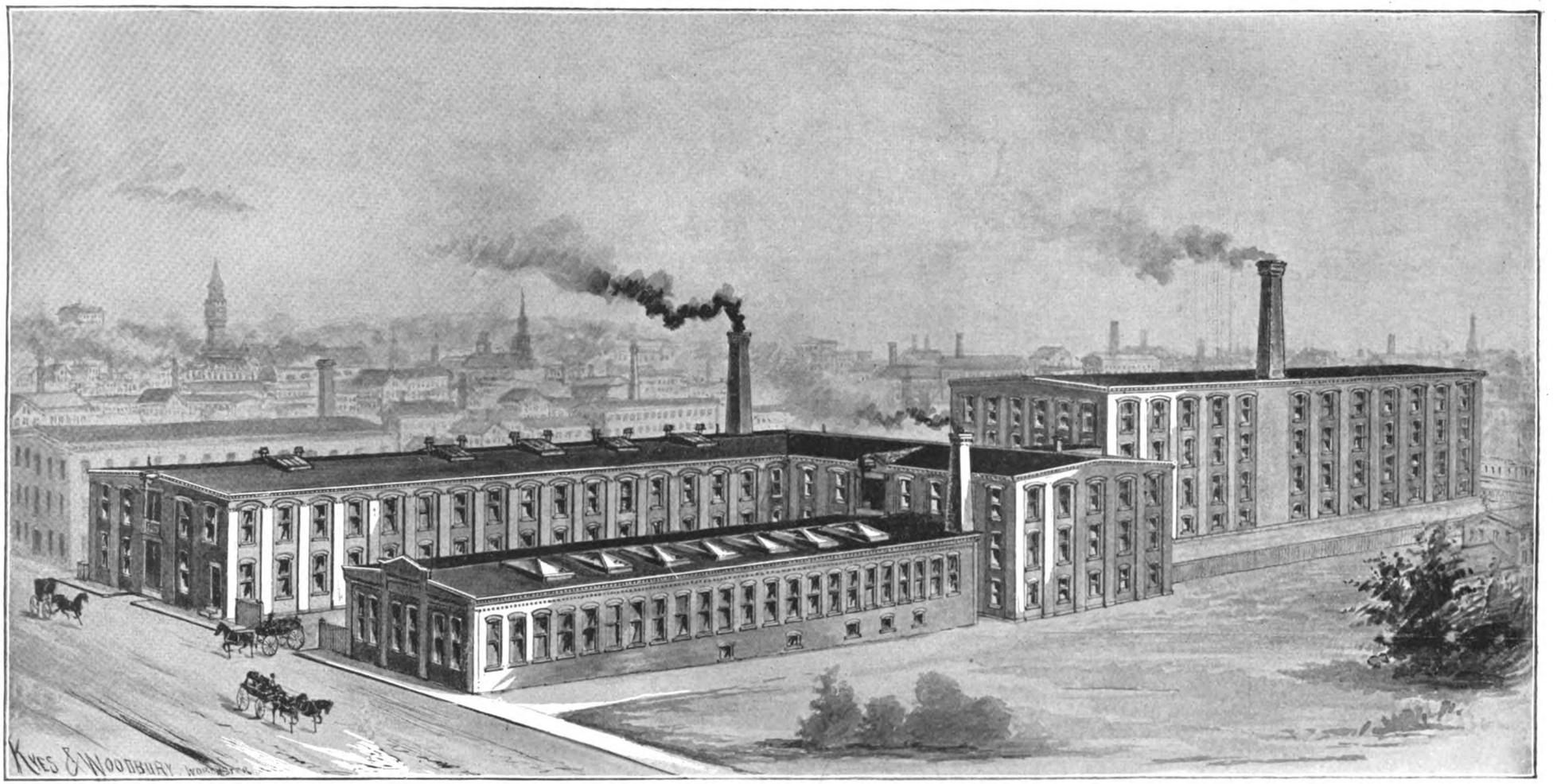
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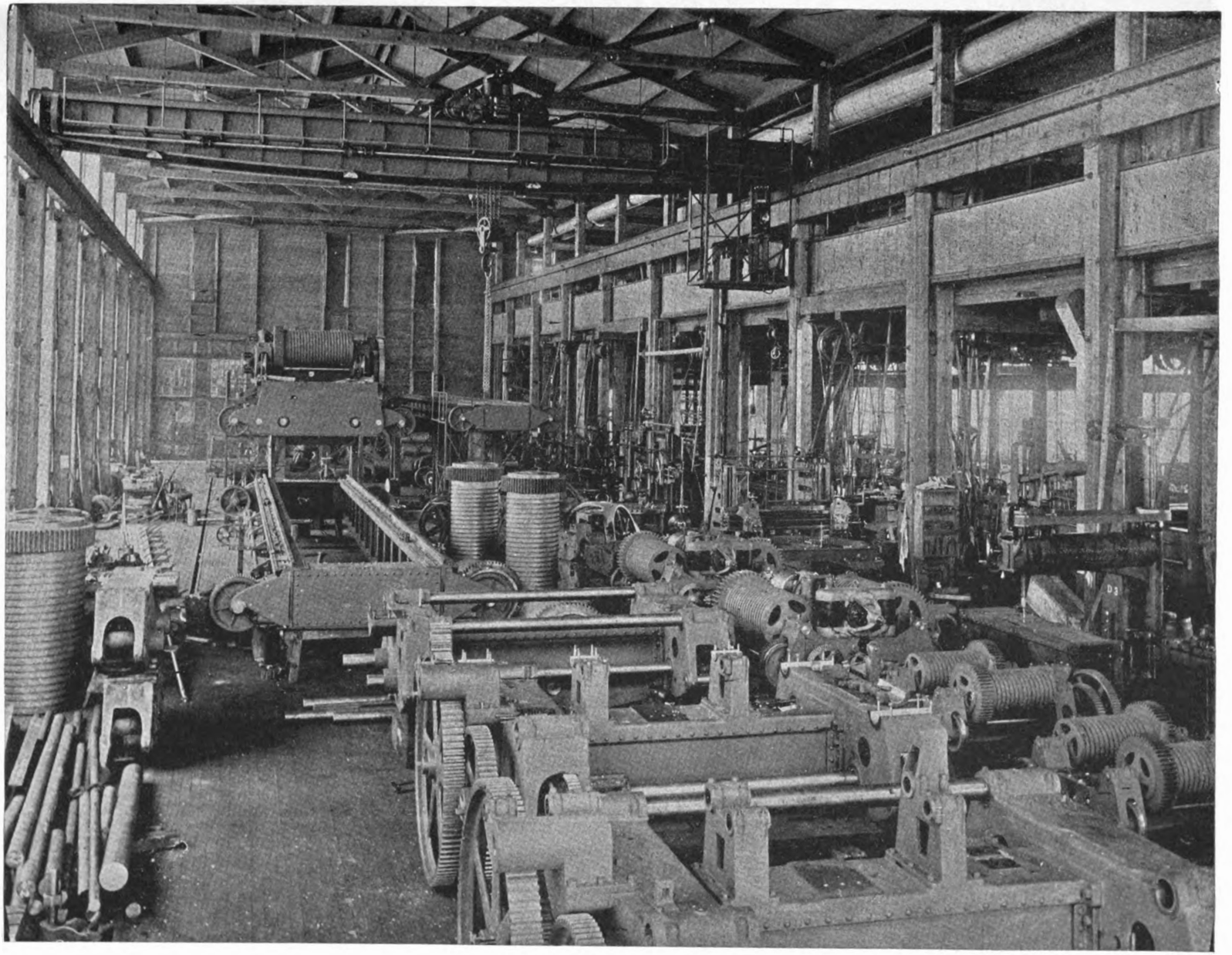


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POND 79 INCH LOCOMOTIVE DRIVING-WHEEL LATHE.

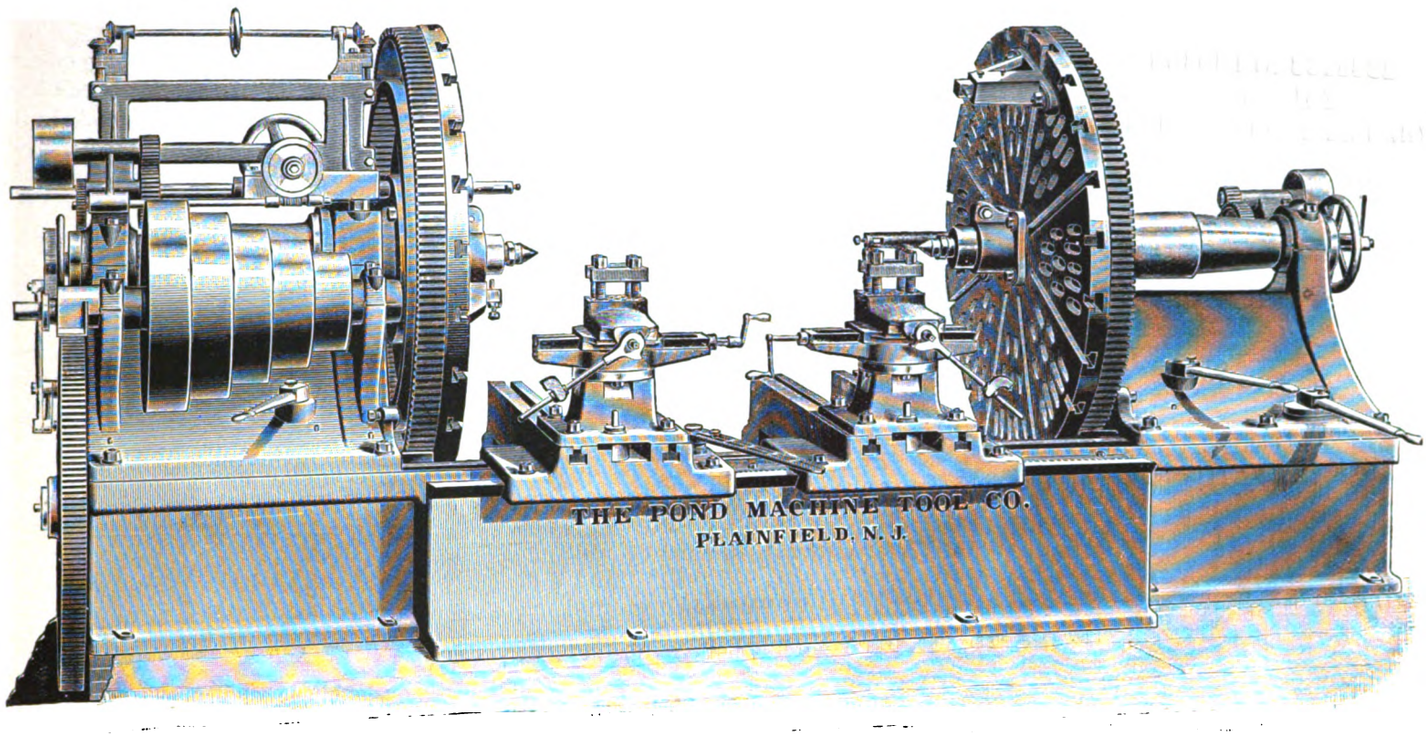


FIG. 3000.

This 79 inch Wheel Lathe is built from new and improved designs, embodying the most modern ideas for convenience in operating, and is made very strong and stiff, to meet the demands of locomotive work of the heaviest class.

The Lathe will swing wheels 74 inches diameter over tread. Adjustable head is moved along bed by an improved method that permits of its being located at the exact point desired in a much shorter time than by the ordinary method.

The bed consists of three inverted ∩ sections, the two front ones of which are carried up much higher than is usual, and all are thoroughly united by cross pieces of same section. This form of bed permits the use of a very short tool post, thus materially lessening the strain which is common by reason of the leverage arising from the greater length of the tool post ordinarily used. The bed is of sufficient length to admit wheels on the axle fitted with the longest crank pins, without adjustable head overhanging the end of bed.

The tool posts are furnished with compound slide rests, and feeds for the same are positive and universal.

The driving cone has five steps for a 6 inch belt. The two face plates have ten speeds each, and can be driven together or separately at the same or different speeds.

All gearing is cut from the solid. Face plate pinions and pinion shaft are of forged steels, the shaft being of extra large diameter.

The slotted hand wheel on end of internal spindle screw, from which feeds are operated, is so locked to the main spindle that it is impossible for the internal spindle to back out and allow the axle to become loose on the centres.

Countershaft is furnished with pulleys for two speeds, and is driven by a 6 inch wide belt. 42 inch pulley should make 55, and 30 inch pulley should make 90 revolutions per minute.

A full set of drop forged hardened wrenches is furnished with each machine.

Single or double quartering attachment can be furnished, and when this is done, a positive device, for locking face plate while boring, is provided.

64 INCH DOUBLE DRIVING-WHEEL LATHE.

This Lathe swings 64 inches in diameter over the shears; the cone pulleys have 5 speeds for 4½ inch belt; it is very powerfully geared, giving 10 changes of speed; the distance between the face plates is 8 feet 6 inches, which allows room for a pair of drivers to be put in without removing the crank pins; both tires can be turned at once, or the hub of one wheel can be turned while turning the tread of the other. It has two compound slide rests so arranged as to be able to turn both journals at the same time; self-acting feeds in all directions from overhead rock shaft and ratchet feeds.

The front of the bed is raised to give additional strength to it, thereby shortening the tool posts, and giving greater rigidity under the cut.

The saddles are of such form that when turning the largest wheels, the tool posts can be placed directly in front of the treads, thereby reducing the overhang of the tools to a minimum.

Weight, 28,700 lbs.

A quartering attachment can be added when so desired, increasing the weight to 29,700 lbs.

Speed of countershaft, 80 revolutions.

Fast and loose pulleys, 24 x 6¼ inches.

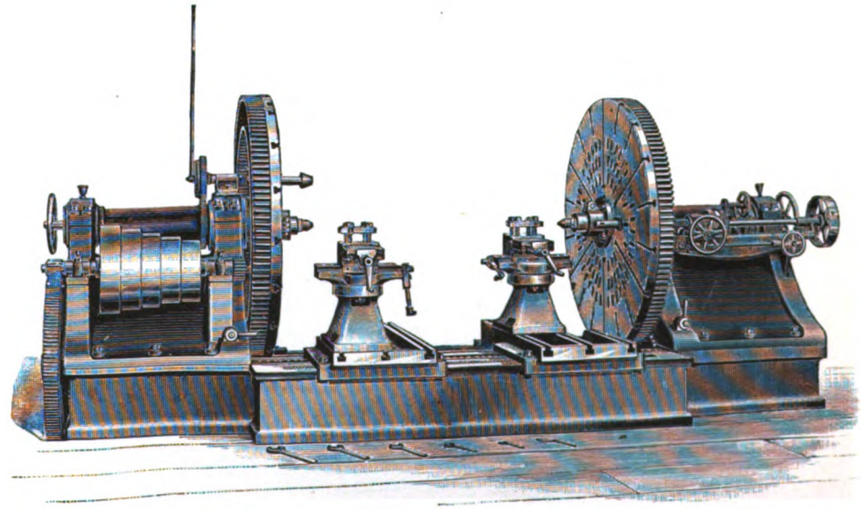


FIG. 3001.

OTHER SIZES MADE AS CALLED FOR.

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APPARATUS FOR HEATING, SETTING AND REMOVING TIRES.

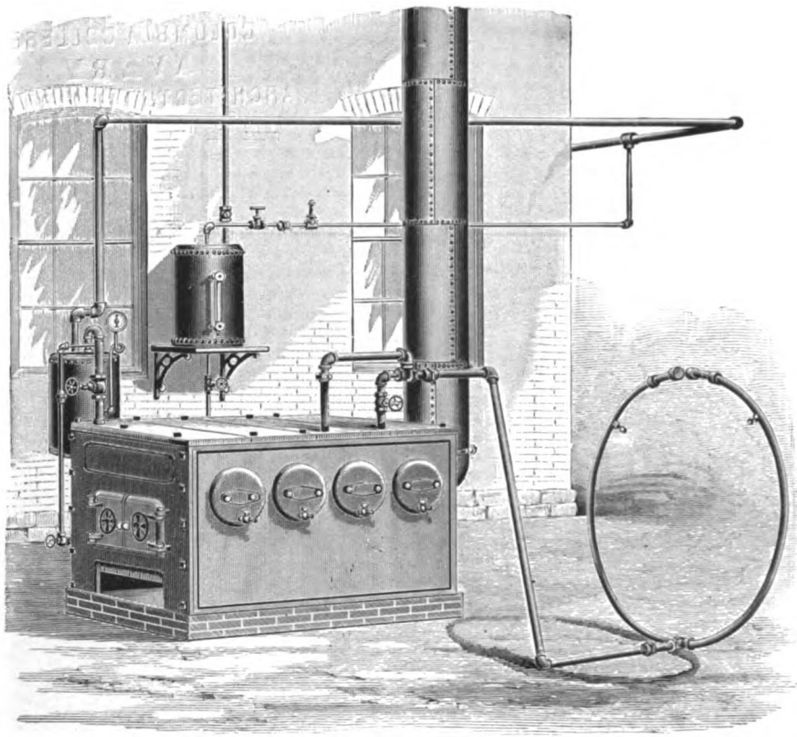


FIG. 3002.

A very complete arrangement for putting on new tires or taking off old ones, without removing wheels from under the engines. Will do all the work connected with tire heating, setting, removing, shimmering and replacing. With this apparatus and system of doing the work, less than one-tenth of the time is consumed, and the paint on the wheel centres is not injured.

PRICE, $350.00.

NEW APPLICATION OF TIRE HEATER.

This tire-heating apparatus is proving itself to be a very valuable and economical appliance for locomotive and other repair shops, where a quick and cheap heat is needed to straighten iron and steel boilers, crown sheets, tube sheets, smoke boxes, extension fronts, tanks, etc., where engines have been in collision, or crown and tube sheets sprung, from burning or other causes. The fact that the gas for heating is so cheaply and easily generated, and safely handled, and can be conducted in ordinary gas piping of any size from ½ inch to 1¼ inches, within a reasonable distance of the generator, makes it the most convenient means for getting a quick heat in any place which would be inaccessible to the ordinary charcoal pan and bellows.

GAS TIRE-HEATING MACHINE.

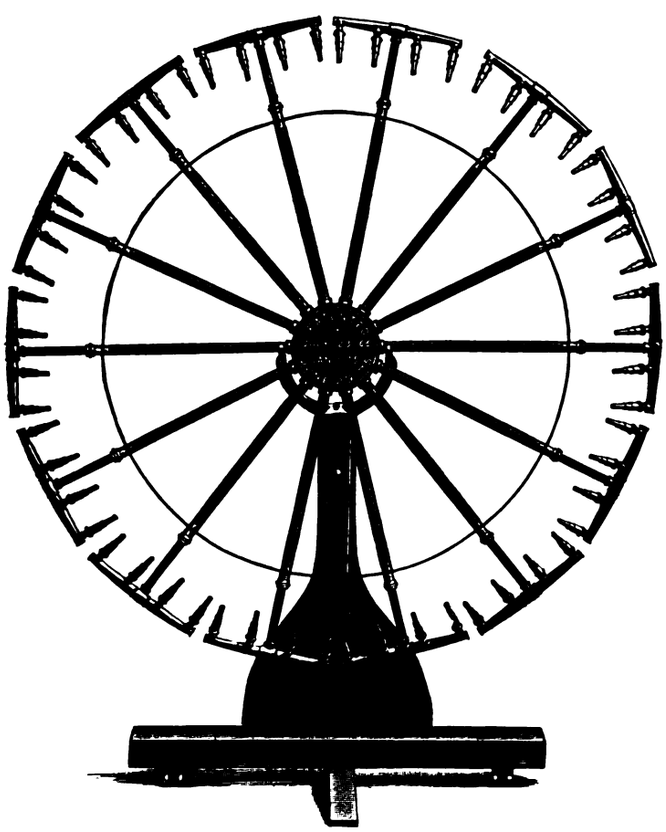


FIG. 3003.

DIRECTIONS FOR SETTING UP AND WORKING.

Take the gas from an ordinary 2 inch gas pipe, and wind from a half inch pipe from the blower; connect the two ends to two pieces of rubber hose about seven feet long, of sizes to correspond with the gas and blower pipes; then connect the two ends of the rubber hose to a Y-shaped coupling, which is connected to the hub of the tire heater. Place the tire heater in close proximity to the tire to be heated, adjust the gas burners so the ends will be within one-half inch of the outer surface of the tire; turn on the gas full force, light one of the burners, and the blaze will be instantly communicated to the others; then turn on the wind about half force—if the blaze is too large, regulate it from the blower pipe by reducing it down to an intense blue—heat for ten or fifteen minutes, and the tire will be ready to operate on.

Where gas cannot be obtained we can furnish a machine to make it from gasolene.

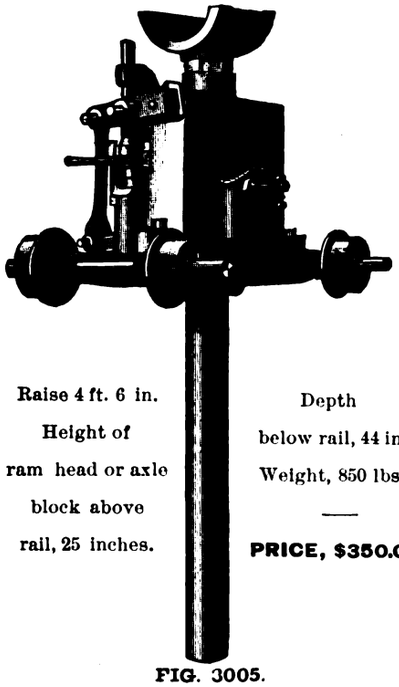
WEIGHT, 140 LBS. **PRICE, $200.00.**

Tight tires have been removed in five minutes' heating, and wheels under the locomotive shimmed in thirty minutes without removing the tire, consuming only seven feet of gas per minute, and a full set of tires, 3 x 6, has been put on in one hour and a half by one man alone. It is durable, requires no water to cool the tire, does not injure the paint, and can be adjusted to wheels varying three feet in size in two minutes.

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VREELAND'S TRANSFER JACK.



Raise 4 ft. 6 in.
Height of
ram head or axle
block above
rail, 25 inches.

Depth
below rail, 44 ins.
Weight, 850 lbs.

PRICE, $350.00.

FIG. 3005.

Attention is called to this very simple, cheap and quick device for removing from under locomotives either the drivers or trucks, and replacing the same, which has recently been much improved in design, whereby greater convenience of working and speed has been obtained.

The pump now has double piston, which by the turning of a clutch varies the speed.

FARRINGTON'S DRIVING-WHEEL JACK.

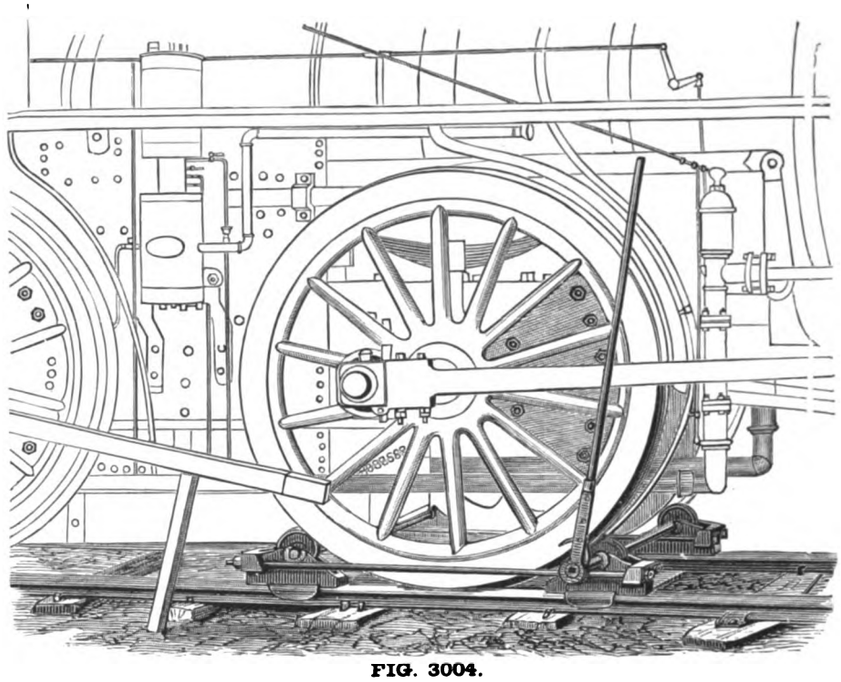


FIG. 3004.

For raising and revolving the driving wheels of locomotives for the adjusting of eccentrics and valves.

Weight, 380 lbs. Weight, boxing, 100 lbs.

PRICE, FIG. 3004, $100.00.

All railroad men recognize the necessity for the occasional removal of these wheels for examination of bearings and repairs, but have been prevented from doing so by the lack of a tool which was safe, expeditious, and at the same time not too cumbersome and expensive.

The advantages claimed for this invention are that the engine is not disturbed from its regular height. There is no jacking up first one end of the engine and then the other until the drivers will roll out under the tail piece. There is no obstructing the work underneath and the floor around by girders and blocking. There are neither cumbersome and expensive drop tables nor large steam hoists, and *no floor space is required* for the tool.

A reference to the cut, Fig. 3005, shows that the working part of this device is a specially designed Hydraulic Jack, mounted on a track which crosses the regular pit at right angles, as shown below. All working parts of this jack are designed so that they can be gotten at easily without disturbing any other parts. The top of the ram has a semi-cylindrical head in which the axle rests and in which it may be revolved so that it can be dropped on a track running at any angle with the pit.

In operating, the engine is run over the pit until the axle or truck to be removed is over the jack track ; the jack is then run under the locomotive and pumped up until the weight is taken up and is then moved sideways, when the wheels are lowered until they clear the frame when the jack is moved sideways, and when as far as desired is pumped up and the track replaced under them again, and jack ram lowered until the head clears, when they can be rolled away. Three men only are required to work it, one in the pit and one at each wheel.

When it is desired to remove all of the wheels a "billy" is placed at each end of the frame, and on these the boiler may be run to another track or shop if desired.

Four pairs of drivers have been replaced under a consolidation engine by a gang of five men in 38 minutes, and it is a common occurrence to run an engine into the shop or round house in the morning after her regular trip, and drop a pair of drivers, refit one or more new boxes and send her out on the afternoon trip without dropping the fire, and thus saving expense and time of knocking out and rebuilding it.

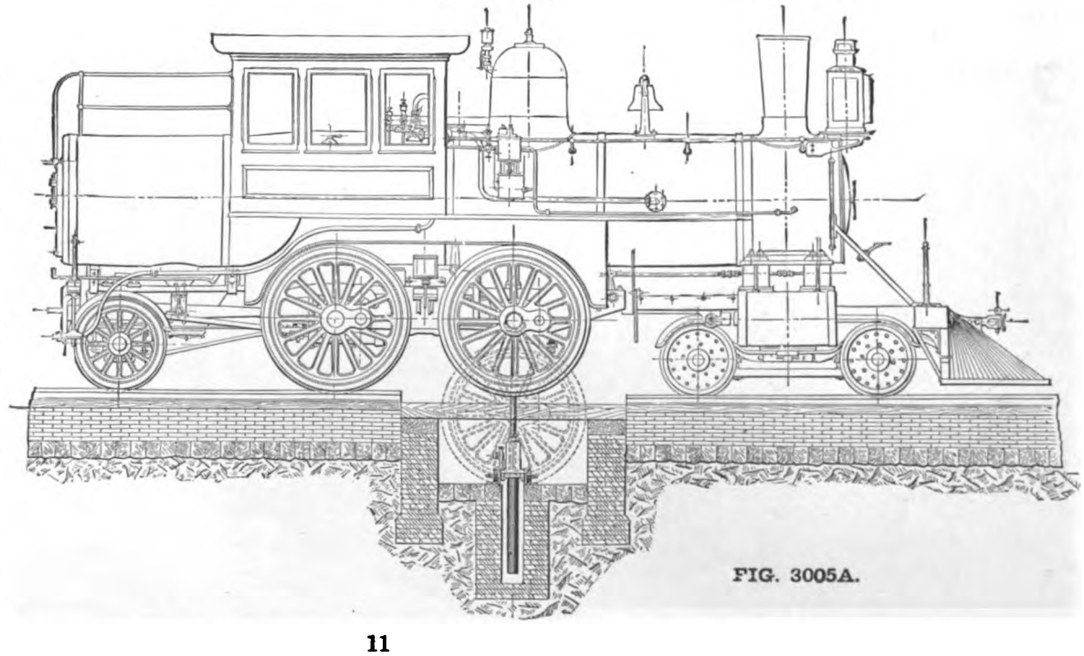


FIG. 3005A.

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ELEVATING HYDRAULIC CRANK PIN AND SMALL WHEEL PRESS.

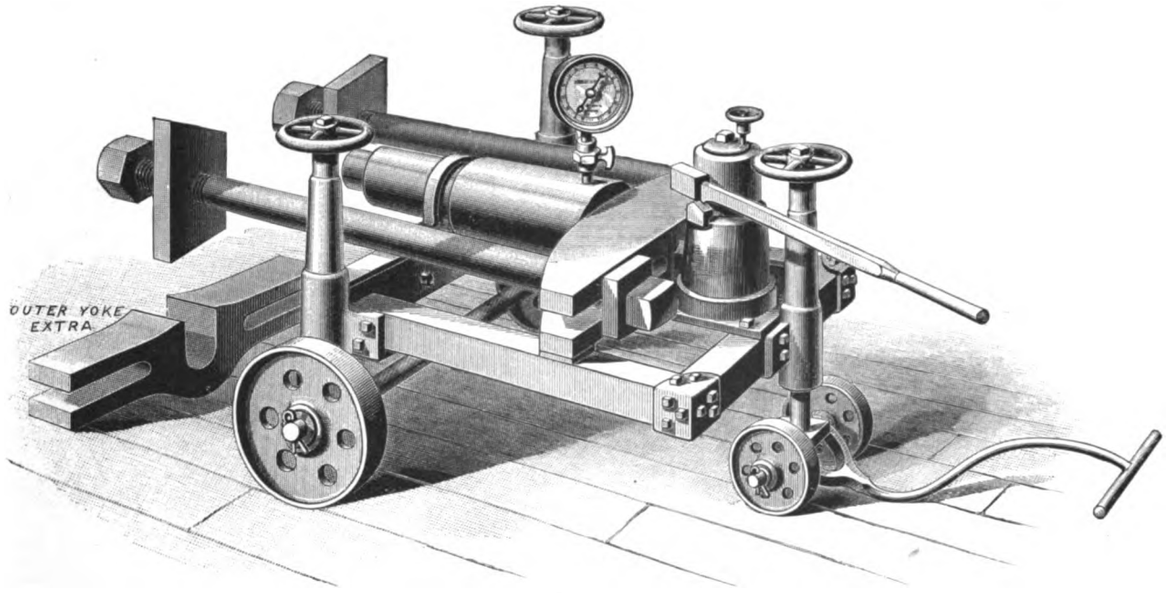


FIG. 3006.

This Horizontal Hydraulic Press is for pressing in crank pins of locomotives and engines, or for removing the same, also for pressing on and off small car wheels.

It is hung upon three screws mounted on large wheels, stands about 21 inches from the ground to the centre of ram, and has a vertical adjustment from that to about 33 inches. This will accommodate it to any unevenness of ground or varying heights of work without blocking, etc.

It has two pumps, one small and one large; both work by the same lever at the same time, and by one man. When speed is required both are used, giving a movement to the ram of $^1/_6$ of an inch per stroke, and a pressure of about 10 tons for 100 ton press. When the full capacity is required, the large pump is opened by means of the wheel on top of head and only the small one used. To return the ram after pressing, the valve is opened by depressing the lever (same as in any ordinary hydraulic jack); it will then return itself, being forced back by means of a heavy spiral spring within the cylinder, thus saving much time and labor in prying it back, as was formerly done. The component parts are made of the following materials: forged steel cylinder, ram, side rods and yoke; wrought iron washers, and elevating screws which work in steel nuts, steel pumps with hardened steel pistons which come in contact with packing only, thus reducing the chances of wear or damage to that most vital part of all hydraulic appliances. It is built with the utmost exactness and care in every detail, with sufficient strength to withstand the strain, but without superfluous material to increase the weight unnecessarily. It is acknowledged by all who use them to be by far the best machine in the market for the purpose.

Size in tons.	Height from ground to centre of ram.	Adjustable up to	Movement of ram.	Weight.	Prices without gauge and attachment.	Prices with gauge and attachment.	For extra length of rods and yoke, add
100	21 in.	33 in.	12 in.	1,800 lbs.	$435.00	$475.00	$100.00
125	21 "	33 "	12 "	1,900 "	460.00	500.00	125.00
150	21 "	33 "	12 "	2,000 "	510.00	550.00	160.00
200	22 "	34 "	12 "	2,200 "	585.00	625.00	200.00

When the press is to be used for wheels, an additional yoke and extra long rods are required. For price, see above.
Standard distance between rods for crank pin, 29 inches.
Standard distance between rods for wheels, 36 inches.
For any variation from this, write for price.
Larger sizes made to order.
In ordering, please state distance required between head of ram and the inside of the washers or yoke.

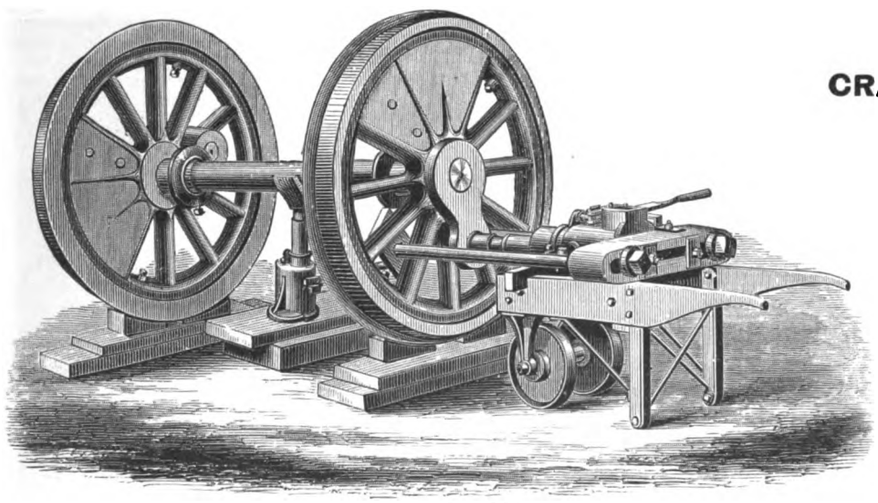


FIG. 3007.

CRANK PIN JACK.

In this style of Crank Pin Press an ordinary Jack of 60 or 90 tons is used.

	Without truck or iron work.	All complete.
60 tons lift, 12 inches.....	$275.00.....	$355.00
90 " " " "	375.00.....	475.00

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PLAIN CRANK PIN PRESS.

This Press is designed for forcing crank pins into locomotive driving wheels, forcing on and off of balance wheels, crank disks, pulleys, gears, drums, etc.

The operator, when using it, stands close to the work and gauge. To a projection on the ram a chain is attached for easily forcing the ram back into the cylinder. The pump valves are large and fall into their seats, requiring no rush of water to seat them, and all parts are made so that they can be easily examined or repaired.

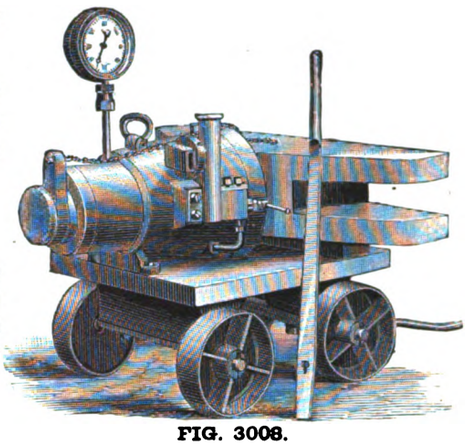


FIG. 3008.

PRICES.

60	ton	Press,	12	inch	movement,	complete	as shown.	Weight, about	950 lbs.....$265.00
100	"	"	"	"	"	"	"	1,250 "	350.00
125	"	"	"	"	"	"	"	1,600 "	400.00
150	"	"	"	"	"	"	"	2,200 "	475.00

As working conditions vary so much, rods are not included, and are made to special order.

CRANK PIN PRESS WITH ADJUSTING SCREWS.

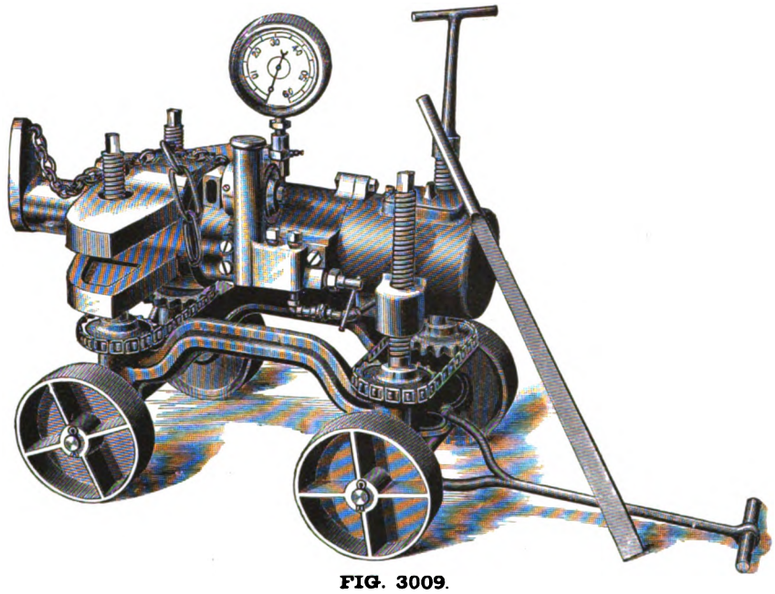


FIG. 3009.

In this form of Press the truck is all iron, and the beam is at the end nearest the work; it also has screws for regulating the height of the ram to suit the position of the pin. When pressing a pin to place, it has been found in some cases that the jack was lifted entirely off the floor by the strain of forcing the pin to its place. When the faces of the ram and the pin do not coincide exactly, the tendency is, when the heavy beam is at some distance from the work, to force the pin slightly out of true. It was to avoid this that this style was devised. We have retained in this jack the pump which proved so satisfactory in our other styles, placing it directly on the cylinder, and directly behind the beam, so that the operator can conveniently watch the work—the cylinder being made in one piece with cross beam, in order to secure lightness. The chain shown attached to the ram is for pulling the ram back into the cylinder, without having to run it up against some heavy piece of machinery and using a crowbar. We have attached to the gauge one of our improved safety couplings, so that the shock caused by sudden releasing of pressure lessens liability of injury. The pump valves are large, and fall into their seats, requiring no rush of water to seat them. The bonnets are fitted metal to metal, requiring no packings, and all parts are made so that they can be easily examined or replaced.

PRICES.

60	ton,	12	inch	movement,	complete,	as shown.	Weight, about	750 lbs.....	price, $325.00
100	"	"	"	"	"	"	"	900 "	" 390.00
125	"	"	"	"	"	"	"	1,150 "	" 450.00
150	"	"	"	"	"	"	"	1,450 "	" 525.00

If wanted without adjusting screws, price is $25 less.

The length of beam on the 60 ton is 28 inches; 100 ton, 32 inches; 125 ton, 34 inches; 150 ton, 36 inches.

The rods, chucks and pin are not included in the price of the machine, as the requirements for these are so variable.

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CRANK PIN MACHINE.

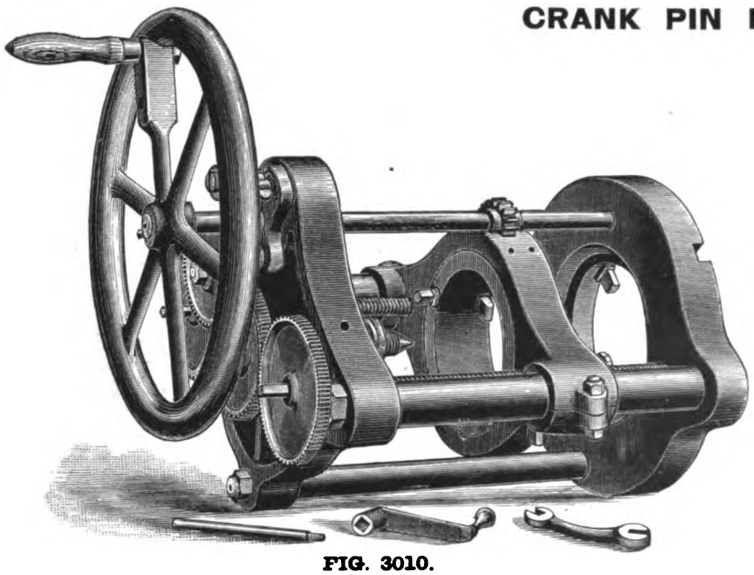


FIG. 3010.

The tools are easy of access, can be seen, and are readily adjusted. The wear can be taken up. It is light in weight and easy to handle, but strong and powerful. It will quickly and accurately true up crank pins, taking off that part of the pin that is eccentric only, and leave the fillets at the corners. It will feed either way and fit any size pin. It will go over the collar of a consolidated engine pin, and for very small pins a collar is slipped into the circular cutter head and tool fastened to it, so it will not project far enough to spring. The end of the machine next to the driver contains a 4-jawed scroll chuck, with thin jaws that centre that end of the machine. At the opposite end there is a centre that slides into the centre of the pin. The machine is then mounted by the original centres, and is clamped in position by bolts passing through the spokes of the driver. The annular cutter head containing the tools is driven by a small pinion, hand wheel and shaft. From this shaft, by gearing, we get an automatic feed either way. The carriage containing the cutter head is given an even, smooth travel by two feed screws.

PRICE, $200.00.

PORTABLE WRIST PIN MACHINE.

This machine is portable, and consists of two side castings, or "housings," held together by two parallel rods, ground true. These rods serve as guides, on which the turning device slides. Between the two guide rods, a screw is placed, as near as possible to the work, and this screw, being turned by gearing on the end of the crank shaft, becomes an automatic feed, which will operate in either direction; or, for convenience in finishing out the fillets at either end of the wrist pin, this feed can be thrown out, and the device worked by hand.

The sliding arrangement, which carries the annular cutter head, or tool holder, is composed of two parts, held firmly together by four steel collar bolts, the parting line being exactly in line with the guide rod and feed screw, and all together are on the centre line of the machine.

The cutter head, or tool holder, is of steel, and its division allows it to be adjusted around the wrist pin to be turned. Gear teeth, cut out of a portion of its circumference, engage with others, operated by the crank shaft.

In the housings, centres are placed to hold the cross head to be operated on. These centres are in line with the main guide rod, and exactly central to the tool holder.

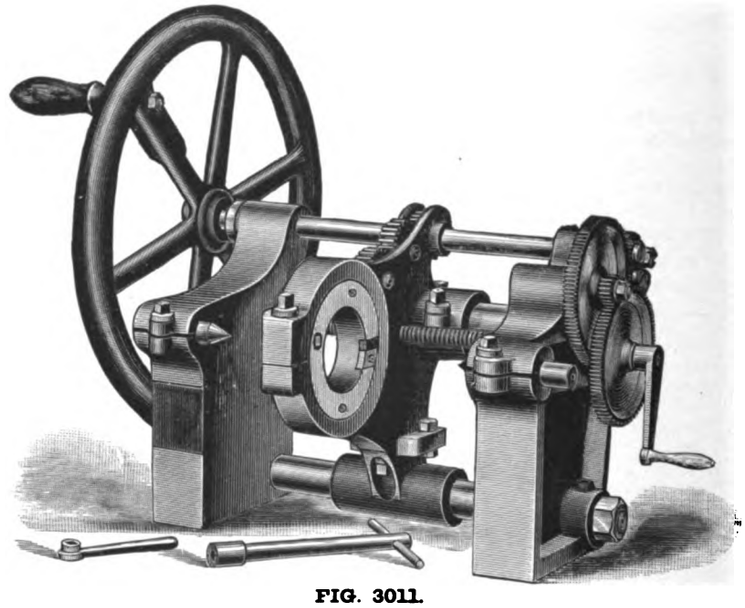


FIG. 3011.

The tools are inserted in the sides of the tool holder, and are held in place by screws fitted into holes, countersunk for manipulation by a socket wrench, and can be readily taken out to grind.

In planning this machine, special attention has been directed toward securing facility of operation in the limited space available; and so well has this end been accomplished, that it is readily manipulated and handled by the ordinary workman. Special care should be taken in laying out the cross heads to be operated on. See that centre marks of sufficient depth are made in the end opposite the intended centre of the wrist pin. Then place the cutter head, or tool holder, around the wrist pin, with tools in, set back. Place the cross head in the machine, on the centres; adjust the sliding frame on the guide rods, and the work and machine are ready.

These machines are also built for stationary use in shops; and those of the stationary type, being driven by power, are adapted to a great range of work.

The machine shown in the accompanying cut is of a size intended for general use in locomotive shops, either on new work, or for truing oval or cut wrist pins.

PRICE, $150.00.

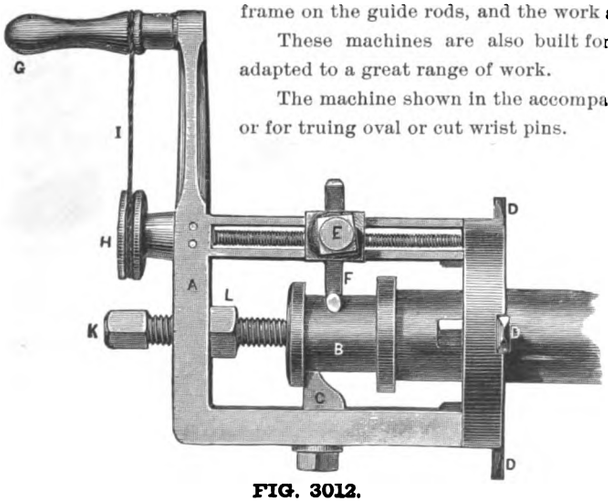


FIG. 3012.

CRANK PIN LATHE.

For re-turning locomotive crank pins, railroad and horse-car axles.

No necessity whatever for removing wheels.

With this lathe one man, in seven hours, can turn a full set of locomotive pins, where it would take three men three days to remove them, turn in a lathe and replace them.

PRICES.

No. 1 Lathe for turning pins of 8-wheel locomotives, 40 tons and under, $110.00.

No. 2 Lathe for turning all sizes of locomotive crank pins, $150.00.

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QUARTERING MACHINE.

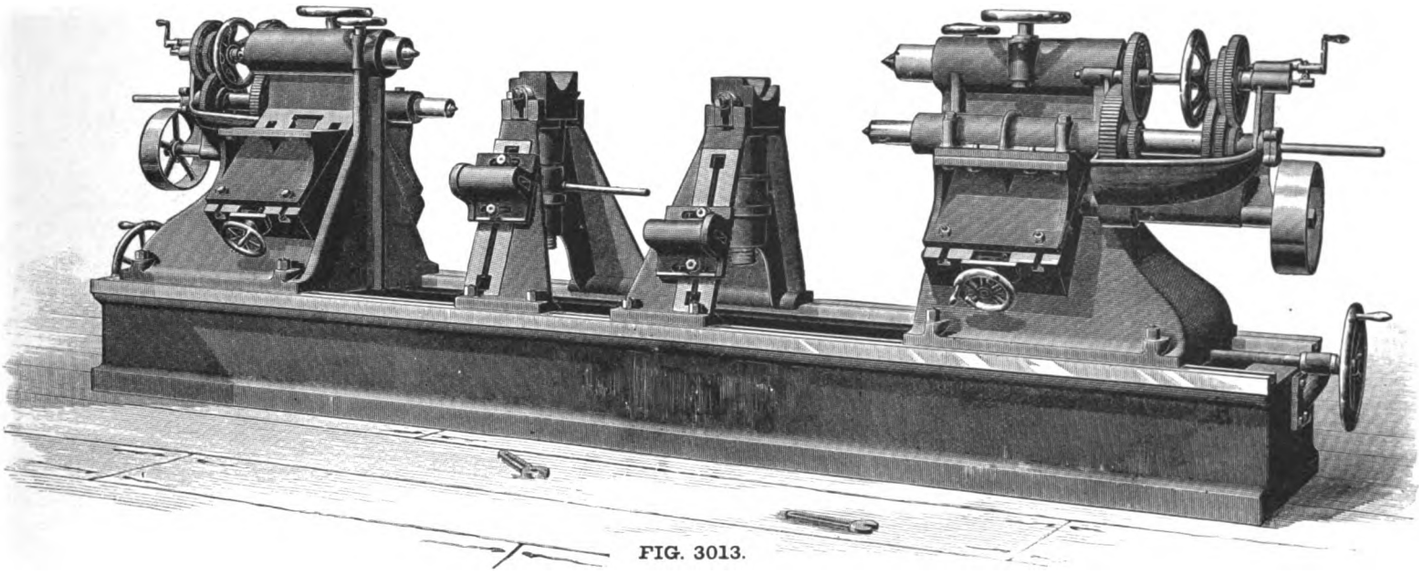


FIG. 3013.

FOR QUARTERING AND BORING CRANK PIN HOLES OF LOCOMOTIVE DRIVING WHEELS.

This machine will quarter wheels ranging from 45 inches to 72 inches diameter, and for cranks ranging from 16 inches to 26 inches throw.

Both crank pin holes are bored at the same time ; the spindles are operated from the outside of the wheels and are driven separately. Each spindle has automatic feed operated by gearing with three changes.

The wheels are centred by the spindles, but not supported by them. They are supported on their axles by substantial steady rests, adjustable for height, and are also secured on the tread.

The spindles may be located on either side of the headstocks, adapting the machine for either right or left hand lead.

The machine is provided with a device for truing up crank pins in place.

The spindles are driven by belt from overhead countershaft. Idler pulleys are provided for taking up the slack of the belt.

The countershaft has three pulleys 24 inches diameter for a 3 inch belt.

Speeds of countershaft, 90 and 120 revolutions per minute.

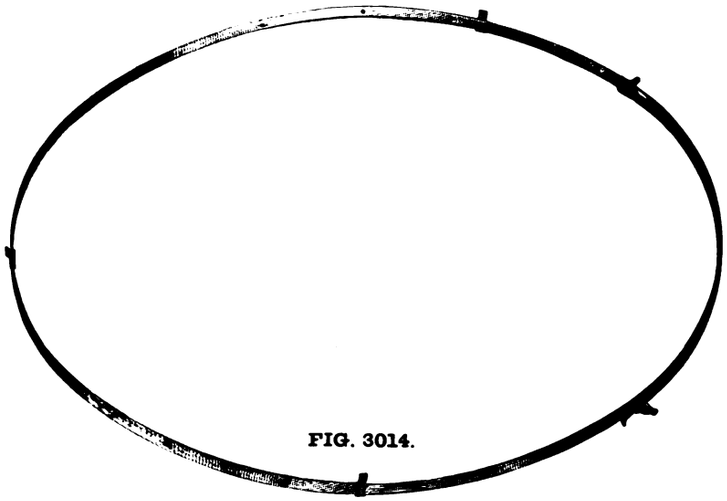


FIG. 3014.

CAR-WHEEL CIRCUMFERENCE MEASURE.

This is very valuable for sizing and pairing car wheels. It is accurately graduated, is plainly and properly figured, and has suitable handles for using. It is made of spring brass, one inch wide, No. 20 gauge, and has steel bearing strips to rest against the flange and tread of wheel. It is used to better advantage than calipers, as the exact circumference can be obtained, even though the wheel is not exactly round. It is made light and durable.

PRICE, $10.00.

ADJUSTABLE TIRE SHRINKAGE GAUGE.

By the use of this Gauge the boring of locomotive tires can be accurately done and with proper shrinkage to any desired allowance. It is so arranged that wear on the points is entirely overcome ; there is no wear on the measuring pieces, they being hardened and ground to micrometer measurements. It is made to conform to the Master Mechanics' Standard of Sizes and Shrinkages as adopted by them in June, 1886.

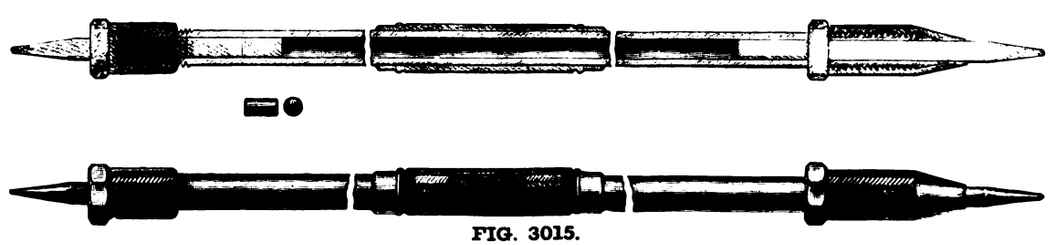


FIG. 3015.

PRICES.

For tires 30 in. to 50 in. inside diameter.....$40.00
For tires 50 in. to 70 in. inside diameter 50.00

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POND SINGLE AXLE LATHE.

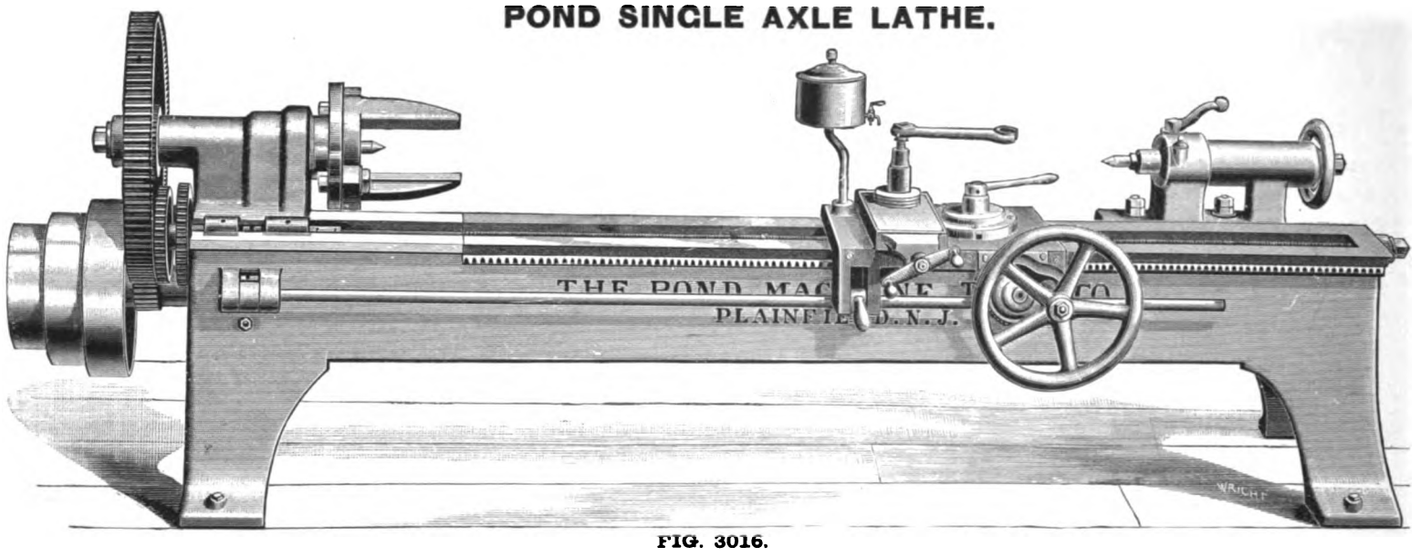


FIG. 3016.

For turning car and locomotive axles. Two pairs of tight and loose pulleys on countershaft give six speeds to spindle, and also enable the workmen to rough out and finish work at different speeds without shifting belt on driving cone.

The driving spindle is fitted with a self-adjusting equalizing carrier, and receives end pressure on an anti-friction collar.

Feeds, by steel screw placed as near line of cut as possible, are positive and self-acting, with proper changes from roughing to finishing, which can be made by the workman instantly without moving from tool carriage.

Tool carriage is quickly brought to desired position by hand wheel, cut steel rack and gearing. Tool holder allows adjustment of tool to proper cutting point.

The slides for tool carriage are raised above the slides for sliding head, by which means they are protected from chips and water, the tool rest shortened and stiffened, and the tool carriage allowed to pass the sliding head for convenience in changing axles.

Sliding head can be set to turn tapering. Water tank and wrenches furnished.

Countershaft has two sets of tight and loose pulleys; one set 30 inches and the other 20 inches diameter by 4 inches face, which should make 150 and 100 revolutions per minute, respectively. If desired, crane, as shown in Fig. 3017, can be furnished.

DOUBLE AXLE LATHE.

For turning both ends at same time of car and locomotive truck axles.

The driving head is fitted with a self-centering double driver by which the axle is revolved on dead centers steadily and without tendency to deflect it, insuring the greatest possible accuracy.

There are six turning speeds and three changes of feed, either of which can be changed instantly from roughing to finishing without shifting belt on driving cone or moving away from the tool carriages. The finest and medium feeds are suitable for steel and heavy cuts, the medium and coarsest for wrought iron or steel requiring only light cuts, thus nearly doubling the capacity of the lathe for the latter class of work as compared with a lathe having only two feeds, which must of necessity be slow enough for heavy cuts in steel. The feeds are positive by steel screws placed as near line of cut as possible.

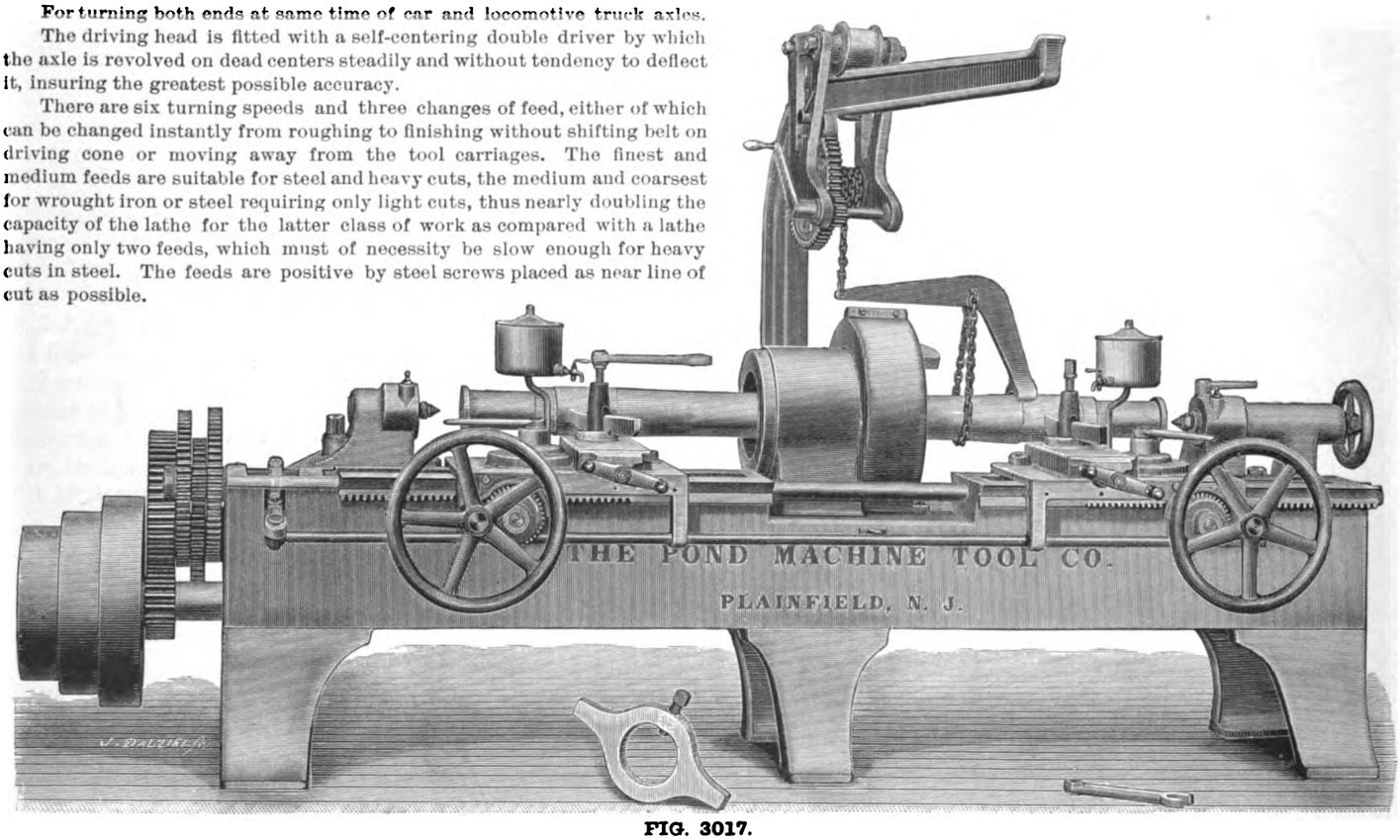


FIG. 3017.

Tool holders allow vertical adjustment of tools. Tool carriages are quickly brought to desired position by hand wheels, steel racks and gearing.

The front of the bed where tool carriages are fitted is higher than the back where sliding heads are secured, by which means the carriage slides are protected from chips and water, the tool rest shortened and stiffened, and the tool carriages allowed to pass the sliding heads for convenience in changing axles.

One man can easily, with crane provided, with only one hitch, take axle from floor to the lathe centers.

Countershaft with two sets of tight and loose pulleys, water tanks and wrenches furnished.

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DOUBLE AXLE LATHE.

This is a carefully designed tool for the heavy duty it is called upon to perform, and the carriage is broad to prevent wear on either end of the bed opposite to the journal on the axle.

It is driven by a 3 grade cone, powerfully geared, to carry two heavy cuts simultaneously.

The hole through the centre driver is 8 inches diameter.

The feed gears are coarse, both tailstocks are adjustable along the bed of the lathe, and in one the spindle is adjustable for entering and removing the axles. Size of pulleys on counter, 18 x 6 inches, and should make 100 revolutions per minute.

Weight, 8,000 lbs.

PRICE, COMPLETE, WITH CRANE, $.....

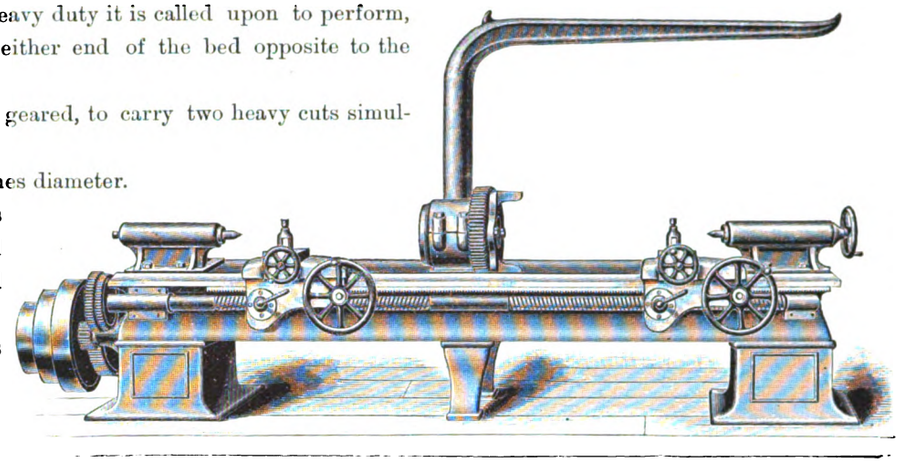


FIG. 3018.

POND PLAIN CAR WHEEL BORER, WITH CRANE.

FOR BORING WHEELS 42 INCHES DIAMETER ON TREAD.

This machine is designed to meet the requirements of locomotive and car builders for a tool to stand heavy and continuous work.

The machine is very powerful and is provided with every facility for boring the maximum number of wheels in a given time.

The driving cone has four steps for a 5 inch belt.

Feeds are of ample range.

The chuck is of substantial design, with *five* jaws arranged to be operated either universally or independently. It will receive wheels up to 42 inches diameter on tread, and can be quickly adjusted to smaller diameters. Provision is made for taking up the wear of the chuck spindle, and for maintaining it in line with boring spindle; also for resisting the thrust of the tool in cutting.

A power crane, which swings to centre of chuck, is provided for handling work.

Boring spindle has 26 inches travel, is counterweighted, and has rapid hand movement by means of a rack and pinion.

Counter has tight and loose pulleys 24 inches diameter by 5½ inches face, and should run 80 revolutions per minute. Counter for crane has 12 inches diameter pulleys for a 2 inch belt, and should run 300 revolutions per minute.

Wrenches and boring bar are furnished with the machine.

For illustration, with automatic hub-facing attachment, see next page.

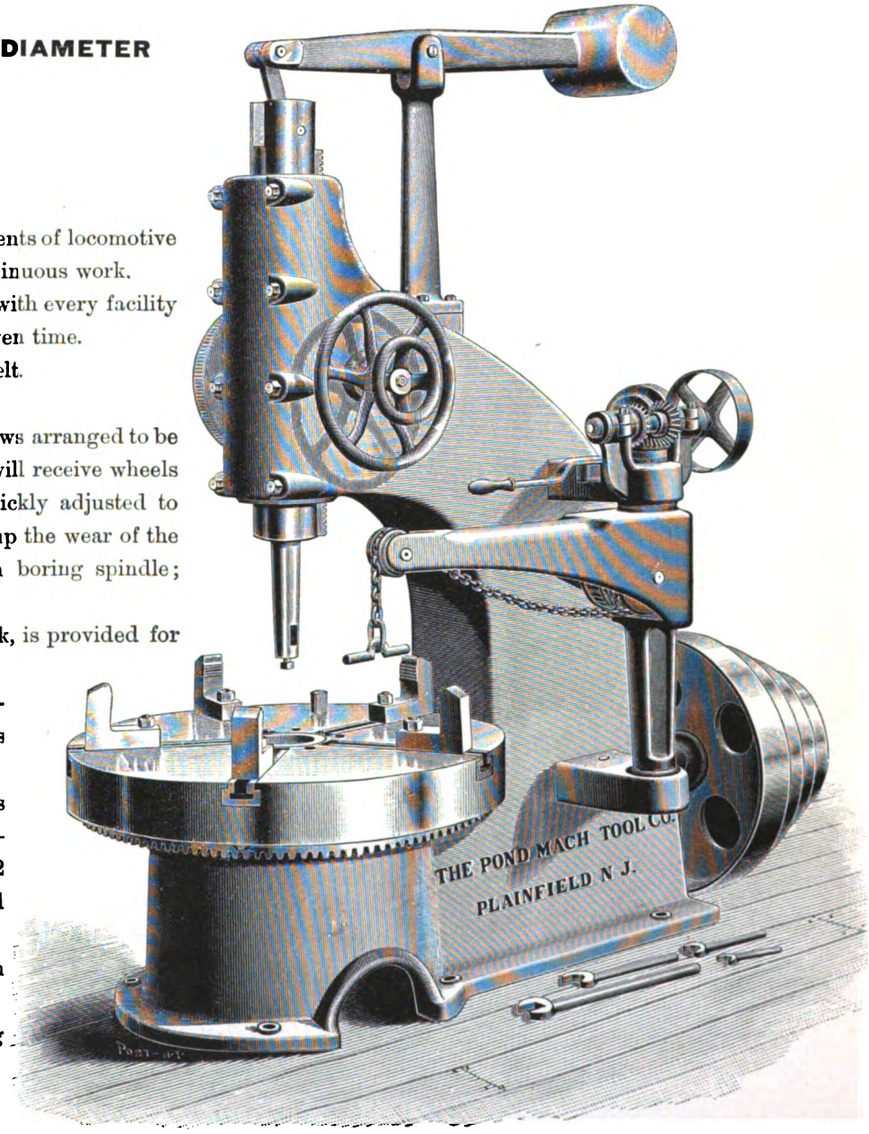


FIG. 3019.

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POND CAR-WHEEL BORER, WITH AUTOMATIC HUB FACER AND CRANE.

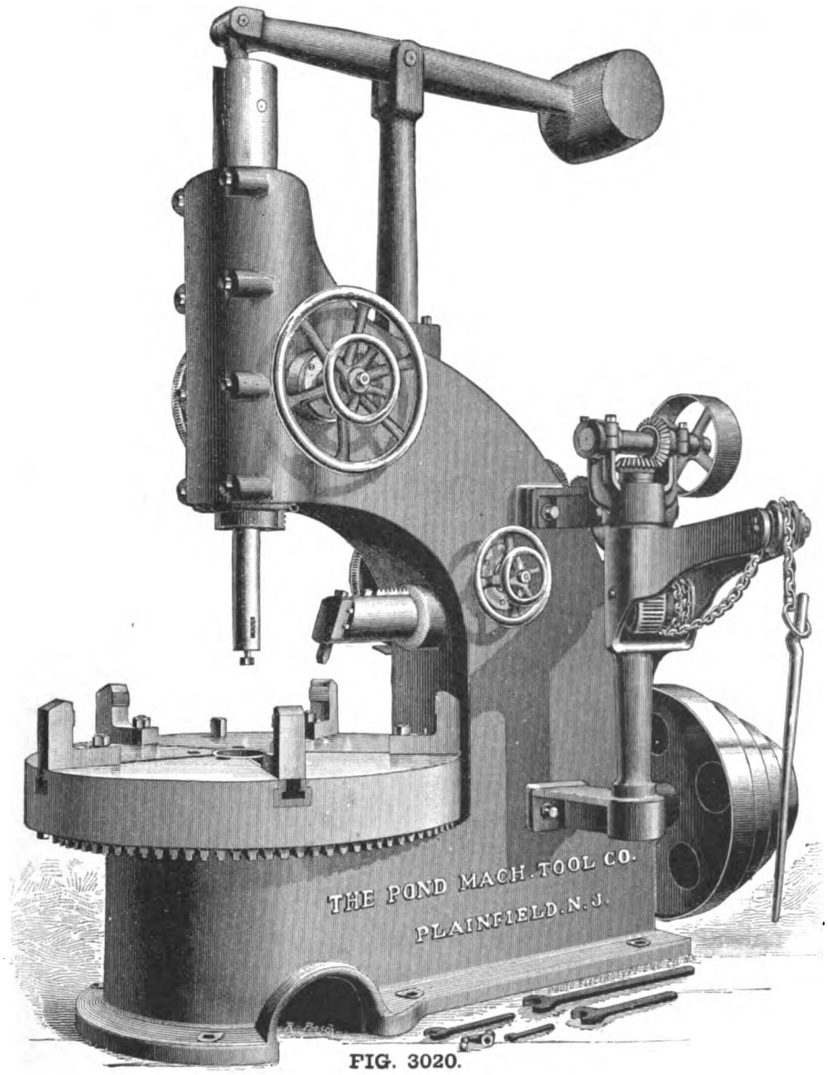


FIG. 3020.

FOR GENERAL DESCRIPTION, SEE PAGE 17, FIG. 3019.

DESCRIPTION, FIG. 3021—FORTY-EIGHT INCH HYDROSTATIC WHEEL PRESS.

This machine will take in wheels up to 44 inches diameter on tread.

A double action pump is furnished, giving a quick motion to the ram up to 25 tons, and conversion to single action can be instantly made for the higher pressures without stopping the pump.

Ram is 10 inches in diameter.

A special feature of this machine is, that the weight of the movable tailstock is entirely removed from either of the tension bars (which are the usual means of support), and is sustained on a solid runway, rendering it much more easy of adjustment.

Pressure gauge, leather packing moulds, hoist and all appliances are furnished.

Tight and loose pulleys on machine are 30 inches diameter, 6¼ inches face, and should make 110 revolutions per minute.

The machine is tested to 150 tons pressure.

Can be furnished to stand either parallel to or at right angles with the line shaft.

POND 48 INCH HYDROSTATIC WHEEL PRESS.

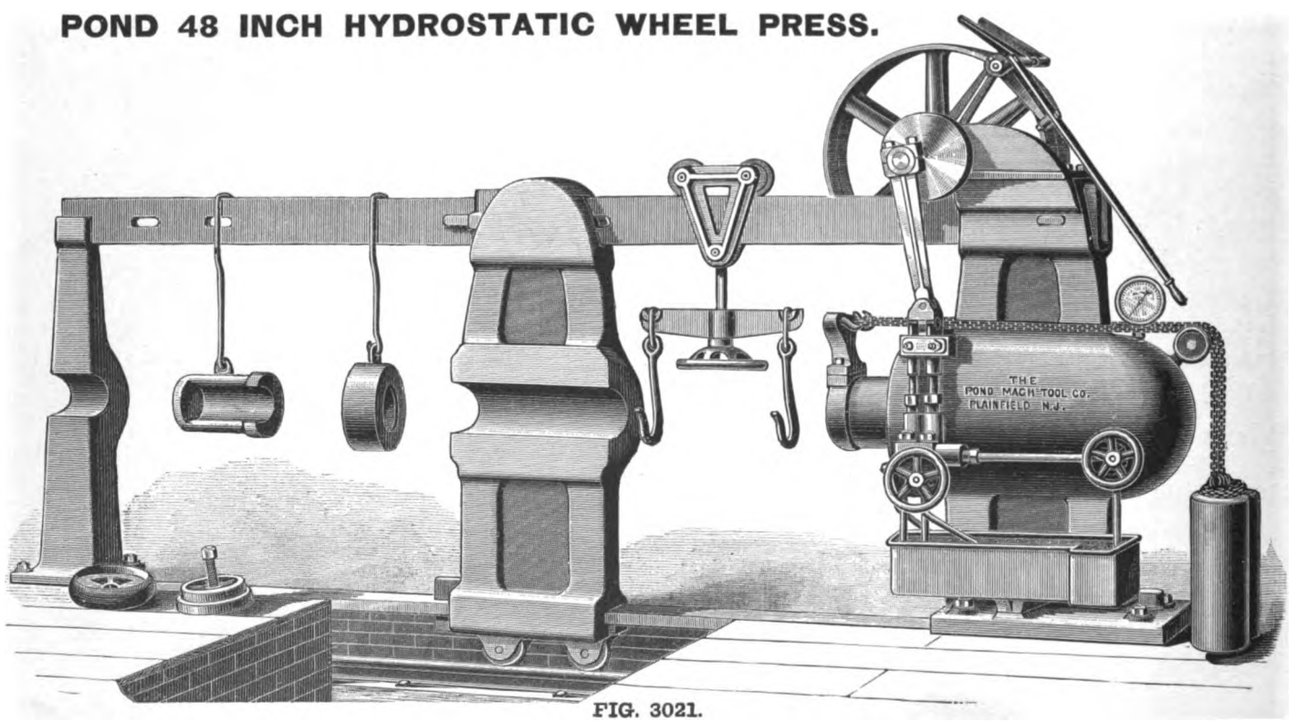


FIG. 3021.

FOR DESCRIPTION, SEE ABOVE.

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POND 84 INCH HYDROSTATIC WHEEL PRESS.

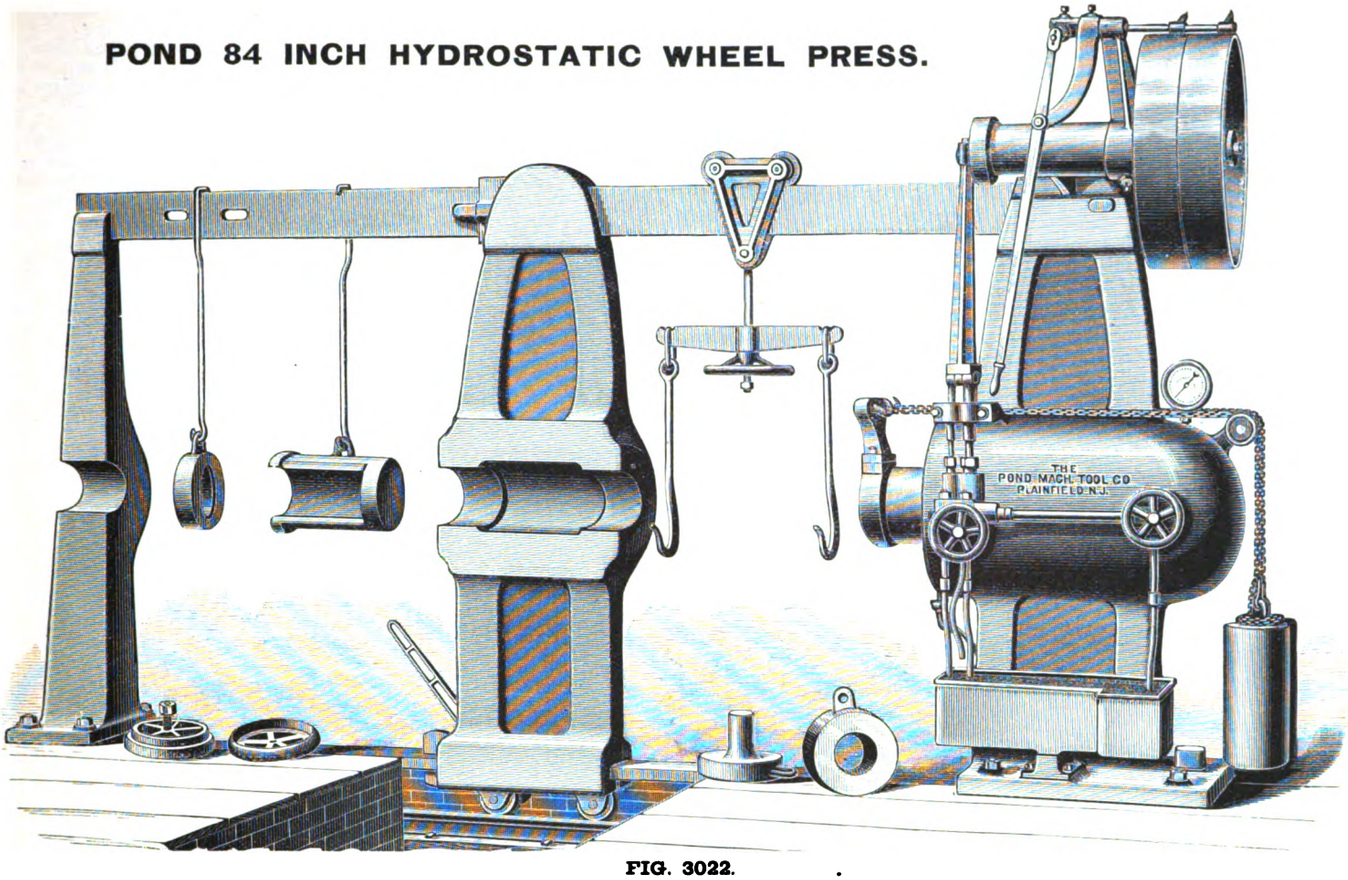


FIG. 3022.

This machine will take in driving wheels up to 80 inches diameter on tread.

A double action pump is furnished, giving a quick motion to the ram up to 25 tons, and conversion to single action can be instantly made for the higher pressures without stopping the pump.

Ram is 12 inches in diameter.

A special feature of this machine is, that the weight of the movable tailstock is entirely removed from either of the tension bars (which are the usual means of support), and is sustained on a solid runway. One of the two rolls in contact with the runway can be revolved by means of a ratchet lever, by the aid of which the adjustment of the tailstock is easily and quickly accomplished.

Pressure gauge, leather packing moulds, hoist and all appliances are furnished.

Tight and loose pulleys on machine are 36 inches diameter, 6¼ inches face, and should make 110 revolutions per minute.

The machine is tested to 200 tons pressure.

Can be furnished to stand either parallel to or at right angles with the line shaft.

SINGLE PLUNGER PUMP, CRANK SHAFT PARALLEL TO TENSION RODS.

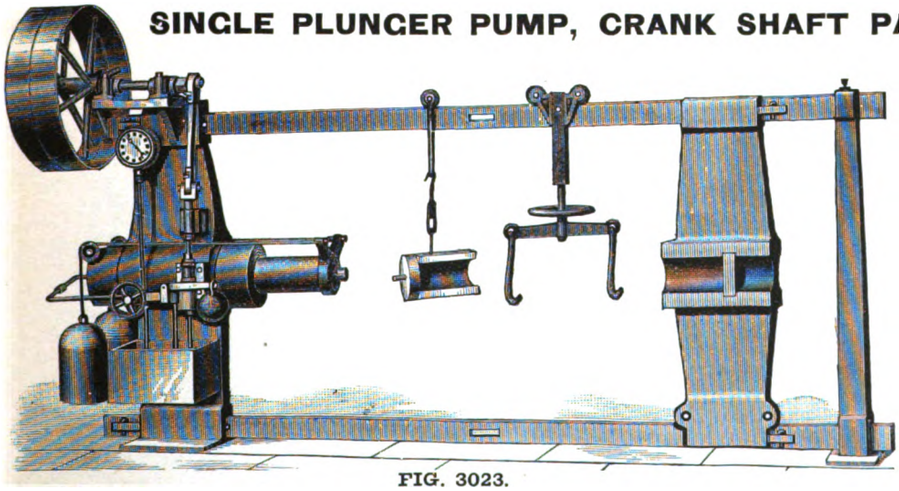


FIG. 3023.

In these Presses the abutment beam wheels roll on the lower tension bar, which can be supported underneath, if desired, leaving the axle or shaft carriers and their contents only to be supported by the upper bar. *The carrier hooks on both styles now have independent rollers and attachments.* The chuck and abutment beam act as distance gauges for the wheels when forcing on two at once. The chuck is attached to ram by central pin, and supporting roller with turn buckle attachment, and a removable block is furnished for forcing off the wheels. The pulleys are 30 x 4 inches in diameter, and should be run at 80 to 100 revolutions per minute.

The suction and pressure valves are both easy of access by separate bonnets situated on the top of pump casting. The pump pistons are packed with a compressive packing and screw gland, which is tight and works with no undue friction. Return weights, water tank and pressure gauge are furnished. All pumps have safety valves. THIS STYLE furnished unless otherwise specified.

Size car wheels.	Between bars.	Power in tons.	Movement of ram.	PRICE.	Size car wheels.	Between bars.	Power in tons.	Movement of ram.	PRICE.	Double Plunger Pump, additional, $75.00
30 in.	34 in.	60	15 in.	$.....	48 in.	52 in.	100 in.	18 in.	$	
36 "	40 "	100	15 "	.....	48 "	52 "	150 "	18 "	.....	
42 "	46 "	100	18 "	.....	60 "	64 "	150 "	18 "	.....	
42 "	46 "	150	18 "	.....	72 "	76 "	200 "	18 "	.....	

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HAND POWER HYDRAULIC WHEEL PRESS.

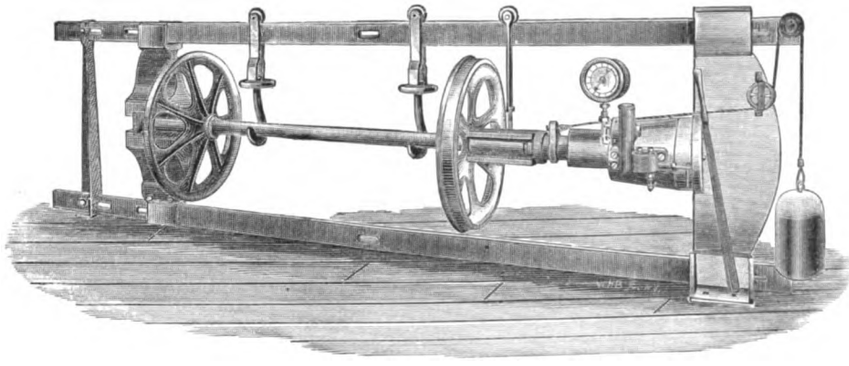


FIG. 3024.

This improved Press embraces many changes from those first made, and is now a very complete tool for use in street railroad shops, small railroad repair shops and engine shops for forcing in shafts, etc.

The lever works perpendicularly and at right angles to line of the Press, and convenient for operator to easily watch the work. The valves are large, perpendicular, and easy of access. The piston is entirely enclosed, thus preventing all grit or foreign material getting into the pump and cutting or preventing its working. The cylinder is made from crucible steel and has a good bearing on stationary beam. The movable beam runs on rollers upon the lower bar, which is planed. The moving beam is recessed so that blocks may be placed in it of sufficient thickness to act as a templet in forcing on car wheels, etc. A swinging chuck placed against the ram of jack acts as a templet for the other end of axle. The block can be also used when forcing a shaft into a wheel. The pull-back weight is suspended from upper bar and does not require any pit.

60 ton Press, complete, for 30 inch wheels, weighs about							1,900 lbs.,	net price,	$350.00
60	"	"	"	36	"	"	2,500 "	"	425.00
100	"	"	"	36	"	"	2,700 "	"	475.00
100	"	"	"	42	"	"	3,500 "	"	525.00

Larger sizes of Power Presses to order. A gauge will be placed on each Press unless otherwise ordered.

We make 60 ton Press for 30 inch wheels of special patterns for export when the heaviest pieces weigh not over 225 lbs., so that they may be carried by mules. It is known by us as the Mule Back pattern. Price, $425.

SMALL HAND POWER HYDRAULIC WHEEL PRESS.

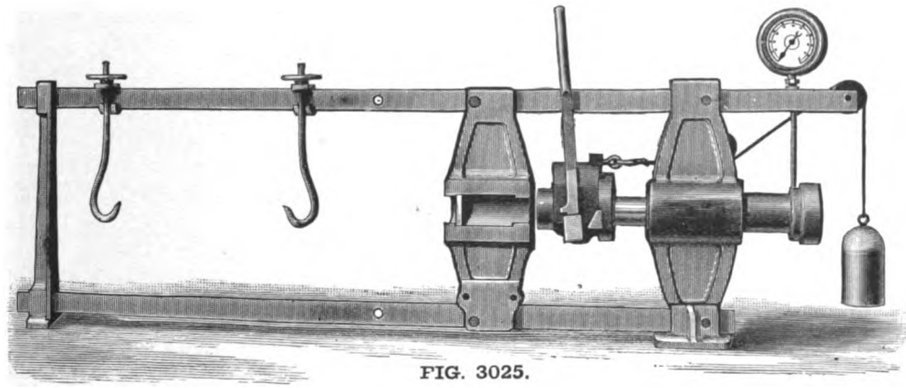


FIG. 3025.

This Press is for shop work and forcing on mining car wheels. A special form of horizontal plain jack is the operating part, the pressure being taken upon the head of the jack. Where desired, the post which supports the outer end of the upper rail will be made with a yoke, so that long shafts may be placed in the Press for forcing off pulleys or gears. The lever works in a vertical position, as shown in the cut, and the Press is reversed in action by simply bringing the lever socket against the lug, and the operator thus stands close to the work. The movable beam rests upon rollers which roll upon the lower bar, which is planed for that purpose. The moving beam is recessed so that blocks may be placed in it of sufficient thickness to act as a templet, or thrust, in placing on wheels. The pull-back weight is suspended from the upper bar, and does not require any pit. The gauge has one of our improved safety couplings, so that the shock, caused by sudden release of pressure, will be taken off of the gauge.

15 ton Press, complete, for 18 inch wheels,							weighs about	700 lbs.,	price, $200.00
30	"	"	"	24	"	"	"	1,700 "	" 275.00

POND STEEL-TIRED CAR-WHEEL TURNING LATHE.

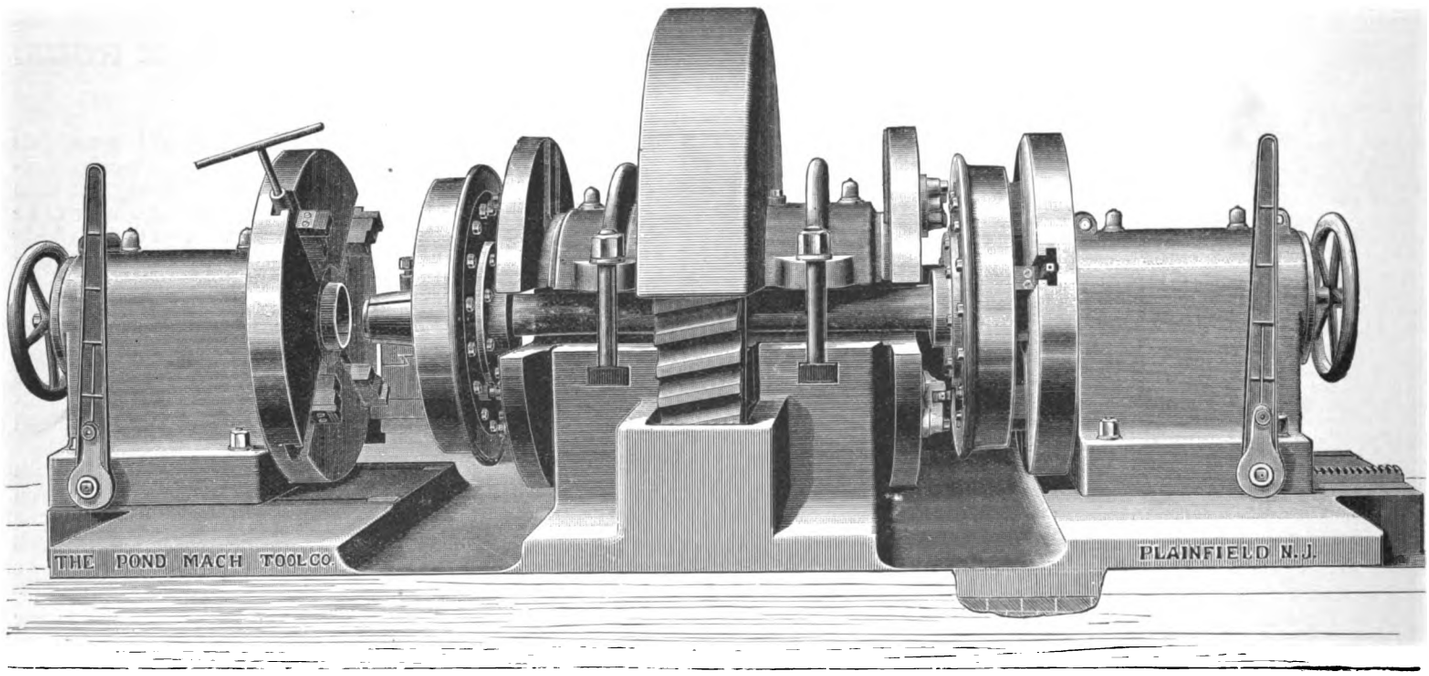


FIG. 3026.

FOR DESCRIPTION SEE NEXT PAGE.

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POND STEEL-TIRED CAR-WHEEL TURNING LATHE.—CONTINUED.

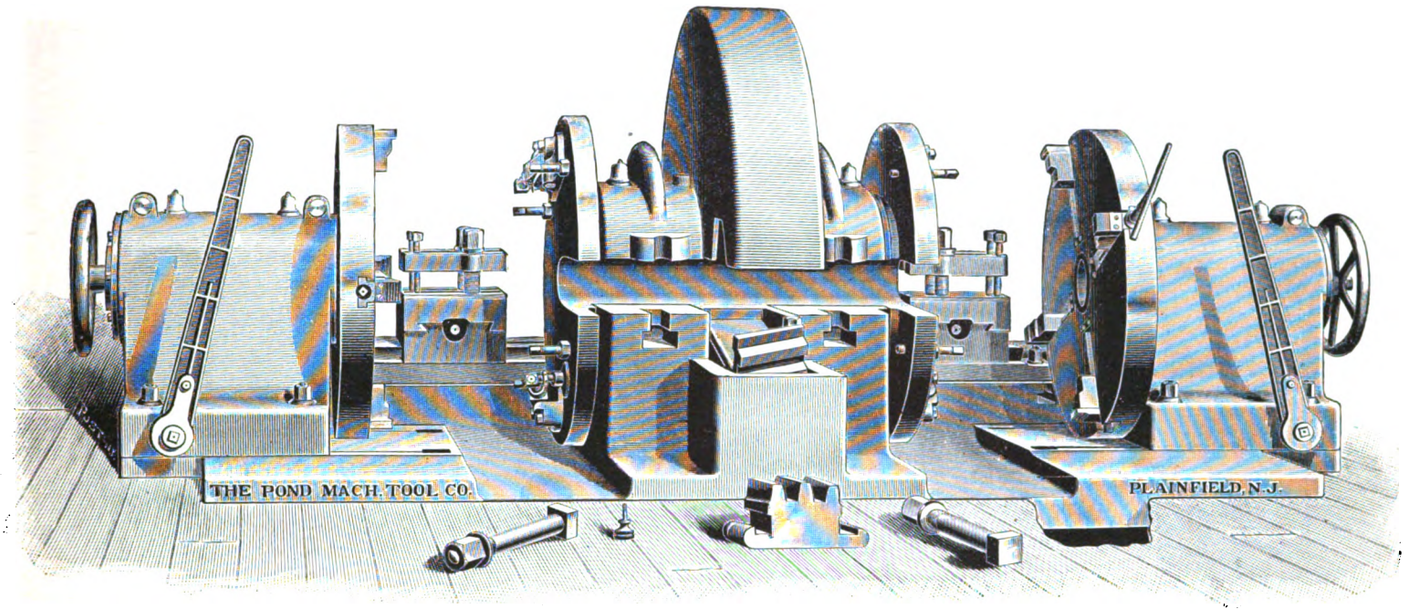


FIG. 3027.

CALIPERING AND PAIRING ATTACHMENT CAN BE FURNISHED IF DESIRED AS EXTRAS.

With the increased demand and application of steel-tired car wheels, the necessity of a special tool which will reduce to a minimum the great expense and time involved in turning the tires when worn presents itself.

The ordinary driving wheel or engine lathe in general use for this purpose is entirely unequal to the requirements, and has been one of the primary objections to the general use of steel-tired wheels. With a thorough knowledge of these requirements, the lathe illustrated herewith has been designed, and by its use a decrease in the time of turning tires is effected to the extent of increasing the amount of work done in a given time over 400 per cent.

The claims made for this tool are based upon no fine theories, but are the results of actual practice, and can be verified by tools in daily operation in many important railroad shops.

Combining the several essential features of compactness, power, ease of operating, strength and capacity for great quantity of work, finished in the most workmanlike manner, it has a superiority over all other tools for this class of work.

The driving mechanism, placed beneath the lathe, is perfectly protected from dirt and chips, and the possibility of injury to the workman is reduced to the minimum. A driving cone having four steps for a 5 inch belt, ranging from 28½ to 14 inches diameter, gives a sufficient variation of speed for the different sizes of wheels. From the cone the initial driving power is transmitted to the large gear shown in the centre by a special method, which is patented, and necessitates the use of only two pairs of spiral spur gears in such a manner that the power is multiplied in the enormous ratio of 1 to 250. This power is applied to the bottom side of the main central gear, and the upper portion being completely enclosed in a casing, the central feature of protection is complete. This arrangement not only allows abundant room for the workman and the handling of tools, work, etc., but permits the chipping out of hard spots to be done without stopping the lathe, a feature that will be appreciated by the latheman, as, to turn wheels in the shortest possible time, the lathe must be kept in constant motion, and this chipping should be done while the wheels are revolving. The face plates and journals are one casting, and the central driving gear is bolted to it, so that either is a simple piece to replace in case of accident, which is hardly to be looked for, as the teeth are 8 inches face by 1½ inches thick, and the pinion so placed that it engages four of these teeth all of the time.

As shown, the gap in the gear into which the wheels are rolled is filled when turning, the segment put in being the only piece that has to be removed to change wheels. Its shape is such that it locks the whole together as if it were one piece. Without help the latheman can easily take out and put this segment back in one half minute.

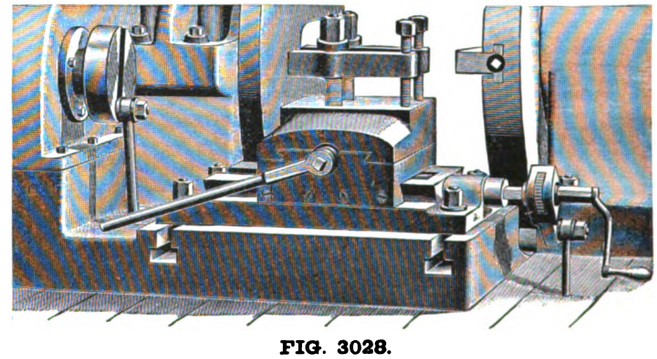


FIG. 3028.

The tool holders can be set to give any desired coning to the tread of the wheels, and are operated by hand or a positive power feed which moves either holder independently $\frac{1}{64}$ to ¼ inch per revolution.

The tailstocks are provided with patent journal supports, which are most simple in construction and effective in operation. By this method the ordinary delicate lathe centre is dispensed with, and the inner ends of tail spindles are bored conical sufficiently large to admit of segmental expanding sleeves, which are turned to fit the conical bore in the inner end of tail spindle, and bored to fit the axle journal.

In preparing to turn a pair of wheels, the tailstocks are moved back, by means of levers shown in the cut, far enough to admit the axle; the segmental expanding sleeves, described previously as fitting the bore in the tailstock spindles, are slipped on the journals; the segment of large driving gear being removed, the wheels are rolled into position and the segment replaced and locked; the tailstocks are moved forward, the taper bore in tail spindles receiving the taper segmental expanding sleeves, thus contracting them, causing them to slightly grip the axle journal and centre it in the lathe; the tailstocks are then secured to the bed plate by means of the bolts shown, and further compression and rigid adjustment of the segmental sleeves obtained by means of the hand wheels on the outer ends of the lathe, and an equalized lateral adjustment of the axle, to allow the engagement of the chuck jaws with the under side of the tire, is also obtained at the same time.

The tail spindles and the axle, when in position, are practically one piece, and with the tailstock chucks gripping the under side of the tire, the wheels driven by the patented dogs of the inner face plates, which form a solid piece with the centre driving gear, an absolutely rigid and solid adjustment is secured, which insures the wheels running true with the journals after turning, as any springing of the axle or crowding of the wheels out of truth sideways is an absolute impossibility, no matter how great the pressure on the tread or the flange required to keep the tool up to the cut. This arrangement permits the use of broad-faced tools equal in width to the tread of the wheel, and cuts very much heavier than is possible on any other lathe.

Wheels of 42 inches or smaller diameter can be turned without removing from the axle, and can be placed in the lathe, the dogs and tailstocks adjusted ready for turning in fifteen minutes without the use of crane, as the wheels are rolled to the centre, which is 23 inches above the floor. The patented driving dogs are of such construction that they need not be removed when changing wheels, and will drive without spring or chatter, which will be the result of pins, even if very large diameter are used projecting from the face plates in a line parallel with the axle, and which is so destructive to the edge and life of a cutting tool.

The difficulty experienced in other makes of lathes to hold the wheels to the capacity of the tool is here entirely overcome in the most effective manner, and the work of turning steel-tired wheels accomplished without vibration or chatter under the heaviest possible duty.

In design the lathe is symmetrical and attractive in outline, and combines in its construction patented improvements, the result of a practical knowledge of the requirements of such a machine, and fully meets all the claims made for it.

WEIGHT,.....POUNDS. PRICE, $.....

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CHILLED CAR WHEEL GRINDERS.

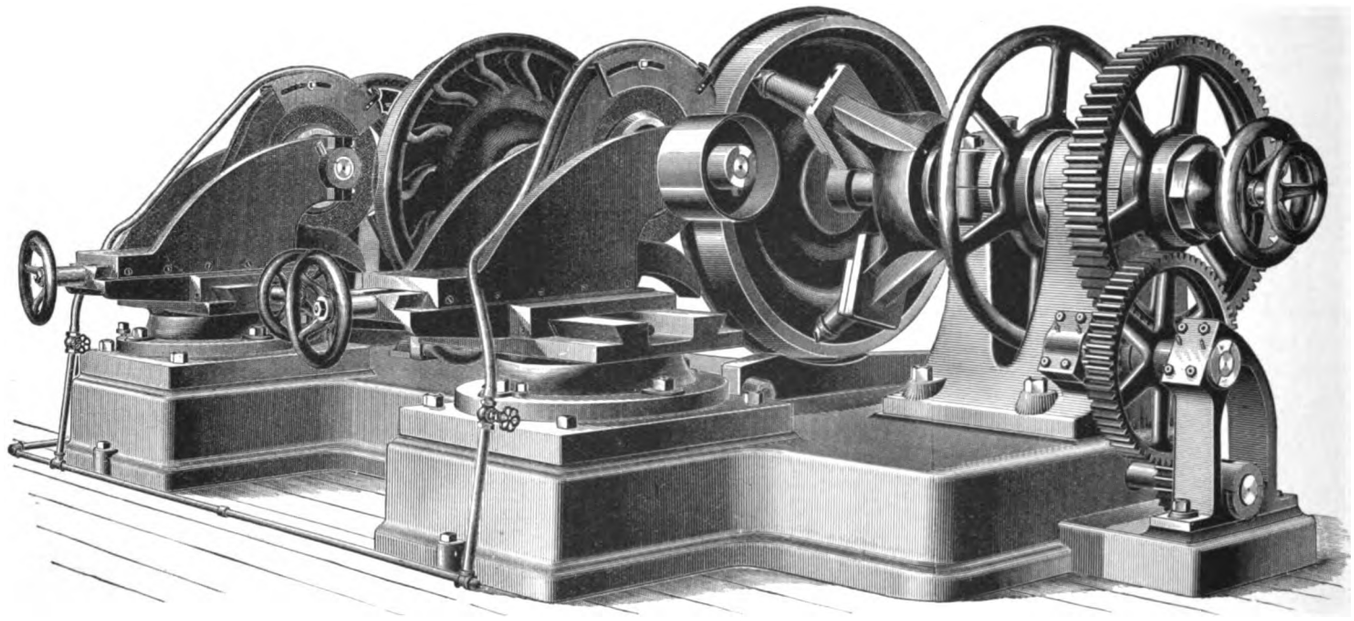


FIG. 3029. FRONT VIEW.

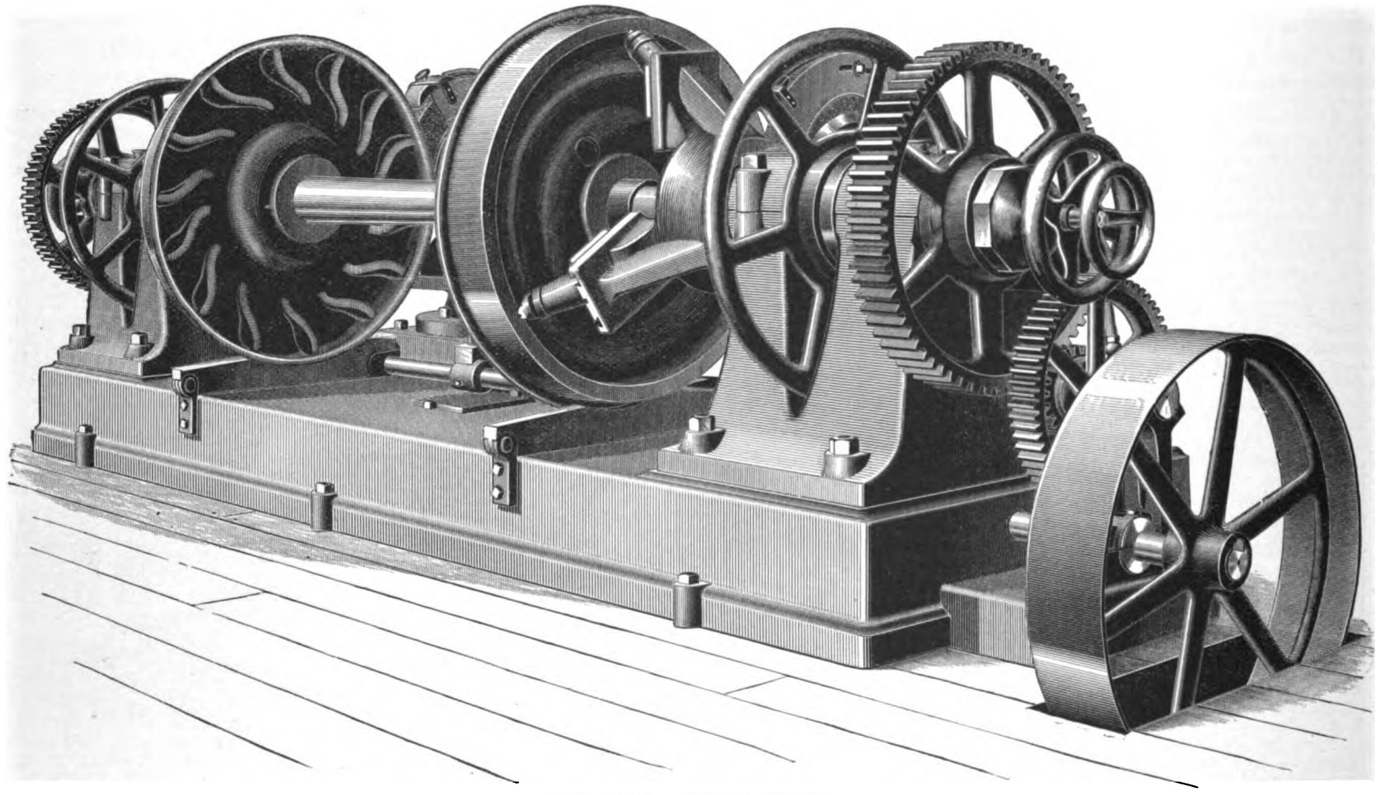


FIG. 3030. REAR VIEW.

The advantage of grinding chilled cast iron wheels, especially for passenger and locomotive service, has been satisfactorily demonstrated through several years of practice on the Pennsylvania and other railroads. Ground wheels, if made perfectly true, give smoother motion, and the life of the wheels, as well as the durability of the road bed, is considerably increased, while a slid wheel can be ground true and its usefulness restored at a very insignificant cost. Instances are on record where wheels which have been condemned for flat spots after having made only a few thousand miles have been ground, thereby bringing the total mileage above the average mileage of rough wheels, and where some wheels have been ground a second time, and have made three different mileages, which otherwise would have required three rough wheels under the same circumstances.

Out of every one hundred cast chilled iron wheels made there is hardly a single wheel that can be strictly called round, as all are more or less oval in shape. Such wheels, if placed in service, are more likely to receive flat spots than ground wheels, for the high parts of the wheel will become wadded between the brake shoes, and the wheels will slide on the rail. It is, therefore, economy to grind all wheels before they are placed in service, as well as old wheels which have become flat from sliding.

In order to successfully grind chilled wheels it is essential to use a machine that is strongly built in all its parts, so that vibration is reduced to a minimum. The abrading wheels must be firmly secured to prevent them from following the shape of the wheel and merely

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DESCRIPTION OF CAR WHEEL GRINDERS.—CONTINUED.

polishing the tread instead of making the wheel round. Facilities must be provided for changing wheels in the shortest possible time, and all kinds of wheels, whether mounted on axles with inside or outside journals, should be ground without boring holes in their plates. The machine must also be easily operated by one man, both when grinding and changing the wheels.

These machines will grind from six to eight pairs of wheels, or five to seven pairs of old wheels, perfectly true and round, every ten hours at a cost of 24 to 28 cents per wheel. This will be a saving for every old wheel ground equal to the difference between a new wheel and what the old wheel will bring as scrap, minus the cost of grinding, not taking into consideration that more mileage can be got from a ground wheel than from a rough wheel, everything being equal. In the above cost of grinding, labor, abrading wheels, oil, and wear of machinery are all taken into consideration.

The special features of this machine are as follows: it consists of a heavy bed plate located even with the floor, upon which two headstocks are firmly secured, one at each end of the plate. These heads are provided with triple spindles, one inside of the other, and the spindles are simultaneously revolved by a powerful gearing and a shaft running under the bed plate. The inside spindles carry the centers and support the wheels through the center of the axle. They are horizontally adjustable to any length of axle by the hand wheels at the back of the head. The second spindles carry the gear wheels, and impart the revolving motion to the inside as well as the outside spindles by means of keys. The outside spindle, which carries the clamping arrangements, is horizontally adjustable by the large hand wheels located in the middle of the heads. The clamping heads are provided with three arms having radially adjustable yielding contact points, which are forced against the wheels by the large hand wheels and take hold at the under side of the rims. The contact points are made of tool steel, and shaped in two edges and conform themselves to any irregularities in the shape of the wheels. On one side of the bed plate the abrading wheel posts are strongly secured. These posts have two slides for regulating the feed, and to the upper one the abrading wheels are so held in bearings that any yielding is impossible. A short track is located under the car wheels, and is provided with a cam arrangement, by means of which the car wheels and axles are lifted up to the center of the spindles and held there until secured, when the cams are lowered and the wheels will swing free of the rails. By this arrangement the man that operates the machine is enabled to exchange wheels in three or four minutes. An adjustable hood nearly surrounds the wheel and prevents the water from flying off. A centrifugal pump, piped and having a valve to regulate the flow of water upon the wheel, is attached to each machine, the water being taken from a tank located in the base of the machine, out of the way. The top of the bed of the machine slopes toward the center so that the water runs back into the base, to the tank, where the pump again takes it, using the water over and over. The pump furnishes a large supply of water, which prevents heating and keeps the wheel from glazing, and the grinding can be done much faster as a consequence. Moreover, it prevents loose emery flying upon the working parts and upon the neighboring machinery.

Although previous to its introduction other car wheel grinding machines have been in use, the work performed by them had not been satisfactory on account of their weak construction, which made it impossible to grind the wheels perfectly round and true. Another defect was that wheels on axles with inside journals could not be ground without making a hole in the plate of the wheel.

These difficulties have been successfully overcome in this machine. The truing wheels are strongly supported, which prevents them from springing into any cavities that may exist in the treads of the wheels being trued, and the car wheels are both rotated by means of yielding contact points, at the rim of the wheels, thus reducing vibration to a minimum and securing a smooth surface. The mechanism for advancing the clamping points which rotate the wheels is independent of the arrangement for holding the axle in a central position, whereby the length of the axle journal outside of the wheels is immaterial and may be entirely absent, as is the case where engine truck wheels are trued. The yielding contact points are radially adjusted for different sizes of wheels.

The following advantages are obtained by the use of this machine:

1. The two headstocks, each furnished with a horizontally adjustable centering spindle, enable the car wheels to be always kept in the center of the machine opposite the abrading wheels, regardless of the length of the axle on which the wheels are mounted, and without being compelled to move the heads or the abrading wheel posts on the bed plate.

2. As the two headstocks each have a clamping mechanism secured at the rim of the wheels, a rotary motion free from vibration is imparted to the wheels.

3. By the use of the radially adjustable arms on the clamping mechanism smaller wheels of different diameter can be trued up.

4. The independent longitudinally movable centering spindles, in connection with the independent movable mechanism, render it possible to support and revolve wheels for grinding, whether the axles on which the wheels are mounted extend outside of the wheels, as with outside journals, or stop at the hub of the wheels, as with inside journals, and without drilling holes in the wheels.

5. The yielding contact points on the clamping mechanism adjust themselves to any irregularities in the shape of the wheels, and prevent undue strain on the parts.

6. The clamping of the car wheels is quickly effected without requiring special attention from the operator.

7. The rails on which the wheels run from the floor of the shop to the machine being provided with a cam arrangement operated by a short lever, the car wheels and axle are always received in the machine at the right height to be secured by the centering spindles, so that one man is able to operate the whole machine without cranes or other assistance.

Machine can be made to take in both wide and narrow gauge wheels when so ordered.

Weight, about 7 tons. Floor space, 14½ feet long by 5½ feet wide.

Write for prices and further description.

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CHILLED CAR WHEEL GRINDERS.

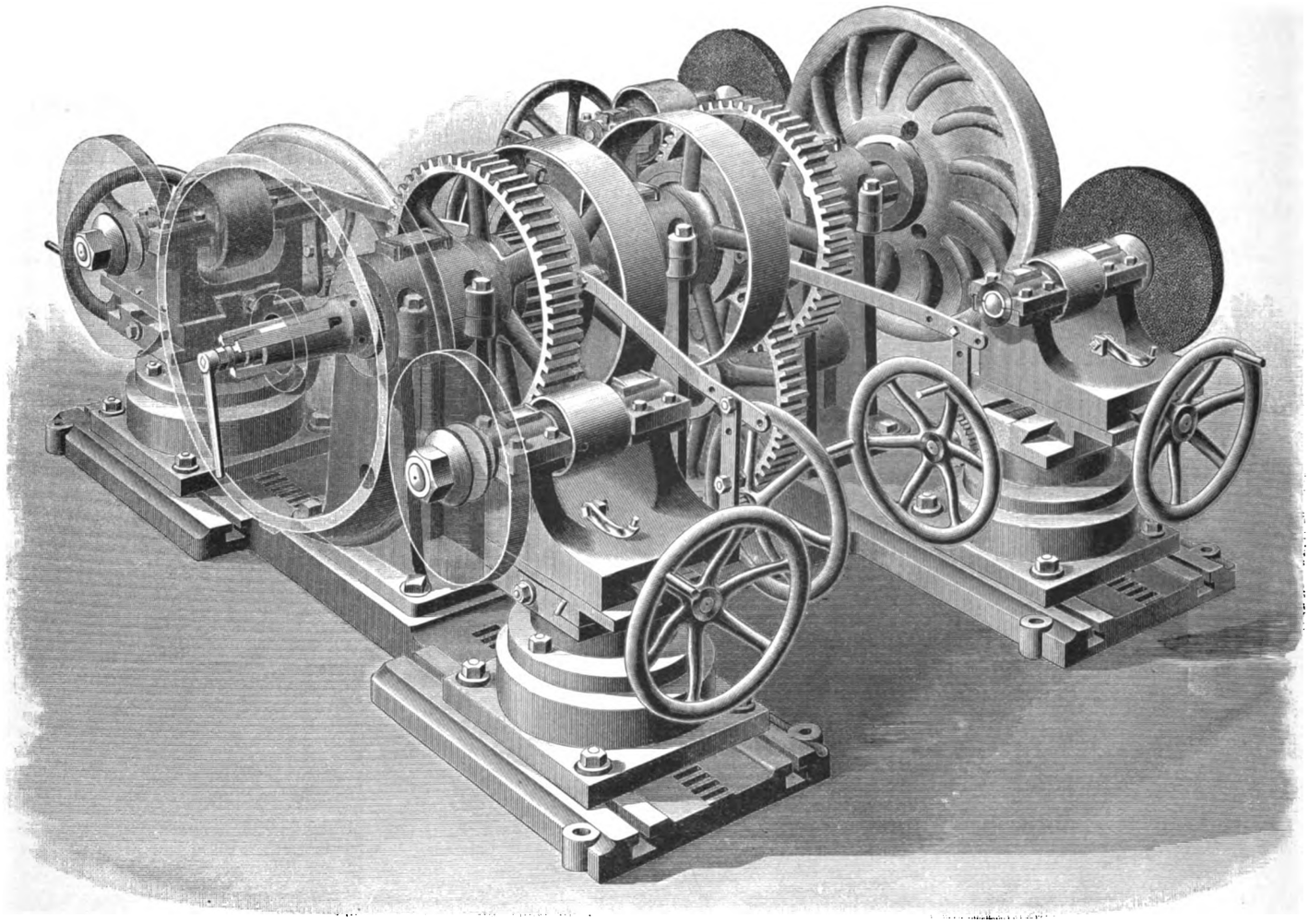


FIG. 3032.

This machine is constructed in the heaviest and most durable manner, calculated to withstand all possible wear consequent on the heavy work it is subjected to. It weighs, complete, 13,000 lbs., and occupies a floor space of 8 square feet. Its capacity, with four grinding heads, is from 40 to 50 wheels per day, according to the condition of car wheels treated. Can be furnished with one, two or three grinding heads to meet smaller outputs. When car wheels are placed in the machine and emery wheels adjusted, the latter are moved across the treads automatically, the only attention necessary being to properly feed the emery wheels for depth of cut. The car wheels are easily placed in the machine by means of a small truck with inclined platform leading to it. The truck is constructed to take wheels of various diameters and bring their bores exactly in line with the end of the expanding mandrel, the tightening of which centers the car wheel for grinding. Each end of the machine works independently, and when a wheel on one end is finished it can be taken off and another put on without suspending operation on the unfinished one. The machine will treat wheels from 18 to 43 inches. Car wheels are bored before being ground; thus when they are finished their periphery bears a true relation to the center—a result which is not obtained in wheels bored after they are ground.

PRICES.

With 1 grinding head (capacity 10 to 15 wheels per day)	$1,200.00
With 2 grinding heads (capacity 20 to 25 wheels per day)	1,500.00
With 3 grinding heads (capacity 30 to 35 wheels per day)	1,900.00
With 4 grinding heads (capacity 40 to 50 wheels per day)	2,200.00

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GENERAL DESCRIPTION, POND ENGINE LATHES.

The beds are of ample depth and of sufficient width to provide, without overhang, a solid support for the tool posts when turning large diameters. The largest sizes have three instead of two walls, increasing greatly their strength and giving a third and central support to the carriages.

The head stocks are of such form as to best sustain the strains to which they are subjected. They are provided with cones of the largest possible diameter, with wide belt steps. On the 48 inch and smaller sizes the cones are mounted on the live spindles, securing the smooth motion of the belt for the quick speeds or small work, and on the larger sizes they are mounted on the face plate pinion spindles. All lathes as regularly made are triple geared. The 32 inch and all larger sizes are geared into an internal gear on the face plate.

The spindles are supported in long heads, and the live spindles are mounted in patented bronze bearings with adjustment for wear. In order to so increase the wearing surfaces that accuracy will be preserved after long and severe use, the spindles are much larger in diameter than required to support rigidly the heaviest work.

The sliding heads or tail stocks have large wearing surfaces in contact with the beds, a set-over for taper turning, with separate bolts on the larger sizes for upper and lower slides so that set-over can be adjusted without releasing lower slides from the beds. Also on larger sizes there are attached to the tail stock a pawl that locks them positively to the bed, and a bracket carrying gears which engage with the steel feed rack. By this arrangement the tail stock may be easily moved along the bed by using one of the crank wrenches.

The carriages have long bearings upon wide V or flat tracks, as may be preferred; they are gibbed to the outside edges of the bed at front and back; they can be clamped when cross-feeding. They are provided with tool slides having compound and swiveling movements, arranged on the smaller sizes, with one and two of the usual slotted tool posts with a screw in each, and on the larger sizes, with two straps and four bolts. They have automatic friction, longitudinal, cross, angular and screw cutting feeds, either of which being in use positively locks out all others. The direction of longitudinal, cross and angular feeds can be changed at the carriage. The feeds are connected to the live spindle by three gears and a sliding key, giving three changes of feed without changing gears. The carriage gearing is driven by a spline in the steel lead screw. The thread of the lead screws is used only for screw cutting. The gear engaging feed rack can be disengaged when cutting screws, thus preventing uneven motion caused by revolution of the feed gearing.

Screw gearing, steady rests, wrenches and friction countershafts are provided.

POND 84, 72, 60 AND 54 INCH ENGINE LATHES.

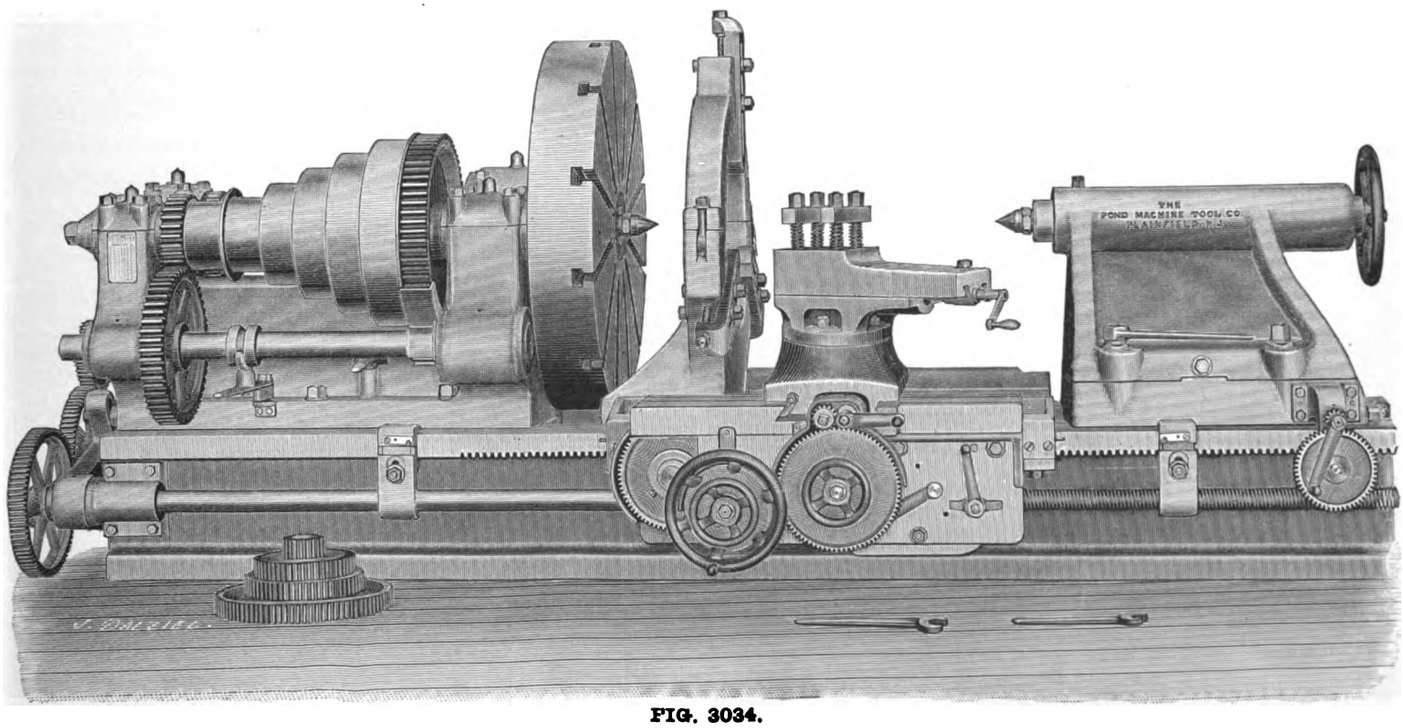


FIG. 3034.

FOR TABLE DIMENSIONS, SEE PAGE 26.

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POND 48 AND 42 INCH ENGINE LATHES.

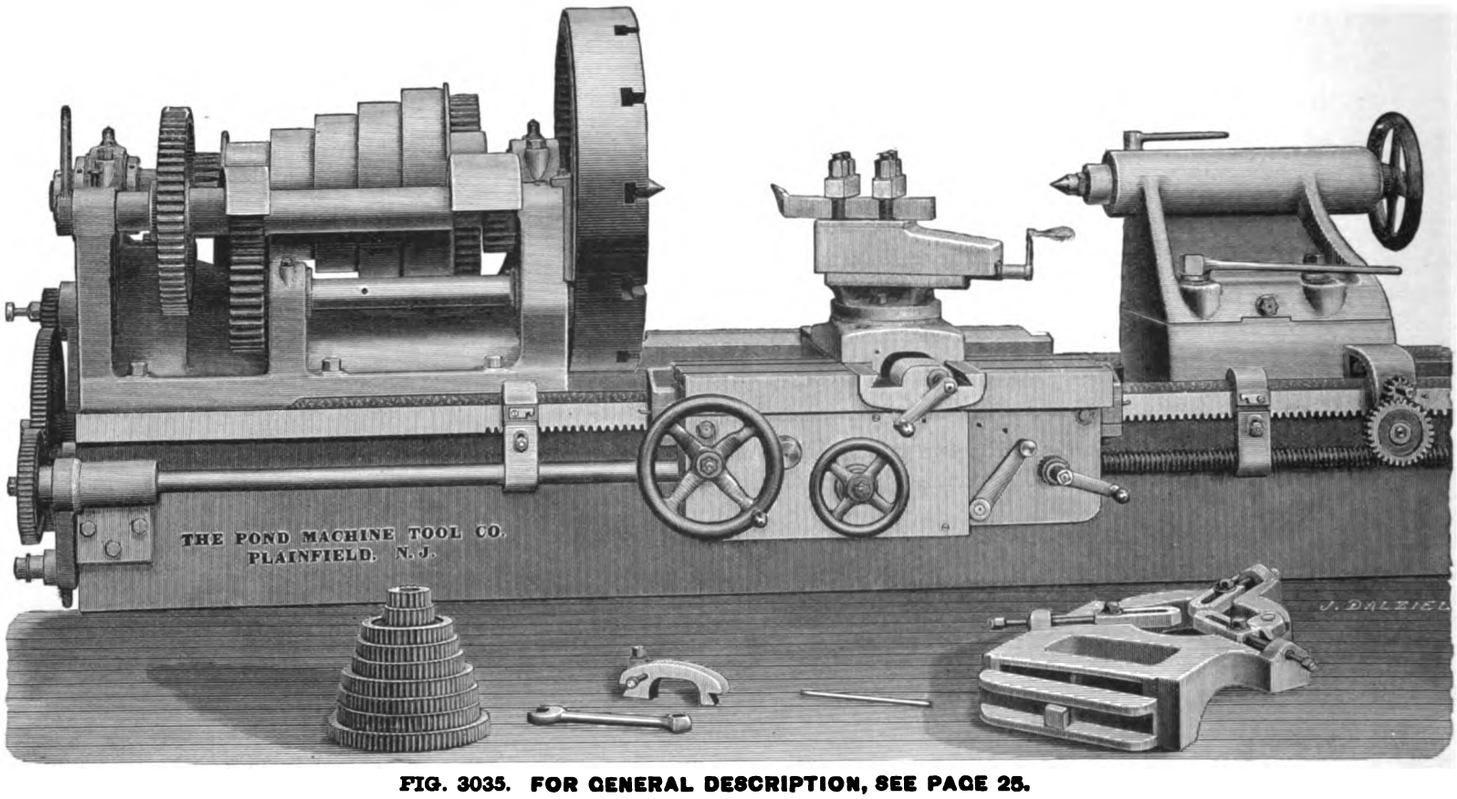


FIG. 3035. FOR GENERAL DESCRIPTION, SEE PAGE 25.

REAR VIEW, SHOWING TRIPLE GEARING AND TAPER ATTACHMENT.

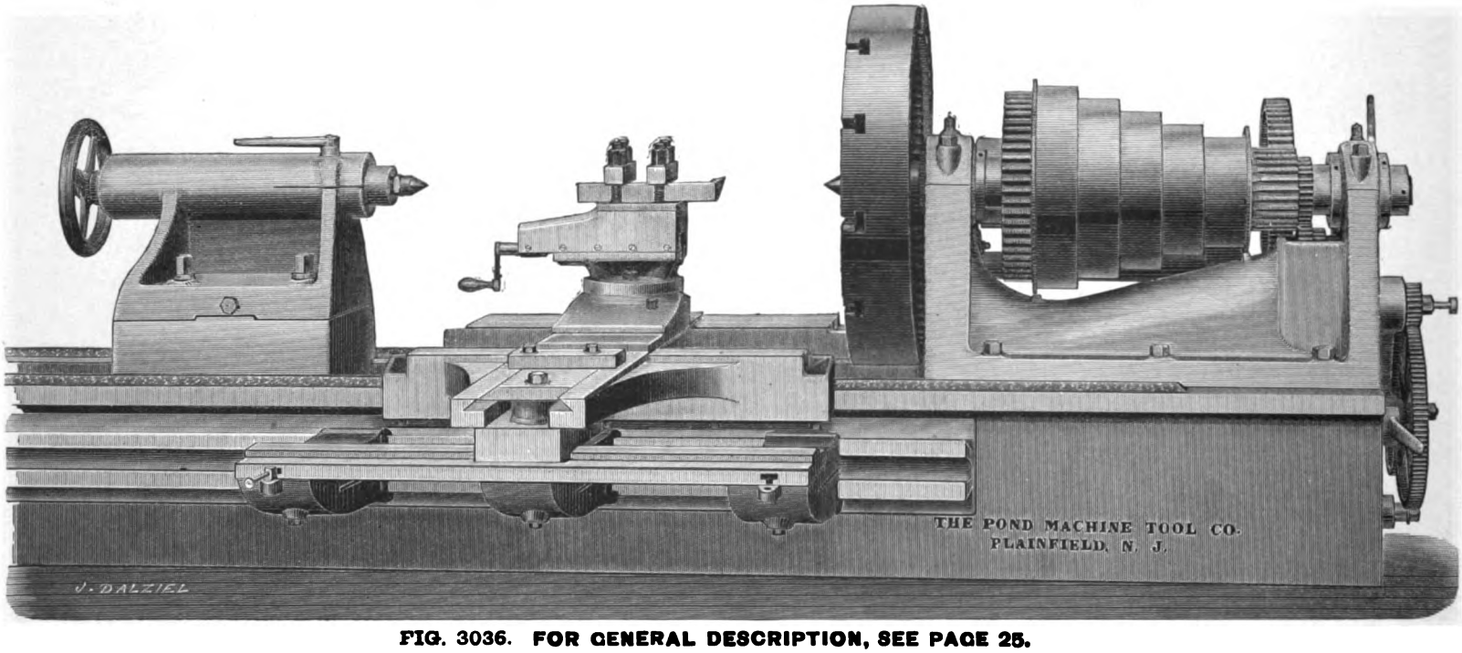


FIG. 3036. FOR GENERAL DESCRIPTION, SEE PAGE 25.

GENERAL DIMENSIONS, FIGS. 3034 TO 3038.

Fig. No.	Swing over bed.	Swing over rest.	Bed length.	Turning length.	Weight, pounds.	Weight, per foot, pounds.	Prices.	Prices, per foot.	Extra, for splicing beds longer than 34 feet.	Extra, for triple geared into face plate.	Extra, for power angular feed.	Extra, for taper attachment.
3038	24 in.	18	8 ft.	3 ft. 0 in.			$	$	$	$	$	$
3038	26 "	18	8 "	2 " 4 "								
Spec'l, no cut	32 "	24½	8 "	2 " 1 "								
3037	32 "	26¾	12 "	5 " 0 "								
3037	36 "	30¾	12 "	5 " 0 "								
3035	42 "	35½	14 "	4 " 6 "								
3035	48 "	37¼	14 "	4 " 1 "								
3034	54 "	45¾	16 " 6 in.	6 " 4 "								
3034	60 "	51	18 " 6 "	6 " 3 "								
3034	72 "	59	20 "	6 " 2 "								
3034	84 "	70	20 "	6 " 2 "								

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POND 36 AND 32 INCH ENGINE LATHES.

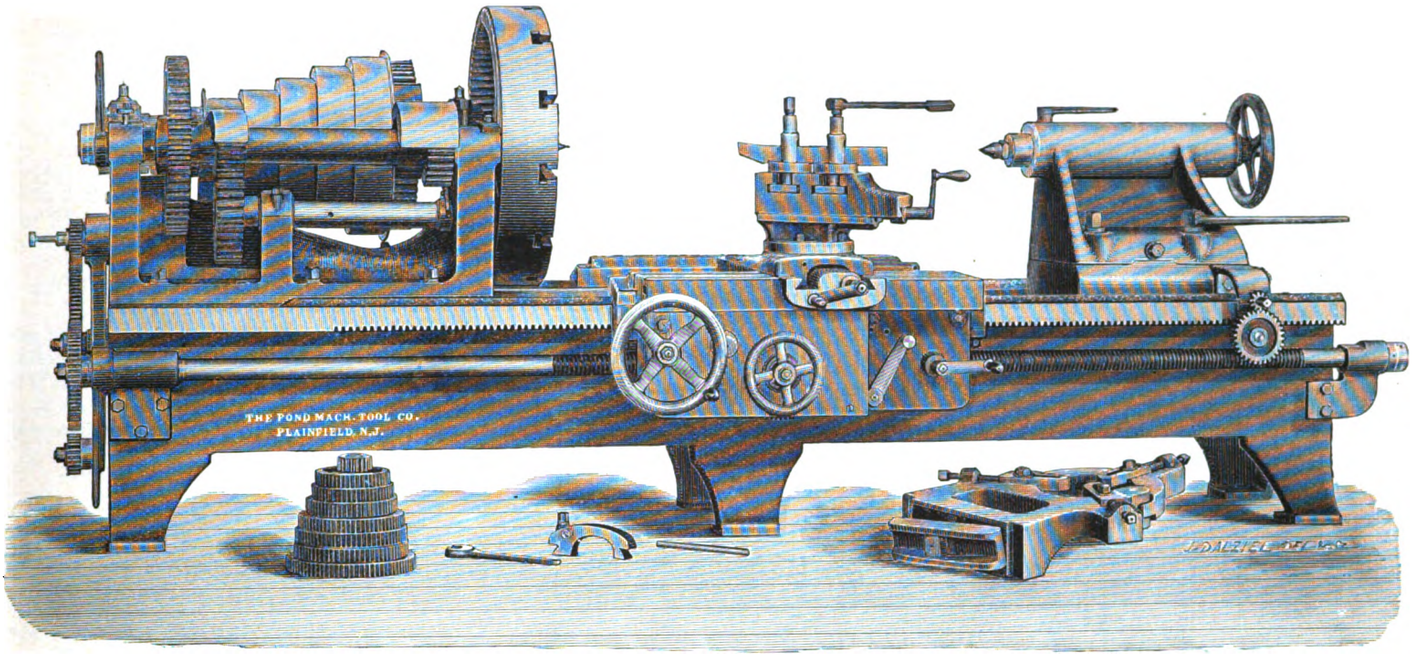


FIG. 3037.

POND 26 AND 24 INCH ENGINE LATHES.

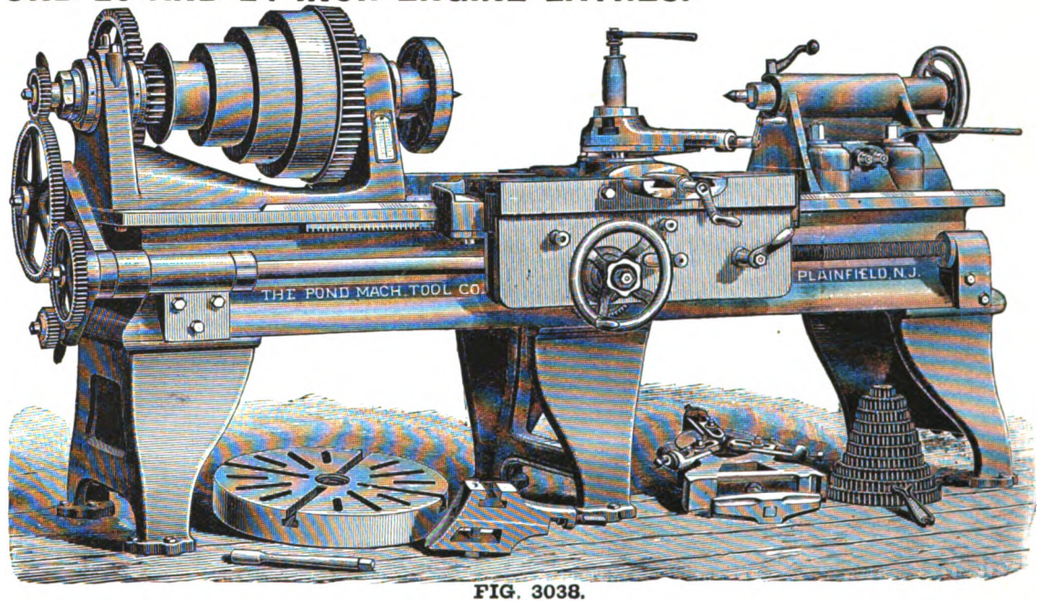


FIG. 3038.

For general description Pond Engine Lathes, see page 25, and for table of dimensions, see page 26.

DESCRIPTION, FIG. 3039.

This lathe has crucible steel spindles with large bearings. Head is strongly back geared.

Cone pulley has five sections, the largest of which is 21 inches diameter, for a 4 inch belt.

Compound rest securely gibbed to the outside of bed at front and back sides, with long bearings on the bed.

Power cross feed is furnished.

Side tool block is furnished for turning work as large as the lathe will swing.

Rack gear can be drawn out of the rack, thus preventing wear on these parts when not required in screw cutting and other similar work.

Tailstock is moved by a pinion gear in connection with the rack.

Steel leading screw with open and shut nut.

Cuts threads 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 per inch.

Independent rod and patent friction feed, with the addition of patent variable feed, giving a range of feed from 25 to 8 cuts per inch, the regular speeds of feed being 25, 40 and 60 cuts per inch.

Countershaft has patent friction pulleys 18 inches diameter for a 5 inch belt, and should make 75 revolutions per minute.

Swing over bed, 30 inches. Length of bed, 12 feet. Turns, 6 feet. Swing over rest, 19¾ inches.

WEIGHT, 7,850 LBS. PRICE, $.....

Weight, per foot, 220 lbs.

Extra, per foot, $.....

REED 30 INCH ENGINE LATHE.

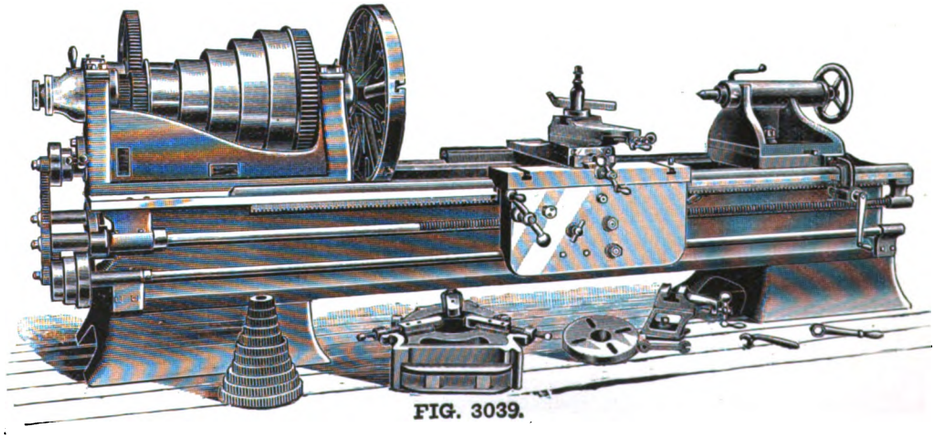


FIG. 3039.

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REED 27 INCH ENGINE LATHE.

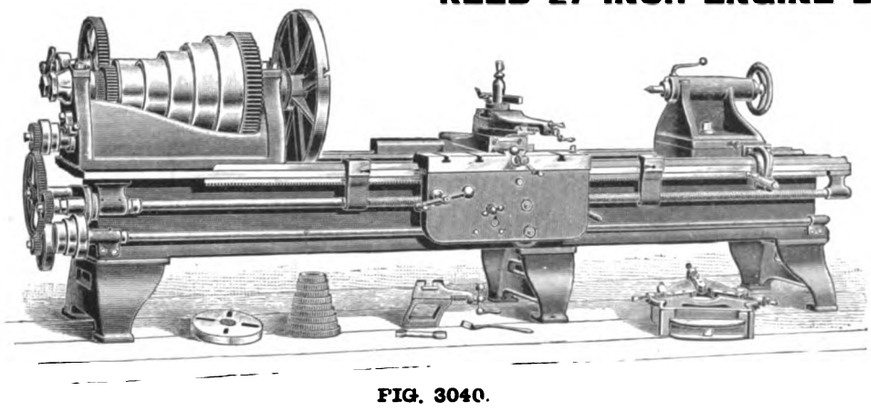


FIG. 3040.

DESCRIPTION, FIG. 3040.

This lathe has crucible steel spindles with large bearings. Head is strongly back geared.

Cone pulley has five sections, the largest of which is 17⅝ inches diameter, for a 3¾-inch belt.

Compound rest securely gibbed to the outside of bed at front and back sides, with long bearings on the bed.

Power cross feed is furnished.

Side tool block is furnished for turning work as large as the lathe will swing.

Rack gear can be drawn out of the rack, thus preventing wear on these parts when not required in screw cutting and other similar work.

Steel leading screw with open and shut nut.

Cuts threads 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 16 per inch.

Independent rod and patent friction feed, with addition of patent variable feed, giving a range from 10 to 24 cuts per inch, the regular speeds of feed being 28, 40 and 68 cuts per inch.

Countershaft has patent friction pulleys 18 inches diameter for a 5-inch belt, and should make 80 revolutions per minute.

Patent friction pulleys can be oiled while running, thereby saving loss of time, danger and annoyance in running off the belts, which is an important item where a number of lathes are in use.

Swing over bed.	Length of bed.	Turns.	Swing over rest.	Weight.	PRICE,
27 inches.	12 feet.	6 feet 6 inches.	17¼ inches.	5,860 lbs.	$ .....

Weight per foot, 200 lbs. Extra, per foot, $..... Prices include large and small face plates, center rest, screw gears and wrenches.

REED 24 INCH ENGINE LATHE.

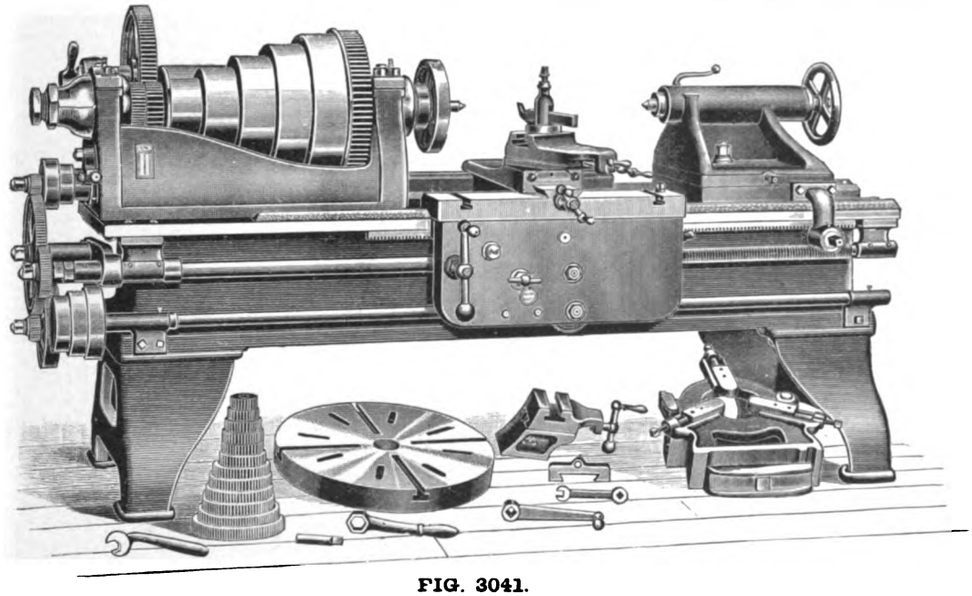


FIG. 3041.

GENERAL DESCRIPTION, FIGS. 3041 AND 3042.

These lathes have crucible steel spindles with large bearings. Heads are strongly back geared.

Each lathe is provided with compound rest, strongly gibbed at the outside of bed at front and back sides, with long bearings on the bed.

Power cross feed is furnished, also side tool block for turning work as large as the lathe will swing.

Rack gear can be drawn out of the rack, thus preventing wear on these parts when not required for screw cutting and other similar work.

Lathes are provided with independent rod and patent friction feed with patent variable feed, giving a large range of feed.

Countershafts are furnished with patent friction pulleys, so arranged that they can be oiled while running, saving loss of time, danger and annoyance in running off the belts, which is an important item where a large number of lathes are in use.

Taper attachments can be furnished if desired.

REED 22 INCH ENGINE LATHE.

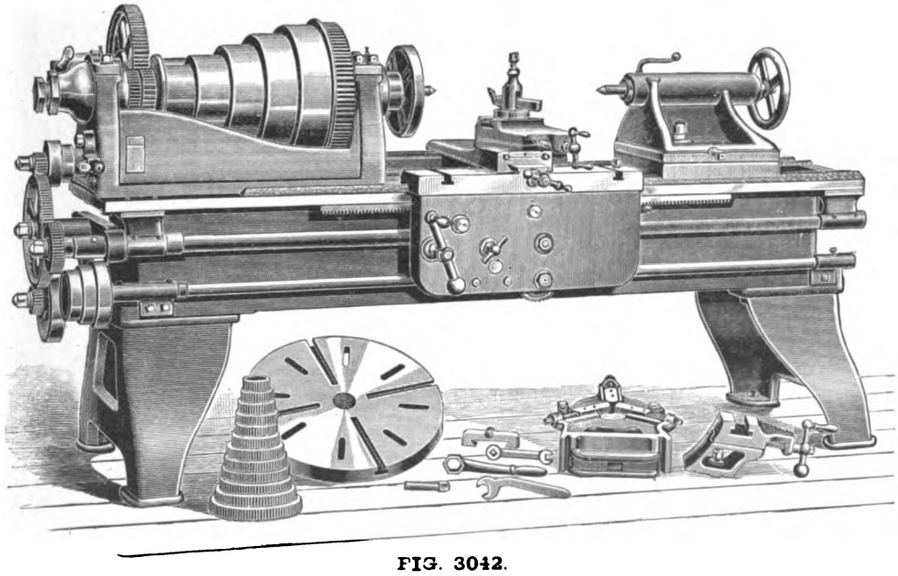


FIG. 3042.

PRICES.

Swing over bed.	Length of bed.	Turns in length.	Swing over rest.	Weight.	Prices.
24 in.	12 ft.	7 ft. 6 in.	14½ in.	5,035 lbs.	$ .....
22 "	10 "	5 " 9 "	13 "	4,050 "	.....

Swing over bed.	Cone pulley, largest section.	Cone pulley for belt, width.	Weight per foot, longer beds.
24 in.	16 in.	3½ in.	180 lbs.
22 "	14¾ "	3¼ "	160 "

Prices include large and small face plates, center rest, screw gears and wrenches.

DIMENSIONS, COUNTERSHAFT PULLEYS FOR FIGS. 3041 AND 3042.

For 24-inch lathe, 16 inches diameter for 4-inch belt, should make 95 revolutions per minute. For 22-inch lathe, 16 inches diameter for 4-inch belt, should make 100 revolutions per minute.

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REED 20 INCH ENGINE LATHE.

GENERAL DESCRIPTION, FIGS. 3043, 3044 AND 3045.

These lathes have crucible steel spindles with holes through their entire lengths, and run in large bearings, Babbitt metal lined. The heads are strongly back geared. The 20 inch is kept in stock with compound rest; the 18 inch with compound or plain gib rests; the 16 inch with compound, plain gib or raise and fall rests. The rests are strongly gibbed at the front and back sides with long bearings on the bed. All have power cross feed. Side tool blocks are furnished for the 20 and 18 inch lathes, for turning work as large as the lathes will swing. Rack gears can be drawn out of the racks, thus preventing wear on these parts, when not required for screw cutting.

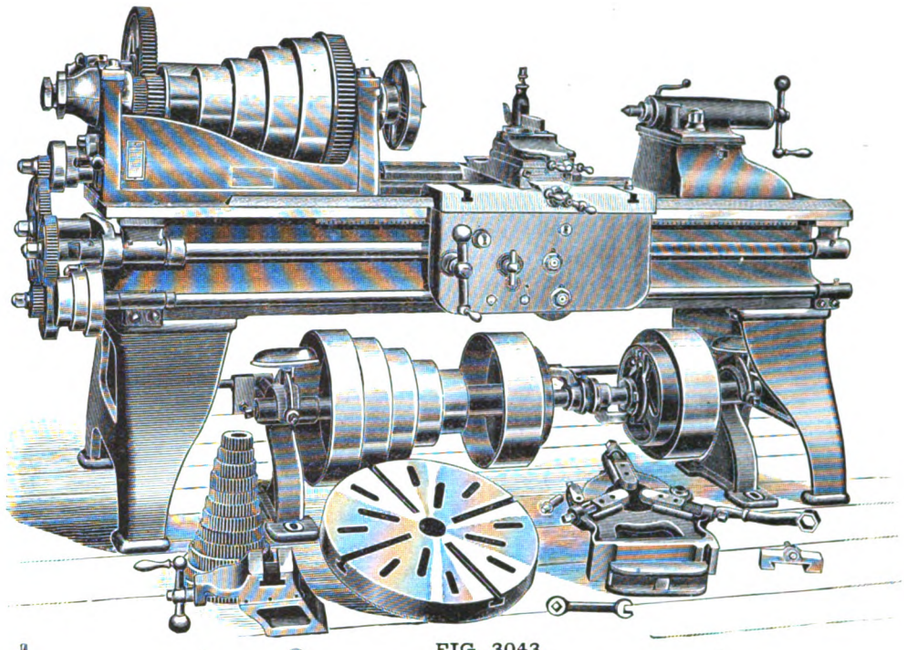


FIG. 3043.

The lathes are provided with independent rod and patent friction feeds and patent variable rod feeds.

The countershafts are furnished with patent friction pulleys so arranged that they can be oiled while running.

COUNTERSHAFTS.

Size lathe.	Diameter pulleys.	Belt width.	Revo. per minute.
20	14	4 in.	115
18	13	3½ "	120
16	12	3¼ "	120

REED 18 INCH ENGINE LATHE.

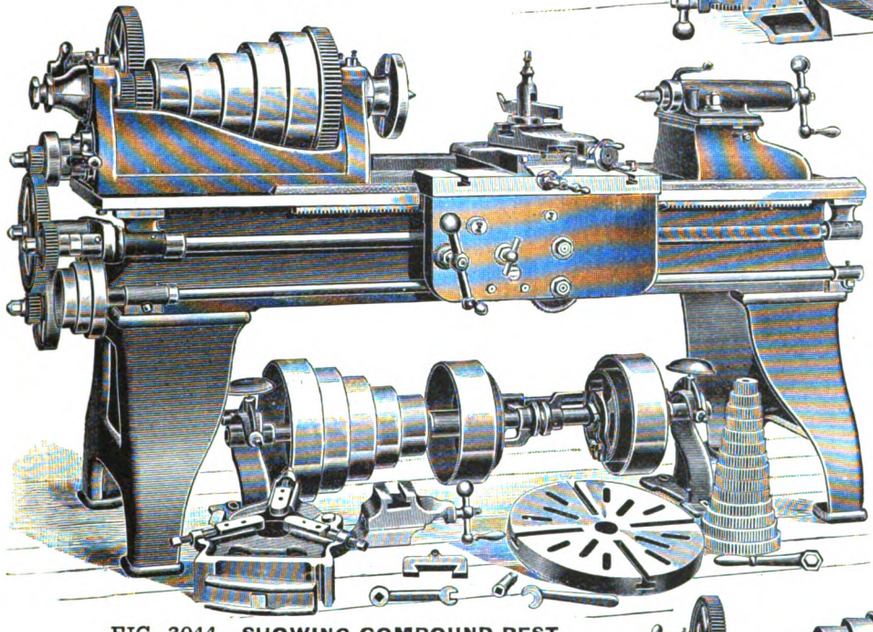


FIG. 3044. SHOWING COMPOUND REST.

DIMENSIONS.

Size lathe. Inches.	Length bed. Feet.	Turns between centers.	Size hole in spindle.	Weight. Lbs.	Largest cone section.	Size belt for cone.
20	8	3 ft. 9 in.	7/8	3,100	13½ in.	3 in.
18	8	4 " 3 "	13/16	2,665	12 "	2¾ "
16	6	2 " 9 "	13/16	1,835	10½ "	2½ "

Size lathe. Inches.	Swing over compound rest.	Swing over plain rest.	Swing over raise and fall rest.	Extra weight per foot.
20	11¾	.....	.....	145 lbs.
18	10½	11	.....	130 "
16	9⅝	10	7¾	110

PRICES.

Including large and small face plates, center rest, wrenches and countershafts.

Size lathe. Inches.	Length bed. Feet.	Prices.	Extra per foot.	Extra compound rest.	Extra for taper attachment.	Extra for large hole in spindle.
20	8	$.....	$.....	$.....	$.....	$.....
18	8	$.....	$.....	$.....	$.....	$.....
16	6	$.....	$.....	$.....	$.....	$.....

REED 16 INCH ENGINE LATHE.

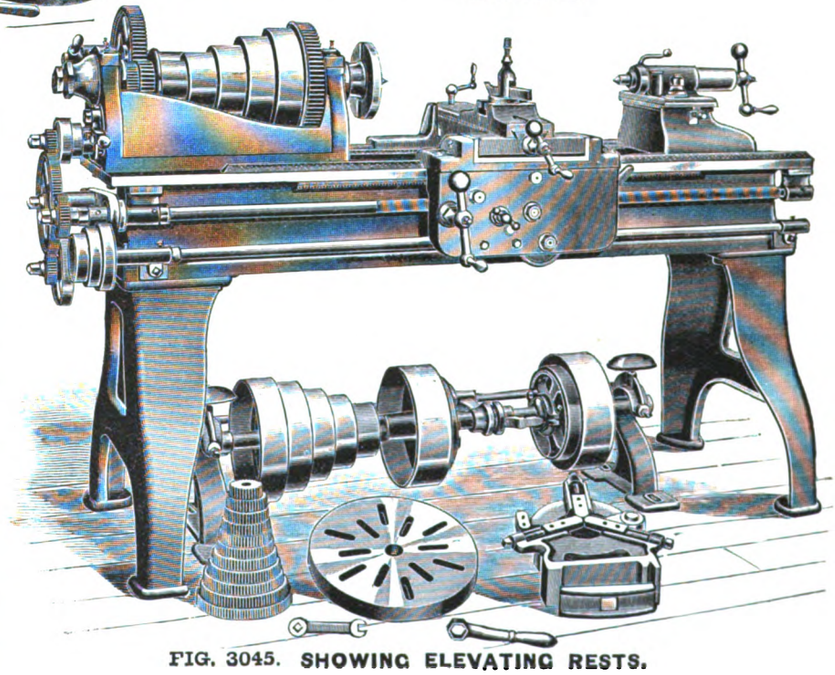


FIG. 3045. SHOWING ELEVATING RESTS.

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REED 14 INCH ENGINE LATHE.

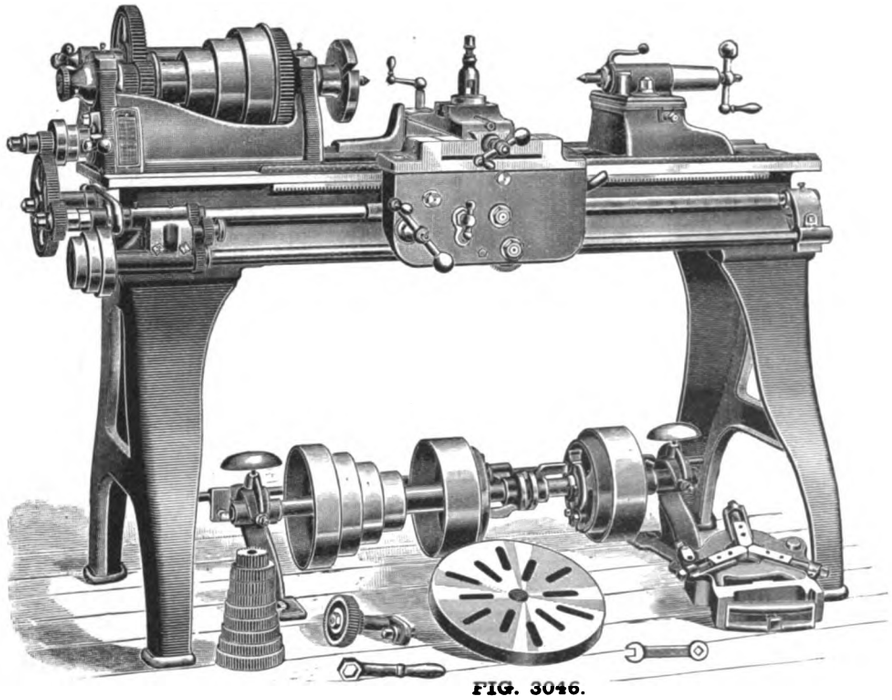


FIG. 3046.

This lathe is made with hollow spindle in the head. Diameter of hole, $\frac{9}{16}$ inch.

Cone pulley has four sections, $8\frac{1}{2}$, $6\frac{3}{4}$, 5 and $3\frac{1}{4}$ inches diameter, respectively, for a 2 inch belt.

Steel rack and pinion for moving carriage.

Steel leading screw with open and shut nut.

Cuts threads 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 28, 30, 32 and 36 to the inch.

Independent rod and patent friction feed, with addition of patent variable feed, giving a range from 24 to 280 cuts per inch.

Lathe is furnished with raise and fall gib rest as shown, or can be furnished with plain gib rest at same price.

Compound rest can be furnished at an extra charge.

Power cross feed is furnished.

Countershaft has patent friction pulleys, 10 inches diameter, for $2\frac{3}{4}$ inch belt, and should make 140 turns per minute.

Patent friction pulleys can be oiled while running, thereby saving loss of time, danger and annoyance in running off the belts, which is an important item where a number of lathes are in use.

Swing over bed.	Length of bed.	Swing over elevating rest.	Swing over plain rest.	Turns in length.	Weight.	Price.
14 in.	6 ft.	7 in.	$8\frac{1}{2}$ in.	43 in.	1,260 lbs.	$.....

Weight, per foot, 75 lbs.

Extra, per foot, for longer beds, $.....

Extra for compound rest..... $.....

TAPER ATTACHMENTS FOR FIGS. 3039 TO 3048.

FIG. 3047 REPRESENTS 16 INCH LATHE WITH PLAIN GIB REST AND TAPER ATTACHMENT.

These lathes can be furnished with either raise and fall gib rest or plain gib rest and taper attachment at the same price.

Can be furnished with compound rest and taper attachment at an extra price.

Cross feed is furnished when taper attachment is added.

Weight, per foot, of bed, 16 inch, 125 lbs.; 14 inch, 80 lbs.

Prices include large and small face plates, center rest, wrenches and countershaft. For other details, see Fig. 3045 and Fig. 3046.

The bar for moving the carriage on a taper is 24 inches long, resting on a bracket, which is movable the entire length the lathe will turn. The bar is provided with a graduated scale and adjusting screws, so that boring or turning to any desired taper up to 3 inches to the foot can be accomplished without trial cuts.

It is the most positive and convenient form of taper attachment. It does not admit of lost motion, and the removal of a single bolt detaches the taper from the carriage, leaving the lathe free for ordinary work.

Swing over bed.	Weight.	Price. 6 foot bed.
16 in.	1,775 lbs.	$.....
14 "	1,450 "	$.....

16 inch, per foot, longer bed, $.....

14 " " " " " $.....

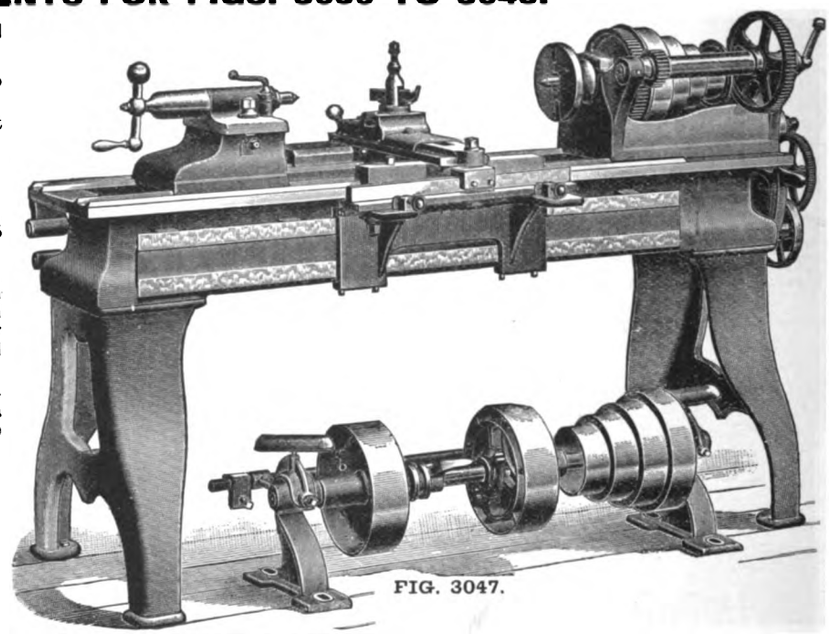


FIG. 3047.

REED 12 INCH ENGINE LATHE.

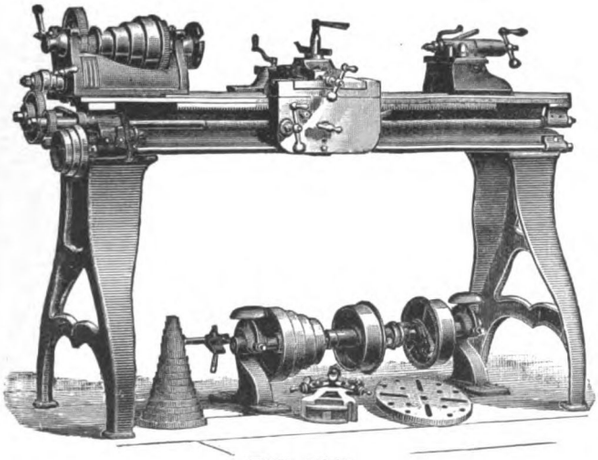


FIG. 3048.

This lathe is made with hollow spindle in the head. Diameter of hole, $\frac{9}{16}$ inch.

Cone pulley has four sections, $7\frac{1}{2}$, 6, $4\frac{1}{2}$ and 3 inches diameter, respectively, for a $1\frac{3}{4}$ inch belt.

Steel rack and pinion for moving carriage.

Steel leading screw, with open and shut nut.

Cuts threads 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 36, 38 and 40 to the inch.

Independent rod and patent friction feed, with addition of patent variable feed, giving a range from 28 to 280 cuts per inch.

Lathe is furnished with raise and fall gib rest, as shown, or it can be furnished with plain gib rest at same price.

Compound rest can be furnished at an extra charge.

Taper attachment can be furnished with plain gib rest only.

Lathe is not made with power cross feed.

Countershaft has patent friction pulleys, 8 inches diameter, for a $2\frac{1}{4}$ inch belt, and should make 180 revolutions per minute.

Patent friction pulleys can be oiled while running, thereby saving loss of time, danger and annoyance in running off the belts; which is an important item where a number of lathes are in use.

Swing over bed.	Length of bed.	Swing over elevating rest.	Swing over plain rest.	Turns in length.	Weight.	Price.
12 in.	5 ft.	$6\frac{1}{4}$ in.	7 in.	33 in.	930 lbs.	$.....

Weight, per foot, 50 lbs.

Extra, per foot, $.....

Extra for compound rest, $.....

Extra for taper attachment, $.....

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14 INCH ENGINE LATHE.

FOR GENERAL DESCRIPTION, SEE FIG. 3056.

Extra for compound rest $15.00
" " rod feed 20.00
" " hand rest 3.00
" " follower rest 3.00
" " raise and fall carriage 15.00

Pulleys on countershaft are 8 x 4 inches, and should make 190 revolutions per minute.

PRICES.

Swing.	Length of bed.	Between centers.	Weight.	Price.
14 in.	6 ft.	40 in.	1000 lbs.	$175.00
14 "	7 "	52 "	1070 "	185.00
14 "	8 "	64 "	1140 "	195.00
14 "	9 "	76 "	1200 "	205.00

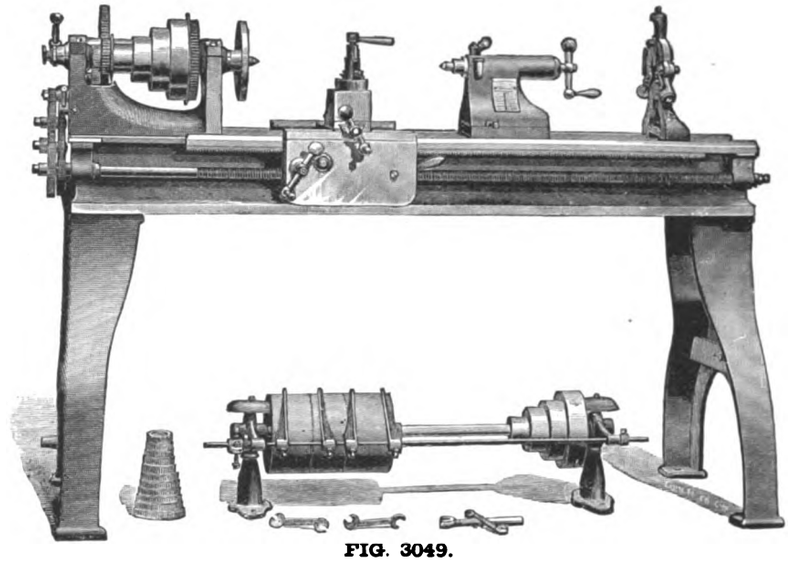


FIG. 3049.

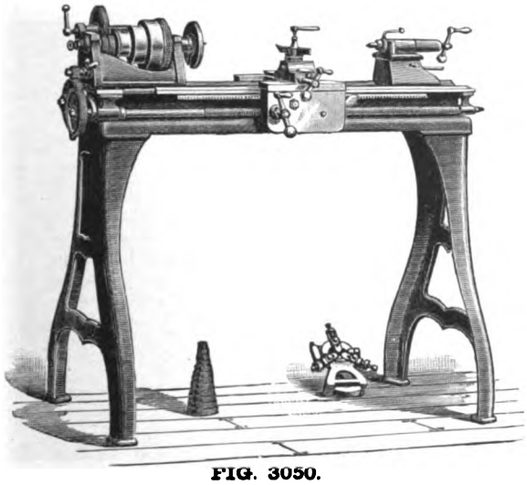


FIG. 3050.

10 INCH ENGINE LATHE. PLAIN CIB REST.

This lathe is made from recent patterns, and has several features that are new for lathes of this size, among which are the friction for connecting and disconnecting cone pulley with the large gear on spindle when back gears are used.

It has hollow spindle in the head, to receive rods up to ½ inch diameter.

The screws that move tool block and tail spindle are graduated in such a way that they can be worked to $\frac{1}{100}$ inch without the use of calipers.

It cuts right and left hand threads from 6 to 48 per inch.

It is well made, and of the best material; is stiff, strong, well proportioned and neat in appearance.

Prices include countershaft, which has tight and loose pulleys 7 inches diameter by 2 inches face, and should make 200 revolutions per minute.

Swing over bed.	Length of bed.	Turns.	Swing over rest.	Weight.	Price.
10 in.	4 ft.	28 in.	7 in.	500 lbs.	$.....
10 "	5 "	40	7 "	525 "	.....

11 INCH ENGINE LATHE. PLAIN CIB REST.

This lathe is made from recent patterns, and has many new features.

Head spindle is hollow, having a $\frac{9}{16}$ inch hole.

The screws that move tool block and tail spindle are graduated to read to hundredths of an inch.

It cuts right and left hand threads, and feeds both ways. All gears are carefully cut and run smoothly.

The feed gearing is driven by a slot in the leading screw in connection with a patent friction, and can be instantly engaged or disengaged at any desired point. It is simple in construction, positive in operation, and cannot get out of order, and is so arranged that the thread of the leading screw is not used, consequently its accuracy for screw cutting is not impaired. The direction of the feed is changed, or the feed gearing is disconnected, by movement of the small lever shown on the end of the headstock. Change gears to cut from 5 to 36 threads to the inch, all necessary wrenches and center rest are furnished with the lathe.

It is stiff and strong; well made in every particular, and of the best material.

Prices include countershaft, which has tight and loose pulleys 8 inches diameter by 2¼ inches face, and should make 200 revolutions per minute.

Swing over bed.	Length of bed.	Turns.	Swing over rest.	Weight.	Price.
11 in.	4 ft.	24 in.	7⅞ in.	660 lbs.	$.....
11 "	5 "	36 "	7⅞ "	700 "	.....
11 "	6 "	48 "	7⅞ "	740 "	.....

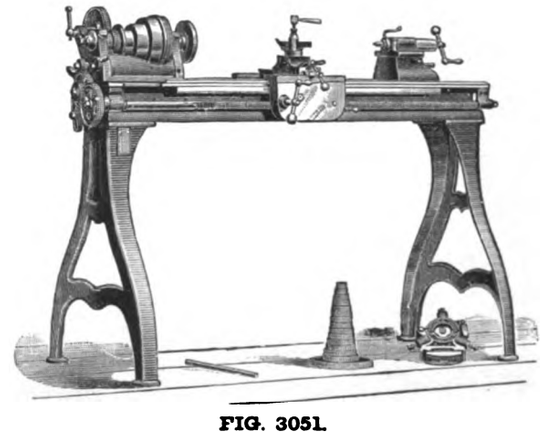


FIG. 3051.

ATTACHMENTS FOR FIGS. 3050 AND 3051.

Belt for foot lathe, Figs. 3053 and 3054 ..... $1.00
Follower rest, for lathe with plain rest only 3.50
Large slotted face plate, 9 inches diameter 3.00
Hand rest attachment for wood turning 2.00
Spur and female centers for wood turning, each 1.50
Screw face plate 2.00
Spider center for centering $4.00
Square center for centering 1.50
Crotch center 1.50
Blank center for holding chucks 1.00
Set of 12 turning tools, ⅜ x ¾ inch steel, finished and ground .....
Single turning tools, ⅜ x ¾ inch steel, finished and ground .....

Patent friction countershaft can be furnished in place of the regular countershaft, with tight and loose pulleys, at an extra charge of $7.00.

Chucks of any size or style can be furnished fitted to these lathes.

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11 AND 10 INCH SWING ENGINE LATHES.

WITH RAISE AND FALL CIB REST AND PATENT FRICTION FEED.

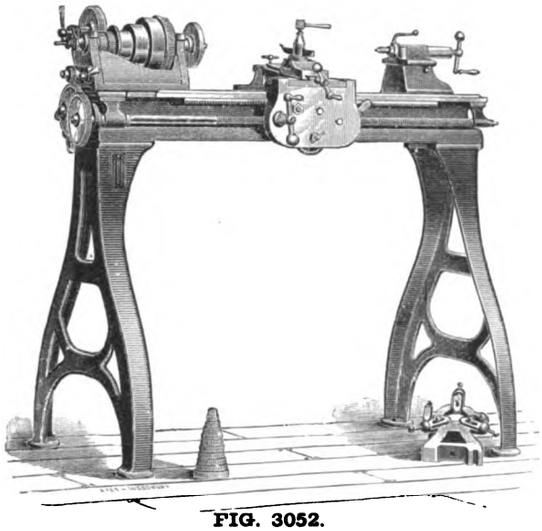


FIG. 3052.

In this Lathe all gear teeth are accurately cut, and run smoothly and quietly.

The head spindle has a half inch hole through it, and is furnished with a finished plunger for starting out the centre.

The cone pulley has three changes for 1½ inch belt, and the back gears give six turns of the cone to one of the spindle, which gives ample power for any work the lathe will swing.

The tail spindle has a bearing 4¾ inches long, and the screw which moves the spindle is graduated in such a manner as to be worked to 1-100th of an inch without other measurements. The tailstock has a bearing of 6½ inches upon the bed, and is securely held in position by a strong bolt, in connection with a shoe under the bed.

The rest is wide, and strong enough to take any cut the power in the head will give without spring or chatter, and is of the raise and fall form, with all the advantages of delicate adjustment for the cutting tool which larger lathes with this form of rest have, and which is a decided improvement over all lathes of this size heretofore made with the plain flat rest, which makes it necessary to loosen the cutting tool to adjust it. The screw which moves the tool block is so graduated as to be worked to 1-100th of an inch, without the use of calipers.

The feed gearing is driven from a slot in the leading screw in connection with a patent friction, and can be instantly engaged or disengaged at any desired point. It is simple in construction, positive in operation, cannot get out of order, and is so arranged that the thread of the leading screw is not used, consequently its accuracy for screw cutting is not impaired. The direction of feed is changed, or the feed gearing is disconnected, by movement of the small lever shown on the end of the headstock. On 11 inch lathes, change gears to cut from 5 to 36 threads to the inch, and on 10 inch cuts from 6 to 48 threads, all necessary wrenches and centre rest are furnished with the lathe.

Prices include countershaft, which has tight and loose pulleys, for 11 inch, 8 inches diameter by 2¼ inches face, and should make 200 revolutions per minute, and for 10 inch has tight and loose pulleys, 7 inches diameter by 2 inches face, and should make 200 revolutions per minute.

THE GENERAL DESCRIPTION 3052 APPLIES TO FIGS. 3053 AND 3054.

PRICES, FIG. 3052.

Swing over bed.	Length of bed.	Turns.	Swing over rest.	Weight.	Price.
11 in.	4 ft.	24 in.	6¼ in.	660 lbs.	$.....
11 "	5 "	36 "	6¼ "	700 "	.....
11 "	6 "	48 "	6¼ "	740 "	.....
10 "	4 "	28 "	5⅝ "	500 "	.....
10 "	5 "	40 "	5⅝ "	525 "	.....

PRICES, FIG. 3053.

Swing over bed.	Length of bed.	Turns.	Swing over rest.	Weight.	Price.
11 in.	4 ft.	24 in.	7⅞ in.	660 lbs.	$.....
11 "	5 "	36 "	7⅞ "	700 "	.....
11 "	6 "	48 "	7⅞ "	740 "	.....
10 "	4 "	28 "	7 "	500 "	.....
10 "	5 "	40 "	7 "	525 "	.....

11 & 10 IN. FOOT ENGINE LATHES.

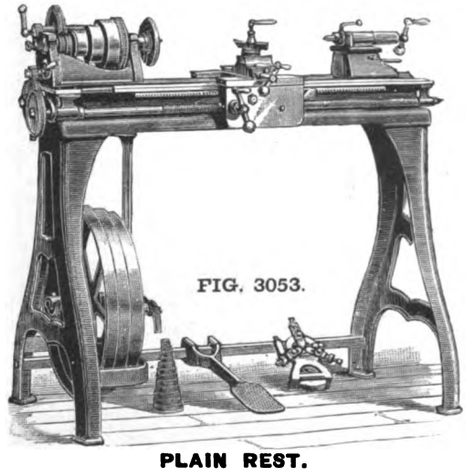


FIG. 3053.

PLAIN REST.

PRICES, FIG. 3054.

Swing over bed.	Length of bed.	Turns.	Swing over rest.	Weight.	Price.
11 in.	4 ft.	24 in.	6¼ in.	700 lbs.	$.....
11 "	5 "	36 "	6¼ "	740 "	.....
11 "	6 "	48 "	6¼ "	780 "	.....
10 "	4 "	28 "	5⅝ "	550 "	.....
10 "	5 "	40 "	5⅝ "	575 "	.....

FOR EXTRAS, SEE PAGE 31.

11 & 10 IN. FOOT ENGINE LATHES.

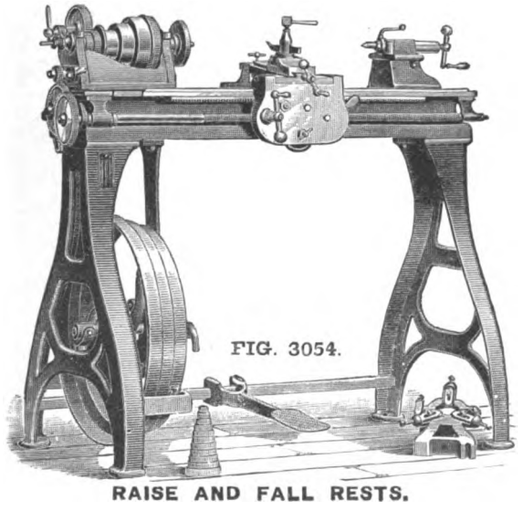


FIG. 3054.

RAISE AND FALL RESTS.

BOLT LATHES.

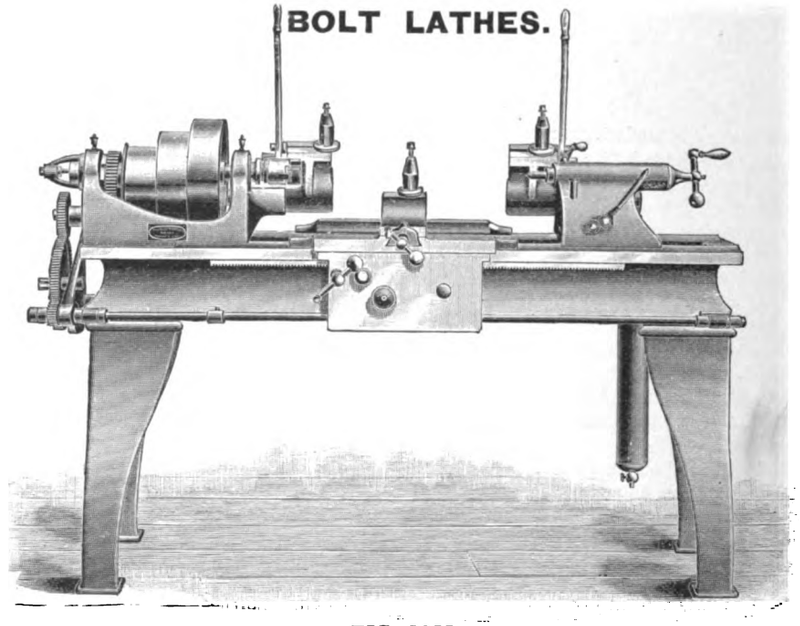


FIG. 3055.

These Lathes are designed for the rapid turning of forged bolts, and perform the operations of turning and squaring up the end and under the head, the intention being to save time by performing several operations at once, and by saving the rehandling. Interchangeable head holders, or drivers, are attached to the spindle, which do away with dogging. An automatic stop enables several lathes to be operated at the same time when the length of work will permit.

With this machine are furnished set of head holders, countershaft, wrenches, and squaring-off and taper attachment, tanks, pump, and connections.

Weight, 1,850 lbs. Pulleys, 12 x 4, should make 150 revolutions.

PRICE OF MACHINE, COMPLETE, $.....

Deduct for taper attachment.

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14 INCH GAP FOOT LATHE.

The headstock is of the latest design; it has a four speed cone for a 1¾ inch belt; the cones are 8½, 6⅜, 4⅝ and 2⅞ inches in diameter. The back gear is thrown in and out by a cam motion; right or left hand threads may be cut by reversing, by a very simple arrangement, the gear in the headstock, and this may be done while lathe is in full speed. The spindle is made of 1⅝ steel and has a ⅝ inch hole entirely through it; the wear is taken up by a bush and jam nut. The tail spindle is made of 1½ inch steel.

One of the great features of this lathe is the gap, which is directly under and in front of the face plate; this gap will permit a swing of 22 inches in diameter and 5 inches wide. For turning pulleys, patterns, cranks, etc., it is invaluable. The bed at the gap is just as stiff as at any other point.

The foot motion is the most powerful, practical, and best in use, and can be operated either sitting or standing. The fly-wheel which is turned, weighs 150 pounds; the crank shaft runs on 5 inch friction rollers, let through a core in the legs, and has a bearing on each side. The pulleys on the countershaft are 8 x 4; the speed should be 190 revolutions per minute.

We make this lathe either with or without the gap, as may be ordered, and with either the foot motion or with a countershaft for power. When both foot motion and countershaft are ordered, the price is $12.00 extra. The lathe is furnished complete with a steady rest, 8 inch face plate, two pointed centres, the necessary wrenches, and gears to cut all standard threads from 5 to 36.

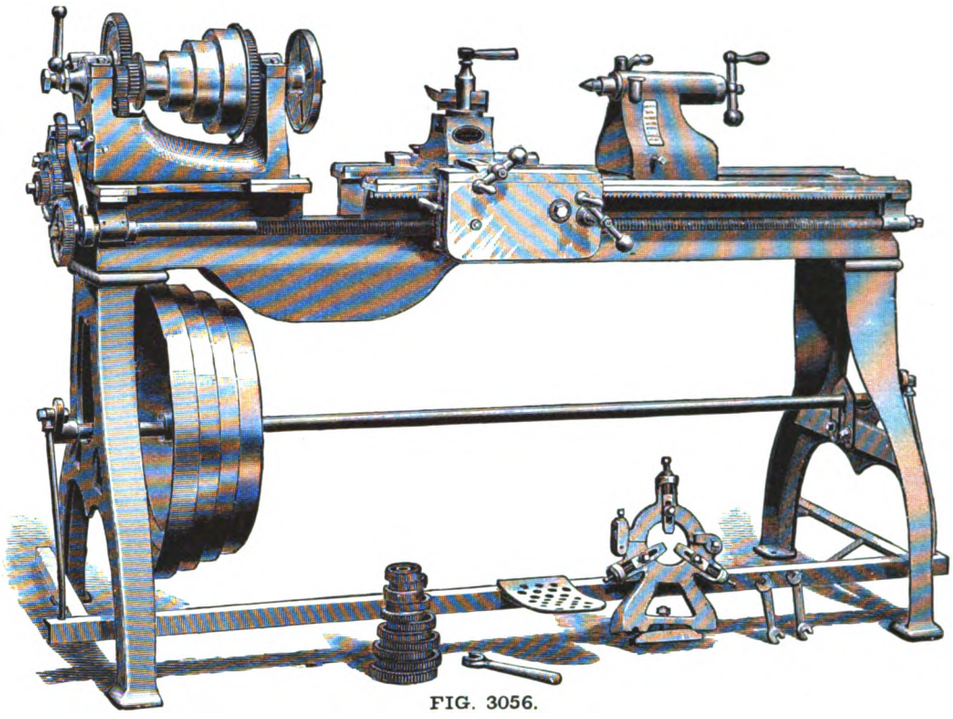


FIG. 3056.

PRICES, WITH EITHER FOOT MOTION OR COUNTERSHAFT.

Swing.	Length of bed.	Between centres.	Weight.	Price.
14 in.	6 ft.	40 in.	1,000 lbs.	$175.00
14 "	7 "	52 "	1,070 "	185.00
14 "	8 "	64 "	1,140 "	195.00
14 "	9 "	76 "	1,200 "	205.00

We put the compound slide rest on these lathes for $15.00 extra.
We put a rod feed on either the gap or straight bed lathes for $20.00 extra.
Hand rest, $3.00; follower rest, $3.00; raise and fall carriage, $15.00 extra.

PLAIN FOOT LATHES.

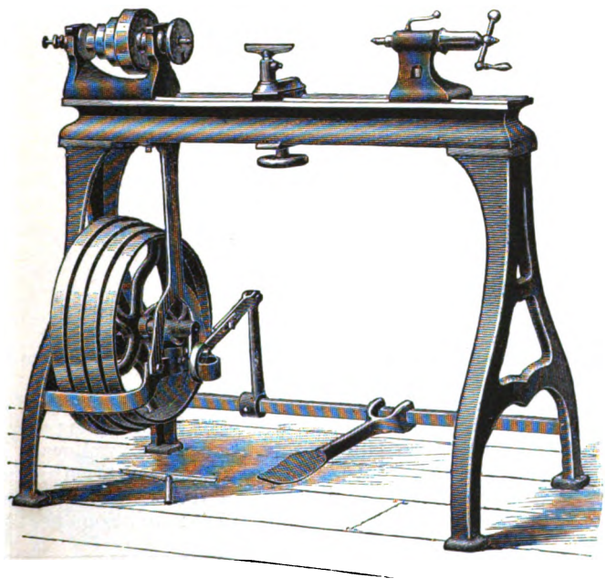


FIG. 3058.

These Lathes are made from new and improved patterns.
The foot motion is of the most approved form.
The 11 inch lathes can be furnished with back gears for $25.00 extra.

PRICES.

Swing.	Length of bed.	Between centres.	Weight.	Price.
9 in.	3½ ft.	24 in.	300 lbs.	$ .....
9 "	4 "	30 "	325 "	.....
11 "	3 "	14 "	375 "	.....
11 "	4 "	26 "	400 "	.....
11 "	5 "	38 "	440 "	.....

STUD AND BOLT LATHE.

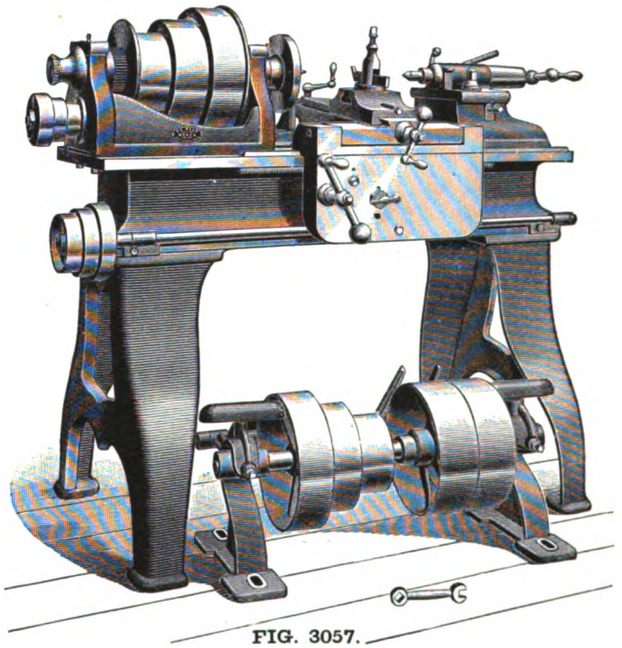


FIG. 3057.

16 INCHES SWING.

This is a very heavy and powerful Lathe, and is calculated for removing a large amount of metal at a single cut.

Has hollow spindle, the front bearing of which is 2 5/16 inches diameter by 4⅛ inches long.

Cone pulley has 3 changes, 7, 9½ and 12 inches diameter by 3 inches face.

Raise and fall gib rest extra large and strong.

Feed works are driven by a patent friction, and are capable of carrying any cut the power in the head can make, and are provided with an automatic stop motion, which can be set at any point, and a boy can run two or more of these machines, on ordinary work.

It is made without back gears or screw cutting attachment.

Extra, per foot, $8.00. Weight, per foot, 75 lbs.

Countershaft has self-oiling boxes and tight and loose pulleys, 12 inches diameter by 3 inches face, and should make 150 revolutions per minute.

PRICES.

Swing over bed.	Length of bed.	Turns.	Swing over rest.	Weight.	Price.
16 in.	5 ft.	26 in.	7 3/4 in.	1 300 lbs.	$ .....

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BENCH LATHES.

BENCH LATHE.

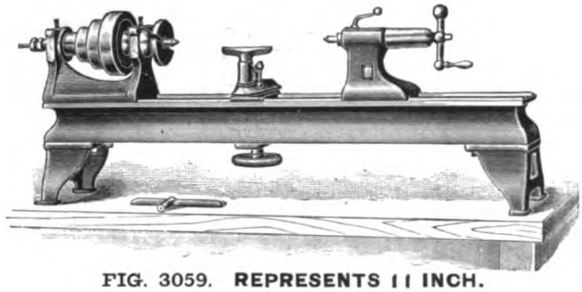


FIG. 3059. REPRESENTS 11 INCH.

Swing.	Length of bed.	Distance between centers.	WEIGHT.	PRICE.
in.	ft.	in.	lbs.	
9	3½	24	160	$
9	4	30	170	
11	4	28	235	
11	5	40	260	

These lathes are well made in every particular, and from new patterns. Cone pulley in the head is turned inside as well as out, insuring a perfectly balanced and true running head.

Head spindles are made of cast crucible steel, and are hollow.

Pulleys on countershaft are 6 inches diameter by 2 inches face, and should make 300 revolutions per minute.

Countershaft included with lathe at prices quoted.

TAIL STOCK WITH LEVER MOTION.

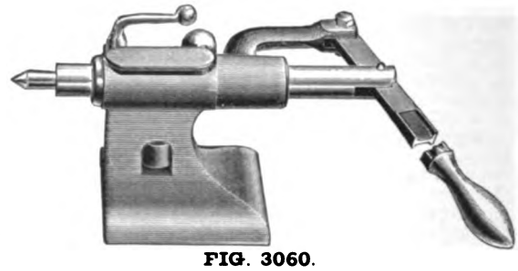


FIG. 3060.

Lever motion can be furnished with any size hand lathe, Figs. 3057 to 3061, instead of screw feed, at the same price.

Extra will be charged if both lever and screw are desired.

HAND LATHES.

11 INCH HAND LATHE.



FIG. 3061.

These lathes are well made in every particular.

Cone pulley in the head is turned inside as well as out, insuring a perfectly balanced and true running head.

Head spindles are made of cast crucible steel, and are hollow.

Countershafts for 9 and 11 inch lathes have tight and loose pulleys 6 inches diameter by 2 inches face, and should make 300 revolutions per minute.

Countershaft for 14 inch lathe has tight and loose pulleys 8 inches diameter by 2¾ inches face, and should make 240 revolutions per minute.

Countershaft for 16 inch lathe has tight and loose pulleys 10 inches diameter by 3 inches face, and should make 190 revolutions per minute.

Countershaft always included with lathe at prices given.

Swing.	Length of bed.	Distance between centers.	Weight.	PRICE.
9 in.	3½ ft.	24 in.	210 lbs.	$
9 "	4 "	30 "	225 "	
11 "	4 "	28 "	340 "	
11 "	5 "	40 "	380 "	
14 "	4 "	21 "	500 "	
14 "	5 "	33 "	570 "	
14 "	6 "	45 "	640 "	
14 "	8 "	69 "	710 "	
16 "	4 "	17 "	560 "	
16 "	5 "	29 "	630 "	
16 "	6 "	41 "	700 "	
16 "	8 "	65 "	770 "	

HAND LATHES WITH BACK GEARS.

14 INCH SWING.

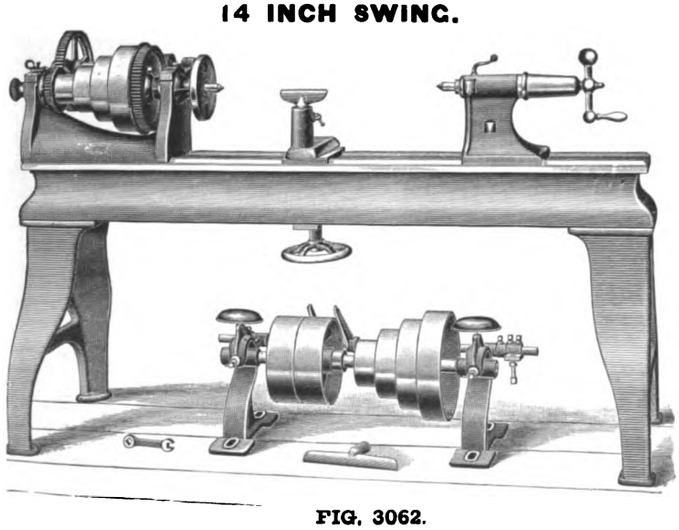


FIG. 3062.

These lathes have hollow spindles in head, and the cones are turned inside as well as out.

Countershaft for 11 inch lathe has tight and loose pulleys 6 inches diameter by 2 inches face, and should make 285 revolutions per minute.

Countershaft for 14 inch lathe has tight and loose pulleys 8 inches diameter by 2¾ inches face, and should make 225 revolutions per minute.

Countershaft for 16 inch lathe has tight and loose pulleys 10 inches diameter by 3 inches face, and should make 175 revolutions per minute.

Swing.	Length of bed.	Distance between centers.	Weight.	PRICE.
11 in.	4 ft.	26 in.	345 lbs.	$
11 "	5 "	38 "	395 "	
14 "	4 "	18 "	500 "	
14 "	5 "	30 "	570 "	
14 "	6 "	42 "	640 "	
14 "	8 "	66 "	710 "	
16 "	4 "	15 "	560 "	
16 "	5 "	27 "	630 "	
16 "	6 "	39 "	700 "	
16 "	8 "	63 "	770 "	

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SLIDE RESTS.

The special advantages of this rest are that the screw is in the centre of the rest and entirely covered, thus being protected from dirt and flying chips. The hand wheels for all sizes, except that for 9 and 10 inch lathes, are changeable to either end of the screw. It is mounted on a swivel base, can be set to any required angle, and can be attached to any style lathe. All sliding surfaces are carefully fitted by scraping. These rests are kept in stock.

LENGTH OF REST.	SWING OF LATHE.	PRICE.
9 in.	9 and 10 in.	$.....
12 "	11 and 12 "	.....
15 "	14 "	.....
15 "	16 "	.....

FOR LATHES, FIGS. 3058, 3059, 3061 AND 3062.

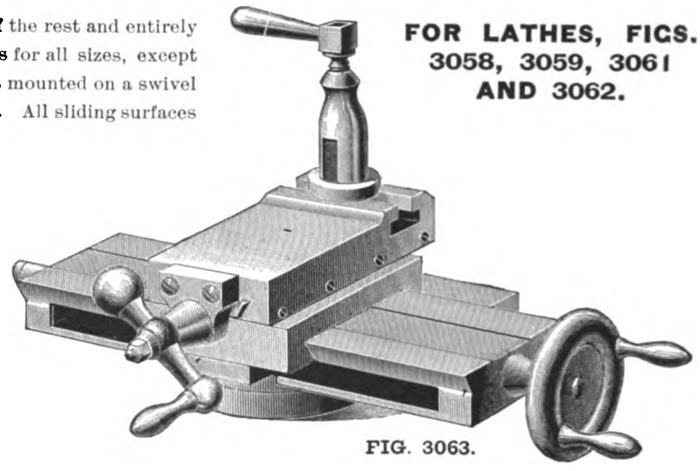


FIG. 3063.

LATHE TOOLS.

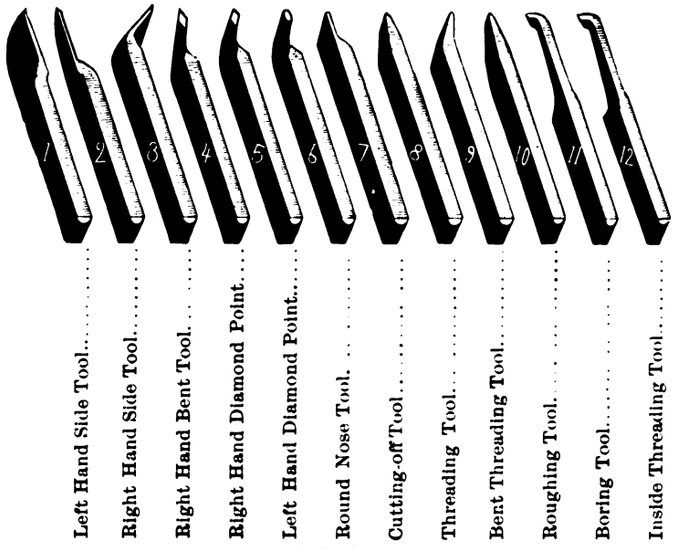


FIG. 3064.

They are forged and tempered with special care, so they can be used until worn out, without re-forging.

PRICES PER SET OF 12 TOOLS.

For slide rests, use					⅜ in.	x	⅝ in.	stock, price,	$3.00
For engine lathes, 10 in. and 11 in. swing,					⅜ "	x	¾ "	" "	3.00
For	"	"	14 " and 16	"	"	½ "	x 1	" "	6.00
For	"	"	18, 20 and 22	"	"	⅝ "	x 1¼	" "	9.00
For	"	"	24	"	"	⅝ "	x 1½	" "	11.00
For	"	"	27 and 30	"	"	¾ "	x 1½	" "	13.00

CENTRE GRINDER.

A LATHE ATTACHMENT FOR GRINDING HARDENED CENTRES IN PLACE.

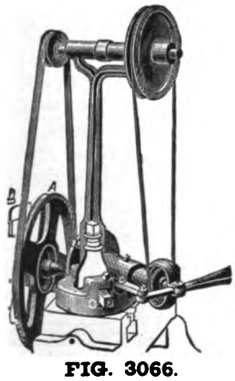


FIG. 3066.

MODE OF OPERATION.—A small emery wheel is suitably mounted to receive motion from the lathe, as shown. The driving pulley A is placed against the face plate, quickly centred, and temporarily held in place by the cup piece B (with the dead centre brought up against it), then secured by two bolts.

The casting C is set over the tool post and secured by a short bar through the slot, after adjusting to angle desired for grinding centre.

Setting the two half circle points, seen on the machine, in line with face plate, or at right angles with shears of lathe, 60°, the usual angle for centres is obtained. Any other angle, however, may as readily be had. Centre of emery wheel should be at same height as lathe centre.

PRICE, $15.00.

HAND OR SPEED LATHES.

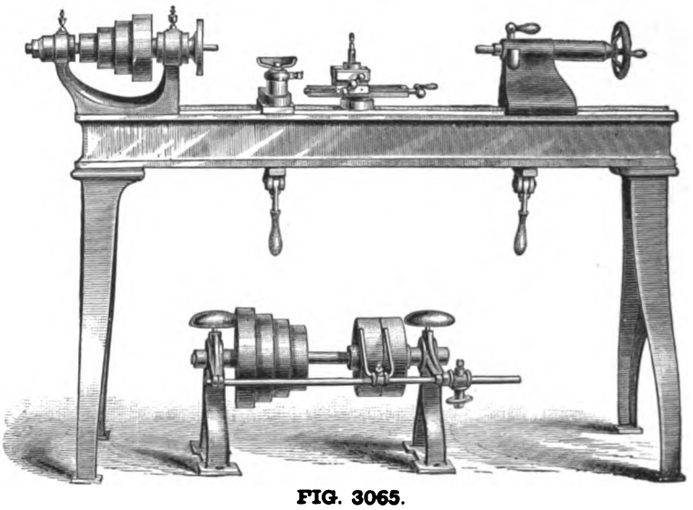


FIG. 3065.

Speeds of countershaft for hand lathes of course vary very much with different kinds of work, but the speeds given below we find about right for machine work.

10 in.	hand	lathe,	tight	and	loose	pulley,	6 x 2,	.	about	400 revs.
12 "	"	"	"	"	"	"	8 x 2¼,		"	300 "
15 "	"	"	"	"	"	"	10 x 3,	.	"	225 "

PRICES.

	WEIGHT.	PRICES
10 in. x 4 ft.....	400 lbs.	$60.00
12 " x 4 "	450 "	72.00
12 " x 5 "	500 "	75.00
12 " x 6 "	550 "	78.00
12 " x 6 " back geared	550 "	100.00
15 " x 6 "	700 "	100.00
15 " x 8 "	800 "	107.00
15 " x 10 "	900 "	115.00

SLIDE RESTS FOR FIG. 3065.

10 in.	rests,	feeds	lengthwise,	6	in.	cross feed,	2 in.	$	.....
12 "	"	"	"	7½	"	"	3 "		.....
15 "	"	"	"	9	"	"	4 "		.....

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UNIVERSAL HAND LATHE.

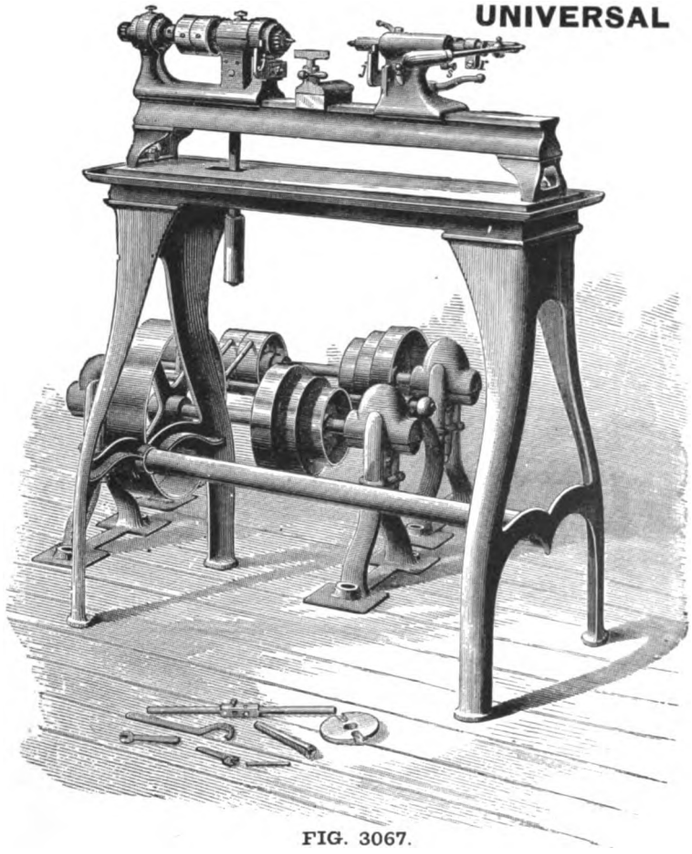


FIG. 3067.

DESCRIPTION, FIG. 3067.

The tool holder guides, on the head and foot stock, may be set in or out, and enable the lathe to be used for turning small shafts, studs, screws, etc., either straight or taper, and for finishing many classes of work for which an engine lathe is ordinarily used.

The lathe has ½ hollow spindle.

The lathe swings 9 inches over bed, and receives 14 inches between centers. The bed is 36 inches long.

The overhead works consist of two countershafts. The first has tight and loose pulleys, 6 inches in diameter, 2½ inch face, also a three step cone pulley. The second countershaft has a corresponding cone pulley, and a driving pulley. The hangers have adjustable and self-oiling boxes. The first shaft should run about 300 revolutions per minute.

WEIGHT, 500 LBS. PRICE, $ .....

An extra slide rest and a center rest are furnished when desired.

PRICE, EXTRA SLIDE REST, $ .....
" CENTER REST, - $ .....

DESCRIPTION, FIGS. 3068 TO 3071.

Figs. 3068 and 3069, Hand Lathes. The spindles have hardened steel conical bearings, fitted with adjustable compound back center to take up wear.

The bearings are ground on all sides.

This lathe swings 12 inches, and on 4 foot bed takes 26 inches between centers; cone has 4 steps for 1½ inch belt, and can be run at any speed, as it is turned all over and carefully balanced.

The tailstock is fitted with either lever or screw feed, as shown in the two cuts. Along the back of the bed is fitted a wooden shelf 10 inches wide.

Counter has fast and loose pulleys, 7 inches by 2½ inches, with turned iron cone.

Extra for ¾ hole through live spindle, - $5.00
Deduct for long legs and shelf, - - - 5.00

Fig. 3070, Compound Slide Rest. It has a cross feed of 7½ inches and 6½ inches the other way.

PRICE, FOR 12 INCH LATHE, $45.00

Fig. 3071, Compound Slide Rest. It has a cross feed of 6½ inches and 5 inches the other way.

PRICE, $42.50.

12 AND 10 INCH HAND LATHES.

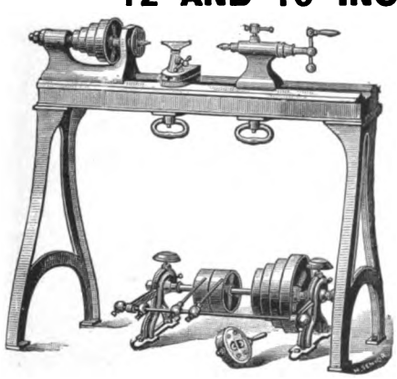


FIG. 3068.

PRICES.

12 inch, - - - - - $85.00



FIG. 3069.

PRICES.

12 inch, - - - - $85.00

COMPOUND SLIDE RESTS FOR FIGS. 3068 AND 3069.

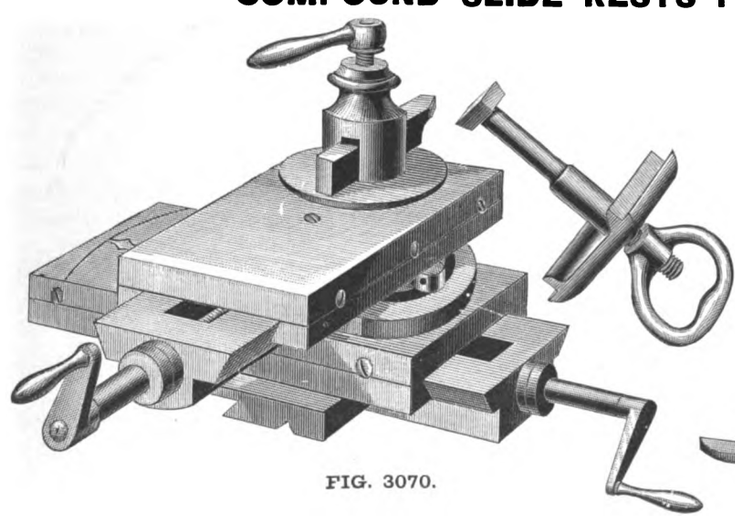


FIG. 3070.

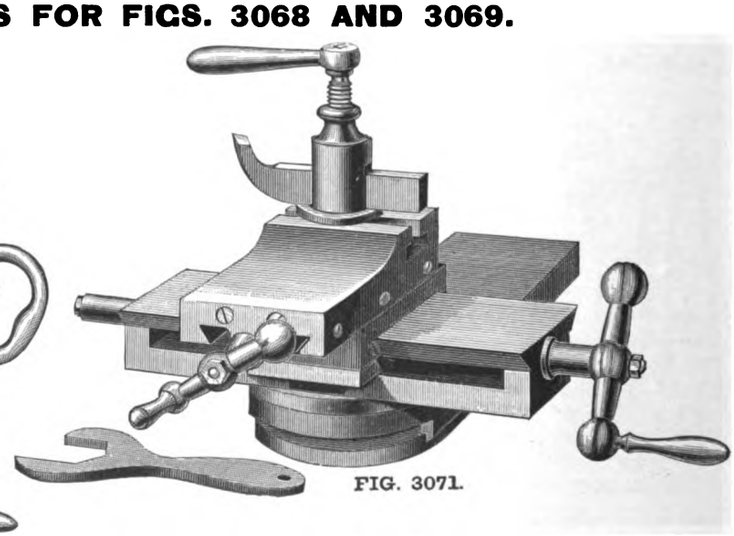


FIG. 3071.

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HAND LATHES.

10 INCH SWING.

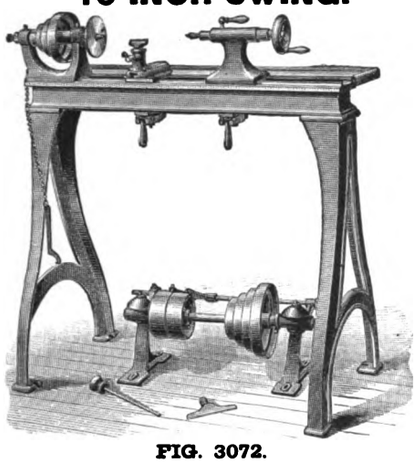


FIG. 3072.

PRICES, FIG. 3072.

Hole through spindle	$\frac{3}{8}$ in. diam.
Length of bed	40 in.
Distance from floor to center of spindle	14 in.
Distance between centers	24 in.
Actual swing of lathe	10½ in.
Tight and loose pulleys on countersh'ft	6x2 in.
Speed of countershaft	235 rev.
Weight, complete	300 lbs.
Price, on high legs, with shelf	$60.00
" " low legs, for bench	55.00
" lever attachment	10.00

12 INCH SWING.

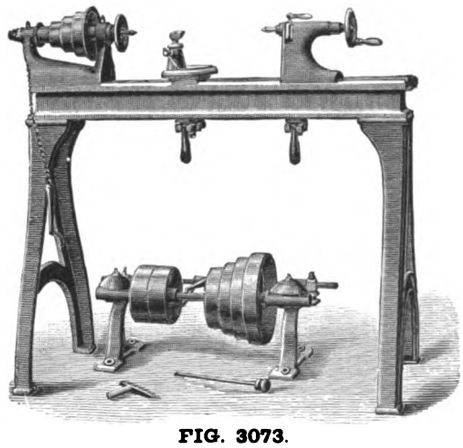


FIG. 3073.

PRICES, FIG. 3073.

Hole through live spindle	$\frac{17}{32}$ in. diam.
Length of bed	4 ft.
Distance from floor to center of spindle	45 in.
Distance between centers	26 in.
Actual swing of lathe	13 in.
Tight and loose pulleys on countershaft	8x2½ in.
Speed of countershaft	220 rev.
Weight, complete	430 lbs.
Price of lathe	$75.00
" lever attachment	10.00

15 INCH SWING.

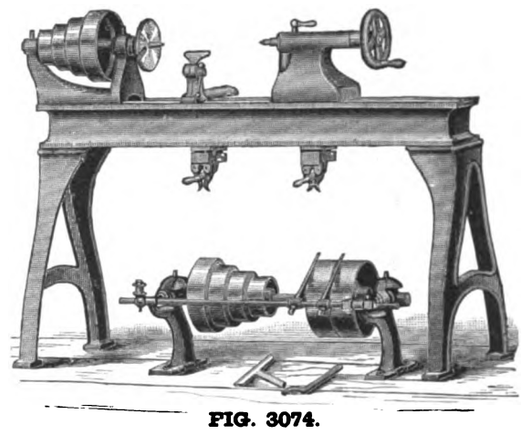


FIG. 3074.

PRICES, FIG. 3074.

Hole through live spindle	$\frac{11}{16}$ in. diam.
Length of bed	5 ft.
" between centers	30 in.
Distance from floor to center of spindle	42 in.
Actual swing of lathe	15½ in.
Tight and loose pulleys on countershaft	10x3 in. face.
Speed of countershaft	185 rev.
Weight, complete	645 lbs.
Price, as shown in cut	$100.00

SLIDE RESTS FOR ABOVE.

The screws are steel, and the sliding surfaces are scraped to bearing. There is a quickly adjusted elevated arrangement for the tool post, which, together with its other advantages, makes this a first-class tool in every respect.

For 15 in. Lathe, feeds lengthwise, 8 in. cross feed, 3 in.								Price,	$45.00
" 12 "	"	"	"	8 "	"	2¾ "		"	40.00
" 10 "	"	"	"	7 "	"	1⅞ "		"	25.00

FINE BENCH LATHE.

PRICES AND DIMENSIONS, FIG. 3075.

Length of bed, 27, 30 or 33 inches, as ordered.

Between centers, 12, 15 or 18 inches, as ordered.

Swing, 7 inches.

Cone pulley, $4\frac{4}{16}$, $3\frac{3}{16}$ and 2 inches diameter by $1\frac{1}{16}$ inch face.

Lathe, including centers and T-rest, 18 inches between centers	$105.00
" " " " 12 inches "	100.00
Slide rest	50.00
Grinding attachment, for inside and outside work	30.00
Center rest	5.00
Four spindle revolving tailstock	100.00
Three spindle tumble rest	75.00
Double ended slide rest (levers)	65.00
" " (screws)	110.00
Boring rest	75.00
Screw cutting attachment, including change gears to cut from 14 to 200 threads per inch	115.00
Grinding rest	80.00
Push spindle tail stock, closed or half open	25.00
Countershaft, for lathe, two speeds	12.00
" " three "	18.00
Grinding countershaft	13.00
Self-centering spring chucks, hardened and ground true	2.50
Face chucks, 2 inch	2.00
" 3 inch	3.00
Opening chucks	2.00
Expanding mandrel for opening chuck	1.50
Face plate, 3 inch	2.50
" 5 inch	3.50
" 7 inch, with T-slots and angle iron	8.00
Crotch or V center	2.00
Drill pad center, 1 inch	1.00
" " 2 inch	1.50
" " 3½ inch	2.25
" " 5 inch	3.00

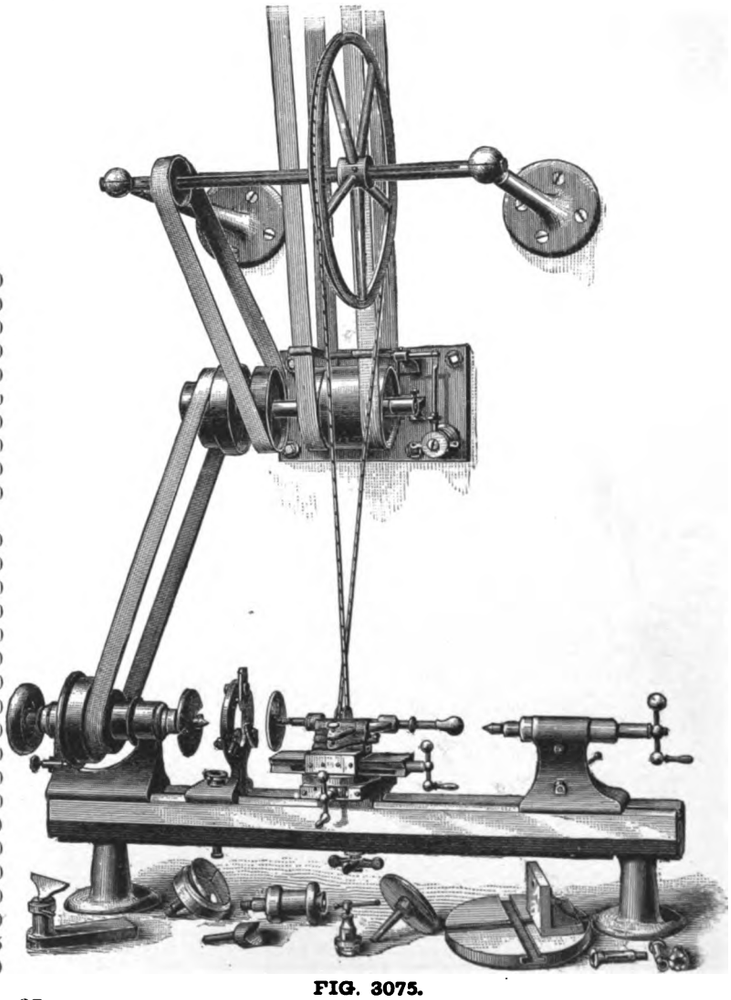


FIG. 3075.

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SPINNING LATHE.

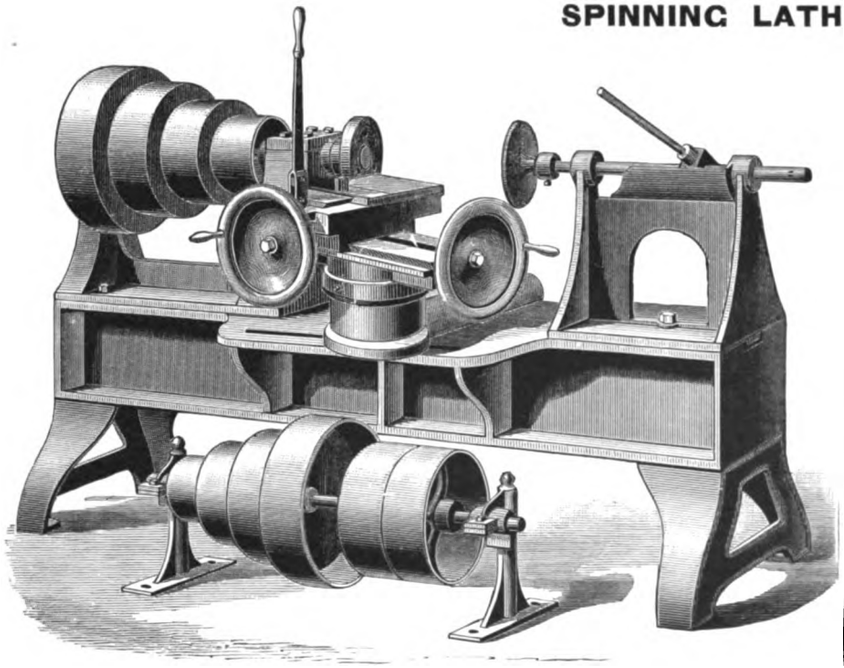


FIG. 3076 REPRESENTS NO. 6.

These Lathes are for spinning, burnishing, trimming and wiring such work as is produced by the drawing presses, where such spinning is necessary. They are also used for hand spinning from the flat, and when intended for that purpose a T rest is provided, instead of the compound rest.

By use of the tilting rest all but the largest articles can be spun, trimmed and wired at one setting. A countershaft, with tight and loose pulleys and cone, is provided with each lathe.

No. of Lathe,	No. 4.	No. 5.	No. 6.
Price of lathe and countershaft, without compound rest, burnisher, trimming or wiring attachment,	$125.00	$140.00	$260.00
Compound rest,	100.00	125.00	150.00
Anti-friction burnisher,	35.00	40.00	40.00
Trimming attachment,	30.00	35.00	35.00
Wiring attachment,	10.00	10.00	10.00
Tilting rest alone,	25.00	25.00	30.00
Price, complete, as above,	$325.00	$375.00	$525.00
Weight, about,	850 lbs.	1,200 lbs.	3,000 lbs.
Length of bed,	54 ins.	50 ins.	77 ins.
Swing over bed,	20 ins.	22 ins.	30 ins.
Swing over rest,	15½ ins.	17 ins.	20 ins.
Diameter of cones,	5, 7½, & 10 ins.	6, 8 & 10 ins.	7, 10, 13, 16 ins.
Face of cones,	2¼ ins.	3 ins.	4 ins.
Diameter of T. and L. pulleys on countershaft,	12 ins.	12 ins.	16 ins.
Width of T. and L. pulleys on countershaft,	3 ins.	3 ins.	5 ins.
Speed of countershaft per minute	300 rev.	250 rev.	200 rev.

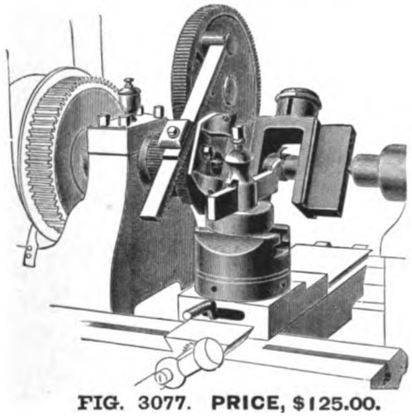


FIG. 3077. PRICE, $125.00.

Oval Chuck, including anti-friction back piece, 16 inches in diameter, with greatest difference between long and short diameter of oval 3½ inches, ... $100.00

Oval Chuck, 38 inches in diameter, with difference in ovals of 10 inches, . . .

Cast steel spinning chucks furnished of any desired pattern.

CROSSHEAD PIN TURNING ATTACHMENT FOR LATHE.

This machine rotates the crosshead back and forth, saving the time of one or two men. The tool cuts more than half way around the pin; the crosshead is then reversed on centres, and the other half turned, completing the pin.

One machine covers all sizes of crosshead pins, from the smallest up to a pin 5 inches in diameter for a 200 horse power engine.

Larger machines built to order. The rack Pitman, driving pinion, rack pinion, wrist pin for rack, and stud for large gear, are made of steel. The gears and rack are all cut from solid stock.

SLATE'S PATENT CUTTING-OFF TOOL.

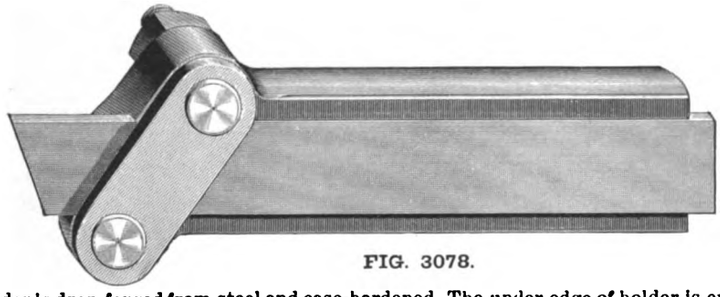


FIG. 3078.

The holder is drop-forged from steel and case-hardened. The under edge of holder is extended, giving blade firm support directly under cut.

The blades are 6 inches long, ⅞ inch wide, milled and ground on both sides to give proper clearance.

This tool is handy in planer or shaper. Splining shafts, and for many uses, the 5-32 to 7-32 blades make a cheap planing tool. The shank of holder entering tool post is 1⅛ x ½ inch.

Price of No. 2 holder and ⅛ blade, $2.50.

OFFSET HOLDER.

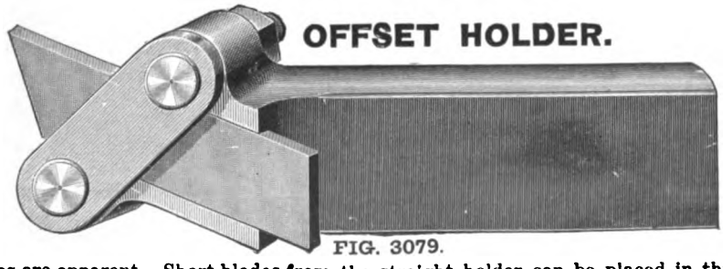
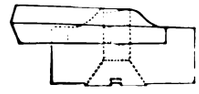


FIG. 3079.

Its uses are apparent. Short blades from the straight holder can be placed in this. With the holder a full length blade is sent. Shank of holder, 1⅛ x ½ inch.

Price of No. 2 offset holder and ⅛ blade, $2.50.

SLATE'S DIAMOND POINT HOLDER.



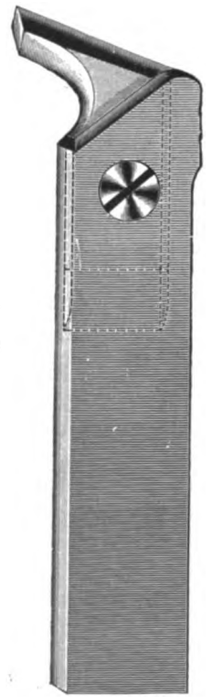


FIG. 3080.



FIG. 3081.

DIAMOND POINT, FULL SIZE.

The shank of holder is 1¼ x ½ inch. The diamond point is shown full size. These tools are cheap, are drop-forged from best tool steel, are convenient, can be kept in stock in tool-room and given out, saving time of forging and time waiting in many cases. The cost of a diamond point is less than the tool steel in rough.

Price of No. 1 holder and diamond point, $1.00.

Diamond Points, each, 20 cents.

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CRESCENT CUT-OFF TOOL.

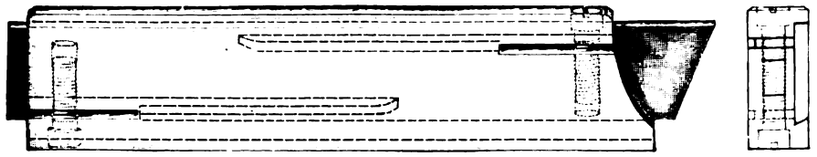


FIG. 3082.

The design of this tool shows a steel case-hardened holder, with milled recess for receiving a blade or cutter.

This tool will meet the wants of users who desire to withdraw the holder from tool post without changing position of same. A careful consideration of the design will show superiority over tools similar in shape.

The upper edge of recess stands at right angle to back, the lower edge at angle of 80°. Transverse slots are cut from top and bottom of either end entirely through stock of holder for a short distance, the cuts being continued, overlapping each other at the centre, where the slots do not extend through the metal. The small set screws in either end are used to draw the parts together temporarily for grinding, etc., and are not intended to aid in holding it when cutter is in use.

The blade is held while in use by the pressure of the binding screw in tool post, and a sufficient stock of metal is provided to prevent holder becoming permanently bent or set, at point of contact. The blade requires grinding on end only. The upper edge is square and always ready for use. The blade used is the same as in the Slate cut-off holders, with the exception of the under edge, which is beveled on 10° angle, to fit slot in holder.

Size of No. 2 holder, 1¼x½ inch; blades, 6½ inches long, ⅞ inch wide.
Size of No. 3 holder, 1⅞x⅝ inch; blades, 7 inches long, 1 inch wide.

Price of No. 2 holder and ⅛ blade, $2.50.
Price of No. 3 holder and ⅛ blade, $3.00.

PRICES OF PARTS, FIGS. 3078 TO 3082.

Slate's cut-off tool, No. 2, straight and blade	$2 50
" " " " 2, offset and blade	2.50
Crescent cut-off tool, No. 2	2.50
" " " " 3	3.00
Diamond point holder and one diamond point	1.00
Diamond points, each	.20
Blades for Slate or crescent tool, No. 2—	
1-16 inch	.30
3-32 "	.30
1-8 "	.30
5-32 "	.35
3-16 "	.40
7-32 "	.45
1-4 "	.50
Blades for crescent holder, No. 3—	
1-8 inch	.40
5-32 "	.45
3-16 "	.50
7-32 "	.55
1-4 "	.60
Clip No. 1, used on old style tools, each	.08
Bolt No. 2, used with strap No. 4, each	.04
Bolt No. 3, used with strap No. 5	.04
Strap No. 4	.08
Strap No. 5	.08
Hardened nuts, No. 6, each	.07

The old style holders on which the No. 1 clip was used can now be fitted with strap No. 4 and bolt No. 2.

INDISPENSABLE LATHE DOG.

It can be attached to work after the work is centred in the lathe. It can be used equally as well BETWEEN COLLARS as upon plain or straight work.

A large dog can be used on a light mandrel where the work is large in circumference. It can also be used for locking work on the mandrel in case of it slipping.

OUR GREAT CLAIM is that one set of THREE INDISPENSABLE DOGS will do the work that it usually requires from ten to twelve of the old style of dogs to do, and at about ONE-HALF THE COST.

They are made of drop-forged steel and fitted with steel set-screws.

PRICES.

No. 0 for amateurs, jewelers and tool makers, takes from ¼ to 1 in	each, $1.00
" 1 " general lathe work, takes from ¼ to 1¼ inch	" 1.50
" 2 " " " " " ½ " 2¼ "	" 2.50
" 3 " " " " " 1 " 3¼ "	" 3.50
Per set of three, to take from ¼ to 3¼ inch, comprising one each, Nos. 1, 2 and 3	7.50



FIG. 3083.

DROP FORGED STEEL DOGS.

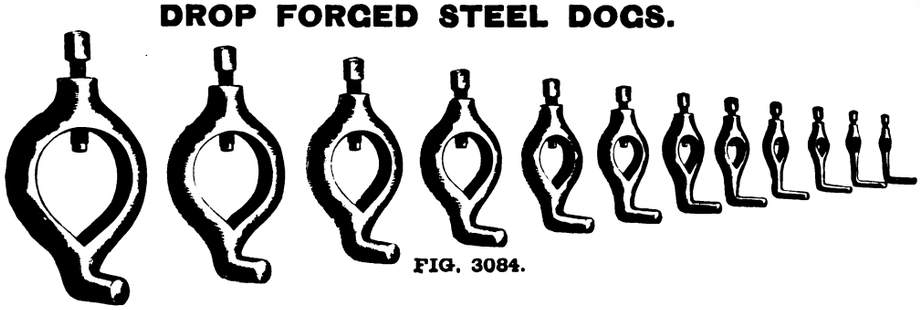


FIG. 3084.

PRICES, FIG. 3084.

⅜ inch	$0.50	1¾ inch	$1.25
½ "	.60	2 "	1.40
¾ "	.70	2½ "	1.60
1 "	.80	3 "	1.80
1¼ "	.95	3½ "	2.00
1½ "	1.10	4 "	2.30

MECHANIC'S CLAMP.

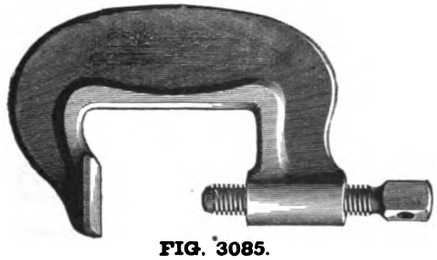


FIG. 3085.

THE BACK IS 1 1-2 INCHES FROM CENTRE OF SCREW.

No. 1, opens 2 inches	$1.25
" 2, " 3 "	1.50
" 3, " 4 "	1.75
" 4, " 5 "	2.00
" 5, " 6 "	2.25
" 6, " 7 "	2.50
" 7, " 8 "	2.75
" 8, " 9 "	3.00
Full set	$17.00

EXTRA HEAVY STEEL BRIDGE CLAMP.

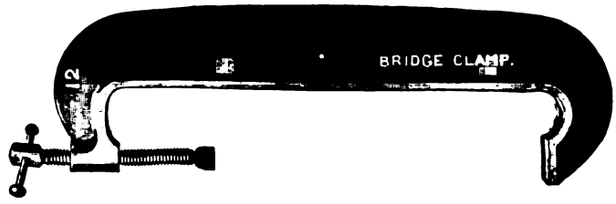


FIG. 3086.

THE SCREW IS HEAVY AND HAS BUTTON ON THE END.

No. 12, opens 24 inches	$12.00
" 13, " 30 "	16.00

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HEAVY STEEL CLAMP.

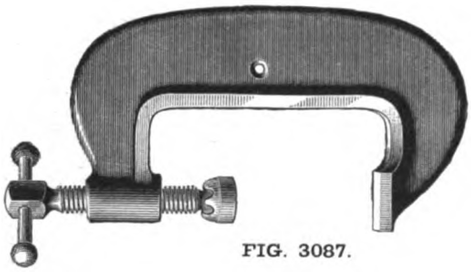


FIG. 3087.

Extra heavy, with button on end of screw, hung on a ball so as to accommodate itself to irregularities without bending the screw. The foot of the clamp is planed.

The back is 2½ inches from centre of screw.

PRICES.

No. 1,	opening to	2 in.	$1.75	No. 7,	opening to	10 in.	$3.75
" 2,	"	" 3 "	2.00	" 8,	"	" 12 "	4.25
" 3,	"	" 4 "	2.25	" 9,	"	" 14 "	5.00
" 4,	"	" 5 "	2.50	" 10,	"	" 16 "	6.00
" 5,	"	" 6 "	2.75	" 11,	"	" 18 "	7.00
" 6,	"	" 8 "	3.25				

Full set, 11 sizes, $40.50.

LIGHT STEEL BOILER CLAMP.

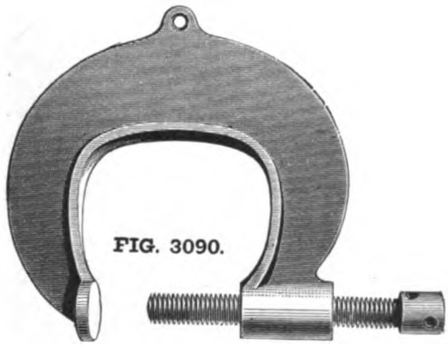


FIG. 3090.

PRICES.

No. 0, opens 2½ in., runs back 2½ in..... $2.00
" 1, " 4 " " " 4½ "..... 4.00

NEW VISE CLAMP.

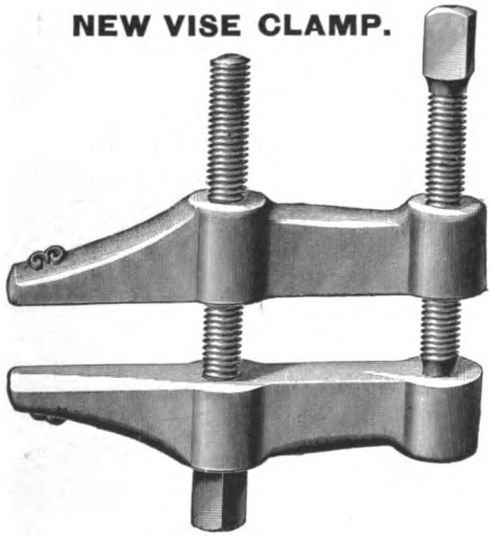


FIG. 3094.

MADE FROM STEEL CASTINGS.

No. 1, opening to 1¼ in..... $1.25
" 2, " " 2¼ "..... 1.50
" 3, " " 3¼ "..... 2.00
" 4, " " 4¼ "..... 2.50
" 5, " " 5¼ "..... 3.25
" 6, " " 6¼ "..... 4.00
Full set..... 14.50

EXTRA HEAVY STEEL BOILER CLAMP.

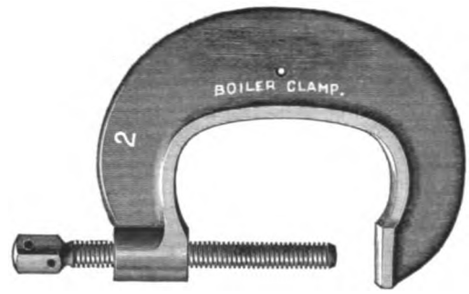


FIG. 3088.

PRICES.

No. 1, opens 4 in., runs back 5 in..... $5.00
" 2, " 6 " " " 5 "..... 7.50
" 3, " 10 " " " 5 "..... 10.00

Screws have square threads; are heavy, and run down to the foot and are hardened at the point.

STEEL CLAMP DOG.

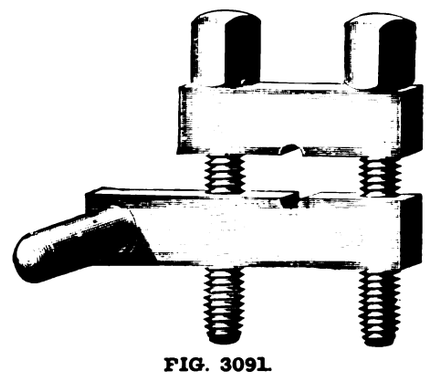


FIG. 3091.

THESE ARE MADE FROM THE STEEL BAR.

PRICES.

No. 1, opens 1 in..... $1.25
" 2, " 1½ "..... 1.50
" 3, " 2 "..... 1.75
" 4, " 3 "..... 2.00
Full set..... 6.50

STEEL DOG WRENCH.



FIG. 3092.

Fitting screw heads from ⅜ to ¾ inch square. Will answer for both dogs and tool post.

PRICE, 75 CENTS.

CLAMP DOG.

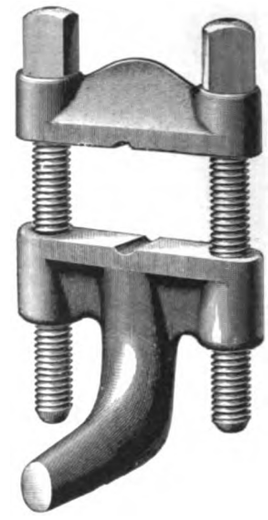


FIG. 3089.

MADE OF MALLEABLE IRON.

PRICES.

No. 1, opens 1 in..... $1.00
" 2, " 1½ "..... 1.10
" 3, " 2 "..... 1.30
" 4, " 3 "..... 1.60
Sets of four..... 5.00

PATENT BOLT DOG

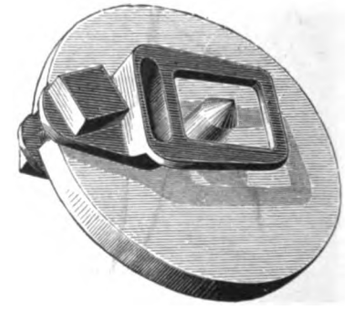


FIG. 3093.

Set of 12 sizes, $\frac{5}{16}$ to 2 in. inclusive.

PRICE, $2.50.

STEEL CHUCK DRILL HOLDER.

PRICES, FIG. 3095.

No. 1, taking drills from ⅜ to $\frac{9}{16}$ in. $0.50
" 2, " " " $\frac{9}{16}$ " ¾ " .50
" 3, " " " ¾ " 1⅛ " .60
" 4, " " " 1⅛ " 1⅝ " .75
" 5, " " " 1⅝ " 2 " .90
Full set..... 3.25

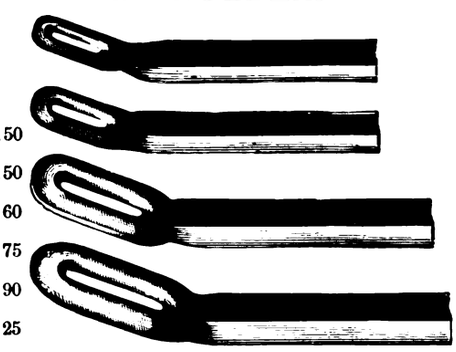


FIG. 3095.

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LATHE DOGS.

HEAVY STEEL DOG.



FIG. 3096.

This dog has a very heavy boss, so that if the thread wears a heavier screw can be substituted.

PRICES.

No. 1	3/8 in.	$0.40	No. 13	2 in.	$1.35
" 2	1/2 "	.50	" 14	2 1/2 "	1.45
" 3	5/8 "	.60	" 15	3 "	1.60
" 4	3/4 "	.60	" 16	3 1/2 "	1.80
" 5	7/8 "	.70	" 17	4 "	2.10
" 6	1 "	.70	" 18	4 1/2 "	2.75
" 7	1 1/8 "	.80	" 19	5 "	3.25
" 8	1 1/4 "	.80	Full set of 19, $23.60.		
" 9	1 3/8 "	.95	No. 20 (ex.)	5 1/2 in.	$4.00
" 10	1 1/2 "	.95	" 21	6 "	5.00
" 11	1 3/4 "	1.10	" 22	7 "	6.00
" 12	2 "	1.20	" 23	8 "	7.00

One small set of 8, by 1/4 in. to 2 in. 6.25
One set of 12, by 1/4 to 2 in. continued by 1/2 to 4 in. 13.20

MALLEABLE IRON DOG.

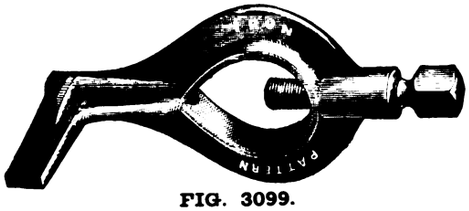


FIG. 3099.

PRICES.

No. 1	3/8 in.	$0.30	No. 7	1 3/4 in.	$0 90
" 2	1/2 "	.30	" 8	2 "	1.00
" 3	3/4 "	.40	" 9	2 1/2 "	1.20
" 4	1 "	.40	" 10	3 "	1.30
" 5	1 1/4 "	.60	" 11	3 1/2 "	1.40
" 6	1 1/2 "	.60	" 12	4 "	1.60

Small set of 8, $4.50. Full set of 12, $10.00.

STRAIGHT TAIL DOG.



FIG. 3097.

This pattern will stand much more than a bent tail, and some prefer them on account of their direct action on the work.

PRICES.

No. 1	3/4 in.	$0.60	No. 11	2 1/2 in.	$1.45
" 2	7/8 "	.70	" 12	3 "	1.60
" 3	1 "	.70	" 13	3 1/2 "	1.80
" 4	1 1/8 "	.80	" 14	4 "	2.10
" 5	1 1/4 "	.80	" 15	4 1/2 "	2.75
" 6	1 3/8 "	.95	" 16	5 "	3.25
" 7	1 1/2 "	.95	" 17	5 1/2 "	4.00
" 8	1 3/4 "	1.10	" 18	6 "	5.00
" 9	2 "	1.20	" 19	7 "	6.00
" 10	2 1/4 "	1.35	" 20	8 "	7.00

One set to 2 inch, $7.80. Full set, $44.10.

EXPANDING MANDREL.

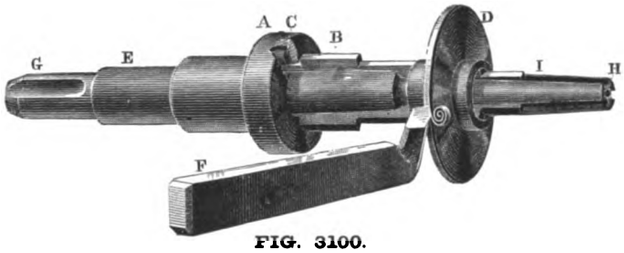


FIG. 3100.

AMATEUR'S SIZE.

Taking anything from 3/8 to 1 inch, inclusive. Price, $5.00.

MACHINIST'S SIZE.

No. 1	1/2 to 1	in. $10.00	No. 4 (with screws)	2 to 3	in. $32.00
" 2	1 " 1 1/2	" 14.00	" 5 "	3 " 4	" 44.00
" 3	1 1/2 " 2	" 18.00			

DIRECTIONS.—To tighten the work drive with a copper hammer or a piece of soft iron or brass, on the large end G, not too hard, to loosen on small end H. You can take a good cut by driving with a one ounce copper or brass hammer, and not drive hard.

This tool is steel, well made, is simple, substantial, cheap and useful. Nos. 4 and 5, owing to their weight, have a screw instead of a sleeve.

LIGHT STEEL DOG.



FIG. 3098.

PRICES.

No. 1	3/8 in.	$0.35	" 9	2 1/2 in.	1.40
" 2	1/2 "	.35	" 10	3 "	1.50
" 3	3/4 "	.50	" 11	3 1/2 "	1.70
" 4	1 "	.60	" 12	4 "	1.90
" 5	1 1/4 "	.75			
" 6	1 1/2 "	.85			
" 7	1 3/4 "	1.00			
" 8	2 "	1.10			

Small set of 8, $5.50.

Full set of 12, $12.00

REVERSIBLE INDEPENDENT FACE PLATE JAWS.

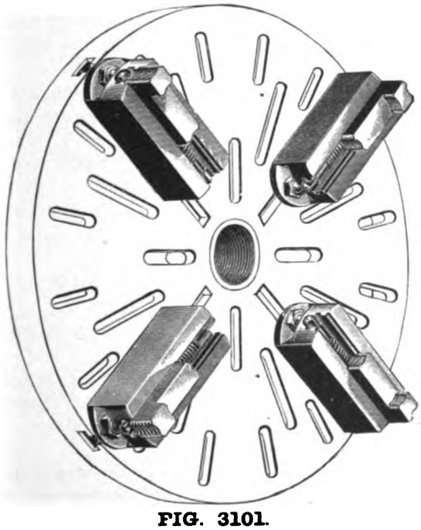


FIG. 3101.

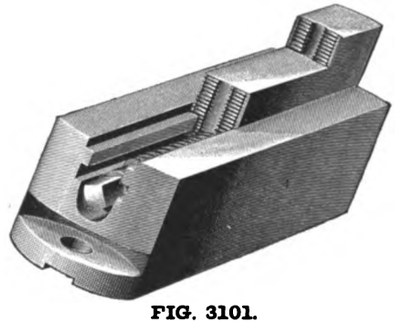


FIG. 3101.

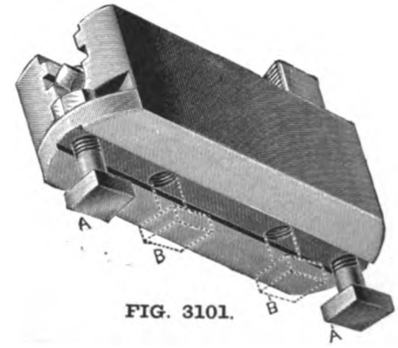


FIG. 3101.

BOTTOM VIEW OF FACE PLATE JAW, WITH BOLTS IN POSITION, FOR ATTACHING TO FACE PLATES HAVING "T" SLOTS.

Size, 10 in. ..... price, per set of three, $60.00; per set of four, $80.00
" 12 " ..... " " " " 90.00; " " " 120.00

These jaws have been recently improved, and as now made are adapted to a great variety of work. The recess for the nut allows of their being used on face plates and tables having a "T" slot, a great advantage over the old style, as when fastened this way they may be readily moved and adjusted. Should it be desirable, however, they may be attached the old way by drilling holes through the face plate and screwing the same bolts directly into the jaws as shown by the dotted lines in the cut, the bodies being already drilled and threaded for that purpose.

They are thoroughly made, the jaws and screws being of open hearth steel. The sliding jaws have parallel groves their entire length, and are operated by a screw having a threaded bearing in the jaw its entire length.

Four of these jaws bolted to the face plate of a lathe or to the table of boring mills, drill presses, etc., make a chuck that is the cheapest, most practical and durable, and at the same time the easiest to handle of any made. They are very strong, and make a perfect and satisfactory substitute for a large chuck at a much less cost.

This is the only face plate jaw in the market that is reversible. The sliding jaw may be run out and turned end for end, or the body may be reversed. The screws are squared at each end and may be reversed, if desired. The jaws may be put on and taken off the plate very easily, one man doing the work alone, without the use of tackle of any kind—a great advantage over the handling of a large chuck.

We now make them in two sizes, as per list above. The 10 inch are adapted for use on plates from 30 to 40 inch diameter, and the 12 inch for 40 inch and larger. The 12 inch jaws are not only longer, but are heavier and stronger every way than the 10 inch, they being designed for the heaviest class of work.

We furnish two bolts with each jaw and a steel key with each set.

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CUSHMAN 4 JAW REVERSIBLE JAW INDEPENDENT CHUCK.

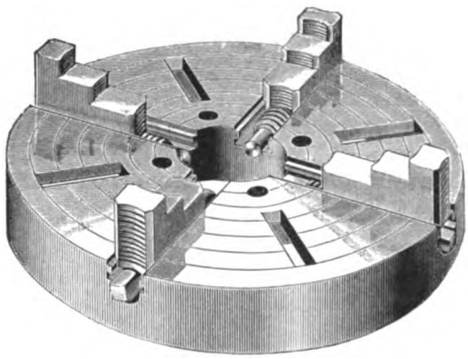


FIG. 3102—FRONT VIEW.

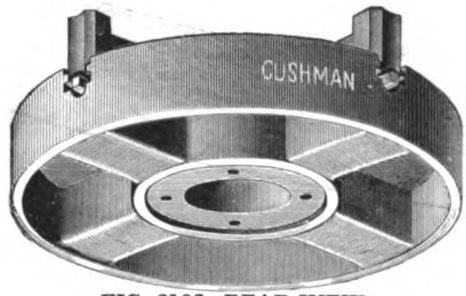


FIG. 3102—REAR VIEW.

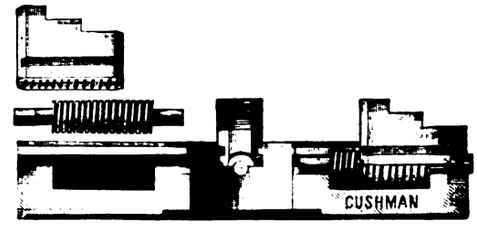


FIG. 3102—SECTION.

Diameter. Inches.	Diameter of hole. Inches.	Diameter of face-plate. Inches.	Price.
4½	1	4 3/16	$14.00
6	1¾	5 1/16	18.00
8	1⅞	4 3/4	22.00
9	1⅞	4 3/4	24.00
10	2	4 3/4	26.00
12	2⅞	6 1/16	30.00
14	3	6 1/16	34.00
15	3	6 1/16	35.00
16	3	6 1/16	38.00
18	4	7 1/16	44.00
20	4	7 1/16	50.00
21	4	7 1/16	55.00
22	4¾	9 1/2	57.00
24	4¾	9 1/2	65.00
26	4¾	9 1/2	75.00

WESTCOTT INDEPENDENT CHUCK.

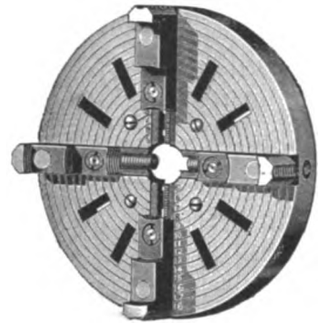




FIG. 3103.

DESCRIPTION, FIG. 3103.

The jaws are made to reverse, and they can also be quickly replaced with other jaws for special work.

On the right is a side view of jaw, with full nut and the screw with its collars, which are solid with the screw.

The shell covers the screw heads, leaving no projections in the rim.

Diameter. Inches.	Capacity. Inches.	Price.
7½	7½	$18.00
10⅛	10⅛	23.00
13	13⅛	30.00
15¼	17	35.00
18	19	44.00
21	25½	55.00
24	28	65.00

WHITON 4 JAW INDEPENDENT CHUCK.

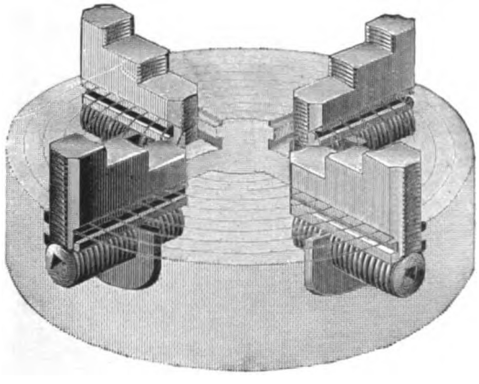


FIG. 3104.

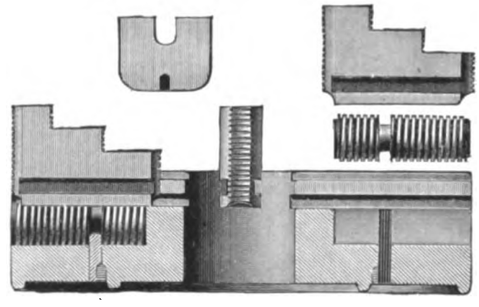


FIG. 3104—SECTION.

DESCRIPTION, FIG. 3104.

The body of the chuck is a single heavy casting, strongly proportioned, and has radial slots open at both ends, in which the jaws slide. Beneath these slots are parallel cylindrical recesses, into which the screws are fitted, and inserted in a *radial* direction. This construction shows clearly in the sectional view. The screws, which are of large diameter, are grooved or necked down near the centre, and are held in place in the chuck by a steel plate having a **U** shaped bearing, as shown. This plate is fitted to a groove in the frame of the chuck and inserted from the back side after the screw is in place. It is thoroughly hardened and receives all the thrust of the screw.

The screws have square recesses in their outer ends, to receive the wrench, which is more easily applied in this way than when the recess is in the wrench, because both squares are always in sight.

By the construction thus described the following advantages are obtained which are not possessed by any other chuck:

1. The screw thread extends fully to the outside of the chuck, so that the jaw has greater traverse than in other independent chucks, and work larger than the diameter of the chuck may be safely held.

2. The entire thrust of the screws in gripping the work is received on hardened steel shoulders, which are very durable. Consequently the backlash from end wear is very much reduced.

3. The screws may be easily removed if desired, but are held in place in the chuck so that they will not fall out or become at all displaced when the jaw is removed.

4. Should the jaw and screw become stuck together from lack of oil or any other cause, they can be removed from the chuck and separated without injury, which is not possible in other chucks.

The workmanship and material are excellent throughout. Both the screws and jaws of all sizes are made from bar steel. The jaws are carefully hardened and in all sizes can be easily reversed, which is a feature of great convenience.

Bolts and wrench are furnished with each chuck, the latter being hardened where it comes in contact with the screw, which is also hardened.

Diam. Inches.	Will hold Inches.	Hole. Inches.	Face plate. Inches.	Price. 3 jaws.	Price. 4 jaws.
6	7½	1 5/8	3 25/32	$16.50	$18.00
7½	9 3/4	2 1/8	4 3/32	18.00	20.00
9	11 3/4	2 3/8	4 29/32	21.00	23.00
12	15	2 15/16	6 5/16	27.50	30.00
15	18	3 1/8	7	31.00	35.00
18	21½	3 7/8	8 5/16	38.00	44.00
21	24½	3 7/8	8 5/16	48.00	55.00
24	27½	3 7/8	8 5/16	56.00	65.00

UNION INDEPENDENT CHUCK.

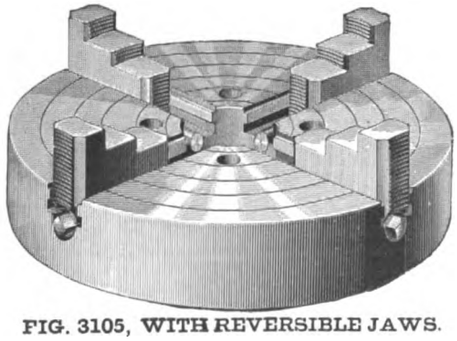


FIG. 3105, WITH REVERSIBLE JAWS.

PRICES, FIG. 3105.

Diameter. Inches.	Weight. Pounds.	Diameter of hole. Inches.	Diameter of face plate. Inches.	Price.
4	6	1	4 3/16	$14.00
6	11	1 3/4	5 1/16	18.00
8	25	1 7/8	4 3/4	22.00
10	35	2	4 3/4	26.00
12	54	3	6 1/16	30.00
14	72	3	6 1/16	34.00
15	80	3	6 1/16	35.00
16	86	3	6 1/16	38.00
18	113	4	7 3/16	44.00
20	122	4	7 3/16	50.00
22	172	4 3/4	9 1/2	57.00
24	193	4 3/4	9 1/2	65.00
30	393	6	15	120.00
36				210.00

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WHITON 3 AND 4 JAW INDEPENDENT CHUCKS.

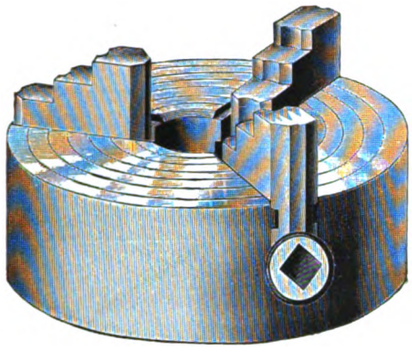


FIG. 3106.

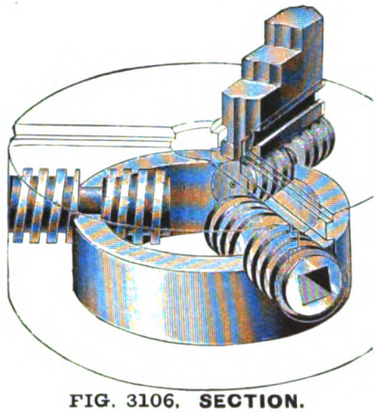


FIG. 3106. SECTION.

PRICES.

Diameter.	Weight.	Diameter of hole.	Diameter of face plate.	Prices, 3 jaws.	Prices, 4 jaws.
2 inch.	¾ lb.	7/16 inch.	1 1/8 inch.	$6.50	$8.00
2½ "	1¼ "	½ "	1 3/32 "	7.50	9.00
3 "	2 "	5/8 "	2 1/16 "	8.50	10.00
4 "	4 "	1 "	2 3/32 "	10.00	12.00
5 "	5¼ "	1 "	2 3/32 "	12.00	14.00

REAR VIEW, NO. 3107 A.

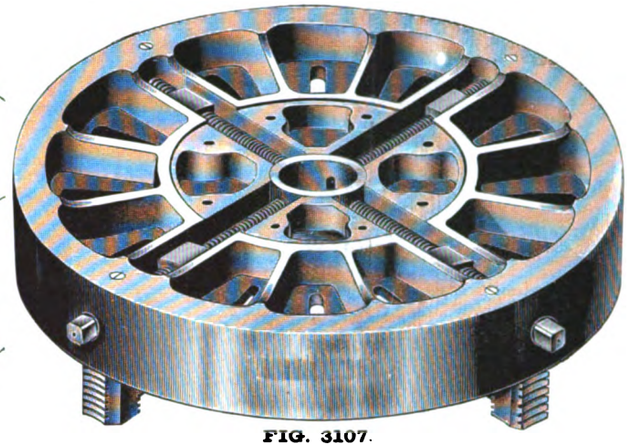
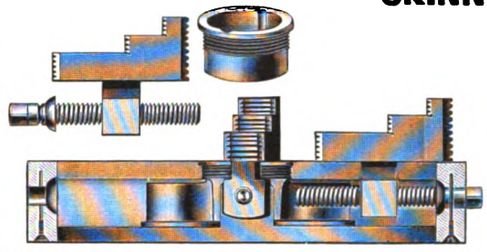


FIG. 3107.

SECTION, FIG. 3107 A.



SKINNER INDEPENDENT CHUCKS.

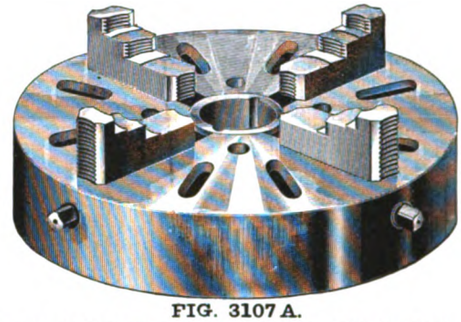


FIG. 3107 A.

PRICES, FIG. 3107 A.

Sizes. Inch.	Diameter of hole through center. Inch.	Diameter of recess for face plate. Inch.	Prices.	Sizes. Inch.	Diameter of hole through center. Inch.	Diameter of recess for face plate. Inch.	Prices.
4	¾	2¾	$14.00	24	3	12	$65.00
6	1¼	4	18.00	26	3	13	80.00
8	1½	4	22.00	28	3	14	100.00
10	1¾	4¾	26.00	30	3¼	15	120.00
12	2	6	30.00	32	3¾	15	150.00
14	2¼	7	34.00	34	3½	15	180.00
16	2¾	8	38.00	36	3½	18	210.00
18	3	8	44.00	38	3¾	18	240.00
20	3	10	50.00	40	3¾	18	255.00
22	3	12	57.00	42	3¾	18	270.00

HORTON INDEPENDENT CHUCK.

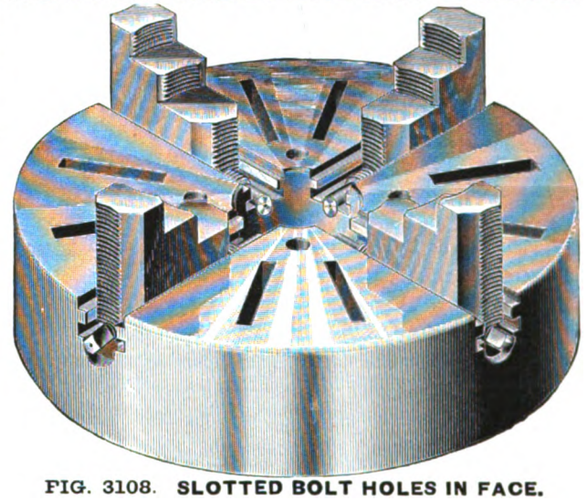
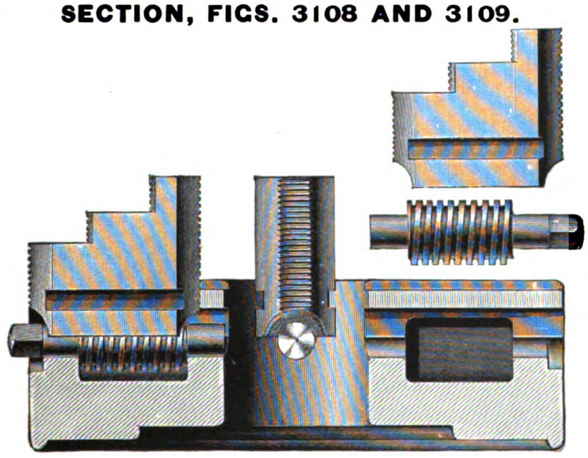


FIG. 3108. SLOTTED BOLT HOLES IN FACE.

SECTION, FIGS. 3108 AND 3109.



HORTON INDEPENDENT CHUCK, 38 INCH ONLY.

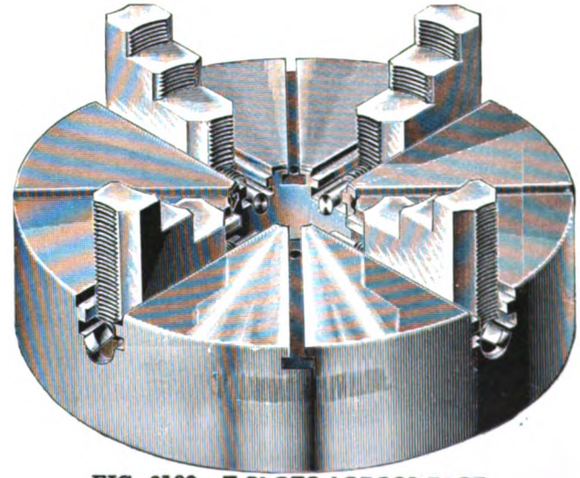


FIG. 3109. T SLOTS ACROSS FACE.

PRICES, FIGS. 3108 AND 3109.

Sizes.	Weight of chuck.	Diameter of hole through center.	Diameter of recess for face plate.	Prices.
4 inch.	5 lbs.	1	3	$14.00
6 "	12½ "	1¼	5 1/16	18.00
8 "	25 "	1 7/8	4 3/4	22.00
9 "	30 "	2	4 3/4	24.00
10 "	35 "	2	4 3/4	26.00
12 "	61⅛ "	3	6 1/16	30.00
14 "	84 "	3	6 1/16	34.00
15 "	100 "	3	6 1/16	35.00
16 "	114 "	3	6 1/16	38.00
18 "	143 "	4	7 1/16	44.00
20 "	190½ "	4	7 1/16	50.00
22 "	216 "	4 3/4	9 1/2	57.00
24 "	254 "	4 3/4	9 1/2	65.00
26 "	340 "	5 1/2	13	80.00
28 "	373 "	5 1/2	13	100.00
30 "	454 "	6	15	120.00
32 "	463 "	6 1/2	15	150.00
34 "	503 "	6 3/4	15	180.00
36 "	520 "	7 1/4	18	210.00
38 "	595 "	7 1/4	18	240.00
40 "	609 "	7 1/4	18	270.00
42 "	625 "	7 1/4	18	300.00

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HORTON UNIVERSAL LATHE CHUCKS.

COMMON 3 JAW CHUCK.

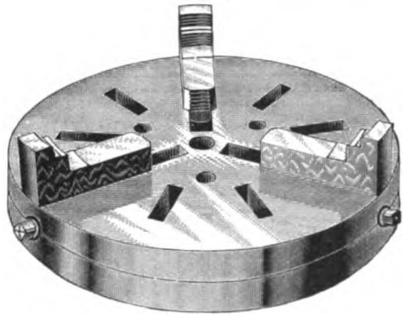


FIG. 3110.

This cut represents all three jaw chucks over 12 inches in diameter. Slots are made entirely through the body of chuck, which makes it very convenient for bolting heavy work to if required. Smaller sizes without slots.

INSIDE JAW CHUCK.

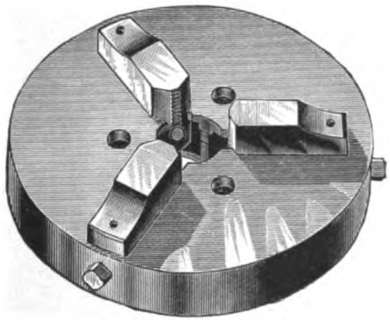


FIG. 3113.

This Chuck is used on milling machines and screw machines, and for holding pipe, rods, drills, dies, etc. The hole in centre of the 6 inch chuck is 1¼ inches in diameter, and will allow a pipe or rod of that size to pass entirely through the chuck. These jaws have the same length of bearing on work as the No. 1 jaw, the bite being on both sides of driving screws. They project from face ½ inch. We make all sizes with this style of jaw, and keep 4, 6 and 9 inch in stock.

PRICES, FIGS. 3110 TO 3114.

4	in.	chuck	.....	3 jaw,	$22.00,	4 jaw,	.....
5	"	"	.....	"	25.00,	"	$30.00
6	"	"	.....	"	26.00,	"	32.00
9	"	"	.....	"	34.00,	"	42.00
12	"	"	.....	"	44.00,	"	56.00
15	"	"	.....	"	52.00,	"	64.00
18	"	"	.....	"	62.00,	"	75.00
21	"	"	.....	"	80.00,	"	95.00
22	"	"	.....	"	90.00,	"	110.00
24	"	"	.....	"	100.00,	"	120.00
26	"	"	.....	"	130.00,	"	160.00
30	"	"	.....	"	170.00,	"	200.00
36	"	"	.....	"	230.00,	"	285.00
42	"	"	.....	"	270.00,	"	325.00

COMMON 4 JAW CHUCK.

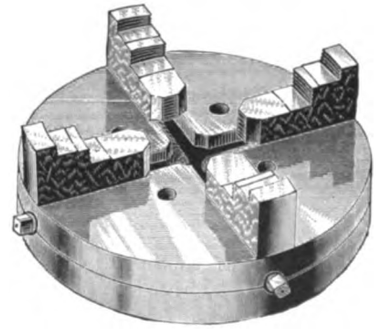


FIG. 3111.

This cut illustrates all 4 jaw universal lathe chucks, and has patent raised seat jaw.

DESCRIPTION, FIG. 3114.

This Chuck is used for holding screws, rods, twist drills, etc. The bite of jaw is outside of chuck, which carries the work away from it, so that it can be readily worked at. For hand tool work and brass finishers it makes a very superior chuck. It is also the best drill chuck in market, holding large drills very firm. We keep this style in stock up to 12 inches, both three and four jawed, and can furnish larger if wanted.

2 JAW CHUCK.



This Chuck has a solid, pointed jaw. The bite of jaw is outside of chuck. It has an opening in centre 1¼ inches in diameter.

FIG. 3115.

PRICES, FIGS. 3115 AND 3116.

5	in.	chuck,	two jaw	$21.00
6	"	"	"	22.00
9	"	"	"	30.00
12	"	"	"	40.00
15	"	"	"	48.00
18	"	"	"	56.00

OUTSIDE BITE CHUCK.

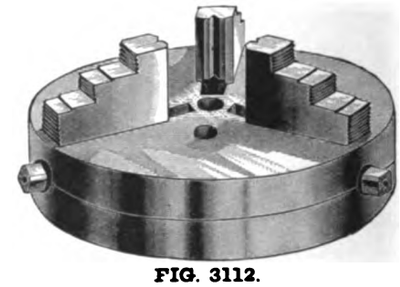


FIG. 3112.

This cut gives a view of our 6 and 9 inch chucks, with outside bites (not reversible). We use the patent raised seat on this style of jaw on all sizes, the same as on our common jaw.

REVERSE JAW CHUCK.

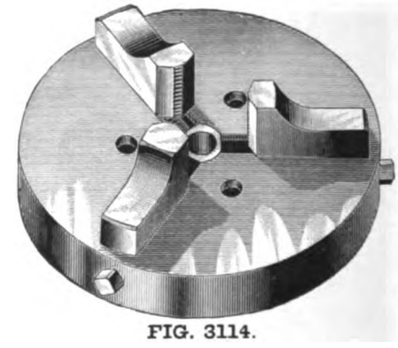


FIG. 3114.

2 JAW CHUCK.

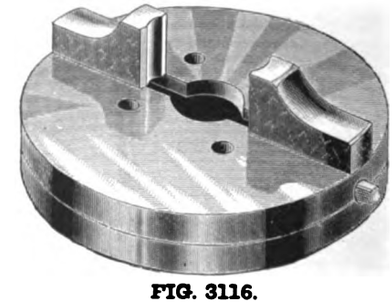


FIG. 3116.

This cut represents our Two Jawed Chucks up to 12 inches in diameter, with jaws turned smooth on the bite, and on a circle of 4 inches in diameter. The hole through centre of chuck is large, to enable work to pass through.

Our Common Jaw, Universal and Combination Chucks are all measured by their capacity to hold work, and not by the diameter of body. The following table gives the weight and diameter of these two kinds of chucks:

JAWS WILL OPEN TO HOLD WORK.									3 jaw weight.		4 jaw weight.		Size of body of chuck.		
4	in.	chuck	will	hold	work	4⅜	in.	diameter	6	lb.	—		4⅝	in.	diameter.
5	"	"	"	"	5	"	"		10	"	11	lb.	6	"	"
6	"	"	"	"	6	"	"		12	"	12½	"	7	"	"
9	"	"	"	"	9	"	"		22½	"	24	"	9¼	"	"
12	"	"	"	"	12	"	"		40½	"	42	"	12¼	"	"
15	"	"	"	"	15	"	"		56	"	56½	"	14⅜	"	"
18	"	"	"	"	18	"	"		68	"	70	"	16¾	"	"
21	"	"	"	"	21	"	"		88	"	103	"	19¼	"	"
22	"	"	"	"	22	"	"		101	"	115	"	20½	"	"
24	"	"	"	"	24	"	"		161	"	165	"	23	"	"
26	"	"	"	"	26	"	"		176	"	185	"	25	"	"
30	"	"	"	"	30½	"	"		197	"	229	"	28	"	"
36	"	"	"	"	36½	"	"		330	"	340	"	34½	"	"
42	"	"	"	"	43	"	"		506	"	510	"	41¼	"	"
42	" six jaw car wheel, 42½ in. diameter. Weight, 600 lbs.														

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2 JAW CHUCKS.

ROUND BODY.

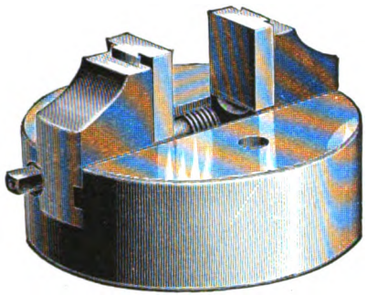


FIG. 3117.

BOX CHUCKS.

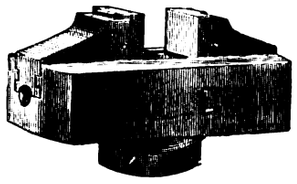


FIG. 3118.

DESCRIPTION AND PRICES, FIGS. 3117 AND 3118.

These Chucks are made with either independent jaws or connected jaws. They are furnished in two styles, as shown. Those with round body are made to bolt to a face plate, while those with box body are to be threaded to fit the spindle.

The 4½ inch, 6 inch and 7 inch round body, with connected jaws, have the screw at the side, giving an unobstructed hole through the chuck.

PRICES.

Size. Inches.	Jaws take. Inches.	Price. Round body.	Price. Box body.	Extra slip jaws. Iron. Per pair.	Extra slip jaws. Cast steel. Per pair.
4½	2	$16.00		$1.00	$2.00
6	2½	20.00		1.00	2.00
7	3	24.00	$24.00	1.00	2.00
9	4	30.00	30.00	1.25	3.00
12	6		36.00	1.25	4.00
15	8		42.00	1.50	5.00

V GROOVE.



FIG. 3119.

These Chucks are made with solid jaws grooved in the center, for holding drills, square head reamers and taps, and for use on screw machines, bolt cutters, hollow spindle machines, etc. They are furnished with either connected jaws (universal) or with independent jaws. They are made to bolt to a face plate, and all have a hole entirely through the chuck.

PRICES.

Diam. Inches.	Diam. of hole. Inches.	Diam. of face plate. Inches.	Height of jaw. Inches.	Width of jaw. Inches.	Price.
4½	1	4⅛	1	1¼	$12.00
6	1¼	5⅝	1¼	1¾	18.00
7	1½	6 1/16	1½	1¾	24.00

PATENT CUTTING OFF CHUCK.

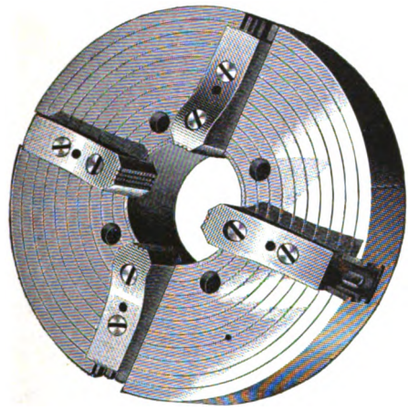


FIG. 3120.

JAWS ARE INDEPENDENT AND UNIVERSAL. MADE EITHER THREE OR FOUR JAWS.

This cut shows a 15¼ inch Cutting Off Chuck, having 5½ inch hole. It will take iron or steel from ¾ inch up to 5½ inches. The jaws have a long bite on the work, holding it firmly. The jaws being independent as well as universal, they can be set true independently, and afterward used universally. This is a very strong, durable chuck, very convenient and efficient.

In the 15¼ inch and larger, the Westcott patent jaws are furnished.

PRICES.

Diameter.	Center hole.	Three jaws.	Four jaws.
7½ inch.	1½ inch.	$26.00	$32.00
10⅛ "	2⅝ "	34.00	42.00
13¼ "	3½ "	44.00	56.00
16 "	Special pattern, 5½ in.	52.00	64.00
18½ "	" " 7 "	62.00	75.00
21¼ "	" " 9 "	80.00	95.00
24 "	" " 12 "	100.00	120.00

UNIVERSAL LATHE CHUCKS.

COMMON 3 OR 4 JAW.

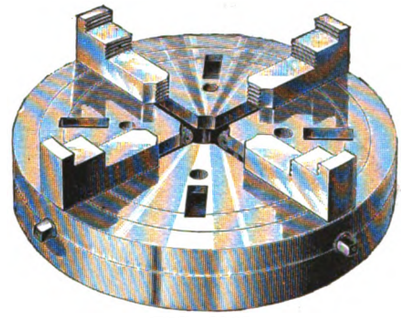


FIG. 3121.

The above cut represents the Universal Lathe Chuck, which is made in all sizes from 3 to 42 inches inclusive.

We can furnish with two, three or four jaws, as desired.

REVERSE 3 OR 4 JAW.

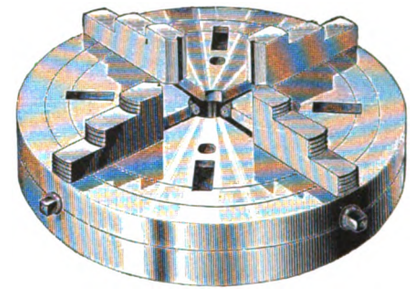


FIG. 3122.

This Chuck is used for holding rings, rods, pipe, drills, etc. It is an excellent chuck for brass finishing.

We can furnish with two, three or four jaws, as desired.

UNIVERSAL LATHE CHUCK.

PRICES, FIGS. 3121 AND 3122.

THREE JAW CHUCKS.

Diameter.						
3	inch chuck,	three	jaw,	either	style	of jaw	$18.00
4	"	"	"	"	"	22.00
6	"	"	"	"	"	26.00
9	"	"	"	"	"	34.00
12	"	"	"	"	"	44.00
15	"	"	"	"	"	52.00
18	"	"	"	"	"	62.00
21	"	"	"	"	"	80.00
24	"	"	"	"	"	100.00
30	"	"	"	"	"	170.00
36	"	"	"	"	"	230.00
42	"	"	"	"	"	270.00

FOUR JAW CHUCKS.

4	inch chuck,	four	jaw,	either	style	of jaw	$26.00
6	"	"	"	"	"	32.00
9	"	"	"	"	"	42.00
12	"	"	"	"	"	56.00
15	"	"	"	"	"	64.00
18	"	"	"	"	"	75.00
21	"	"	"	"	"	95.00
24	"	"	"	"	"	120.00
30	"	"	"	"	"	200.00
36	"	"	"	"	"	285.00
42	"	"	"	"	"	325.00

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WESTCOTT 3 AND 4 JAW SCROLL COMBINATION LATHE CHUCK.

INDEPENDENT UNIVERSAL ECCENTRIC AND REVERSIBLE JAWS.

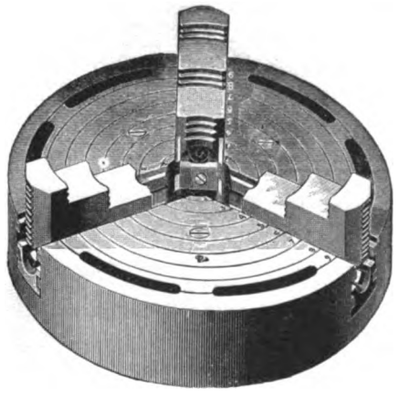


FIG. 3122 A.

PRICES.

Diameter over all.	Will hold inside of jaws.	Diameter of face plate.	Three jaws. Price.	Four jaws. Price.
*4 3/16 in.	5 1/2 in.		$24.00	$30.00
*6 "	6 1/2 "		25.00	31.00
7 1/2 "	8 "	3 1/2 in.	26.00	32.00
10 1/8 "	12 "	4 7/16 "	34.00	42.00
13 1/4 "	15 "	5 5/16 "	44.00	56.00
16 "	18 "	6 3/4 "	52.00	64.00
18 1/2 "	21 1/2 "	7 5/16 "	62.00	75.00
21 1/4 "	26 "	9 1/2 "	80.00	95.00
24 "	30 "	10 "	100.00	120.00
30 "	36 "	12 3/4 "	170.00	200.00
36 "	43 "	15 "	230.00	285.00

* The 4 3/16 inch and 6 inch chucks we are now manufacturing of malleable iron; thus making them, without doubt, the strongest small chucks in the market.

When the lathe spindle is light and it is important that the chuck should not overhang, the centre hole of most sizes can be bored out so as to admit of reversing the face plate, bringing the hub inside of the chuck.

CEARED COMBINATION LATHE CHUCK.

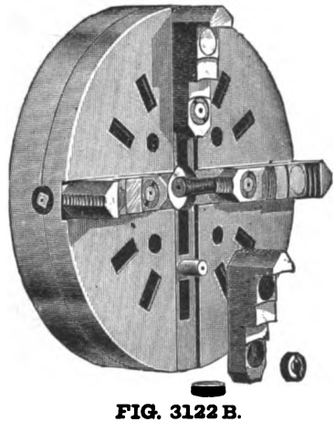


FIG. 3122 B.

MADE WITH THREE OR FOUR JAWS.

With reversible jaws, independent and universal.

On sizes, from 13 inches up, holes extend through the body for convenience in bolting work to the chuck.

PRICES, FIG. 3122 B.

Diameter.	Will hold inside of jaws.	Three jaws.	Four jaws.
5 in.	5 in.	$24.00	
7 1/2 "	7 1/2 "	26.00	$32.00
10 1/8 "	10 3/8 "	34.00	42.00
13 "	13 1/8 "	44.00	56.00
15 1/4 "	17 "	52.00	64.00
18 "	19 3/4 "	62.00	75.00
21 "	25 1/2 "	80.00	95.00
24 "	28 "	100.00	120.00

DESCRIPTION, FIG. 3122 A.

These Chucks are kept in stock, both three and four jawed, from 4 3/16 inches to 36 inches, inclusive.

The jaws of Westcott's lathe chucks being all reversible, enables the machinist to get his tool post, or rest, close down to the work.

When the jaws are reversed, they get a long bite on the work, and hold very firmly. Rings and cylinders can be held while turning off the outside and facing.

The jaws are supported on steel "boxes," which makes it possible for this style of chuck to hold larger work for its diameter than any other chuck made. The holes through the body are to lighten the chuck, and also for convenience in strapping work to the chuck.

CUSHMAN COMBINATION CHUCK.

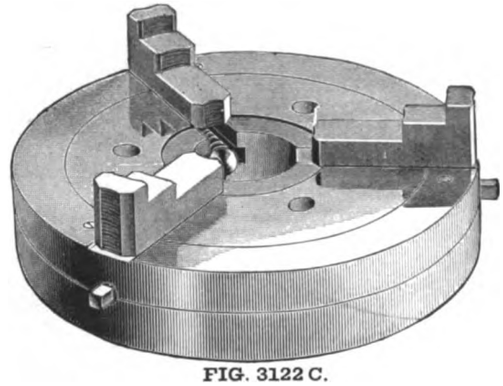


FIG. 3122 C.

CONCENTRIC OR ECCENTRIC, UNIVERSAL OR INDEPENDENT. JAWS REVERSIBLE.

The chuck is rendered universal or independent at will, by the meshing or unmeshing of the circular rack with the bevel pinion on the screw. This is quickly done by pressing the thumb catch on the back of the chuck, and revolving the supporting ring.

In holding eccentrics or irregular work, the jaws may be placed in any desired position, and the rack and screw pinions meshed, forming a chuck with eccentrically placed but with simultaneously moving jaws. The jaws in all sizes, except the 4 inch and 6 inch, are reversible, and the whole chuck may be dismembered for cleaning or oiling, while on the lathe spindle, by simply removing three screws, a desirable feature in large chucks.

An extra set of jaws (No. 2) is furnished with the 4 inch, as the jaws in this size do not reverse.

The jaws in the 6 inch also do not reverse, but extra sets can be furnished at $5.20 per set of three, and $6.40 per set of four.

Bolts and wrench furnished with each chuck.

PRICES, FIG. 3122 C.

Nominal size.	Diameter including projecting screw heads.	Diameter of hole through chuck.	Diameter of face plate.	Price.	
Inches.	Inches.	Inches.	Inches.	3 jaw.	4 jaw.
4	5 7/8	1	3 3/8	$26.00	
6	8 3/16	1 1/2	4 3/4	26.00	$32.00
9	11 1/4	2 1/4	7	34.00	42.00
12	13 7/8	2 1/2	7	44.00	56.00
15	17	3 1/2	10	52.00	64.00
18	20	3 1/2	10	62.00	75.00
21	23 1/2	4	12	80.00	96.00
24	26 1/2	4	12	100.00	120.00

UNION COMBINATION 3 OR 4 JAW CHUCK.

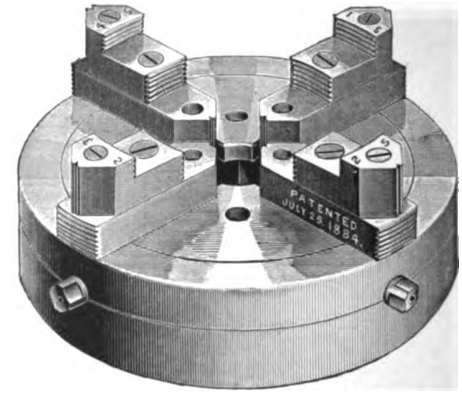


FIG. 3122 D.

WITH REVERSIBLE JAWS.

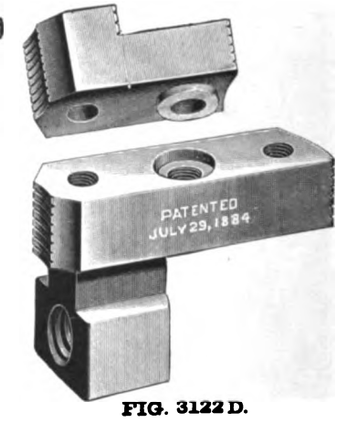


FIG. 3122 D.

This cut represents the reversible jaw, as used in our combination reversible jaw chucks.

We can furnish this chuck from 6 inches to 42 inches inclusive, either in 3 or 4 jaws, as desired.

PRICES, FIG. 3122 D.

Diameter.	4 jaw.	3 jaw.
6 inch chuck, reversible	$32.00	$26.00
9 " "	42.00	34.00
12 " "	56.00	44.00
15 " "	64.00	52.00
18 " "	75.00	62.00
21 " "	95.00	80.00
24 " "	120.00	100.00
30 " "	200.00	170.00
36 " "	285.00	230.00
42 " "	325.00	270.00

DESCRIPTION, FIG. 3122 B.

The shells of these chucks have been enlarged to cover the screw heads, and it is this which makes the odd diameters, like 10 1/8 inch, etc. These chucks, 10 1/8 inch, 13 inch, etc., will swing in any lathe where the 9 inch and 12 inch of any other make of chucks, with projecting screw heads, will swing. In these chucks, the jaws are ground both on the top and bottom, giving a more perfect bearing surface than can be obtained in any other chuck.

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UNIVERSAL AND COMBINATION LATHE CHUCKS.

HORTON COMBINATION CHUCKS, 3 OR 4 JAW.

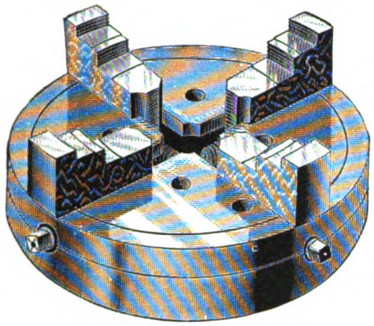
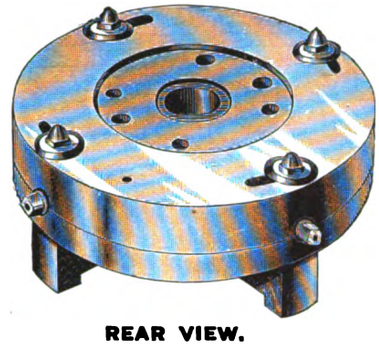


FIG. 3122 E.



REAR VIEW.

Made either 3 or 4 jaw. Fine circular line is to set jaws to. The rear view shows the thumb nuts and slots in shell by means of which the chuck is changed from Universal to Independent.

SWEETLAND UNIVERSAL CHUCKS, 3 OR 4 JAW.

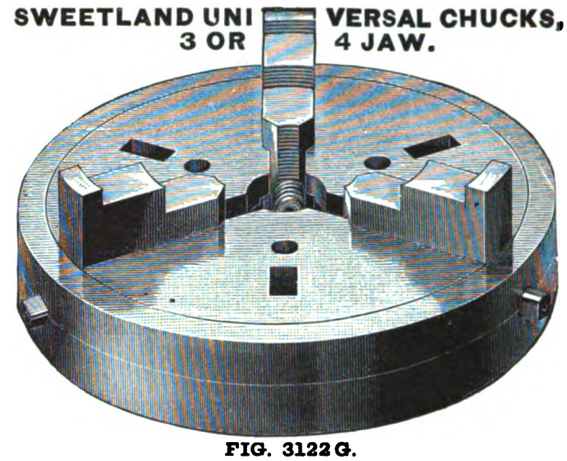
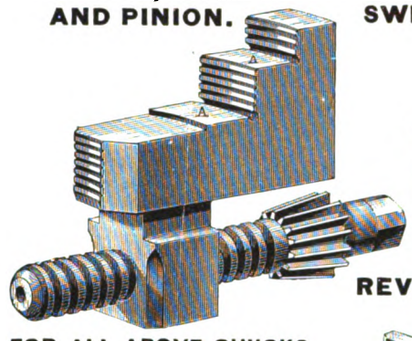


FIG. 3122 G.

JAW NUT, SCREW AND PINION.



FOR ALL ABOVE CHUCKS.

SWEETLAND COMBINATION 3 OR 4 JAW.

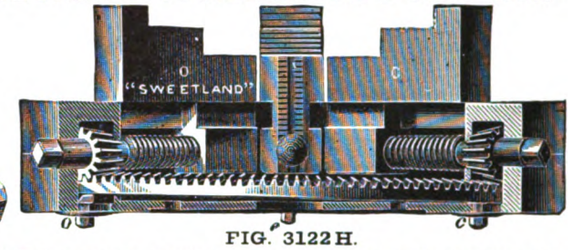


FIG. 3122 H.

SKINNER UNIVERSAL AND COMBINATION, 3 OR 4 JAW.

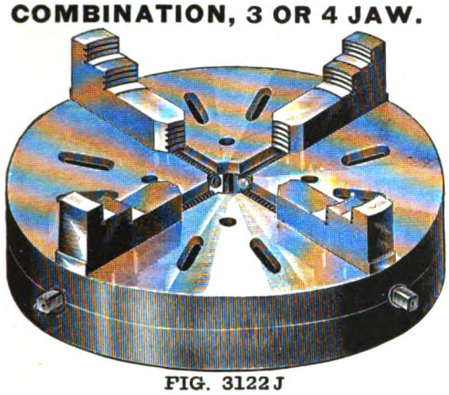
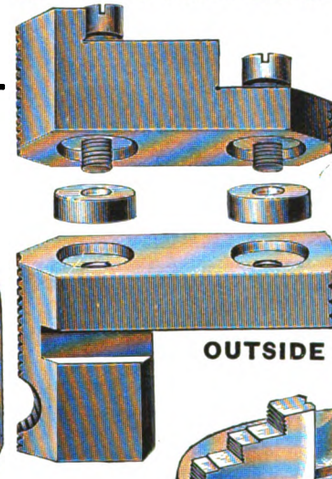


FIG. 3122 J

JAW FOR FIG. 3122 K.



REVERSIBLE JAW COMBINATION CHUCKS, SKINNER'S.

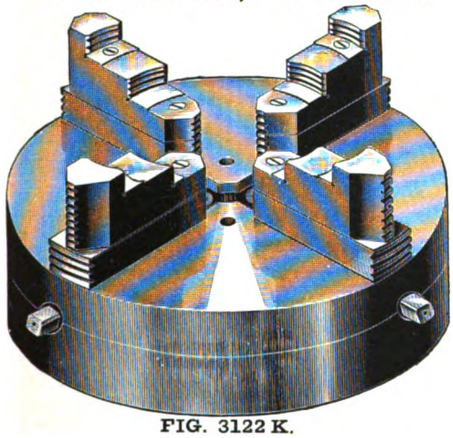


FIG. 3122 K.

REVERSIBLE JAW COMBINATION CHUCKS.

HORTON'S.

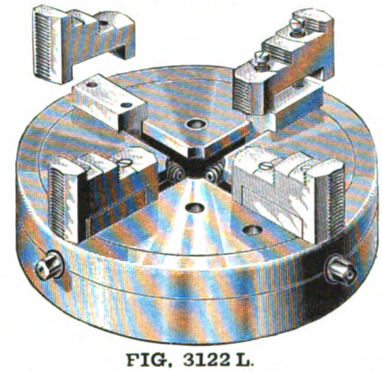


FIG. 3122 L.

SWEETLAND'S.



FIG. 3122 M.

VARIOUS STYLES OF JAWS FURNISHED.

OUTSIDE BITES.

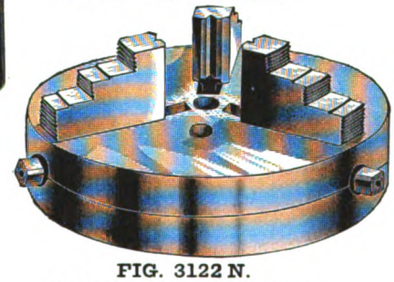


FIG. 3122 N.

REVERSE JAWS.

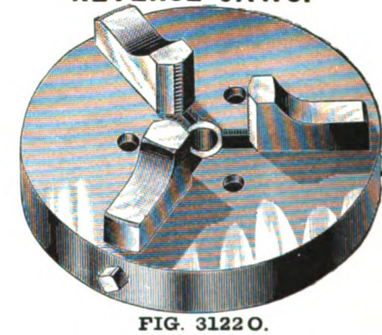


FIG. 3122 O.

INSIDE LOW JAWS.

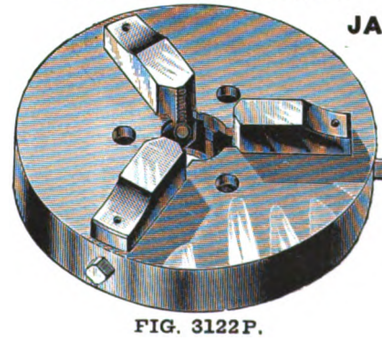


FIG. 3122 P.

JAWS FOR CUTTING OFF LATHES.



FIG. 3122 S.

PRICES.

In ordering, specify name of maker, size, number of jaws, whether Universal, Combination, or Reversible Jaw Combination, and with jaws as per Fig. 3122 E, N, O, P or S. One list price answers for all these chucks, but the discounts vary.

Size chuck.	Three jaws.	Four jaws.
6 inch, either style jaws	$26.00	$32.00
9 " " " "	34.00	42.00
12 " " " "	44.00	56.00
15 " " " "	52.00	64.00
18 " " " "	62.00	75.00
21 " " " "	80.00	95.00
24 " " " "	100.00	120.00
30 " " " "	170.00	200.00
36 " " " "	230.00	285.00
42 " " " "	270.00	325.00

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GEARED SCROLL CHUCKS.

3 AND 4 JAW.

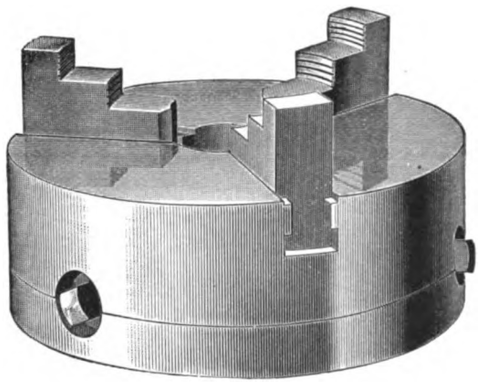


FIG. 3123.

PRICES.

Diameter. Inches.	Diameter of hole. Inches.	Diameter of face plate. Inches.	Price.
2½	5/8		$7.50
3	5/8	2 7/8	10.00
4	5/8	3 1/16	12.00
5	3/4	3 3/4	15.00
6	1 9/16	4 3/4	18.00
7½	2	4 3/4	20.00
9	2½	5 3/4	24.00
12	3	7	30.00
15			40.00

For chucks with two sets of jaws add 20 per cent. extra to above list, and for 4-jawed chucks add 10 per cent.

DESCRIPTION AND PRICES, FIG. 3128.

Three or four jaw chucks, having No. 1 or No. 2 jaws, or both sets, or inside jaws, as in the above cut, are furnished as desired.

PRICES.

Diam.	Diam. hole.	Diameter face plate.	Weight.	Price, 1 set jaws.	Price, 2 sets jaws.
2½ in.	5/8 in.	2 3/8 in.	2 lbs.	$7.00	$8.50
3 "	5/8 "	2 31/32 "	3 "	10.00	12.00
4 "	1 "	3 25/32 "	6 "	12.00	14.40
5 "	1¼ "	4 5/8 "	8½ "	14.00	16.80
6 "	1 5/8 "	5 5/8 "	12½ "	17.00	20.40
7½ "	2 1/8 "	7 "	20 "	19.00	22.80
9 "	2 5/8 "	8 9/16 "	35 "	22.00	26.50
12 "	4 "	7 "	60 "	30.00	36.00

Add 10 per cent. for four jaws.

STYLES OF JAWS.



FIG. 3124.

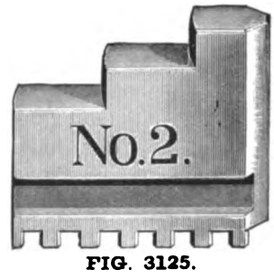


FIG. 3125.

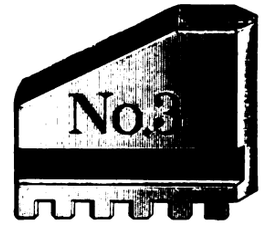


FIG. 3126.

DESCRIPTION, FIG. 3123.

All of them are now made having three pinions, an advantage over the old style, as a chuck so made will outwear any other. It not only makes a handier chuck to use by having a pinion always within reach, but the chuck is thus perfectly balanced, an advantage when required for high-speed machines.

All jaws of No. 2 and No. 3 style are ground true after they are hardened.

We carry in stock a full line of these chucks with No. 1 jaws, No. 2 jaws, No. 3 jaws, and with two sets of jaws (No. 1 and No. 2). We furnish a steel key with each chuck, also screws for attaching to face plate.

When ordering, be particular to state the style of jaws wanted. Unless otherwise specified, we will send chucks with No. 1 jaws.

GEARED SCROLL CHUCK.

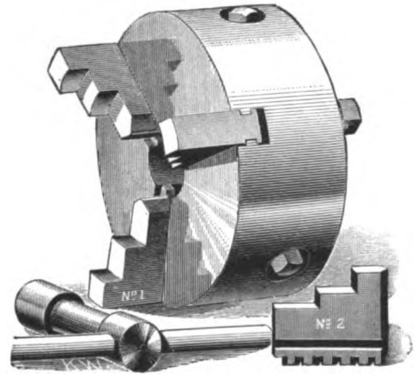


FIG. 3128.

GEARED SCROLL CHUCK.

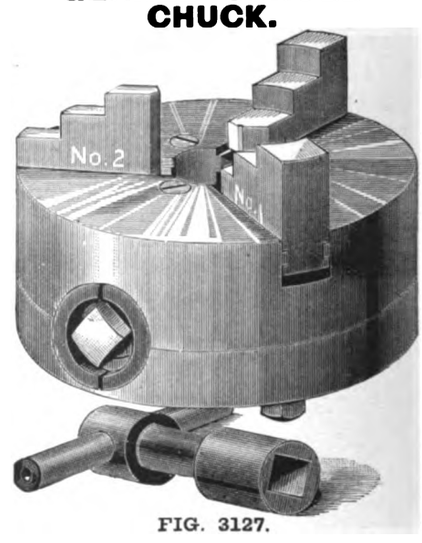


FIG. 3127.

IT HAS BUT ONE PINION OR OPENING FOR THE KEY.

PRICES.

Diameter.	Diameter of face plate.	Diam. of hole.	Weight.	Price.
2 in.	Mandrel.	¼ in.	About 1½ lbs.	$6.50
3 "	2 1/16 inches.	5/8 "	" 2½ "	10.00
4½ "	3 25/32 "	1 "	" 6¼ "	13.00

Add 10 per cent. for chucks with four jaws.
Add 20 per cent. for chucks with two sets of jaws.

GEARED OR PINION KEY CHUCKS.

COMMON JAW.

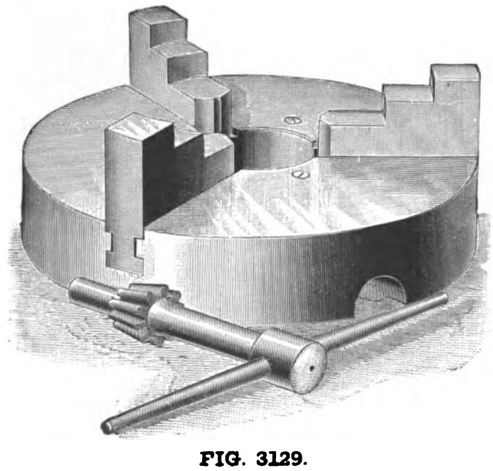


FIG. 3129.

The pinion is a part of the key, as shown, and when worn may be replaced without trouble, as the chuck does not have to be taken apart. The jaws are ground perfectly true in the center after having been hardened, and the parts are made to gauges and are interchangeable.

Jaws of either of the usual forms, or both sets, or inside jaws, are furnished as desired. 4½ and 6 inch chucks with four jaws are kept in stock. These chucks have no superior for holding pieces which require changing often.

PRICES, FIGS. 3129 AND 3130.

Diameter.	Diameter of face plate.	Diameter of hole.	Weight.	Price.
3 in.	2¼ in.	5/8 in.	About 2½ lbs.	$10.00
4½ "	3 1/32 "	1 "	" 6½ "	13.00
6 "	3 25/32 "	1½ "	" 10½ "	17.00
9 "	5 1/8 "	2 3/8 "	" 30 "	22.00

INSIDE JAW.

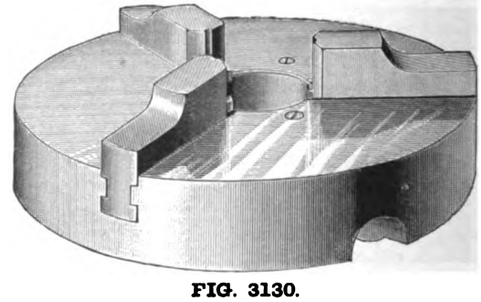


FIG. 3130.

Add 10 per cent. for chucks with four jaws.

Add 20 per cent. for chucks with two sets of jaws.

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GEARED AND LEVER SCROLL CHUCKS.

PRICES, FIGS. 3130 A AND B, FOR 3-JAW CHUCKS.

Diam.	Diam. hole.	Diam. face plate.	Weight.	Prices, 1 set jaws.	Prices, 2 sets jaws.
2½ in.	⅝ in.	2⅜ in.	2 lbs.	$7.00	$8.50
3 "	⅝ "	2¾ "	3 "	10.00	12.00
4 "	1 "	3⅜ "	6 "	12.00	14.40
5 "	1¼ "	4⅜ "	8½ "	14.00	16.80
6 "	1⅝ "	5⅝ "	12½ "	17.00	20.40
7½ "	2⅛ "	7 "	20 "	19.00	22.80
9 "	2⅝ "	8 9/16 "	35 "	22.00	26.50
12 "	4 "	7 "	60 "	30.00	36.00

Add 10 per cent. for four jaws.

AMATURE GEARED SCROLL.

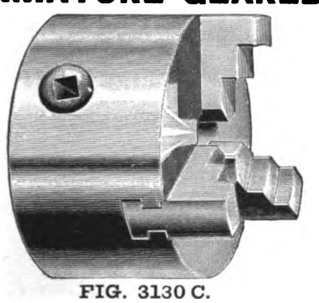


FIG. 3130 C.

AMATURE LEVER SCROLL CHUCK.

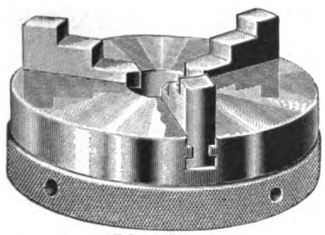


FIG. 3130 E.

Furnished with No. 1 or No. 2 jaws.

The 2 inch is made with a hub in which is a taper hole to which arbor may be fitted. The other sizes are to be fastened to machine by means of a face plate, and screws are furnished with each chuck for so doing.

These chucks may be operated by the hand, but a lever is furnished with each chuck to use when an extra grip is required.

PRICES.

Diameter. Inches.	Prices, with one set of jaws.	Prices, with two sets of jaws.	Extra sets of jaws ordered without chuck.
2	$4.50	$5.75	$1.85
3	5.50	6.75	1.85
4	6.50	8.00	2.25
5	7.50	9.00	2.25

LEVER CHUCKS.

NO. 1 JAWS. NO. 2 JAWS.

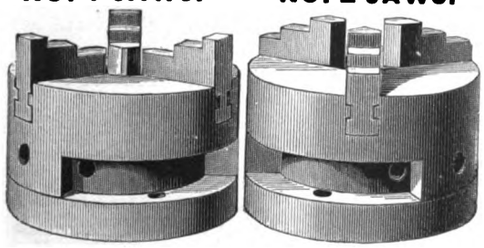


FIG. 3130 H. FIG. 3130 J.

They are made to fit a taper arbor; the 3 inch and 4 inch can be also fastened to a face plate.

They are furnished with No. 1 jaws or No. 2 jaws, also with both sets, No. 1 and No. 2 jaws. Be particular when ordering to state the style of jaws wanted. Unless otherwise specified, we will send chucks with No. 1 jaws.

PRICES.

Diameter. Inches.	Prices, with one set of jaws.	Prices, with two sets of jaws.	Extra sets of jaws ordered without chuck.
2	$4.00	$5.50	$2.25
3	5.00	6.50	2.25
4	6.00	7.50	2.25

GEARED INSIDE JAWS.

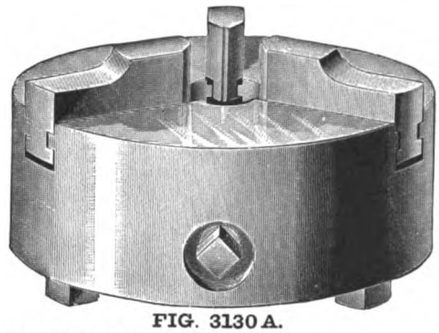


FIG. 3130 A.

PRICES, FIG. 3130 C.

The 2 inch is furnished either to fit a taper arbor or face plate. Be particular, when ordering, to mention which style is required. The 2½ inch is made to attach to face plate only.

We furnish these chucks with any of the three kinds of jaws.

Diameter. Inches.	Prices, with one set of jaws.	Prices, with two sets of jaws.	Extra sets of jaws ordered without chuck.
2	$6.00	$7.50	$2.25
2½	7.00	8.50	2.25

DESCRIPTION, FIG. 3130 D.

We can furnish these chucks with No. 1 jaws, in all the sizes; with No. 2 jaws, up to and including 12 inch, and with both sets, No. 1 and No. 2, up to and including 9 inch.

Be particular, when ordering, to state the style of jaws wanted. Unless otherwise specified, we will send chucks with No. 1 jaws.

IMPROVED LEVER CHUCKS.

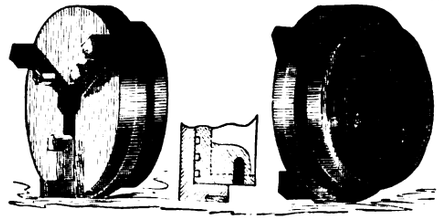


FIG. 3130 G.

The front plates of the 3, 4 and 6 inch sizes are of malleable iron, and the scrolls and jaws are steel.

PRICES.

Diam.	Hole.	Face plate.	Prices.	Diam.	Hole.	Face plate.	Prices.
3 in.	⅝ in.	2 1/16 in.	$8.00	15 in.	2⅝ in.	7 in.	$32.00
4 "	1 "	3 1/16 "	10.00	18 "	3⅞ "	8 5/16 "	38.00
6 "	1½ "	3 7/16 "	16.00	21 "	3⅞ "	8 5/16 "	48.00
9 "	1⅝ "	4 7/16 "	21.00	24 "	3⅞ "	8 5/16 "	60.00
12 "	2 5/16 "	6 5/16 "	26.00				

Add 10 per cent. for chucks with four jaws.
Add 20 per cent. for chucks with two sets jaws.

DESCRIPTION, FIG. 3130 K.

These chucks are operated by hand or lever, and are furnished with No. 1 or No. 2 jaws, or with both sets, as ordered.

PRICES, FIGS. 3130 K AND L.

Diam.	Weight for mandrel.	Weight for face plate.	Diam. of hole.	Diam. of face plate.	Prices, 1 set jaws.	Prices, 2 sets jaws.
2 in.	Abt. 1 lb.	Abt. ¾ lb.	½ in.	1⅝ in.	$4.50	$5.75
2½ "	" 1½ "	" 1¼ "	9/16 "	1 31/32 "	5.00	6.25
3 "	.....	" 1¾ "	⅝ "	2 3/32 "	5.50	6.75
4 "	.....	" 3½ "	1 "	3 "	6.50	8.00
5 "	.....	" 4½ "	1 "	3 "	7.50	9.00

Please state style of jaws wanted when ordering, otherwise No. 1 jaws will be sent.

DESCRIPTION, FIG. 3130 L.

These chucks are arranged for attachment by a taper mandrel as shown, Fig. 3130 L. They have a ½ inch hole entirely through the center and are very convenient for holding drills, wire, etc.

This is the style in which the 2 and 2½ inch sizes are furnished, unless specially ordered "for face plate." See Fig. 3130 K. Furnished with either No. 1 or No. 2 jaws, or with both styles.

GEARED, NO. 1 JAW, 3 OR 4 JAWS.

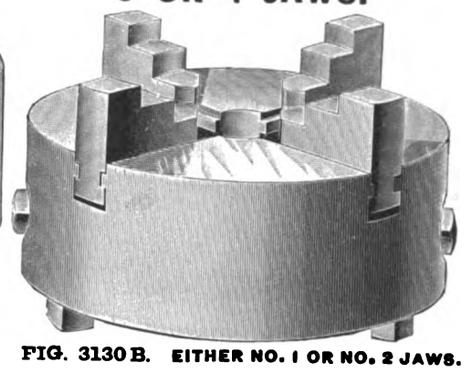


FIG. 3130 B. EITHER NO. 1 OR NO. 2 JAWS.

LEVER, NO. 1 JAW, 3 OR 4 JAWS.

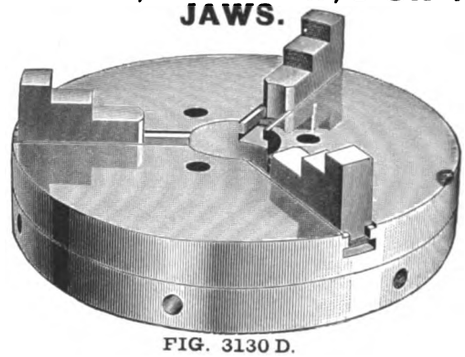


FIG. 3130 D.

PRICES.

Diam.	Diameter of holes.	Diameter of face plate.	Prices.
3 in.	⅝ in.	2 7/16 in.	$8.00
4 "	¾ "	3 9/16 "	10.00
6 "	1 9/16 "	4 "	15.00
9 "	1 3/4 "	5 3/4 "	20.00
12 "	3 "	7 "	26.00
15 "	3 "	7 "	32.00
18 "	4 "	7 13/16 "	38.00
21 "	4 "	7 13/16 "	48.00

For chucks with four jaws add 10 per cent., and for chucks with two set jaws add 20 per cent.

LEVER SCROLL CHUCKS.

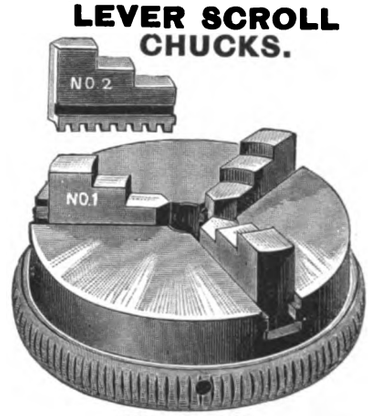


FIG. 3130 K.

ARRANGED FOR USE ON ARBOR.

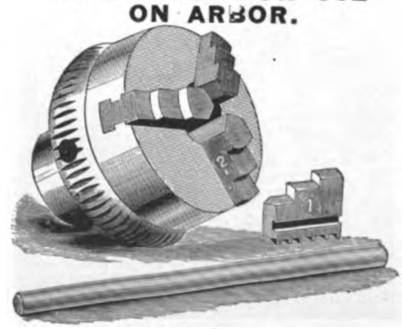


FIG. 3130 L.

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CAR WHEEL CHUCKS.

42, 36 AND 30 INCH 3-JAW CHUCKS.



FIG. 3130 M, HOLDING A WHEEL.

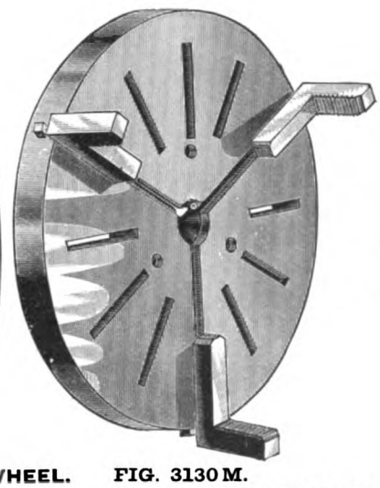


FIG. 3130 M.

PRICES, FIG. 3130 M.

30 inch.	$185.00
36 "	250.00
42 "	300.00

WITH CLAMP JAWS.

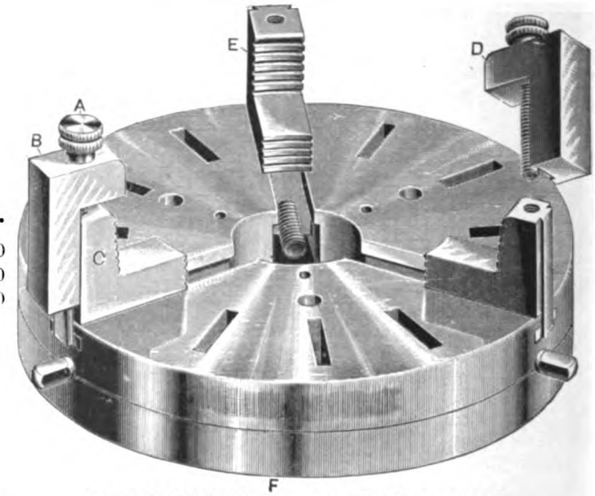


FIG. 3130 N. PRICE, 42 INCH, $400.00.

DOUBLE GEARED 6-JAW CHUCK.

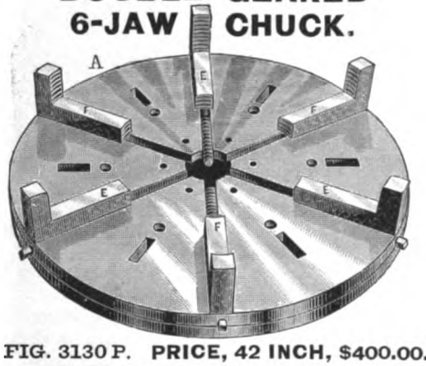
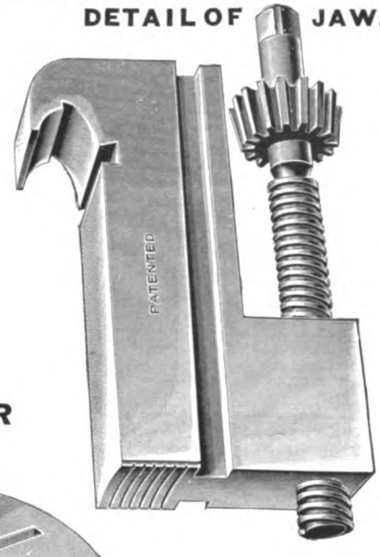


FIG. 3130 P. PRICE, 42 INCH, $400.00.

DETAIL OF JAW.



HEAVY 42 INCH CHUCK.

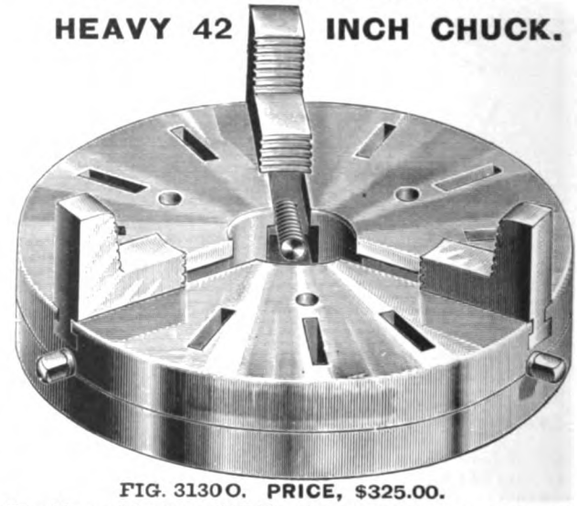


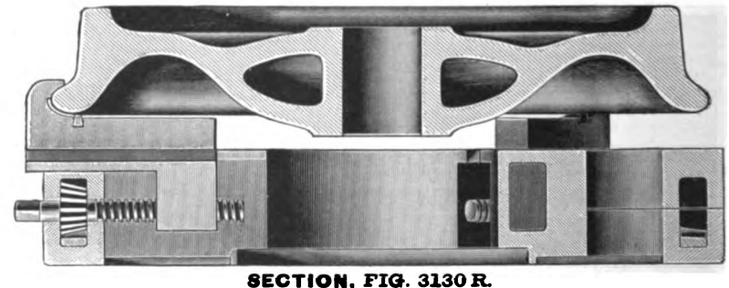
FIG. 3130 O. PRICE, $325.00.

The bites of jaws on 3130 N and O are made at an angle of 3 degrees to fit tread of wheel, and take from 42½ down to 6 inches, showing large hole in center and wheel in place.

SPECIAL 36 INCH CAR WHEEL CHUCK.



FIG. 3130 R. PRICE, $.....



SECTION, FIG. 3130 R.

3 AND 4 JAW CUTTING-OFF CHUCK.

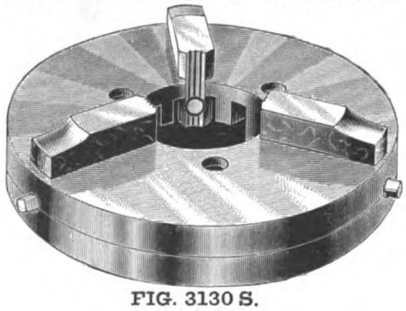


FIG. 3130 S.

The bite on ends of jaws extends both sides of the carrying screw, making it grip very surely. The seat in back for face plate is as large as the diameter will admit of.

PRICES, FIG. 3130 S.

Inches.	Inch hole through center.	3-jaw.	4-jaw.
7	1¼	$26.00	$32.00
8	2⅛	30.00	38.00
9	2⅜	34.00	42.00
12	3⅞	44.00	56.00
14	4⅛	52.00	64.00
14	4⅝	56.00	
17	5⅛	62.00	
20	6½	80.00	
24	8½	100.00	

We furnish wrench, but no bolts, with this style of chuck.

PRICES, FIG. 3130 T.

Diameter.	Size hole.	Prices.
7 inches.	2¼	$28.00
10 "	3⅛	36.00
12 "	4⅜	48.00
14 "	5⅛	58.00

SCROLL CHUCK FOR REAR END WORK.

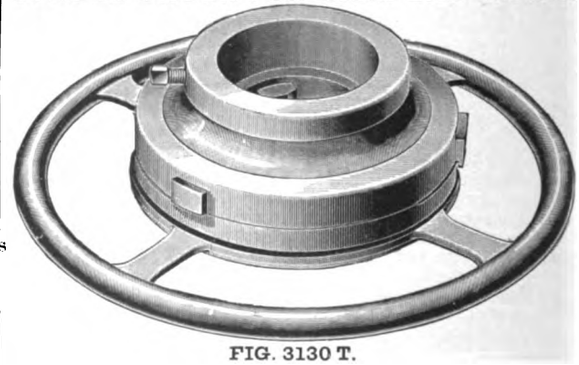


FIG. 3130 T.

This is a back view of chuck, showing wheel to quickly seize and steady long projecting work and the follower, by means of which the chuck is held in place.

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AUTOMATIC SHAFT STRAIGHTENER.

THIS TOOL IS FOR AUTOMATICALLY STRAIGHTENING COLD ROUND IRON OR STEEL AND GAS PIPE, ETC., AND FOR POLISHING SHAFTING.

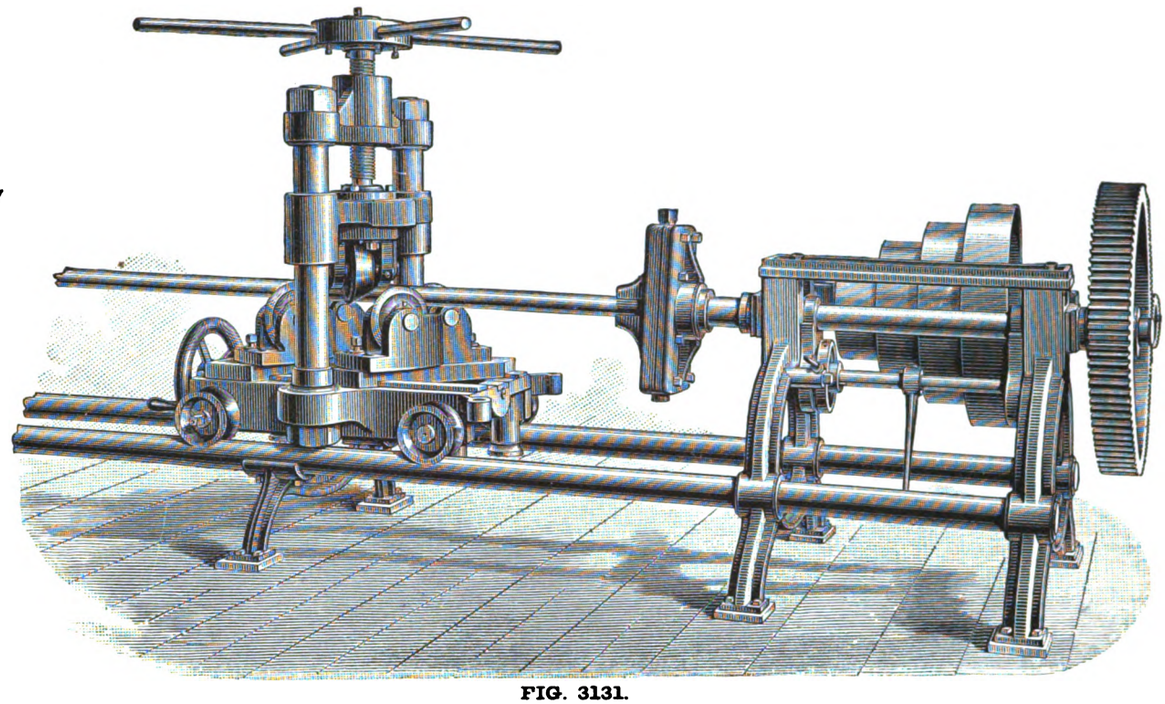


FIG. 3131.

This machine straightens a twenty-four foot bar three inches in diameter in three minutes and twenty seconds, taking out all the crooks and kinks, and leaving the bar in proper condition for the lathe.

It also removes the skin or scale of the iron, greatly facilitating the turning of the iron, as shown by the fact that we have, the past four years, been turning 2 inch diameter bars at the rate of twenty inches per minute, the bar running one hundred revolutions per minute, with a feed of one inch to five revolutions. All other size bars from one and one quarter inches to four inches in the same proportion.

The bar, after being turned, is again run through the rolls for the purpose of removing tool marks, and giving it a polished finish with the same operation; this being accomplished even though the tool finish is comparatively rough. The machine is also provided with an attachment for polishing with an emery block, giving the shafting a fine finish.

1. A machine taking in bars from $\frac{5}{8}$ inch to $2\frac{1}{2}$ inches diameter, 25 feet long, occupying floor space 30 feet by 3 feet. Countershaft should run 325 revolutions per minute; 2 friction clutch pulleys are 18 inches diameter by 5 inch face, and require to drive them 2 pulleys 5 inch face and of suitable diameter to obtain the necessary speed. **PRICE, $1,050.00.**

2. A machine taking in bars from 1 inch to 3 inches diameter, 25 feet long, occupying floor space 30 feet by 3 feet. Countershaft should run 350 revolutions per minute; 2 friction clutch pulleys are 20 inches diameter, and require to drive them 2 pulleys 5 inch face and of suitable diameter to obtain the necessary speed. **PRICE, $1,150.00.**

3. A machine taking in bars from $1\frac{1}{4}$ inch to $4\frac{1}{2}$ inches diameter, 25 feet long, occupying floor space 32 feet by 3 feet. Countershaft should run 300 revolutions per minute; 2 friction clutch pulleys are 24 inches diameter by 6 inch face, and require to drive them 2 pulleys 6 inch face and of suitable diameter to obtain the necessary speed. **PRICE, $1,350.00.**

4. A machine taking in bars from 2 inches to 6 inches diameter, 25 feet long, and occupying floor space 32 feet by $3\frac{1}{2}$ feet. Countershaft should run 450 revolutions per minute; 2 friction clutch pulleys are 20 inches diameter by 6 inch face, and require to drive them 2 pulleys 6 inch face and of suitable diameter to obtain the necessary speed. **PRICE, $1,600.00.**

BABBITT STOVE.

With this stove, by using hard coal, the metal can be kept melted and at the right heat all day without any attention. The pot holds 50 pounds of melted metal, and a sufficient amount can be dipped from it with a hand ladle to pour any ordinary box. By having as many pots as we use grades of metal, there is no danger of getting the different grades mixed.

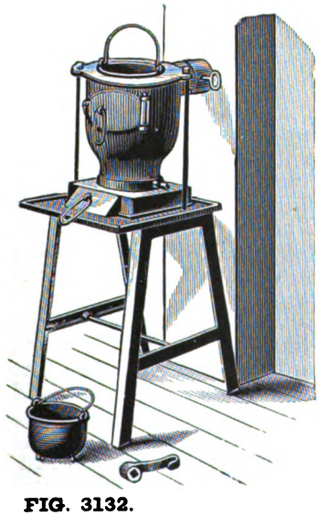


FIG. 3132.

Price of stove with one pot.....$13.00
" " extra pots, each..... 1.00

SHAFTING STRAIGHTENERS.

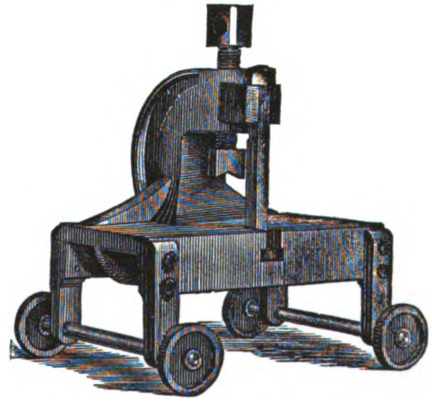


FIG. 3133.

For lathe about 24 to 28 in. swing....$50.00
" " " 32 in. swing..... 60.00
" " " 38 " " 75.00
Special for 4 to 5 in. shafts..... 100.00

IMPROVED SHAFTING ATTACHMENT.

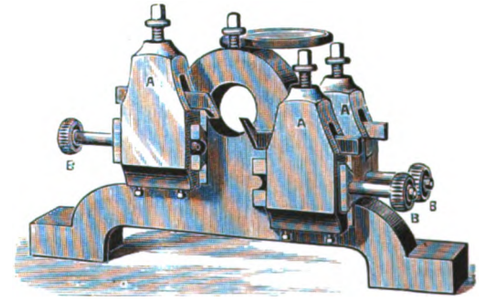


FIG. 3134.

PRICES.

Lathe, 20 in. swing..... ...$.....
" 22 " " ....
" 24 " " ....
" 26 " " ....
" 30 " " ....
" 32 " " ....

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POND SPECIAL SHAFT TURNING LATHE.

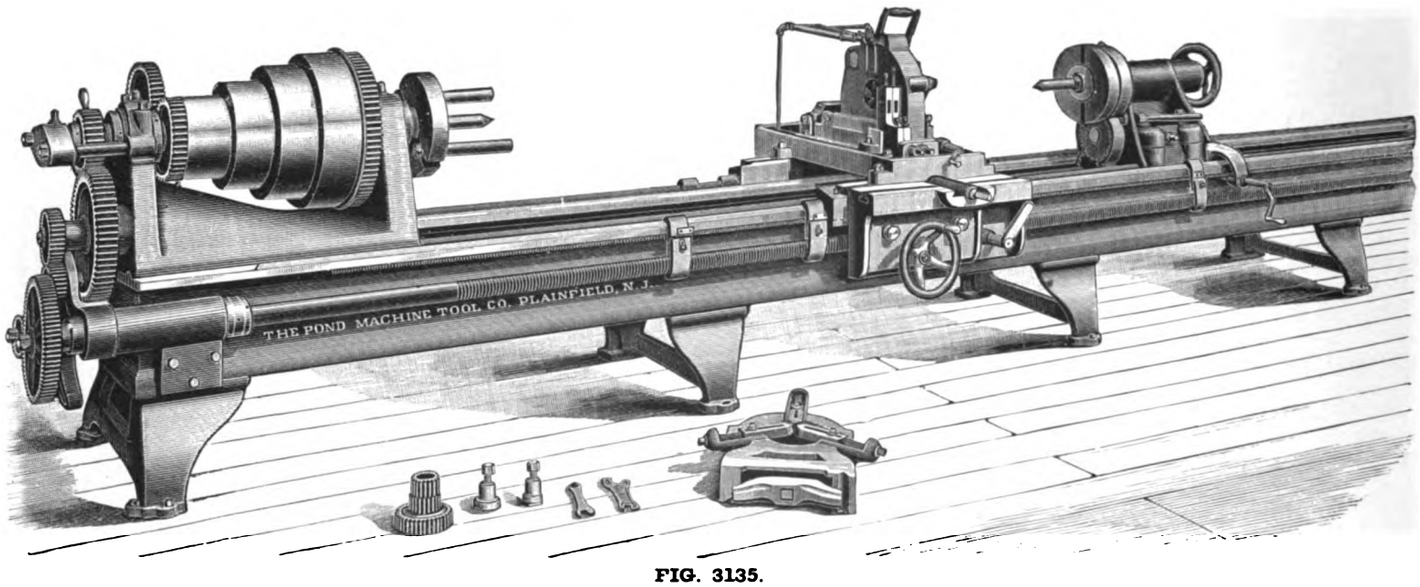


FIG. 3135.

A Lathe of 30 inches swing, with extra wide sections on cone for belt. Head spindle has a very strong step at end, which is found necessary because of the great thrust produced by coarse feeds and deep cuts.

Has attachments, as shown, for driving from tail spindle, thus avoiding changing shaft end for end, and valuable in turning long shafts of small diameter, as power applied to both ends prevents twisting. May be left off if not wanted.

The turning attachment is mounted in a reservoir bolted to the sliding rest, and consists of five jaws that open or shut automatically, to accommodate the increasing or decreasing diameter of shaft, caused by wear of cutting tools while turning the shaft and setting them in again. These jaws hold the shaft steady and to the same centre all the time, which cannot be done if solid or fluted rings are used. Two cutting tools precede, and one water polishing tool follows these steadying jaws. From the reservoir, water is forced at any desired pressure on each tool, by means of a pump driven from lathe counter.

All attachments may be removed and lathe used for general work, for which a plain or compound rest, with or without power cross feed and screw cutting attachment, is furnished, if desired, at a small additional price.

Countershaft has two sets of tight and loose pulleys ; one set 20 inches and the other 12 inches diameter by 6 inches face, which should make 66 and 200 revolutions per minute, respectively.

Swing over bed.	Swing over rest.	Distance between centres.	Length of bed.	Price, complete.	Weight.
30½ in.	22¼ in.	16 ft. 7 in.	24 ft.	$.....	..... lbs.

Extra, per foot, of bed, for any desired length, $..... Extra, for splicing bed longer than 34 feet, $.....

SPECIAL PULLEY TURNING LATHE.

Designed for turning pulleys, spur and bevel gears, fly wheels and friction wheels, either straight or conical.

It is driven by a 6 speed cone for a 4 inch belt, which gives suitable speed for turning pulleys from 12 inches to 50 inches diameter, the capacity being a pulley 50 inches diameter by 30 inches face.

The compound rests on each side have automatic feed of 24 inches, and can be set at any angle for crowning pulleys or for bevel gears. They are swiveled on saddles, which can be moved together or apart to suit different sizes of work by means of a right and left hand screw.

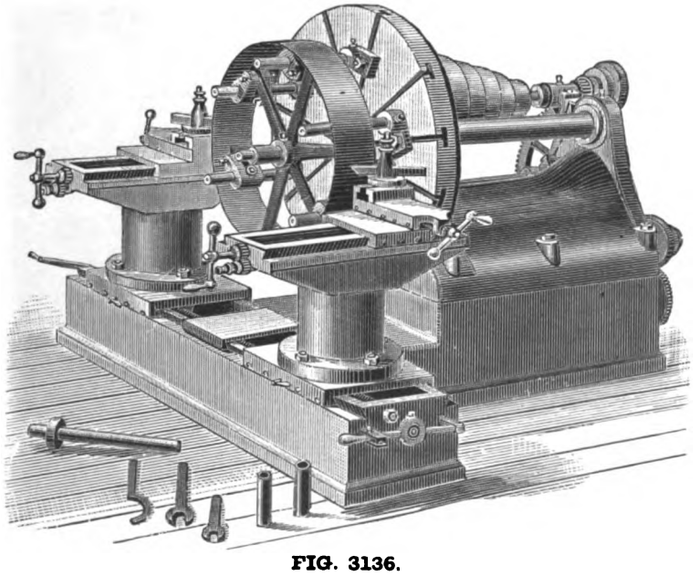


FIG. 3136.

The feed can be reversed by a single motion of lever when the lathe is running, which avoids moving the saddle back by hand in taking second cut.

The centre mandrel, either in itself or by means of split bushings, is made of the size of shaft upon which the pulley is to run; the set screws in pulley being set down on this mandrel before turning, causes the pulley to turn true afterward.

The pulley being in position on centre mandrel, the drivers are fastened to the arms, which relieves the mandrel of all strain, and allows a cut to be taken across the rim, which would destroy the pulley were it driven by the ordinary equalizing driver.

There are four feeds, ranging from $\frac{1}{32}$ to $\frac{5}{16}$ inch, which can be engaged or changed instantly.

Countershaft has double tight and loose pulleys, and two belts from line shaft from pulleys of different sizes, which doubles the number of speeds, making twelve instead of six—the number of steps on cones. This arrangement is very convenient for finishing cuts, as the speed can be increased without changing the belt by a simple motion of belt shifter. These pulleys are 20 inches by 4½ inches, and should be speeded to run 110 slow and 130 fast speed.

Three mandrels, two sets of arm drivers, and a complete set of wrenches are furnished with each machine.

Weight, complete, about 7,500 pounds.

PRICE, $1,000.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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60, 42 AND 30 INCH PULLEY LATHES.

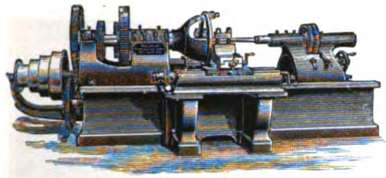


FIG. 3137.

REPRESENTS 60 INCH.

These lathes are especially designed for simultaneously boring and turning pulleys, both straight and crowing face, cone pulleys, gear blanks, and a variety of other work usually done on engine lathes.

DIMENSIONS OF 60 INCH LATHE.

Bed, 10 ft. 4 ins. long, 36 ins. wide at each end, 7 ft. 2 ins. wide at center. Main spindle $5\frac{15}{16}$ ins. diam., $45\frac{7}{8}$ ins. long, bored 2 ins. diam., 20 ins. deep; one chuck $37\frac{1}{2}$ ins. diam. for pulleys 60 ins. diam. down to 40 ins. diam. One chuck $22\frac{1}{2}$ ins. diam. for pulleys 39 ins. down to 24 ins. diam.

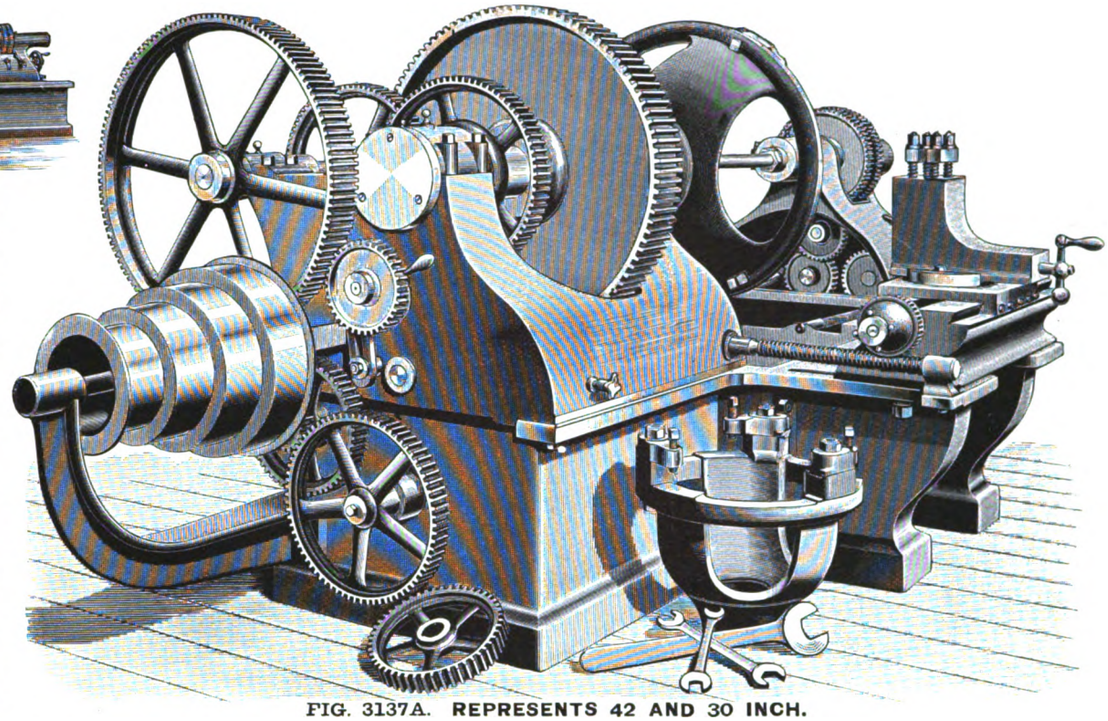


FIG. 3137A. REPRESENTS 42 AND 30 INCH.

Front bearing for spindle, 16 ins. long; base bearing, 8 ins. long. Boring arbor, $3\frac{15}{16}$ x 40 ins., with 3 changes of speed. Boring bar, $1\frac{7}{16}$ x 43 ins., will bore 16 ins. deep. Rails, 42 ins. long, $12\frac{1}{2}$ ins. wide. Saddles each have bearing on rails of 16 ins. long, $12\frac{1}{2}$ ins. wide. Feed from 0 to $\frac{3}{4}$ in. Geared 75 to 1. Driving cone 4 steps, 19 ins., 16 ins., 13 ins. and 10 ins., $4\frac{1}{2}$ in. face. Speed of countershaft, 140 revolutions. **WEIGHT, 13,000 LBS.**

Power mechanism for moving tailstock is used only for the 60 in. lathe.

DIMENSIONS OF 42 INCH LATHE.

Bed, 9 ft. 4 ins. long, $24\frac{1}{2}$ ins. wide at each end, 5 ft. 3 ins. wide at center. Main spindle $4\frac{7}{16}$ ins. diam., $37\frac{3}{8}$ ins. long, bored 2 ins. diam., 16 ins. deep; one chuck $22\frac{1}{2}$ ins. diam. for pulleys 42 ins. diam. by 30 in. face, down to 24 ins. diam. One chuck 11 ins. diam. for pulleys 23 ins. down to 12 ins. diam.

Front bearing for spindle, 14 ins. long; base bearing, 6 ins. long. Boring arbor, $3\frac{15}{16}$ x 35 ins. Boring bar, $1\frac{5}{8}$ x 38 ins., will bore 14 ins. deep. Rails, $36\frac{1}{2}$ ins. long, $10\frac{1}{2}$ ins. wide. Saddles each have bearing on rails of 14 ins. long, $10\frac{1}{2}$ ins. wide. Feed from 0 to $\frac{9}{16}$ in. Geared 48 to 1. Driving cone 4 steps, 18 ins., 15 ins., 12 ins. and 9 ins., 4 in. face. Speed of countershaft, 150 revolutions.

WEIGHT, 8,000 LBS.

DIMENSIONS OF 30 INCH LATHE.

Bed, 7 ft. 4 ins. long, 17 ins. wide at ends, 3 ft. 6 ins. at center. Main spindle $3\frac{3}{16}$ ins. diam., $31\frac{1}{4}$ ins. long, bored $1\frac{3}{4}$ ins. diam., 14 ins. deep; one chuck 15 ins. diam. for pulleys from 30 ins. diam. by 20 in. face, down to 16 ins. diam. One chuck 7 ins. diam. for pulleys 16 ins. down to 8 ins. diam.

Front bearing for spindle, 12 ins. long; base bearing, 5 ins. long. Boring arbor, $2\frac{7}{16}$ x 30 ins., with 6 changes of speed. Boring bar, $1\frac{7}{16}$ x $32\frac{1}{2}$ ins., will bore 12 ins. deep. Rails, 30 ins. long, 7 ins. wide. Saddles each have bearing on rails of 12 ins. long, 7 ins. wide. Feed from 0 to $\frac{1}{2}$ in. Geared 42 to 1. Driving cone 4 steps, 16 ins., 13 ins., 10 ins. and 7 ins., $3\frac{1}{2}$ in. face. Speed of countershaft, 210 revolutions.

WEIGHT, 4,000 LBS.

60, 50, 36 AND 26 INCH PULLEY LATHE.

60 inch swing, will turn pulleys from 12 to 60 inches diameter and up to 28 in width, and is 40 inches between centres.

60 inch, two tools..... .....$595.00
60 " " " and boring..... 639.00

50 inch swing, will turn pulleys from 12 to 50 inches diameter and up to 28 in width, and is 40 inches between centres.

50 inch, two tools..... .....$528.00
50 " " " and boring..... 584.00

36 inch swing, will turn pulleys from 10 to 36 inches diameter and up to 21 in width, and is 33 inches between centres.

36 inch, two tools..... .....$420.00
36 " " " and boring..... ... 473.00

26 inch swing, will turn pulleys from 5 to 26 inches diameter and up to 19 in width, and is 27 inches between centres.

26 inch, two tools..... .....$267.00
26 " " " and boring..... 312.00

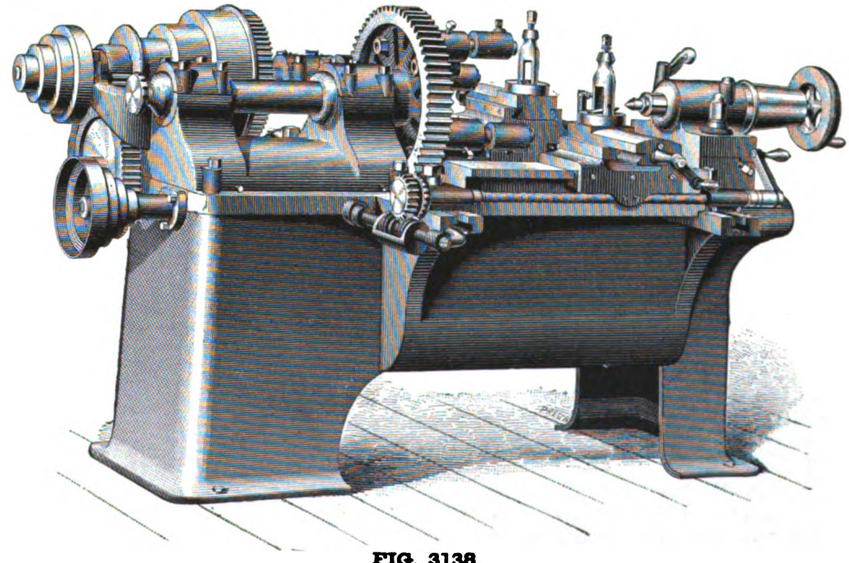


FIG. 3138.

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60 INCH PULLEY LATHE.

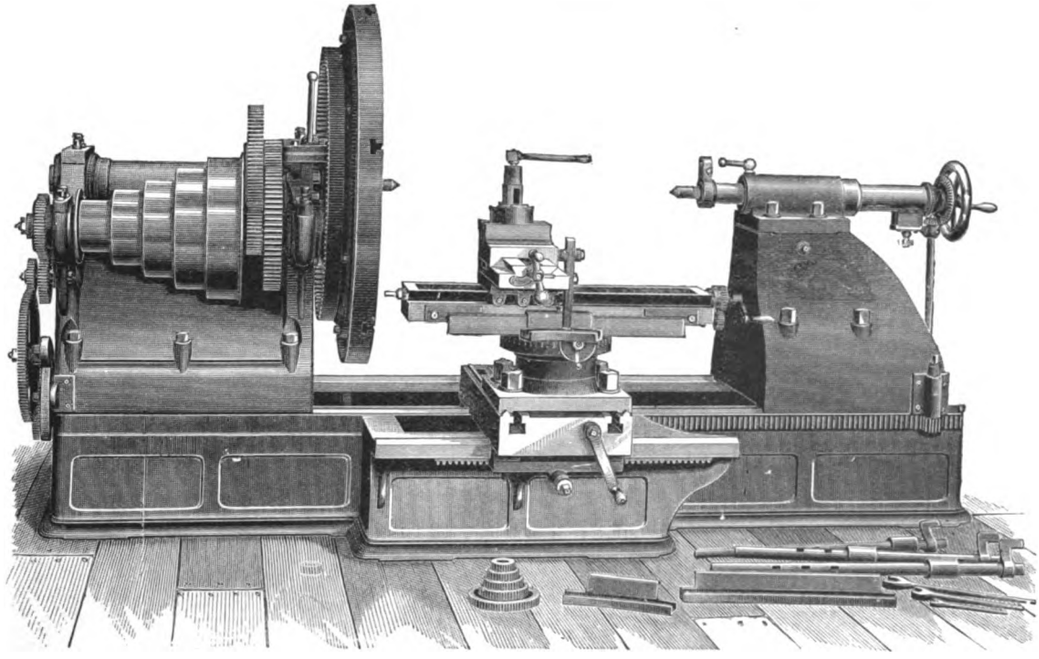


FIG. 3139.

Length of bed, 10 feet 9 inches.

Swing over bed, 60 inches.

Swing over carriage, 50 inches.

Will bore and turn 60 inch pulleys up to 19 inch face.

Will bore and turn 50 inch pulleys up to 32 inch face.

Between centres, 50 inches.

Will turn straight or tapering, and the slide rest has guides having the proper circles for turning the face of pulleys crowning. Will also face off from centre to outside of face plate, and feed at any possible angle automatically.

The tail spindle has an automatic feed of about 13 inches, with variable speeds, and is used for boring out pulleys; three steel boring bars with bushings to fit hole in the head spindle being furnished with the lathe, also overhead countershaft complete, and a full complement of wrenches, etc.

Cone pulleys have five steps and take a 4 inch belt.

Weight, about 9,700 pounds.

PRICE, $1,250.00.

50 INCH PULLEY BORER.

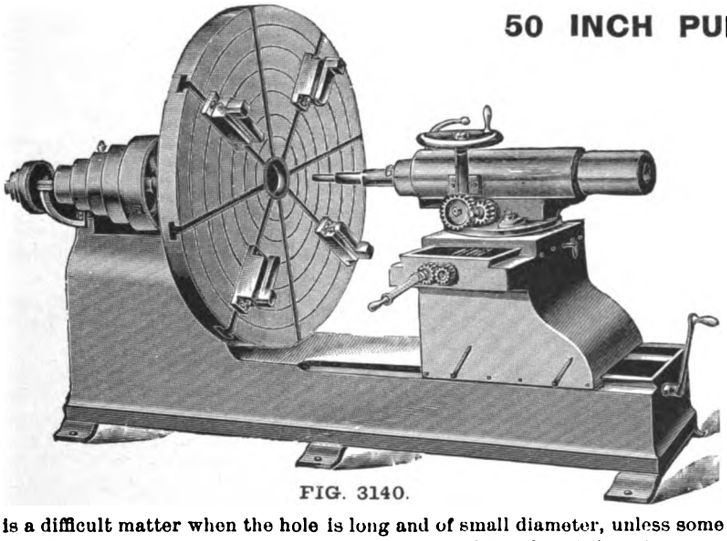


FIG. 3140.

Designed for all kinds of boring and facing up to 20 inch diameter either straight or taper holes.

All the special boring machines of the class where the work is revolved upon a face plate which have been put upon the market up to the present time, are only suitable for boring straight holes of standard sizes, or rather sizes for which special cutters have been provided, and will not face hubs of loose pulleys and other work, without providing some special device for the purpose, which device has to be put on and taken off so often that as a matter of economy it would be as well to leave it off altogether.

That portion of the machine which carries the boring bar is generally located so far from the face plate, in order to bore wide-faced pulleys, that, when boring narrow-faced pulleys, the bar projects so far from its support that it is not stiff enough to true up a hole, without going through it several times.

Most of these machines are constructed with upright spindles, in order to facilitate the chucking of heavy work, the theory being good, provided this was the only principle involved, but after the work is chucked it becomes necessary to bore it, and bore it true, which boring is a difficult matter when the hole is long and of small diameter, unless some support is given to the bar on both sides of the work.

Now, with an upright spindle, all the chips and fine dust follow the bar and spoil any bearing that is provided for it. With a horizontal spindle and bar there is no trouble in putting a stationary support in front end of revolving spindle which will retain its fit upon the bar, and last for years with continuous work.

With a suitable crane and chain hoist, there is no trouble in putting work into a horizontal machine, and as most machinists are trained to truing up work in an engine lathe, they will not require as much special training to enable them to operate a horizontal machine as an upright.

To overcome the objectionable features, and produce a machine which will bore anything that can be bored upon the face plate or in the chuck of an engine lathe, and do it as quickly as the best upright machine, in all cases, and much more so in many cases, was the object sought after in the above illustration.

The face plate is mounted upon a heavy spindle, which is hollow the whole length, allowing the boring bar to pass clear through it when required. It is driven by a steel pinion running in an internal spur gear upon back of face plate; proportion one to eight. Cone pulley has five changes for a 4 inch belt.

Countershaft is driven with two belts from two sizes of pulleys on line shaft, thus giving ten speeds to machine.

A stationary collar is held in front end of face plate spindle round which the spindle revolves, which acts as a support for one end of boring bar, while it is being fed through a long hole, and admits of truing hole in one cut. The head which carries the boring spindle is movable, to and from the face plate, and can be brought close to it when boring work that will permit it, thus avoiding all spring when not using the supporting collar.

It is moved by a coarse thread screw, and locked when in position by two lever gib screws.

A cross slide having a traverse of 11 inches, with power feed, is located on boring bar head, and admits of facing hubs, and also permits the use of an ordinary boring tool for large, odd sized, chambered and taper holes.

The top part of boring bar head, above the cross slide, revolves in a horizontal plane, and can be secured at any angle for boring taper holes, with power feed, and also serves as a means of alignment when any wear of spindle or bar shall have taken place.

Both sides can be operated by hand for working out any irregular forms, either boring or turning.

Feeds are operated by belt, and have four changes.

Feeds are engaged by sliding pinions.

This machine will take in and bore a pulley 50 inch diameter and 30 inch face.

Countershaft pulleys are 20 inch diameter for 4½ inch belts, and should run 81 revolutions on slow speed, and 162 revolutions on fast speed.

Weight, about 5,300 pounds.

Price, including friction counters, four chuck jaws, one long and one short boring bar and holders for bars and revolving bush for face plate, **$850.00.**

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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60 AND 50 INCH PULLEY BORER.

Designed specially for boring pulleys, gears or other objects, as a companion machine to pulley turning lathes.

Set for boring, turning and polishing pulleys that cannot be equaled for rapidity and excellence in executing this work.

The face plate is revolved by powerful gearing, driven by a cone with four steps for a belt 4 inches wide.

The boring bar is fed automatically, 20 inches, with three changes of speed. It is counterweighted and has quick return. The feeds are thrown in instantly by friction.

One tool holder, a set of chuck jaws, and a set of special clamps for holding pulleys, are furnished with each machine.

These machines are adapted to a wide range of work and can be advantageously used on a great variety of general machine shop boring. They will accomplish such work vastly cheaper than a "chucking lathe."

The countershaft pulleys are 24 inches diameter, 4½ inch face, speed of 70 revolutions.

60 inch swing will take in work 24 inches high.

50 inch swing will take in work 24 inches high.

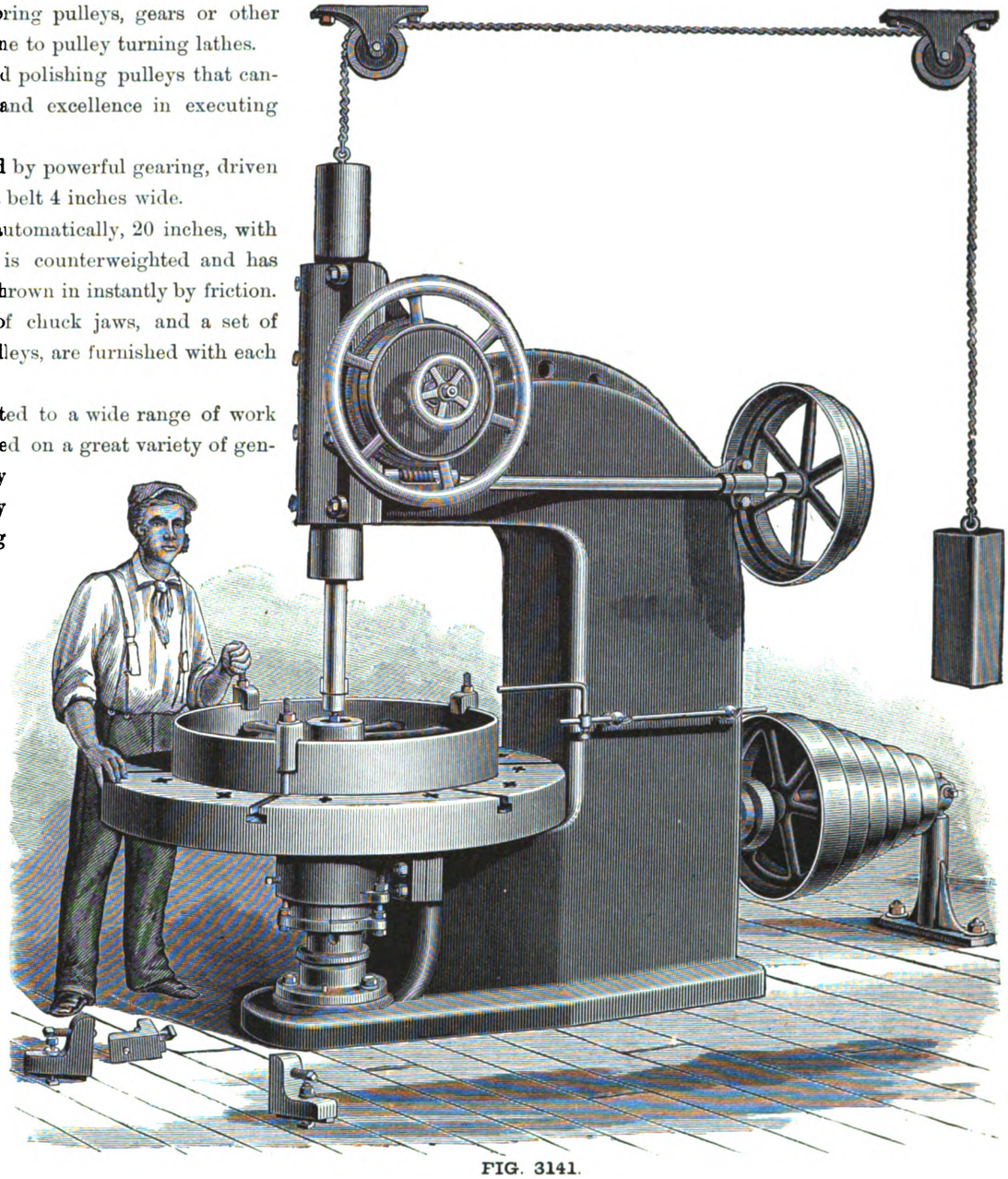


FIG. 3141.

PULLEY HUB DRILLING AND TAPPING MACHINE.

OPERATED BY STOW FLEXIBLE SHAFT.

The machine has a spindle or arbor on which the pulley is put, and held by a taper cone and nut. It has a screw feed motion in line with the axis of the hub, enabling one to start the drill in any part of the hub; also a screw feed motion to feed in the drill.

By loosening a set screw on the side of the machine the latter feed motion is detached, and the tap can be fed in by hand, with a handle applied in place of the flexible shaft.

This machine is designed to drill and tap the hole in hub for set screw, without drilling any hole through the rim, and can be used on pulleys 6 inches diameter and upward. The machine weighs only 18 pounds, and is therefore actually and thoroughly portable.

This should be used by every manufacturer of pulleys, because it avoids drilling a hole through the rim, and leaves the whole face clear and smooth.



FIG. 3142.

PRICE OF MACHINE, COMPLETE.

One pulley hub drilling machine,	$40.00
One No. 4 flexible shaft,	40.00
One No. 4 countershaft,	20.00

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60, 48 AND 39 INCH BORING MACHINE.

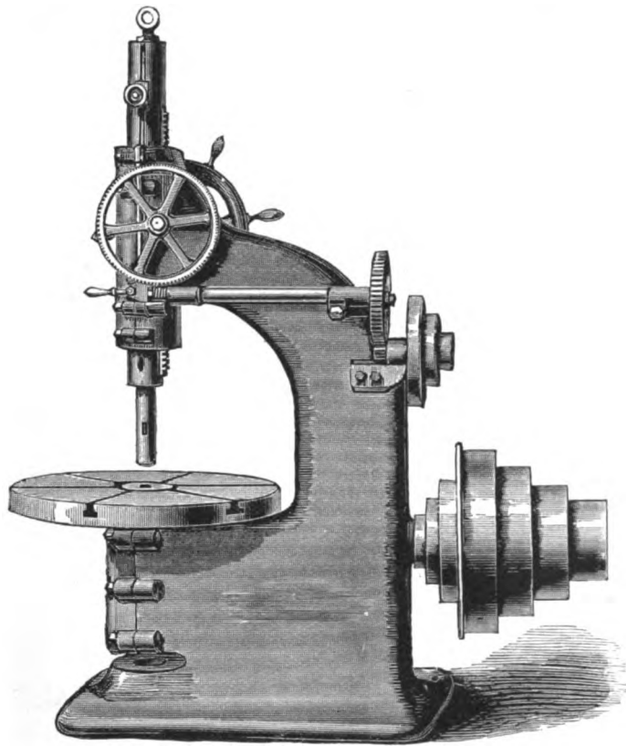


FIG. 3143.

Spindles have a traverse of 30 inches; self-feed; adjustable stop, and quick return; balanced by weight; distance from center of table to column, 19½, 24 and 30 inches; table has an outlet at the bottom for the escape of chips; driven by four change cone for a 4-inch belt; countershafts have two sets of pulleys for fast and slow speed.

Weight, ... lbs., 39 inch. Price, $.....
" ..... " 48 inch. " .....
" ..... " 60 inch. " .....

PULLEY HUB TAPPER AND DRILLER.

Taps pulleys from 12 to 60 inches diameter, and any width of face up to 20 inches.

The countershaft is arranged with tight and loose pulleys, and runs with two belts, open and crossed, so as to give a right-hand motion to the socket for tapping, and a left-hand motion for drilling and for backing out the taps. The front part of the head carrying the drill and tap socket is constructed so that it will go between the rim and hub of a *twelve inch pulley* and set-screw it without drilling through the rim; below that size the pulleys are drilled and tapped through the rim. The relations of the drill socket and the mandrel are such that the drills and taps point exactly to the center of the bore in the pulley, and lack of skill in the operator should not cause them to deviate from their proper course. All working parts of the machine and the mandrels are made of steel, and all parts subjected to bruising wear are case-hardened. Speeds of countershaft, 200 and 85 revolutions per minute. Tight and loose pulleys, 12 and 18 inches diameter, 4 inches face.

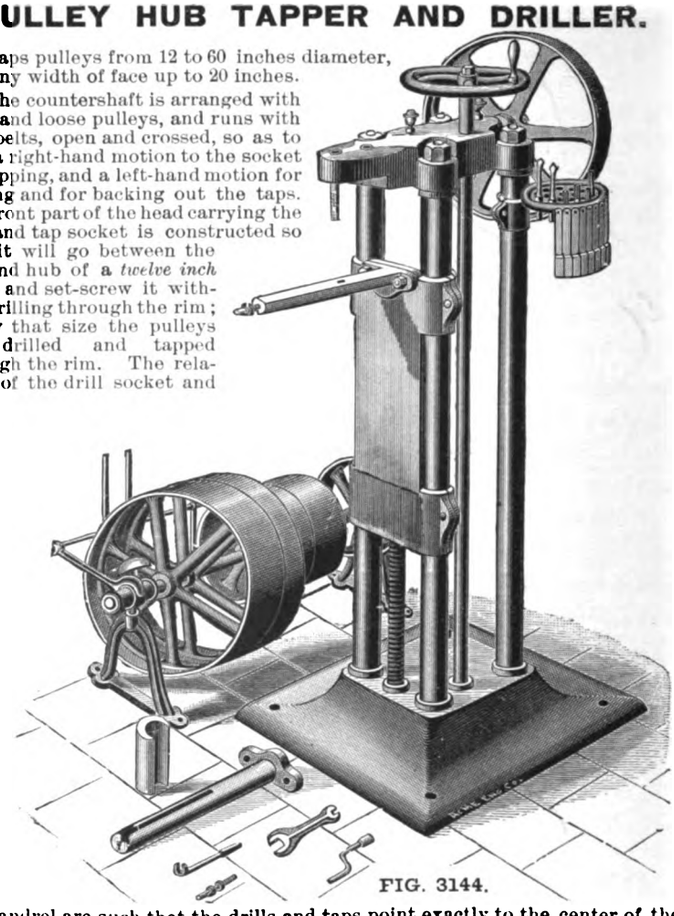


FIG. 3144.

Price, all complete, including set taps, drills, holders and expansion mandrels..... **$270.00.**

SHAFTING GRINDER.

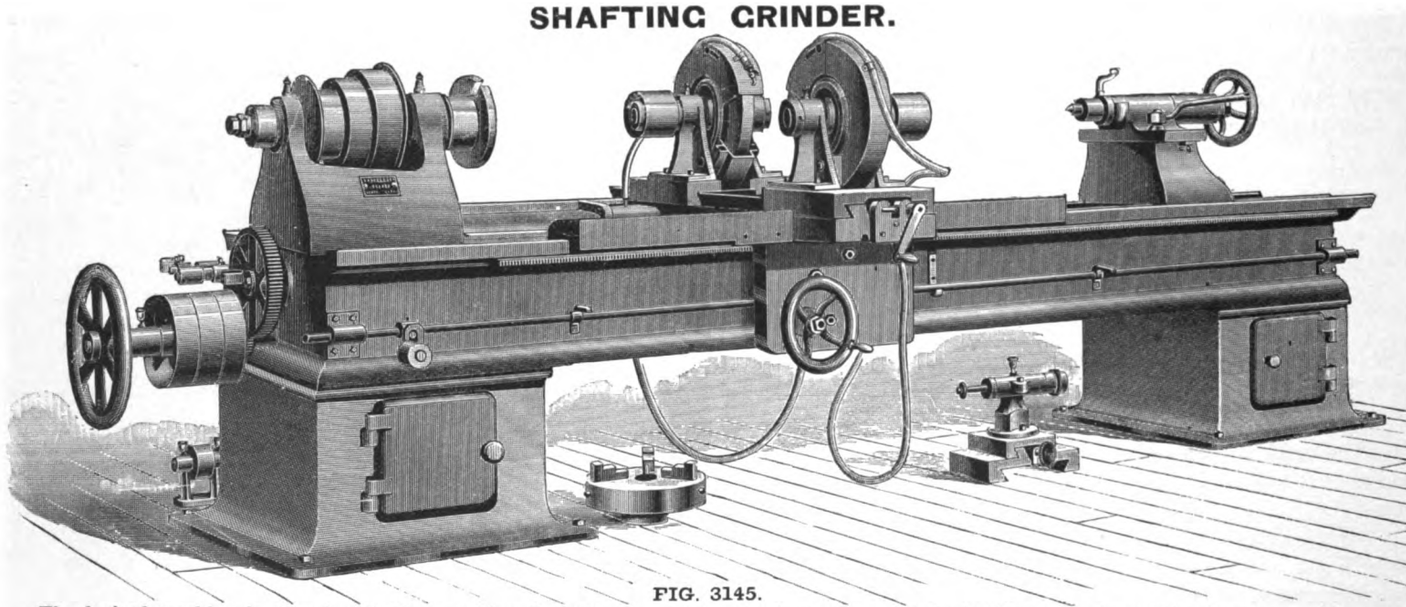


FIG. 3145.

The bed of machine is closed at bottom, making it much more rigid, and acts as a reservoir for holding water to supply the pump. The pump furnishes a large supply of water, prevents heating and expanding the work, and the grinding can be done twice as fast as when ground dry, and more accurately. Emery wheel carriage travels by means of a lead screw through center of bed, engaging with a split nut, to be opened or closed at will. When opened, carriage is free to be run by hand. Machine furnished with a steady rest where only one wheel is sent. The feed work and slide of the machine are covered and fully protected from emery and dust. An extra swivel head is furnished to run on the carriage opposite chuck, arranged to carry very small wheels for grinding the inside of work held in the chuck, either straight or tapering.

Weight, 6,200 lbs. Has a bed 12 feet long, takes in work 8 feet between centers, swings 22 inches over the carriage when ordered to take emery wheels 20 inches in diameter, and will swing 16 inches over carriage when 14 inches diameter. Length of emery wheel bearings, 4 inches; diameter of emery wheel spindle, 2 inches; will carry emery wheel 14 to 20 inches diameter as may be preferred. Length of front bearing in head block, 6 inches; diameter of spindle, 2½ inches; rear bearing, 4¼ inches long by 2 inches in diameter.

PRICE OF MACHINE, WITH PUMP, OVERHEAD DRUM, AND COUNTERSHAFT, $.....

If back geared, $100 additional, and should be back geared for work above 6 inches diameter. For additional lengths, $100 each 2 feet or fraction thereof.

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32-INCH WHEEL BORER.

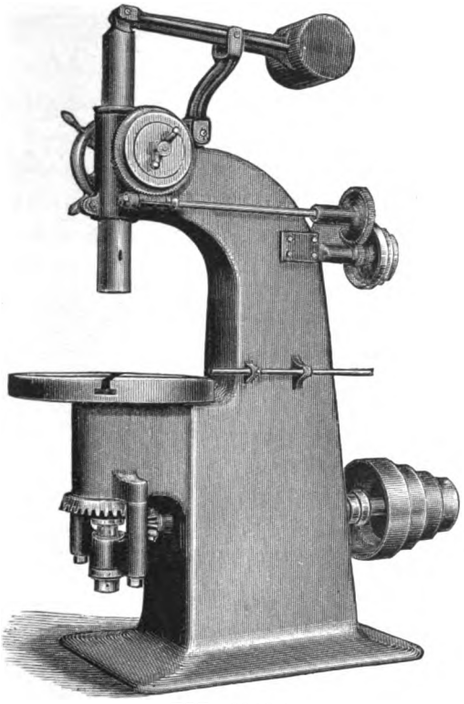


FIG. 3145 A.

Will bore wheels up to 32 inches in diameter, four changes of speed and six changes of feed, arranged to feed $\frac{1}{32}$ inch to a revolution while roughing cut is on and $\frac{1}{4}$ inch while finishing, with quick return motion. The face-plate can be removed and an ordinary lathe chuck put in its place. The spindle is counterweighted. The bottom of the spindle is provided with an adjustable step for taking up the lost motion.

To the machine can be added an attachment whereby hubs can be faced upon the bottom as well as on the top without removing the work from the chuck; thus the whole operation of boring, reaming and facing can be finished at one setting. The bevel gears are accessible, but protected from the chips. **WEIGHT, 3,000 LBS.**

PRICES ON APPLICATION.

36-INCH VERTICAL TURRET BORER.

DESCRIPTION, FIG. 3145 B.

The machine swings 36 inches with four changes of speed, and is provided with a turret head with 5 holes for tools. The turret is counterweighted and has an automatic feed with six changes, arranged to feed $\frac{1}{32}$ inch while roughing cut is on and $\frac{1}{4}$ inch while finishing, with quick return motion. The face-plate is screwed to spindle and may be removed and a chuck used in its place. The spindle is hollow, which allows chips to drop through to the floor. The bottom of the spindle is provided with an adjustable step for taking up the lost motion. To the machine can be added an attachment whereby hubs can be faced upon the bottom as well as on the top without removing the work from the chuck; thus the whole operation of boring, reaming and facing can be finished at one setting. The bevel gears are accessible, but protected from the chips.

WEIGHT, 3,500 LBS.

PRICES ON APPLICATION.

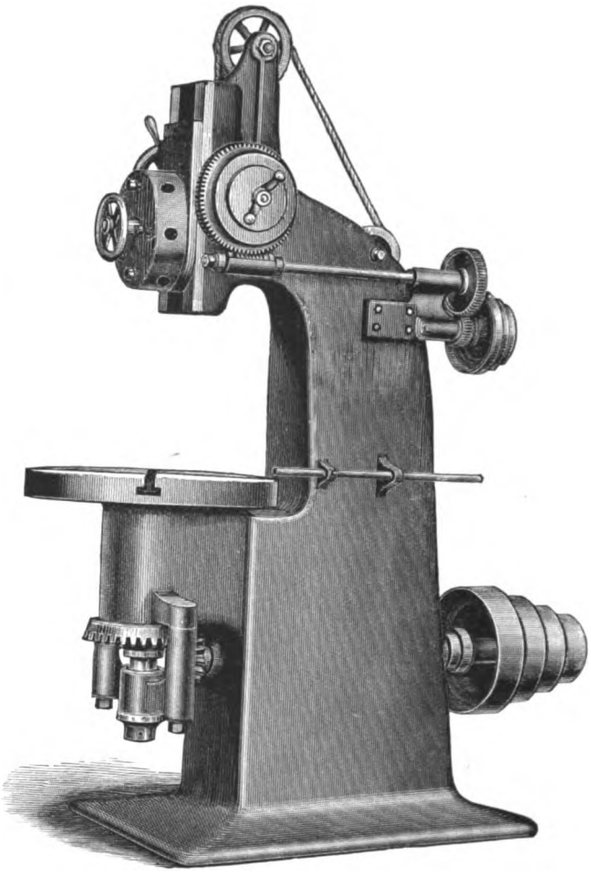


FIG. 3145 B.

PULLEY HUB DRILLING AND TAPPING MACHINES.

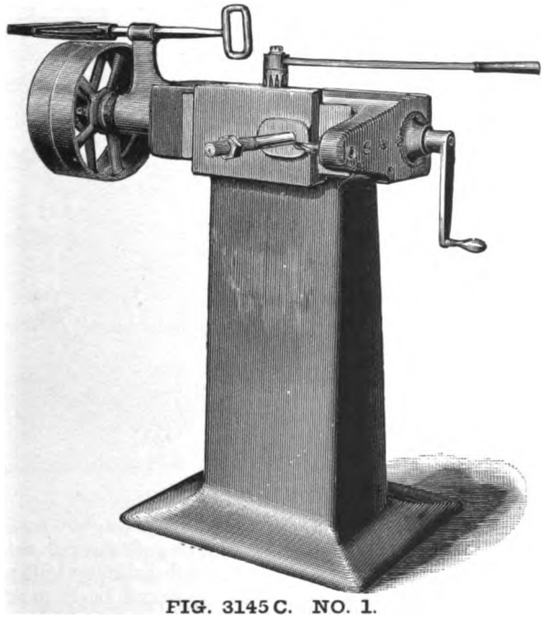


FIG. 3145 C. NO. 1.

For drilling and tapping the hubs of pulleys for set-screws. The work is placed on an arbor and fed by hand. The tap may be operated by hand or power. The machine is so constructed that the taps can be operated partially or entirely by hand, thus avoiding the breaking of taps, which is common where they are operated by power only. The gears are cut from forged steel blanks. A countershaft is not furnished except at an extra cost, as the machine can be placed in a convenient position under the line shaft.

We furnish with the machine either plain arbors and taper cones for holding the pulley or six assorted sizes of arbors of whatever size the customer may desire.

WEIGHT, 900 LBS.

PRICES ON APPLICATION.

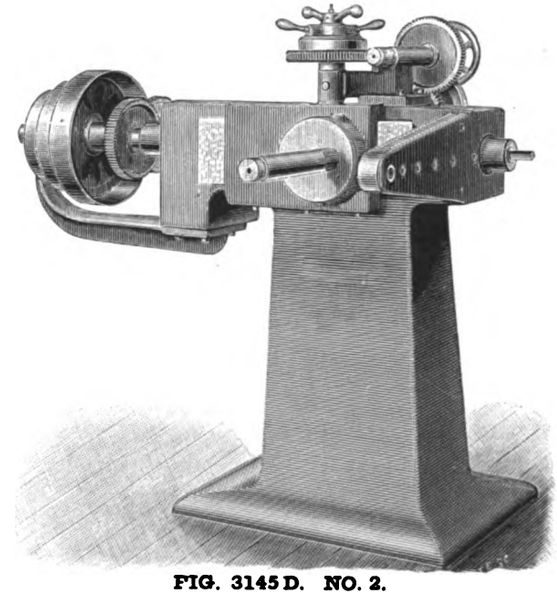


FIG. 3145 D. NO. 2.

For drilling and tapping the hubs of pulleys for set screws and oil holes. The work is placed on an arbor and is fed automatically or by hand. The machine is so constructed that the taps can be operated partially or entirely by hand, thus avoiding the breaking of taps, which is common when they are operated by power only. The machine will drill and tap the hub of pulleys up to 72 inches diameter. The machine is back-geared, with six changes of speed and six changes of feed, with slow hand feed and quick return.

We furnish with the machine either plain arbors and taper cones for holding the pulley or six assorted sizes of arbors of whatever size the customer may desire.

WEIGHT, 3,000 LBS.

PRICES ON APPLICATION.

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COTTER DRILL.

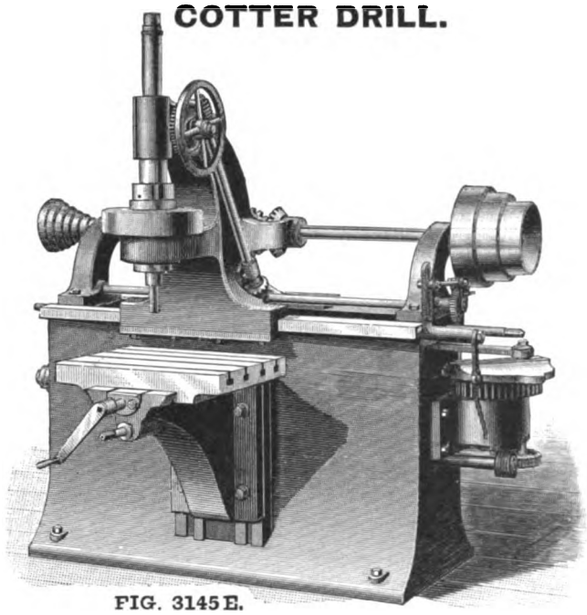


FIG. 3145 E.

An exceptionally useful tool for cutting key-ways, cotter holes, key-ways in shafts, railway axles, cotter holes in connecting rods, straps, piston rods, cross-heads, cutting out joints, and can also be used for ordinary drilling. After the machine is set and started it is entirely self-acting, feeding the length of the slot, the spindle feeding down and then returning, and so on until the slot is of the proper depth.

Machine is capable of cutting slots up to 1¼ inches in width and to 12 inches in length ; feed to the head is by means of a crank and connecting rod, which can be set to any desired stroke. Will admit work in height 21 inches. **WEIGHT, 5,100 LBS.**

KEY-SEAT MILLER AND SLABBING MACHINE.

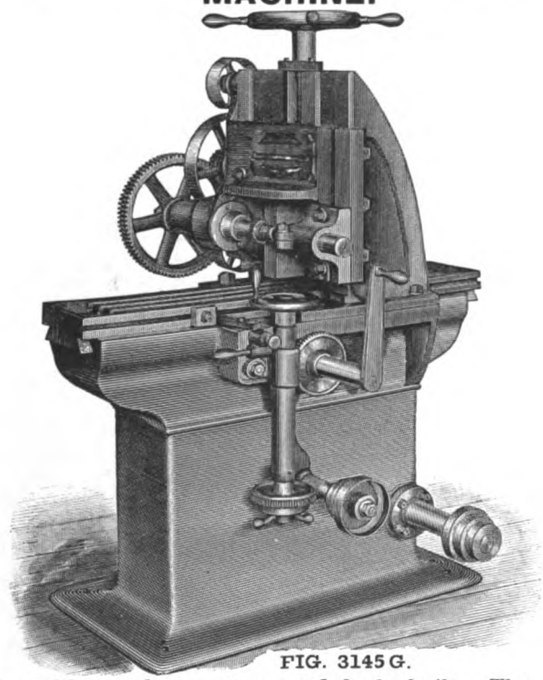


FIG. 3145 G.

This tool is very heavy, strong and finely built. The spindles are arranged so that cutter can be adjusted from right to left without changing washers or removing from machine. The cross-head is gibbed to the housings, and may be adjusted while the machine is in motion. The machine has 3 changes of speed, strongly backgeared ; 3 changes of automatic feed, with automatic stop. An attachment can be added to any of the machines in which to place an end-mill to finish the end of the key-way or spline. The carriage is 4 feet long, 11 inches wide. Shafts of all diameters up to 6 inches can be milled the entire length of the carriage. Machines can be made longer if desired. **WEIGHT, 3,000 LBS.**

LOCOMOTIVE ROD FILLETER AND KEY-SEATING MILLER.

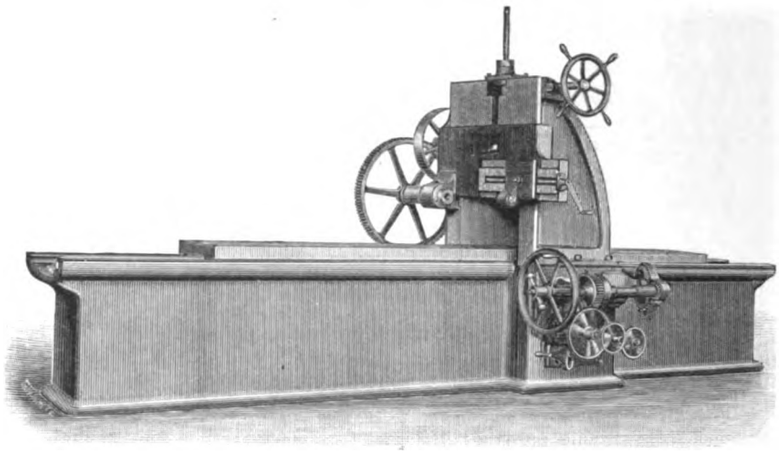


FIG. 3145 F.

For filleting and fluting rods of locomotive and stationary engines. Shafts up to 16 inches diameter can be key-seated on this machine, or a number of small size shafts can be key-seated at one time. The cutters can be fed down into the work while in operation. Engine and locomotive rods can be filleted two at one time. The machine has a carriage 8 feet long—can be made any desired length—21 inches wide. Has a variable automatic feed. We furnish a pump and drip pans and reservoir for soda water or oil at a small additional cost.

WEIGHT, 10,000 LBS.

LOCOMOTIVE ROD MILLER.

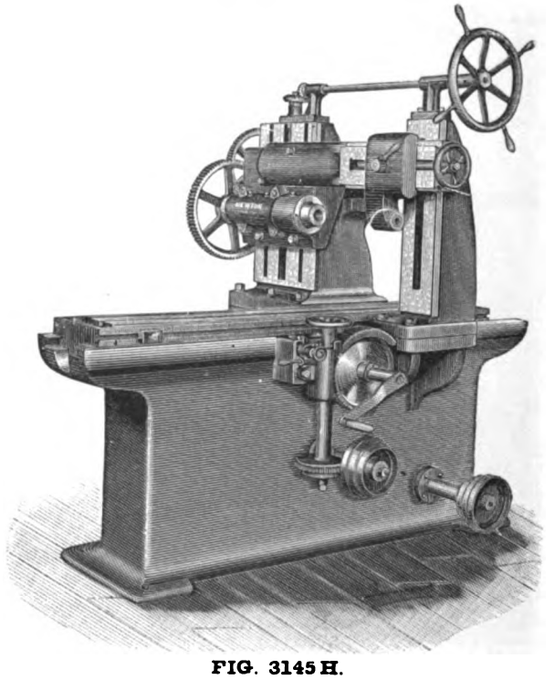


FIG. 3145 H.

This machine is intended to mill and fillet engine rods, spline axles, cut key-ways in shafting, slab links and straps, mill cross-heads, pedestal gibs and wedges, and all ordinary milling. The spindle is very large and driven by compound back gears. The machine has 3 changes of speed and 3 changes of automatic feed, with quick return to carriage. Feed to carriage is through rack and spiral pinion, and not as shown on illustration. The back boxes are connected to head by links, allowing the cutters to be adjusted or fed into the work while in operation. The arbor has an attachment whereby the cutters can be adjusted from right to left without removing the arbor or cutters. Has a carriage 6 feet long, 18 inches wide. Spindle can be raised 16 inches above carriage. The carriages of the machines can be made to any desired length. **WEIGHT, 6,500 LBS.**

PRICES ON APPLICATION.

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VERTICAL CHUCKING MACHINE.

With this machine from two to four times as much work can be accomplished in a given time as can be done upon an engine lathe, and in a much superior manner, the work being more easily trued and fastened in place than upon any machine having a horizontal spindle. The different tools in the turret head are easily brought into operation, and, from their perpendicular position, allow the chips to fall through the center of the spindle of the revolving table to the floor, and thus avoid danger of trouble from the clogging of reamers, etc.

The machine has the capacity to bore a 4 inch hole, and receive a pulley 36 inch diameter, 14½ inch face, with hub 12 inches in length. It makes three cuts and finishes by reaming without the removal of the tools or work.

The revolving table is driven by a five step cone for a 3 inch belt, and is geared 6 to 1. The steps of the cone are so graded as to make the cutting speed uniform for five different diameters of holes.

The turret has four holes 1¾ inches in diameter, and is securely clamped in position. An adjustable dog allows the locking pin to be withdrawn at any part of its upward motion.

The turret slide has a movement of 21 inches, and an automatic feed which can be easily and quickly changed from the finest to the coarsest required; it has quick return by hand, and is counterbalanced by a weight inside of column.

The overhead works have friction pulleys 12 and 16 inch diameter, 3½ inch face, and should run 210 and 105 revolutions per minute.

Weight of the machine, boxed for shipment, is about 4,900 lbs.

PRICE, COMPLETE, $.....

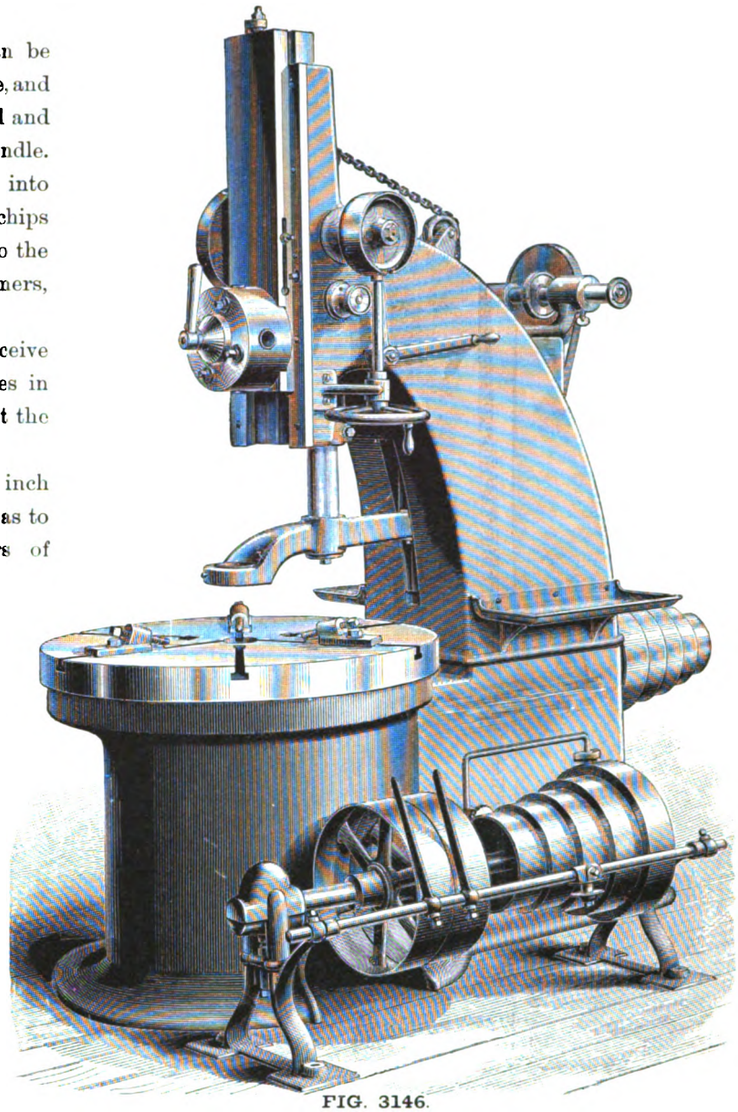


FIG. 3146.

SHAFTING KEY WAY SEATER, OR MILLING MACHINE.

This machine is intended for long and heavy cuts, such as guide bars, connecting rods, key seating shafting, axles to 10 inch diameter, etc., and is a very solid substantial tool.

The bed is heavy and well stiffened by a number of girts, making a firm support for the table and housings.

The table is 14 inches wide, has three T-slots, and is furnished 6 or 8 feet long, as desired, moves by cut rack, and so geared as to be easily operated by hand, and is surrounded by a trough to collect lubricant used on cutters.

The cross head is gibbed to the housings and adjusted by a screw, with graduated dial reading to thousandths, which facilitates accurate measurement for sinking and other cuts. The distance between housings is 19 inches.

The spindle runs in bronze bearings 4⅜ inch diameter and 5½ inches long, is driven by a 3½ inch belt over a 20 inch pulley, through gearing in the ratio of 6 to 1, arranged for 4 speeds. Provision is made for horizontal adjustment of cutters, in addition to that afforded by washers. The greatest distance from top of table to center of spindle is 14 inches; the least, 3 inches. Cutters to 8½ inch diameter can be used. Cutter section of spindle is 1¾ inch diameter, 14 inches long.

The feed is actuated by means of a worm and gear driven by cones having four sections, and can be thrown out by hand, as desired, or stopped automatically by adjustable stop, and is the full length of table.

A pump returns the lubricant to the cutters as collected in a tank contained in the bed.

Countershaft has tight and loose pulleys 18 inch diameter for 4½ inch belt, and should run 200 turns per minute.

Weight, 5,500 lbs. **PRICE, WITH TABLE 6 FEET LONG, $**.....

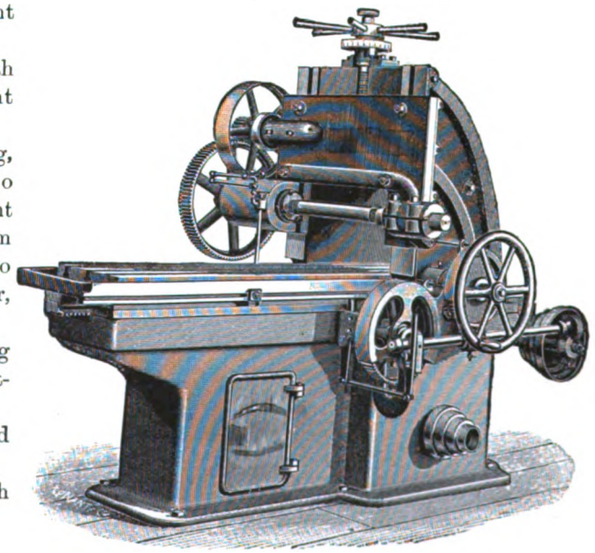


FIG. 3147.

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KEY SEATING MACHINES.

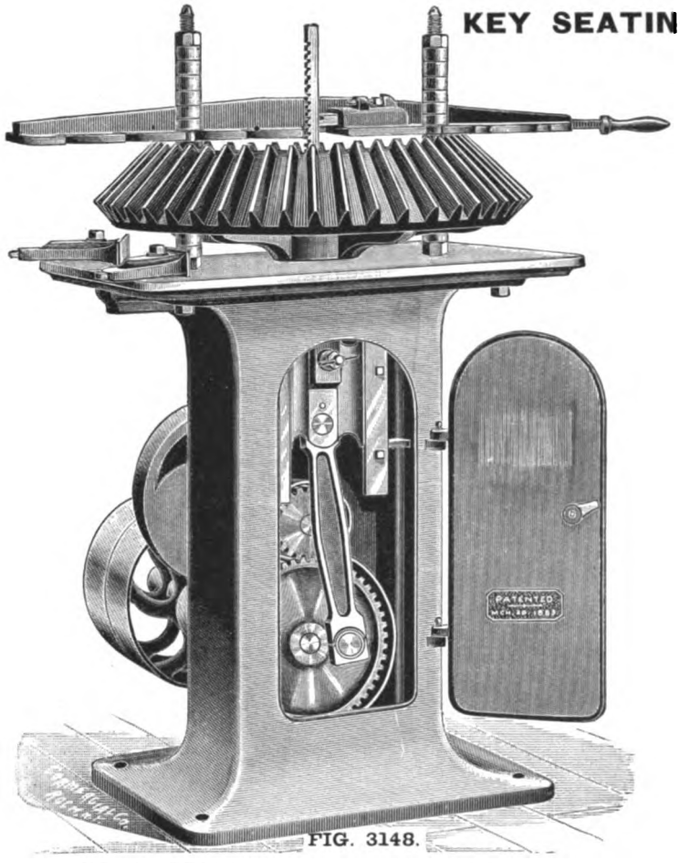


FIG. 3148.

NO. 1. PRICE, $100, WITH CUTTERS 3-8 AND 1-2.

The gears are 1⅝ face and are cut. The connection rod is so arranged as to keep chips and dirt from falling into crank pin. The gears are all cased, and therefore are in no danger from anything getting into them. This casing is not shown in cut. The ways are bored out and top of frame faced by putting frame on a mandrel and facing up top of column in lathe; the top is planed on both sides, and by this arrangement every part is brought perfect and true. The saw clamp is very handy and requires but a very short time to change cutters. The stud pins to clamp are provided with washers, and so arranged that the clamp can be placed between them at any height required and will not drop down. A very simple arrangement is also furnished to give any desired draft to key seat required, also any depth, and every one can be made the same; this is a point long sought for, and is now made to work so perfect that this machine can be used in all shops where key seating is required. The pulleys are 13 inches in diameter and 4½ inches in face, and should make 350 revolutions per minute. This machine will cut ¼ inch to 1 inch key seats and work very fast. Each machine is furnished with ⅜ and ½ inch cutters.

PRICE, $100.00.

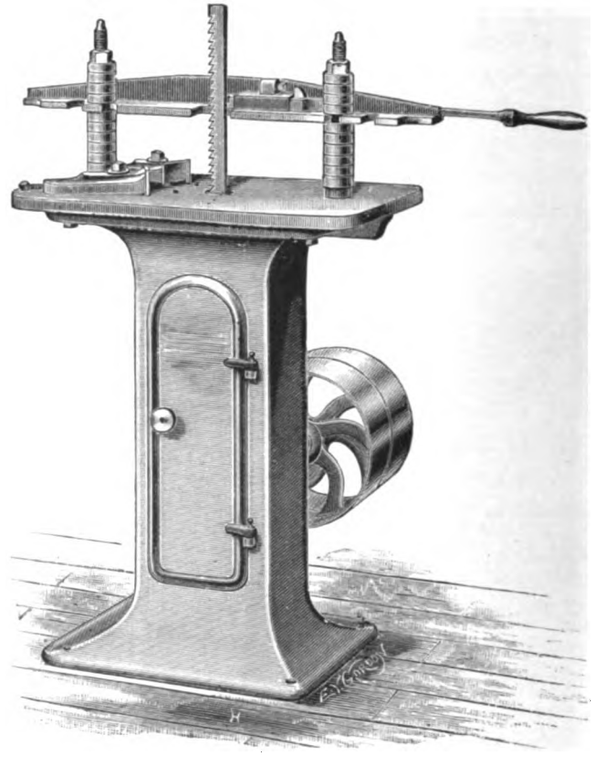


FIG. 3149.

NO. 2. PRICE, $75, WITH CUTTERS 1-4 AND 3-8.

This machine is same as No. 1, except it is not geared. The pulleys are 13 inches in diameter and 4½ inches in face, and should make 60 revolutions per minute. This machine will cut from ⅛ to ⅜ inch key seats, and work very fast. Each machine is furnished with ¼ inch and ⅜ inch cutters. **PRICE, $75.00.**

PRICE OF EXTRA CUTTERS FOR FIGS. 3148 & 3149.

1/4 inch	$2.00	5/8 inch	$3.50
5/16 "	2.25	11/16 "	3.75
3/8 "	2.50	3/4 "	4.00
7/16 "	2.75	13/16 "	4.25
1/2 "	3.00	7/8 "	4.50
9/16 "	3.25	1 "	5.00

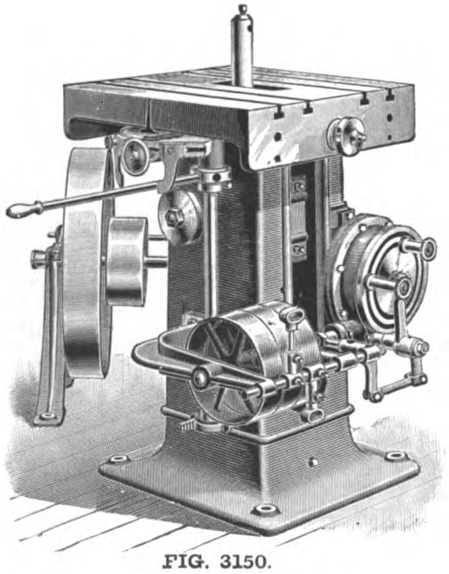


FIG. 3150.

GIANT KEY SEATER.

The loose pulleys are bushed with brass, and all boxes lined with babbitt. Angle plates are provided for readily centering and securing work to table.

Extension arms are furnished for increasing the size of table for work of large diameter.

Each machine is furnished with full line of cutters, countershafts, wrenches, etc.

As illustrating the rapidity with which work can be done with these machines, we have frequently cut key seats 1 inch wide by 6 inches long in 3 to 4 minutes, and 1¼ inch wide by 12 inches long in 12 minutes, and as accurately and exactly as any work can be done upon a planer.

PRICES.

No. 1 machine cuts key seats from the smallest ever used to	1½	in. wide and	10	in. long	$275.00
" 2 " " " " " " " " " "	2	" "	14	" "	350.00
" 3 " " " " " " " " " "	2½	" "	19	" "	500.00
" 4 " " " " " " " " " "	3	" "	24	" "	750.00
" 5 " " " " " " " " " "	3½	" "	30	" "	1,000.00

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KEY SEATING MACHINES.

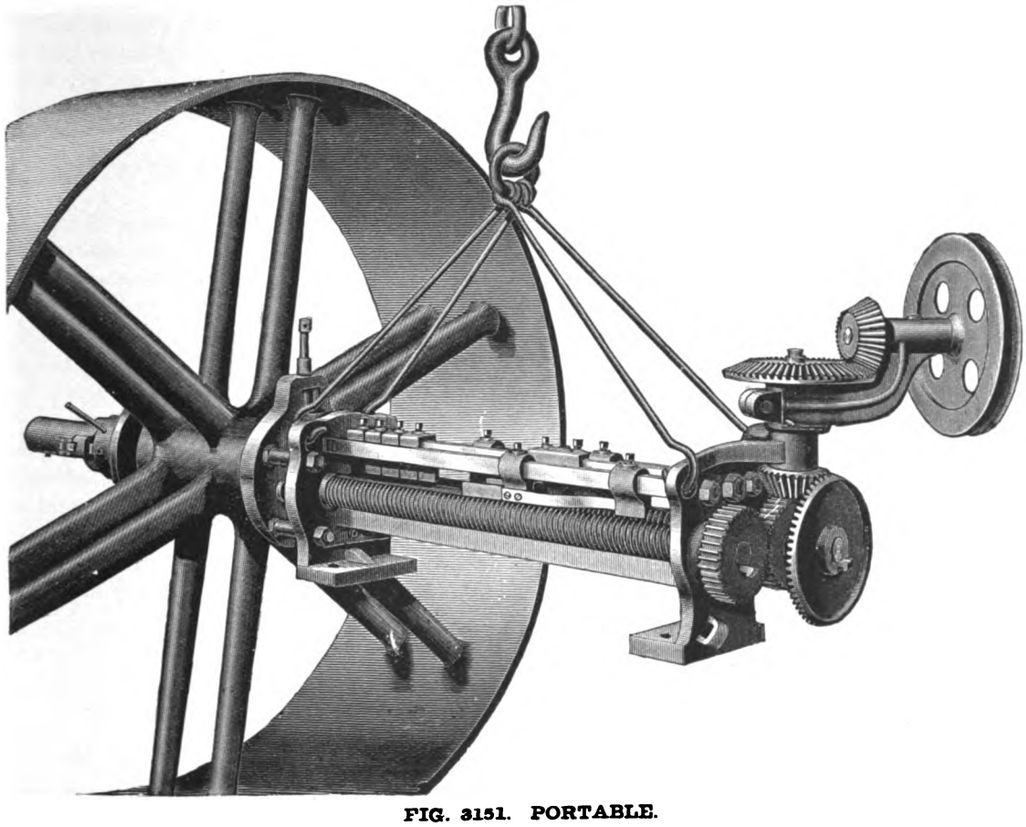


FIG. 3151. PORTABLE.

FOR PRICES, SEE NEXT PAGE.

The range of the standard machine being in all bores, from $2\frac{7}{16}$ inches in diameter up to 14 inches, inclusive; all widths of seats up to $2\frac{1}{2}$ inches, length of cut 24 inches. The machine is furnished with two arbors—these are $2\frac{7}{16}$ and $4\frac{7}{16}$ inches in diameter—all work in bores of $4\frac{7}{16}$, or above, being cut on the large arbor. If the work is heavy, and too large to be placed on the machine, it can be used as a portable machine, as shown by Fig. 3151.

No facing of hub is necessary. The cutting is done by both forward and backward stroke.

The cutters are very easily made and kept in order, and being hung on pins will drag back through the cut without having to be backed away from the work.

The tool bar being supported its entire length there can be no perceptible spring, and having bearing its entire length—top, bottom and sides—insures long use with but little wear.

Either straight or taper seats can be cut at will.

It can be used in split as well as in solid bores, for facing hubs and rims of split wheels, also for slotting the steam ports of Corliss engine cylinders.

When in use as a portable, it is not necessary to place the work or machine in line with countershaft; the sheave being swiveled, it can be driven from any direction. The bore being the guide by which the arbor is centred, insures the seat being true with it.

There is no difficulty in using this machine to cut in bores, where the rim of pulley projects beyond the hub. No large table or face plate is needed to reach the rim. The fastening of work is done instantly.

The standard machine cuts in bores above mentioned, and, with an attachment for the purpose, seats can be cut in holes as small as 1 inch diameter, by one passage of the cutter.

We are also prepared to furnish special machines for extra heavy work.

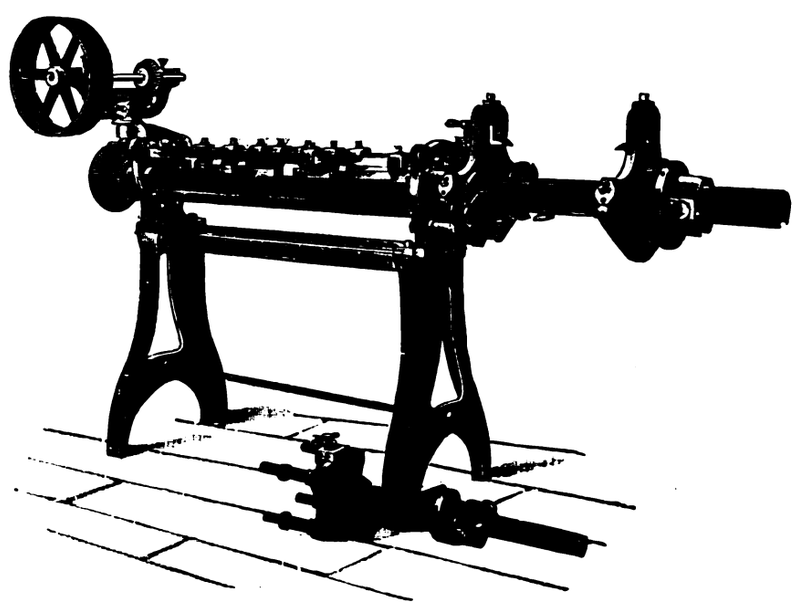


FIG. 3152. STATIONARY.

FOR PRICES, SEE NEXT PAGE.

When writing for prices, please state the longest cut required, and largest and smallest bores in which you want to cut.

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DESCRIPTION, FIGS. 3151 AND 3152.—CONTINUED.

The arbors are made of steel. The small one is $1\frac{15}{16}$ inches in diameter and is supplied with eccentric taper bushings to accommodate it to all bores up to 3 inches diameter, and cuts seats 12 inches long. The arbor is hollow and has within it a bar called the guide bar, which is also steel, and is movable up and down by means of a screw at each end. It is planed out through its entire length, the necessary size and shape to carry within it a tool bar. This steel tool bar carries two tools of the width desired for the key seat. It is connected to the driving carriage by means of a removable pin, and is driven back and forth through the guide bar, cutting in both directions, and fed down the desired depth and taper by the screws at the ends.

The second arbor is $2\frac{7}{16}$ inches in diameter, built same as small arbor, and works in all bores from $2\frac{7}{16}$ inches to 5 inches diameter, and cuts seats to 16 inches long.

The third arbor is $4\frac{7}{16}$ inches in diameter and works in all bores from $4\frac{7}{16}$ inches to 14 inches diameter, and cuts seats 25 inches long, and is constructed the same as the $2\frac{7}{16}$, but in place of using the taper bushings to bring it in position in the bore, the arbor head or flange is made a three-jaw chuck, and indexed to suit different bores, so the jaws can be adjusted as desired. For the other end of the hub a movable chuck is supplied.

Both the arbors are supplied with a clamping device. On each side of the arbor are cut a series of ratchet teeth, and a collar, with loose ratchet pieces, is slipped on the arbor—the pieces dropping into the teeth. By pushing the collar against the hub and turning a nut the work is held firmly in position. It will be seen by the foregoing description that the bore is the guide by which the machine is set, therefore no facing of hub is necessary.

The driving apparatus consists of two parallel screws $2\frac{1}{2}$ inches in diameter, $1\frac{1}{2}$ inch pitch, three threads. They are set 6 inches from center to center, and run in opposite directions; between them is an open-sided nut which slides from one to another within a carriage. The nut engages in one screw and travels the desired distance when it comes in contact with a cam which throws it out of gear, and by a spring it is pushed in gear with the other screw. The nut has on its top two ribs, one of which, by passing behind a guide, holds it in gear. The other serves to receive the pressure of the spring. By shifting the cams and springs, any desired length of stroke can be made. The traveling of the nut carries with it a carriage to which the cutting bar is attached. The screws are driven by cut gears running smoothly and giving a very strong motion to the cutter bar.

PRICES, FIGS. 3151 AND 3152.

The $2\frac{7}{16}$ inch arbor can be arranged to take in bores as large as 6 inches diameter, if so desired.

Machine with either one of the small arbors ($1\frac{15}{16}$ inch or $2\frac{7}{16}$ inch),	$350.00
" " both " " " " " and " "	400.00
" " large, $4\frac{7}{16}$ inch, arbor only,	400.00
" " either one of the small arbors and large arbor,	450.00
" " three arbors,	500.00

KEY-SEATING MACHINE.

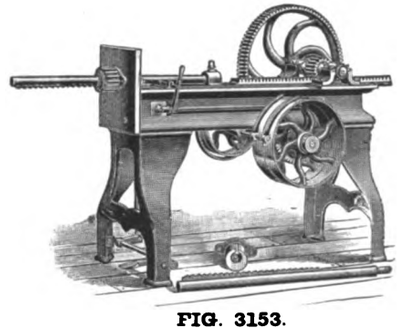


FIG. 3153.

The piece to be slotted is placed on a bushing upon a face plate, and the slot cut by a single passage of the cutter in from ten to twenty seconds. The slots may be made absolutely straight or may be made on any taper required, by a change in the bushing upon which the work is placed. One great saving of time is effected by the use of this machine, from the fact that the work does not have to be fastened to the machine, but is immediately brought to position and held by the bushing through which the cutter passes.

A cutter bar and cutter is not required for each different sized hole, but the same sized slot can be put into any number of different sized holes by means of eccentric bushings.

Size No. 1 will cut a slot 6 inches long, $\frac{5}{8}$ inch wide, $\frac{5}{16}$ inch deep, and No. 2, a slot 12 inches long, 1 inch wide, $\frac{1}{2}$ inch deep, at a single passage of the cutter bar.

Machine will slot any piece less than 6 feet in diameter, as it stands on the floor, and more than that, by having a pit for the casting to swing in. Much larger slots can be cut by using two cutters, taking out a part of the stock with one cutter and finishing to proper size with a larger one.

When ordering cutters or bushings, be sure and give diameter and length of hole to be slotted, width and depth of slot, and whether straight or taper slot.

Driving pulley for No. 1 machine, 18 inch diameter, 4 inch face; speed, 180 revolutions.
Return pulley for No. 1 machine, 12 inch diameter, $2\frac{1}{4}$ inch face; speed, 150 revolutions.
(Both to be driven by same sized pulley overhead.)
Driving pulley for No. 2 machine, 24 inch diameter, 6 inch face.
Return pulley for No. 2 machine, 16 inch diameter, $3\frac{1}{4}$ inch face.
(Both to be driven by same sized pulley overhead.)

PRICE, NO. 1, $350.00; NO. 2, $650.00.

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No. 4 KEY SEATING AND KEY MAKING MACHINE.

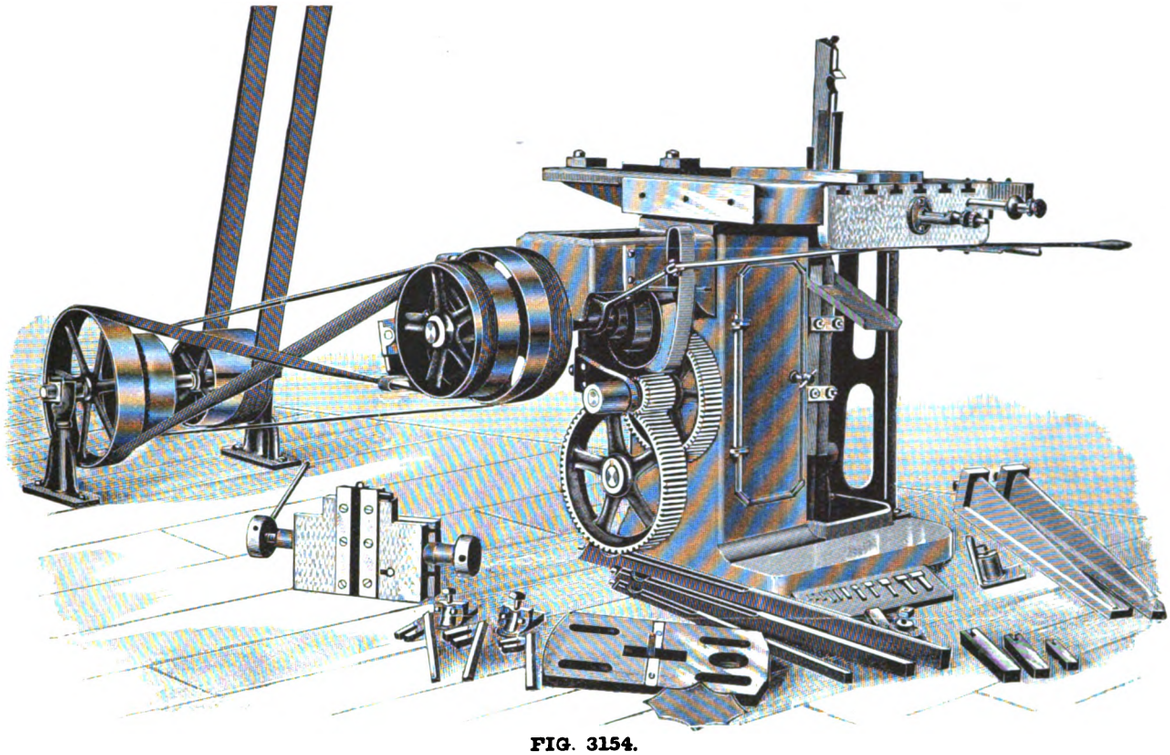


FIG. 3154.

The top plate has T-slots the entire width of the table for ¾ inch bolts, giving great facility for binding down work and fastening securely. The table is provided with extension arms which extend the table so that a pulley 6 feet in diameter may be placed on the machine and cut—if the hub is not faced up, as it does not touch the table. One of the main features of this machine is the oscillating guide for cross head which oscillates from the centre line of the main shaft, giving the tool a straight drawing cut. By means of the adjusting screw to the left on front of table the tool can be inclined forward or backward from a vertical point, and whereby the machine may be set to cut a key way tapering either from the top or bottom with the same side down. The adjusting screw has a scale and pointer which enables the operator to set the machine without the aid of a rule to cut a key way any desired taper up to ¼ inch to the foot. The guide projects down through the floor, having a ground and adjustable bearing both above and below. This always keeps it at right angles with the table, gives a long bearing for cross head and allows lost motion to be taken up. The cross head is made strong and has a bearing on guide its whole length, with a device for taking up wear, and is driven by a steel rack and pinion in place of a crank as formerly. It runs by open and cross belts the same as a planer, and has a quick return—three to one. The slot for the tool bar in cross head extends the entire length, and the tool bar, for heavy work, extends nearly the whole length of the slot, which greatly strengthens the cross head. The bearings which force tool into work are from 6 to 10 inches long, which stiffens the bar, makes it work easy and not cut. The machine is heavily geared back, and the gearing all cut from the solid, and having a very wide face. It is also furnished with a friction clutch. The stroke of the machine is as easily and quickly adjusted as the stroke of a planer, being done by adjustable tappets. The guide for work consists of a plate which fits in a groove at the top of table, and has a projection on each side of tool bar which forms a guide to set work to, gauging by bore of pinion, which is the only accurate way of setting work to cut key ways the same depth, as where gauged by outside of work it is subject to variation from shrinkage and rapping of patterns. Two plates are furnished with this machine for large and small work. For large work we use four leveling blocks—two with set screws for the front of table and two without—to use on back of table. These blocks are made the same thickness as small top plates, and are convenient in cutting pulleys and all work of large diameters, the set screws in blocks being used to push work up to the projections on top plates, so that only one binder is needed, and, in some cases, none at all need be used.

The key maker for this size machine makes keys up to 12 inches long and is easily and quickly adjusted to make keys of any desired taper rapidly and accurately, and any number can be made precisely alike and will fit without filing or hammering. With this machine we furnish four tool bars and tools from ¼ up to 1½ inch, varying by 8ths; also a bevel for grinding tools by, and a gauge for resetting tools accurately. Countershaft furnished with each machine, with speed 175 per minute.

WEIGHT, 2,800 LBS. PRICE, FOR 18 INCH STROKE, $.....

DESCRIPTION, FIG. 3155.

GENERAL DETAILS OF No. 6 ARE SAME AS No. 4, ABOVE.

Capacity, from ¼ to 2½ inches wide, and any length up to 24; making keys from the smallest sizes used up to 1¼ wide and 16 inches long. Capacity of table with extension arms attached will level and cut any pulley up to 12 feet diameter. Each machine equipped with a full set of tools at prices quoted.

Our new patent binding attachment, shown in Fig. 3155, for fastening small and medium work is a very great improvement, as it holds the work securely in place while being cut, and is very much more rapid than with the old method of using bolts and binders.

We furnish extra a special bar, when ordered, that will cut key ways through 4 foot hub and in 5 inch hole, with this machine.

Speed of countershaft for cutting steel, 165 to 170; for iron, 180 to 190. Driving pulleys on countershaft, 12 inches diameter, 4 inches face.

WEIGHT, 5,400 LBS. PRICE, $.....

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NO. 6 KEY SEATING AND KEY MAKING MACHINE.

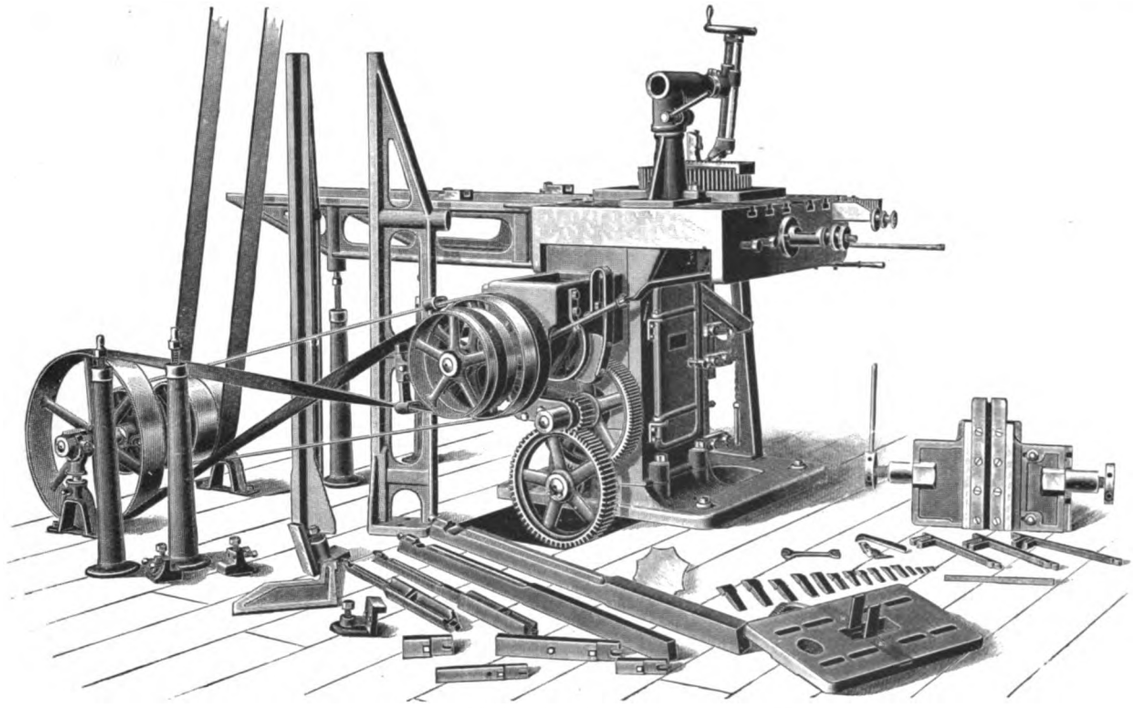


FIG. 3155. FOR DESCRIPTION, SEE PAGE 57.

DESCRIPTION, FIG. 3156.

This machine has 11 inch stroke, cutting key ways 10 inches long by 1 inch wide, and down to the smallest, and is designed for light and rapid work.

It has quick return movement, large and long bearings.

The key maker has a capacity for making keys up to 10 inches long by ¾ inch wide, and makes all the keys alike, and to any taper.

Each machine is provided with a full set of cutters and tool bars, and all needed appliances to do the work with accuracy and rapidity.

It is furnished with the new binding arrangement; same as 3155.

WEIGHT, - 1,600 LBS.

PRICE, $.....

NO. 2 KEY SEATING AND KEY MAKING MACHINE.

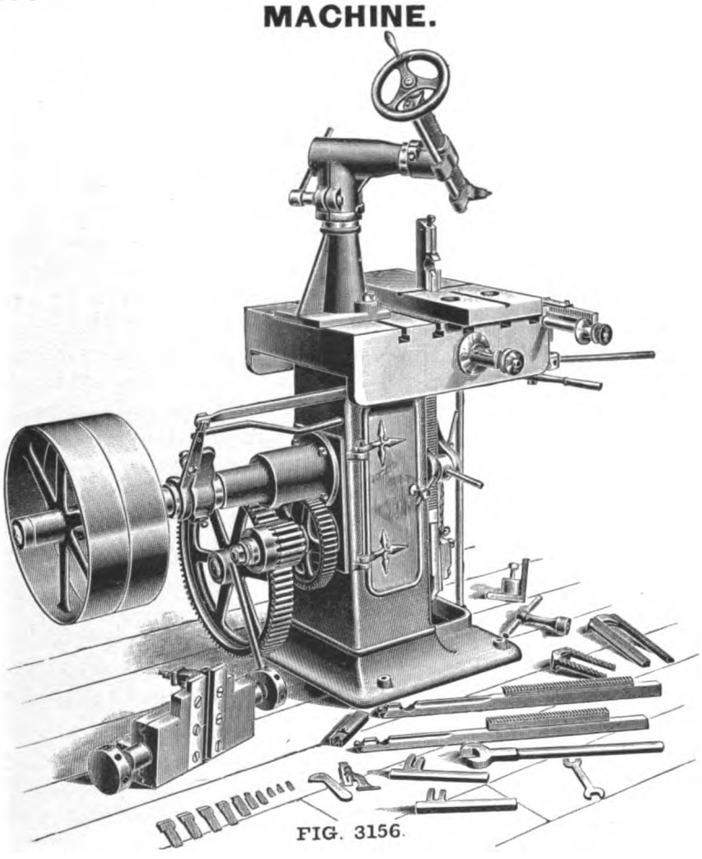


FIG. 3156.

PORTABLE KEY SEATING MACHINES.

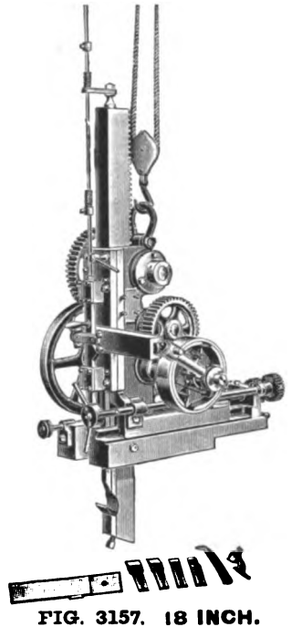


FIG. 3157. 18 INCH.

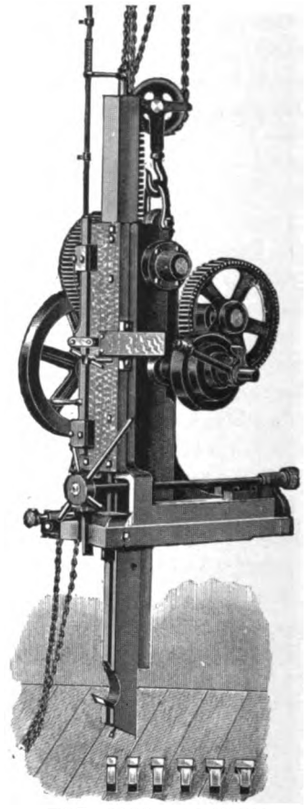


FIG. 3158. 36 INCH.

The portable 18 inch machine, Fig. 3157, is intended to hang on an overhead track, and is intended for work on locomotive drivers as they come from a boring mill. The machine is strong and well made and will cut up to 2 inches wide by 18 inches long.

WEIGHT, 500 LBS. PRICE, $.....

DESCRIPTION OF FIG. 3158.

The portable 36 inch machine will cut key ways 36 inches long by 3½ inches wide, with 8 cutters, 3 inches to 1½ inches.

WEIGHT, 1,800 LBS. PRICE, $.....

The portable 48 inch machine, with 8 cutters, 4 inches down to 2½ inches.....**WEIGHT,.....LBS. PRICE, $.....**

The portable 72 inch machine, with 8 cutters, 5 inches down to 2½ inches.....**WEIGHT,.....LBS. PRICE, $.....**

A countershaft for rope transmission, with oil pockets in sheave and bearings, designed for heavy work. **EXTRA, $45.00.**

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Weight, complete, with countershaft, pulleys and 12 drivers, 48,000 lbs. The face plate is 10 feet in diameter and strongly ribbed, to which the driving gear is bolted in segments. This gear has a pitch diameter of 9 feet $6\frac{5}{100}$ inches, 2½ inch pitch and 5 inch face. The spindle is a heavy casting fitted in phosphor bronze. Box bearings are same as engine bearings, and are 6 feet apart. The front bearing is 20 inches diameter and 20 inches long. The back bearing is 12 inches diameter and 12 inches long. There are seven cone pulleys stepped from 24 to 36 inches, in variation of 2 inches, with a face of 8¾ inches for each. The speed of the countershaft is figured to 50 revolutions per minute. Tight and loose pulleys on countershaft are 46 inches diameter by 6½ inch face. The lathe is fitted with two tool posts—one of these having a longitudinal automatic feed changeable from $\frac{1}{64}$ to ¾ inch per revolution; the other tool post is arranged for hand feeding for facing. The upper part of both tool posts can be set to any angle, in order to give the proper crown to pulleys where crown pulleys are desired.

The lathe is also fitted with a boring bar made of machine steel, 4½ inches diameter, whereby the hub of the wheel can be bored out at the same time the face of the wheel is being turned. This boring bar is fitted with an independent automatic feed, changeable from $\frac{1}{64}$ to ¼ inch per revolution of bar. This bar is also provided with an automatic stop unlocking the feed mechanism when the cut is run out. All gear shafts are of machine steel. This lathe will turn from 10 to 26 feet in diameter by 6 feet face.

WEIGHT, 48,000 LBS. PRICE, $.....

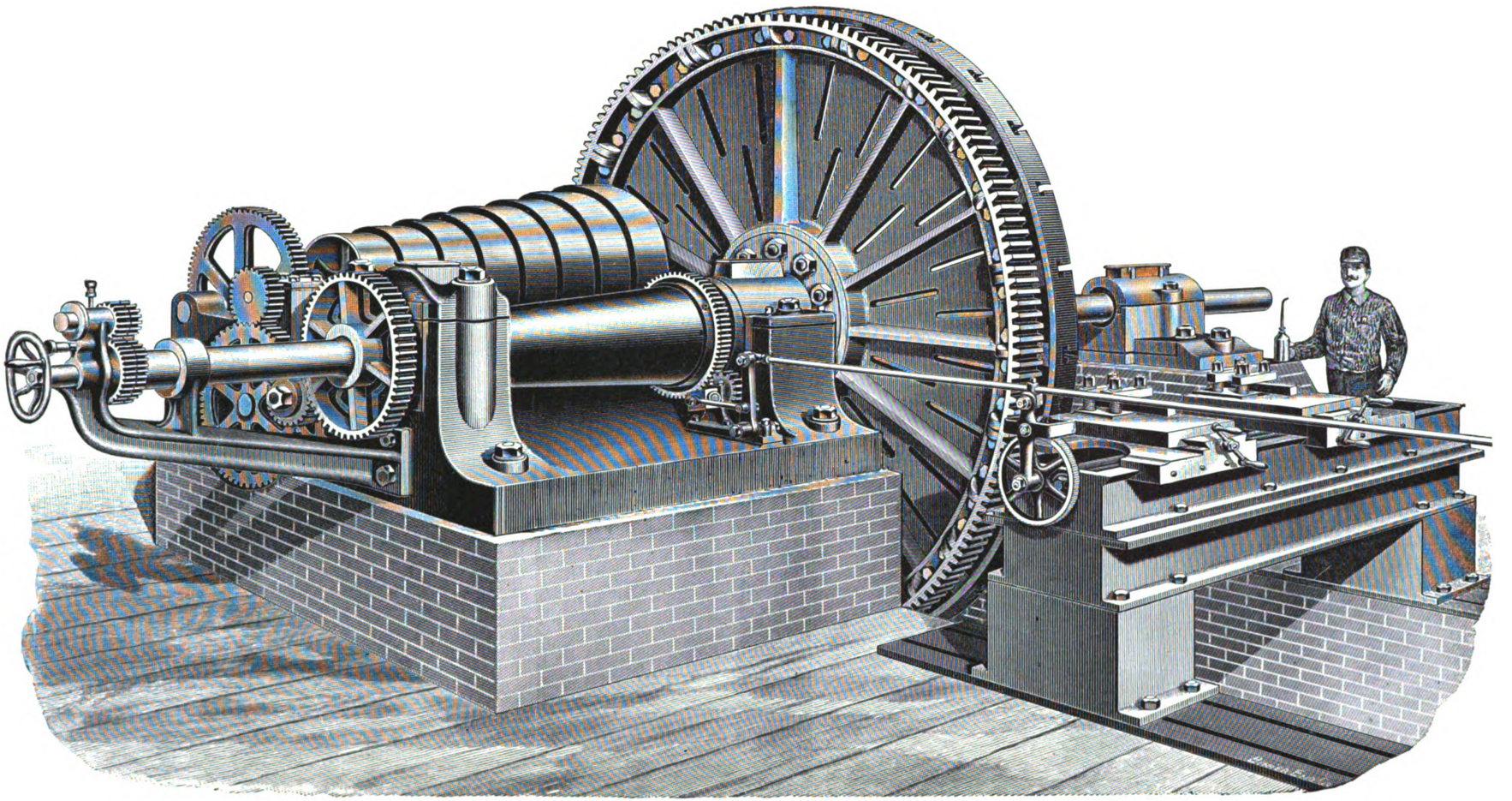


FIG. 3159.

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20 INCH TURRET LATHE.

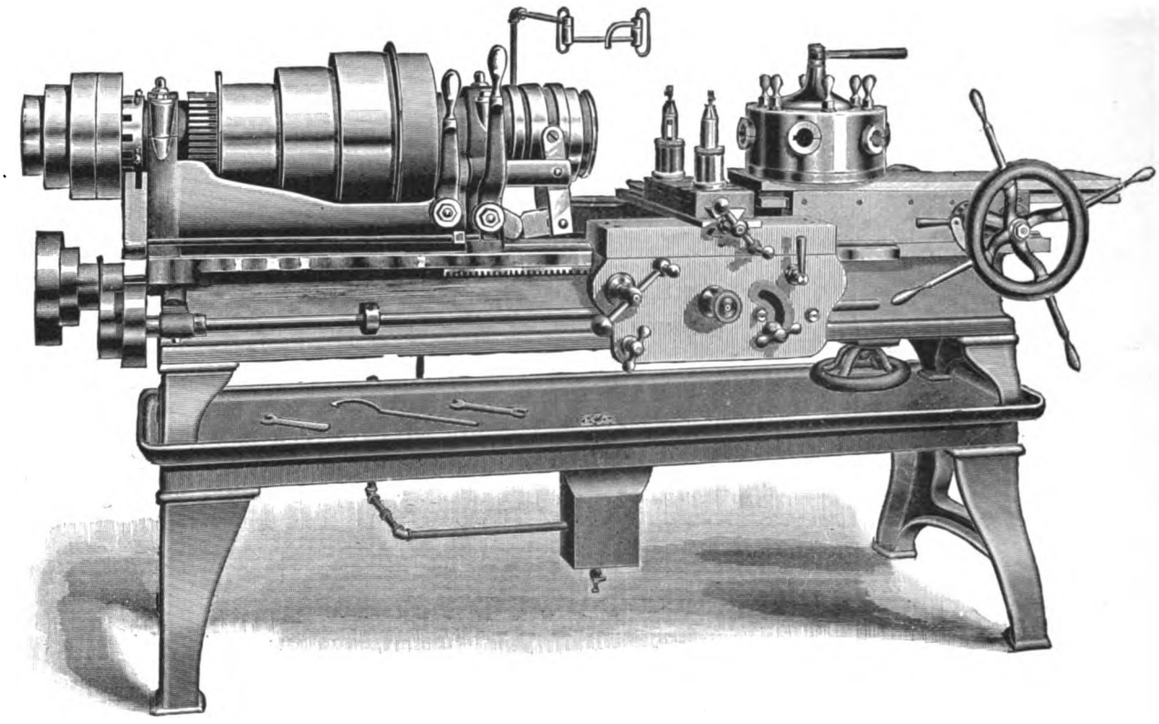


FIG. 3162.

With roller feed and automatic chuck, reversible lateral power feed, reversible power cross feed, and power feed to turret and carriages.

This machine is built on the same lines as the No. 11 X screw machine, Fig. 3593, and can handle the same work. It is, however, capable of a much greater variety.

It takes in stock up to 2⅝ inches, and is suitable for cutting threads with a die up to 1¾ inches in diameter.

It is furnished with roller feed and automatic chuck—see Figs. 3171 and 3172—which handles square, hexagon and round stock equally well up to the limit of its spindle hole. This is operated while the machine is running, and, when thus fitted, will do from fifteen to twenty-five per cent. more work per day than a machine without it.

The turret revolves automatically with the backward travel of slide, and has power feed. The power is transmitted to the feed-rod by a belt running on cones with three grades, which give the full range of feed required. If the gear feed is preferred, it must be so specified. When with gear feed, three change gears are furnished. The curved lever, just back of the pilot-wheel, is for throwing the power feed of the turret into and out of gear, and is provided with the new knock-off, that can be quickly adjusted, so that it will mill or drill to any point of its milling length with great accuracy.

The carriage is in all respects like that of an ordinary engine lathe, and has a reversible lateral power feed and a reversible power cross feed. The cross slide has a tool-post in front and behind, both of which have elevating collars for the accurate adjustment of the tools.

The spindle is provided with back gears, applied by a clutch, operated while the machine is running. The great saving in time accomplished by thus being able to change from a high speed, used in turning, to a slow speed, used in cutting, a thread, and conversely, will be seen at once.

A rotary pump takes the oil from the drip-pot beneath and throws it in a steady stream wherever the operator desires, making the highest cutting speeds practicable. The drainage-pan is extra large to hold all the chips accumulated during the day.

Each machine is provided with a countershaft with friction pulleys, a cat-head for the back end of spindle when without roller feed, six bushings for turret holes, and suitable wrenches.

This machine is also built without the roller feed and automatic chuck, when wanted.

A regular double rest engine lathe taper attachment is added, if the customer orders it; and for screw cutting it is built with a lead screw.

PRINCIPAL DIMENSIONS.

Spindle hole, 2¾ inches. Working length, 13 inches. Swing, 20 inches.

Hexagon stock capacity	$2\frac{5}{16}$ inches.	Square stock capacity	$1\frac{7}{16}$ inches.
Number of turret holes	6	Largest die capacity	1¾ "
Diameter of turret holes	2¾ "	Diameter of turret	13 "
Weight	4,000 lbs.	Turret hole center above slide	$4\frac{1}{16}$ "
Bed width	15 inches.	Bed length	6 ft. 7 in.
Cone sections	8½, 11 and 13½ "	Belt width	4½ inches.
Counter speeds	200, 200 and 100	Counter pulleys	16 in. x 4¼ in.

PRICES.

Without roller feed and automatic chuck.....$

Extra for roller feed and automatic chuck, Figs. 3171 and 3172.....$

For extras that may be used with this tool, see pages 66 and 67, and 208 and 209.

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CHUCKING OR MONITOR LATHES.

This style of machine is built without any drainage pan, and is designed for both brass and iron work.

The slides to the Nos. 1 and 2 are fed by pilot wheels, and to the Nos. 3 and 4 by our improved hand lever.

When regularly made they are furnished with three-stepped cones, but we build them, by special order, with two-stepped cones and extra wide faces, at the same price as the regular machines. They can then be reversed at much higher speeds, and can be stopped quickly. When so built, their capacity for turning out brass and iron work is greatly increased, but of course their range is diminished.

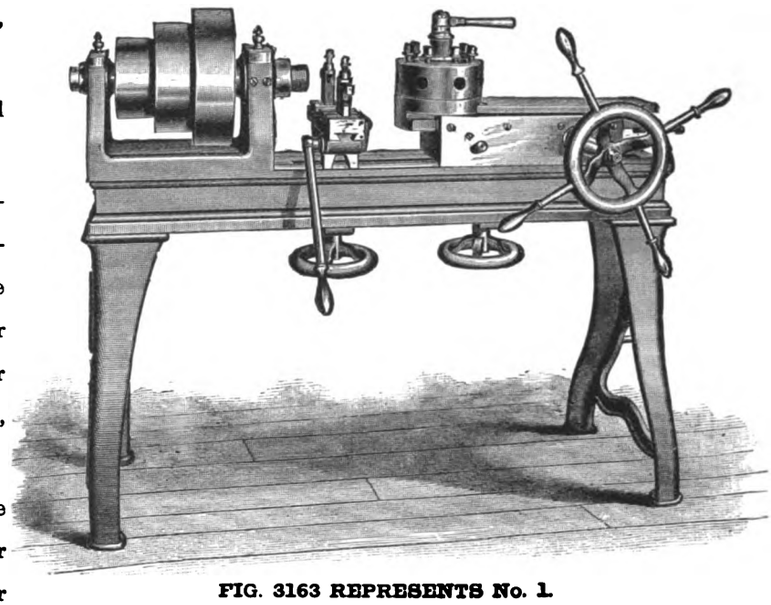


FIG. 3163 REPRESENTS No. 1.

A spring chuck may be applied to the front end of the spindle. It is operated from the back end by a hand wheel or lever, which is connected with the chuck by means of a rod or sleeve running through the hollow spindle. With it the work can be quickly gripped and released.

A spindle brake for quick stopping, operated by a pedal, is provided when wanted.

Chucking outfits, consisting of an ordinary lathe chuck fitted to face plate, tool rest and bushings for boring bars, are furnished with each of these machines when so ordered.

The turret revolves automatically with the backward travel of slide, and there is an adjustable stop screw on the slide that can be set for any point of its milling length.

The cross slide has a front and back stop, and is worked by a hand lever. It has a tool post in front and behind, with elevating rests for the accurate adjustment of the tools.

They are built from the best stock, with steel spindles, bronze boxes and hardened steel fittings to the turret and slide, and with the same care that is put upon our more complete and expensive tools.

Each machine is provided with a countershaft with friction pulleys and suitable wrenches.

Any or all of the following attachments—clutch back gears, power feed to turret, automatic chuck and roller feed, chasing apparatus and second end attachment—can be furnished with these machines.

Numbers of Machines.	1	2	3	4
Swing	16	15	12	10
Bed length	5 ft. 1	4 ft. 10	3 ft. 6¼	3 ft. 4¼
Bed width	10	8⅝	7	5⅝
Spindle hole	1 9/16	1 5/16	1	¾
Working length	10¼	10¼	5¾	4¾
Belt width	4	3¼	3	1⅞
Cone sections	7, 9½, 12	7, 9½, 12	4, 6, 8	3½, 5, 6½
Largest threading die used	1	⅞	⅝	½
Largest square stock used	1 1/16	⅞	⅝	7/16
Largest hexagon stock used	1 5/16	1 1/16	13/16	19/32
Number of turret holes	6	6	6	6
Diameter of turret holes	1¼	1⅛	1	¾
Centre of turret above slide	2⅞	2⅝	2	1½
Diameter of turret	9½	9⅛	7	6
Countershaft speed	200	200	200	225
Countershaft pulleys	14×3¾	12×3½	12×3½	10×3
Weight	1,500	1,200	1,000	750

TURRET-HEAD TOOL.

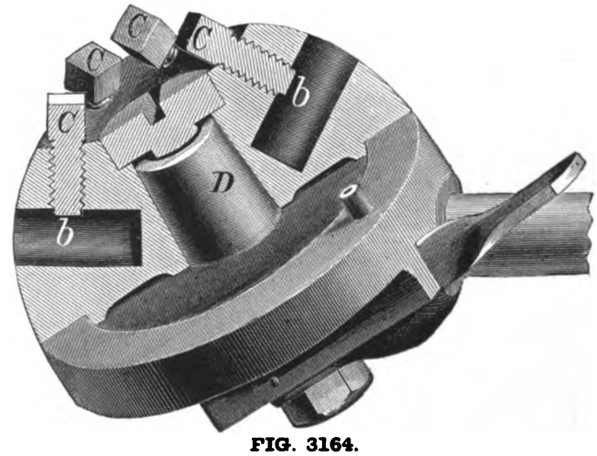


FIG. 3164.

	Diam.	Socket holes.	Weight.	Price.
Small size,	3½ in.,	½ in. diam., 1 in. deep,	3½ lbs.,	$13.00
Large "	5¼ "	7/8 " 1½ "	14 "	25.00

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TURRET-HEAD CHUCKING LATHE, 20 INCHES SWING, WITH BACK GEARS.

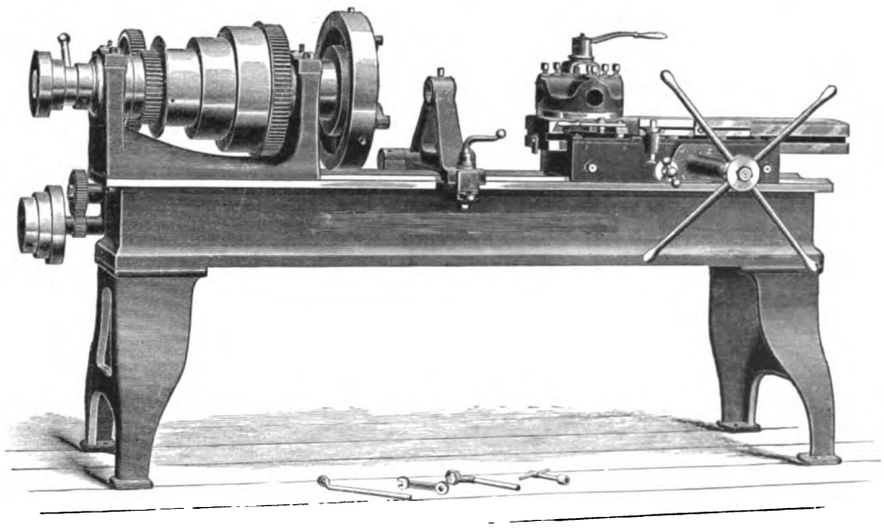


FIG. 3165.

This lathe swings 20 inches and has 7½-foot bed.
Greatest distance from chuck to turret, 32 inches.
Spindle has 2 inch hole through it, and the front bearing is 4 inches diameter.
Cone pulley has three changes, 8½, 11¼ and 14 inches diameter for 3½ inch belt.
Turret is 10 inches diameter, and has 4 holes 1¾ inches diameter, and is arranged to turn by hand, in any position. Turret slide is 38 inches long, and has a movement of 18 inches, with an automatic feed and stop motion. Turret shoe is 26 inches long.
Rest is patented and is a special feature of this lathe. It is hinged to a slide which is bolted to the back side of the bed, and is adjustable for any length of work. It carries a bushing for holding twist drills, and is arranged to be turned back out of the way instantly, to allow the use of other tools in the turret. As a whole, this is a strong, powerful lathe, and with our system of three-lip drills, fully one-third more holes can be made than with the ordinary turret-head chuck lathe.
Countershaft is made with 2 patent friction pulleys, 16 inches diameter by 4 inches face, and should make 75 revolutions per minute, slowest speed.
Chucks of any size and make can be furnished, fitted to the lathe, at reasonable prices.
Weight, without chuck, 2,300 lbs. Weight, per foot, 80 lbs.

PRICE, WITHOUT CHUCK, $ .....
EXTRA, PER FOOT, - $ .....

TURRET-HEAD CHUCKING LATHE, 20 INCHES SWING.

This lathe swings 20 inches and has 7½-foot bed.
Spindle has 2 inch hole through it, and the front bearing is 4 inches diameter.
Cone pulley has 4 changes, 8, 10, 12 and 14 inches diameter by 3½ inches face.
The turret is 10 inches diameter, and has 6 holes 1¾ inches diameter, so arranged as to revolve automatically or not, at the will of the operator. The turret slide is 32 inches long, and has a movement 12 inches long, with an automatic feed and stop motion. Turret shoe is 26 inches long.
The patent chucking rest shown is hinged to a slide, which is bolted to the back side of the bed, and adjustable to any length of work. It is made to carry a bushing for holding twist drills, and so arranged that it can be turned back out of the way instantly, to allow the use of other tools in the turret.
Weight, per foot, 80 lbs.
Countershaft is made with two patent friction pulleys, 16 inches diameter by 4 inches face, and should make 70 revolutions per minute, slowest speed.
Weight, 2,000 lbs.

PRICE, WITHOUT CHUCK, $ .....
EXTRA, PER FOOT, - $ .....

Chucks of any make and size can be furnished, fitted to the lathe, at reasonable prices.

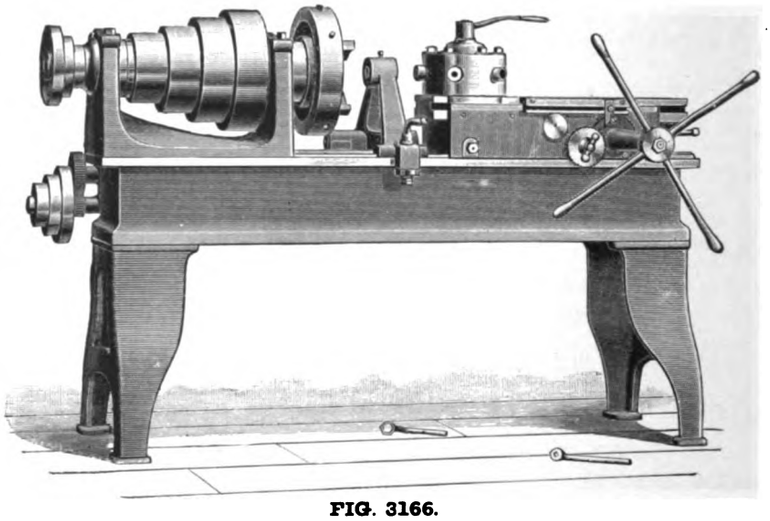


FIG. 3166.

30, 25 AND 20 INCH CHUCKING LATHE.

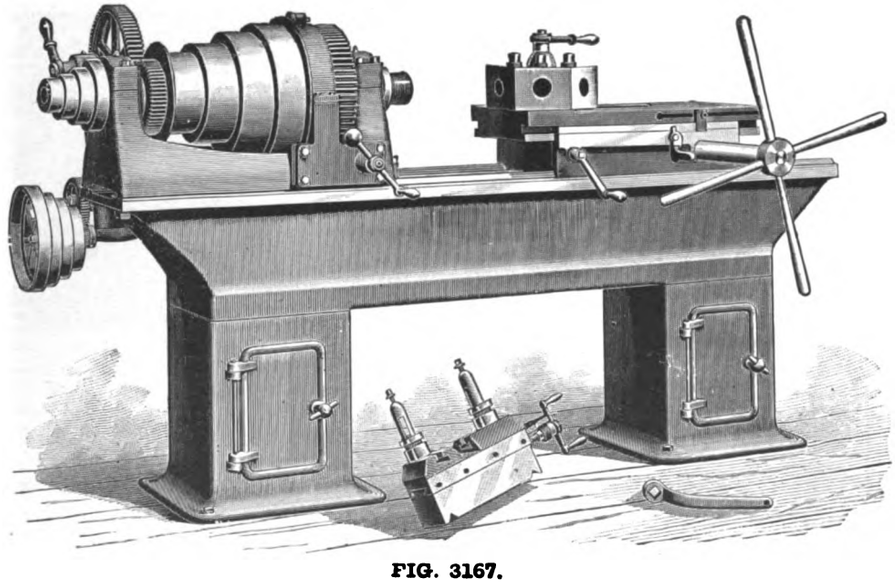


FIG. 3167.

The turret slide has power feed with changes covering necessary variations for average work, and has adjustable automatic stop motion.
The turret is hexagon in form for convenience in using box tools, or special tool holders, and is made either with or without self-revolving mechanism.
Each size has same power, headstock and driving gear.

Swing over ways.....21 inches.
Length of bed..... .7 feet 4 inches.
Diameter of hole in spindle..... 2 1/8 inches.
Diameter of turret across sides.....11 inches.
Diameter of holes in turret, unless otherwise stated..... ..... . 2 inches.
Travel of turret slide.... .....12 inches.
Driving cone.....14 inch diameter for 3 inch belt.
Countershaft pulleys,
16 inch diameter for 3½ inch belt.
Countershaft pulleys..100 revolutions per minute.
Weight of 20 inch machine..... .....2,800 lbs.

PRICES: { **30 INCH, $** .....
25 INCH, ...
20 INCH, ... }

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30 AND 20 INCH TURRET HEAD CHUCKING LATHE.

This lathe swings 30 inches and has 8 foot bed. Greatest distance from chuck to turret, 38 inches.

Spindle has 2 inch hole through it, and the front bearing is 4 inches diameter.

Cone pulley has 3 changes, 7¾, 10¾ and 14 inches diameter, for 3½ inch belt.

Turret is 12 inches diameter and has 4 holes 1¾ inches diameter, and arranged to turn by hand in any position. The number and diameter of holes can be changed to order. Turret slide is 38 inches long, and has a movement of 18 inches. Turret shoe is 26 inches long. A rack and pinion gear are provided for moving turret shoe on bed.

Rest is patented, and is a special feature of this lathe. It is hinged to a slide which is bolted to the back side of the bed, and is adjustable for any length of work. It carries a bushing for holding twist drills, and is arranged to be turned back out of the way instantly, to allow the use of other tools in the turret. This rest, with our system of special three-lip twist drills and holders for same—see Fig. 5138—will make a large saving in the cost of chucking over any other method now in use. Cored holes in castings always run out of true, and to straighten these holes, in the ordinary turret lathe, it is necessary to make one or two cuts, before using the chuck drill, which works the hole down to the right size for the reamer, thus making two or more drillings necessary before reaming.

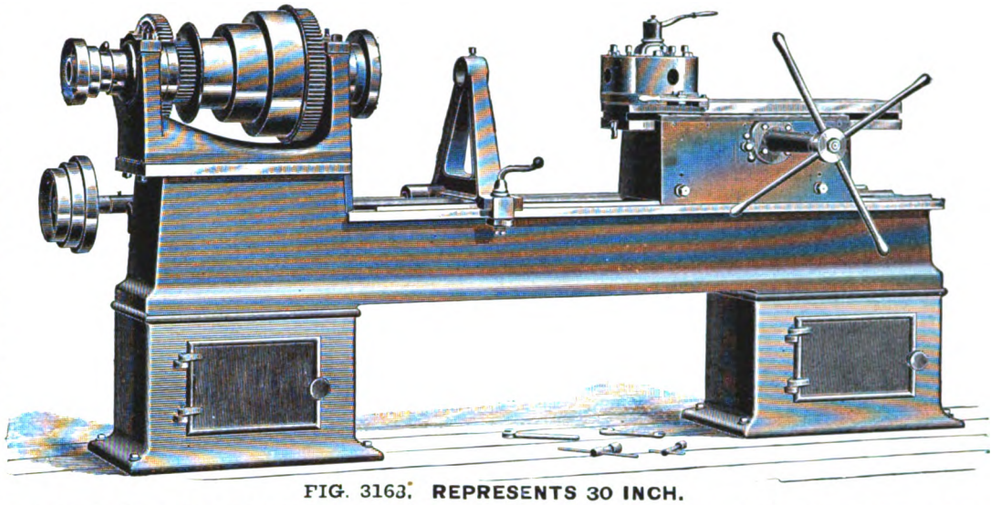


FIG. 3163. REPRESENTS 30 INCH.

By the use of these drills, in connection with our patent chucking rest, one drilling will straighten the cored hole and reduce to the right size for the reamer.

These special three-lip chuck drills are made $\frac{32}{1000}$ inch under size, and the reamer following the drill is $\frac{5}{1000}$ inch under size, leaving $\frac{5}{1000}$ inch for hand reaming to finish the hole.

One drill, of any size from ¾ to 1¼ inch in diameter, with a holder and bushing for same, is included with the chuck lathe at the price given. These drills, which are made of standard length and uniform size of shank, we furnish at reasonable prices.

Countershaft is made with two patent friction pulleys, 16 inches diameter by 4 inches face, and should make 70 revolutions per minute, slowest speed.

Chucks of any size and make can be furnished, fitted to the lathe, at reasonable prices.

WEIGHT, WITHOUT CHUCK, 3,150 LBS. WEIGHT, PER FOOT, 80 LBS.

PRICE, WITHOUT CHUCK, $.....EXTRA, PER FOOT, $.....

20 INCH SWING TURRET-HEAD CHUCKING LATHE, WITH AND WITHOUT BACK GEARS.

PRICES AND DESCRIPTION GIVEN ON APPLICATION.

THE 2 INCH DIAMETER BY 24 INCH LONG FLAT TURRET LATHE.

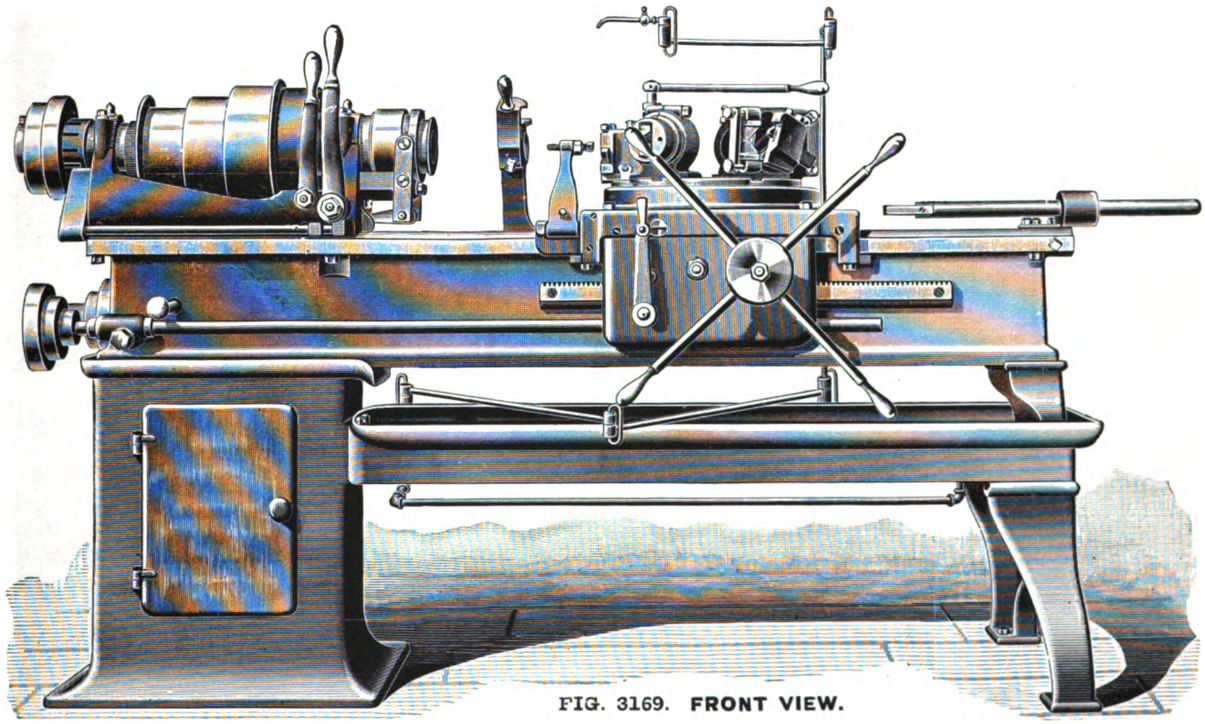


FIG. 3169. FRONT VIEW.

This tool is for the general machine shop, where quick change, rapid production and accurate duplication must be combined.

It does lathe work up to 24 inches in length and 2 inches in diameter. It handles full lengths of rough bars, of round, square or hexagon stock; also drawn or finished stock.

Dimensions.—Working length, 24 inches; working diameter, when worked from the bar, 2 inches; swing over bed, 16 inches; swing over apron, 14 inches; width of belt, 3½ inches; diameters of cone pulley, 10½, 8¾ and 7 inches; diameter of turret, 16 inches; length of bed, 6 feet 8 inches; countershaft pulleys, 12 x 4 inch face; shipping weight complete, 3,300 lbs.

The spindle hole is 2⅛ inches in diameter, and will receive straight bars of 2 1/8 stock. A bushing is provided to reduce this hole to 1 inch, so that when using small stock, one bar will push another through without the ends passing by each other.

The regular outfit furnished with each machine.—Automatic chuck, Fig. 3171, with jaws for holding square, round and hexagon stock, from the capacity of the machine down to ¾ of an inch; roller feed, Fig. 3172; four quick-opening turners, Fig. 3175; four tool holders, Fig. 3174; clutch holder for dies and taps, Fig. 3599; eight U. S. S. dies, adjustable collet, ⅜ to 1¼ by 8ths; bushing for spindle, three stock supports, cross slide, Fig. 3173; oil pumps, triple friction countershaft, suitable wrenches. Price, $.....

The railroad outfit, also called outfit A, includes, in addition to the above, chuck for forgings and castings, taper turner, Fig. 3176; drill chuck,—see page 67,—fitted to turret for holding drills, reamers, etc. Price, $..... For details of parts, see pages 66 and 67; for samples of work done, see page 68.

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2 X 24 FLAT TURRET LATHE—CONTINUED.

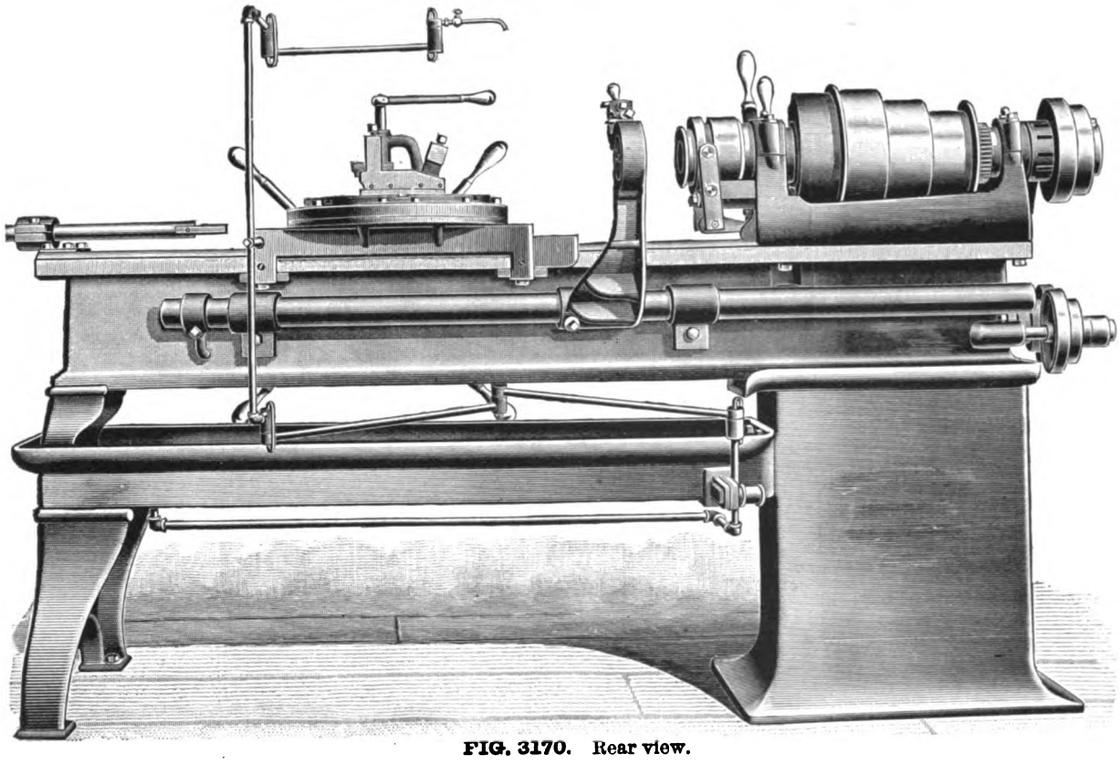


FIG. 3170. Rear view.

OUTER SLEEVE OF AUTOMATIC CHUCK.



FIG. 3171.

AUTOMATIC CHUCK PARTS.

CHUCK BODY.

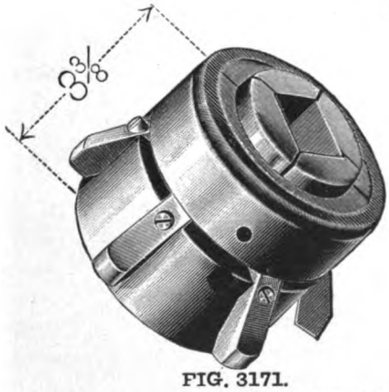


FIG. 3171.

INNER SLEEVE AND ADJUSTING COLLAR.

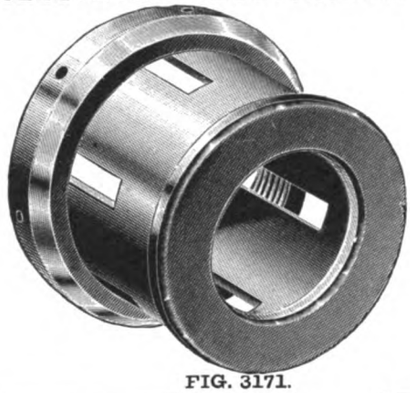


FIG. 3171.

REMOVING JAWS.

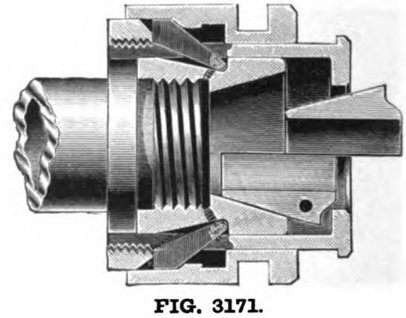


FIG. 3171.

ROLLER FEED.

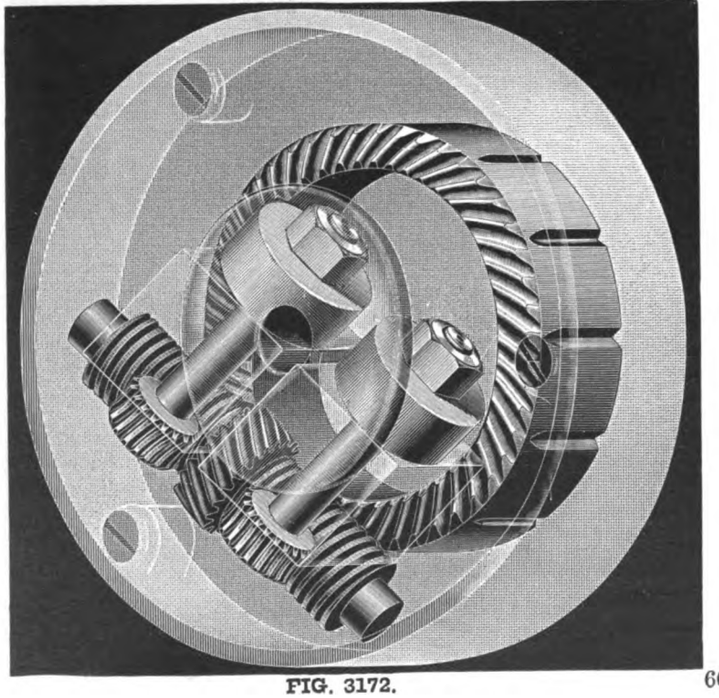


FIG. 3172.

OPEN.

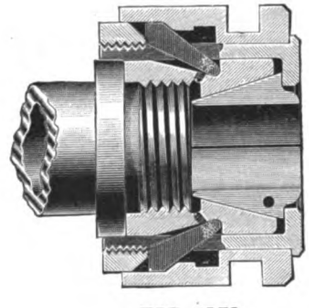


FIG. 3171.

CLOSED.

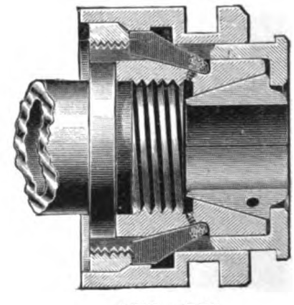


FIG. 3171.

The automatic chuck handles rough bars of round, square or hexagon; also drawn stock; runs true; grips parallel; short and stiff; powerful grip; receives full spindle capacity. New length of work obtained while running.

The roller feed at the back end of the spindle supports the bar of stock, and feeds it through the chuck the instant the chuck is opened. It presents a new length of work while the lathe is running.

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CROSS SLIDE.

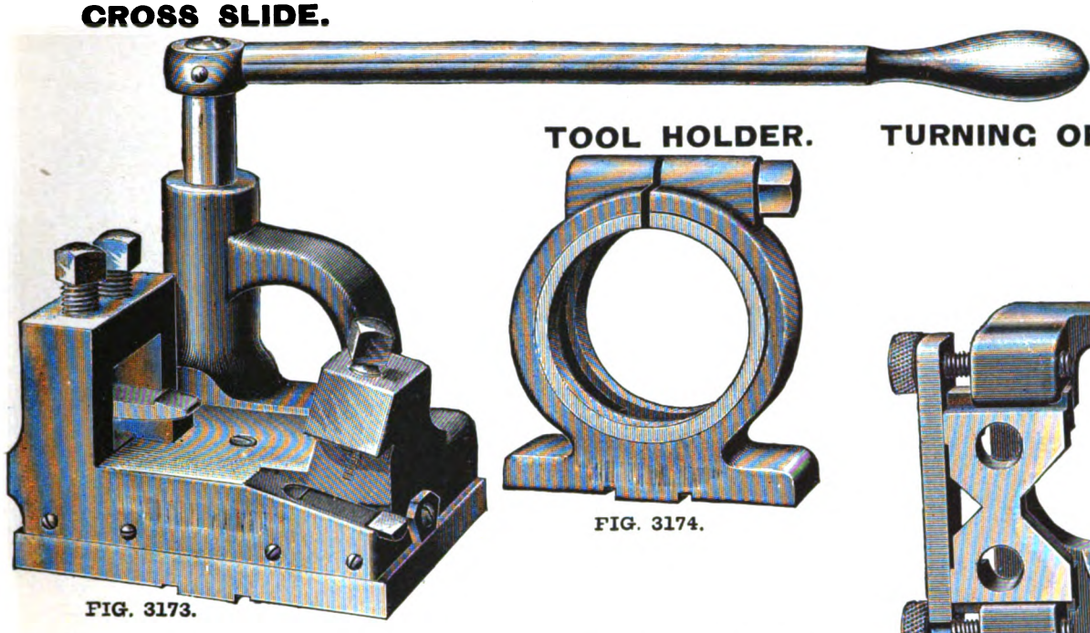


FIG. 3173.

TOOL HOLDER.

FIG. 3174.

TURNING OR CUTTING TOOL.

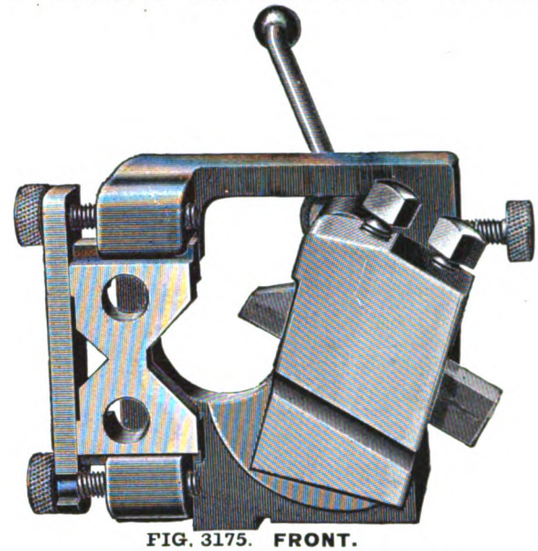


FIG. 3175. FRONT.

TAPER AND IRREGULAR TURNER FORMER.

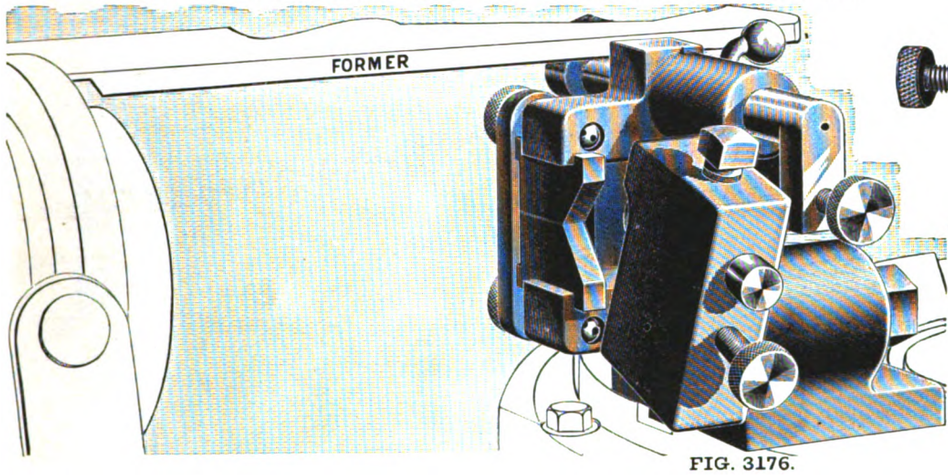


FIG. 3176.

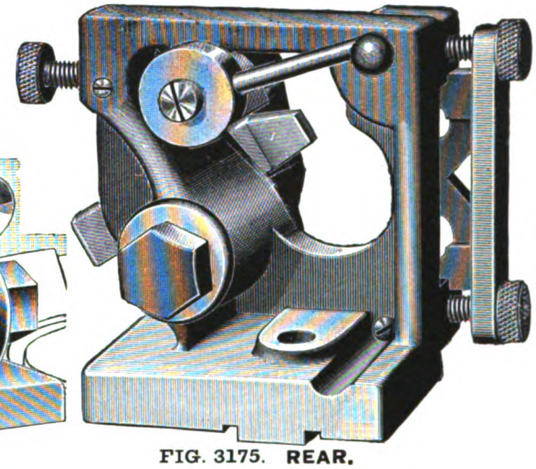
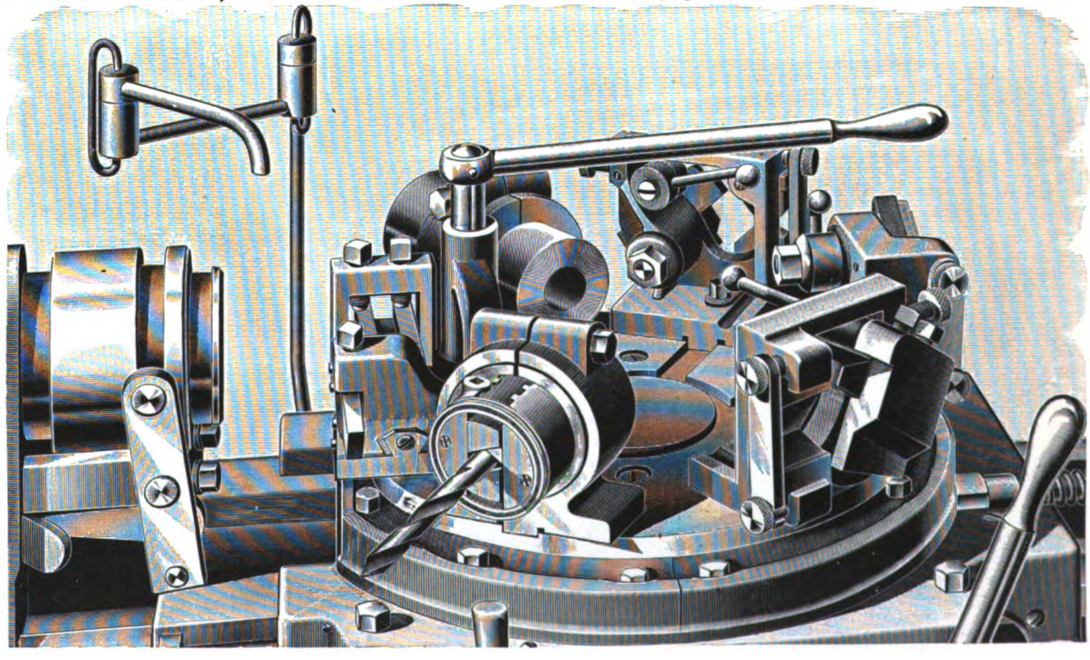


FIG. 3175. REAR.

FLAT TURRET, SHOWING TOOLS IN POSITION.



The cross slide is bolted to the top of the turret, and carries two or three tools for necking or turning and for cutting off. It is operated by a lever, which is connected to the slide by a pinion of small diameter, which gives great leverage. The cutting-off tool is held at an angle, which gives top rake.

The holder is for mills, dies, drills, chucking tools, etc.

The cutting tool is of the simplest form. Easy to grind. It is adjusted for size by knurled head screw. Quickly withdrawn from the work by use of cam. The cam is also used for feeding the cutter into the work, for necking, or for taking a chip from, instead of toward, the chuck.

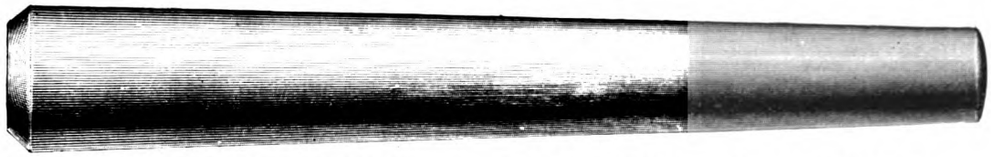
Back rest may be set to precede or follow the cutter.

Does not mark the work in running off.

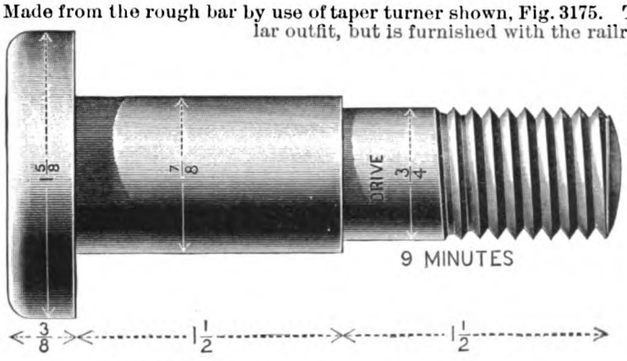
FOR SAMPLES OF WORK DONE ON THIS TOOL, SEE PAGE 68.

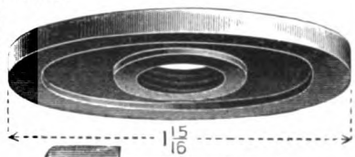
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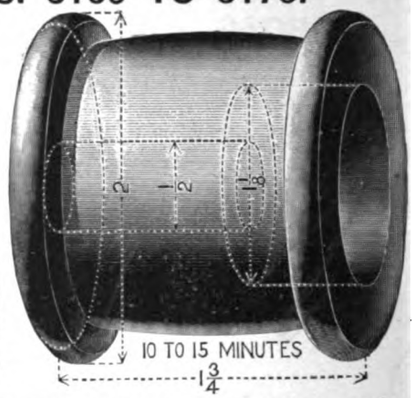
SAMPLES OF WORK DONE ON 2 X 24 LATHE, FIGS. 3169 TO 3176.

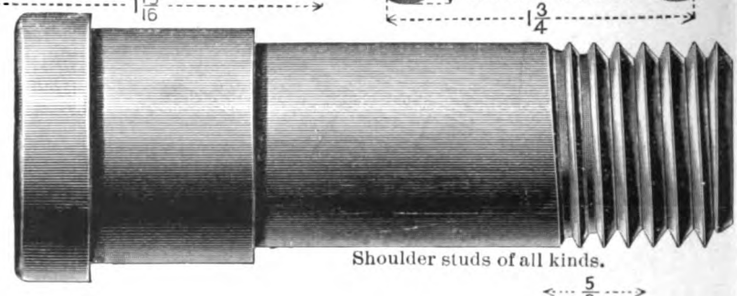


Made from the rough bar by use of taper turner shown, Fig. 3175. This turner is not included in the regular outfit, but is furnished with the railroad outfit.

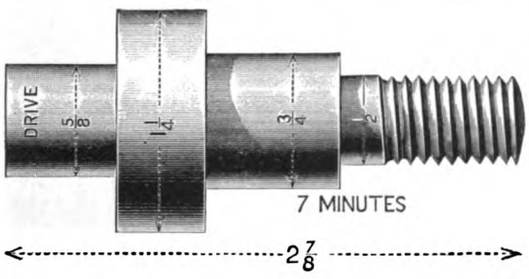


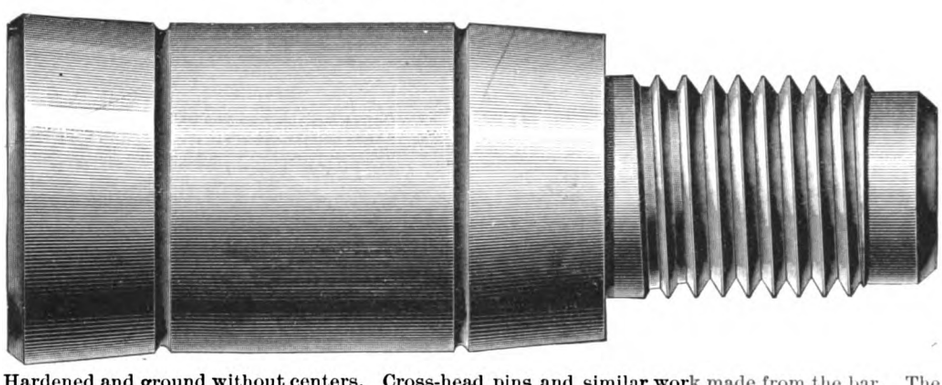




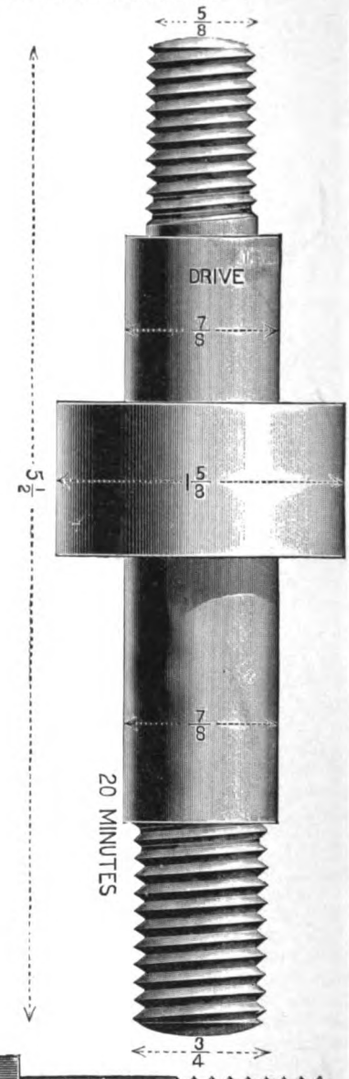


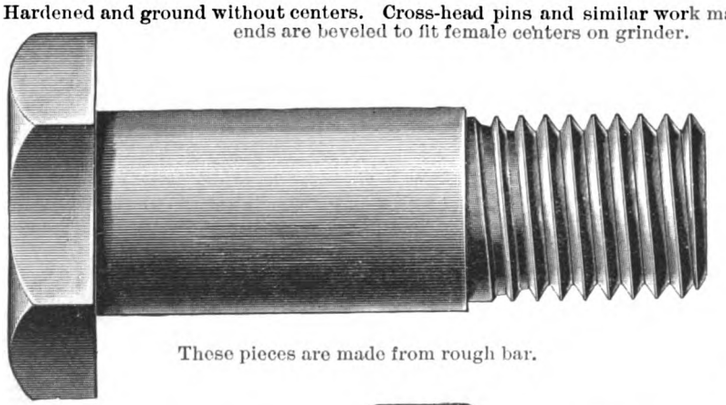
Shoulder studs of all kinds.





Hardened and ground without centers. Cross-head pins and similar work made from the bar. The ends are beveled to fit female centers on grinder.

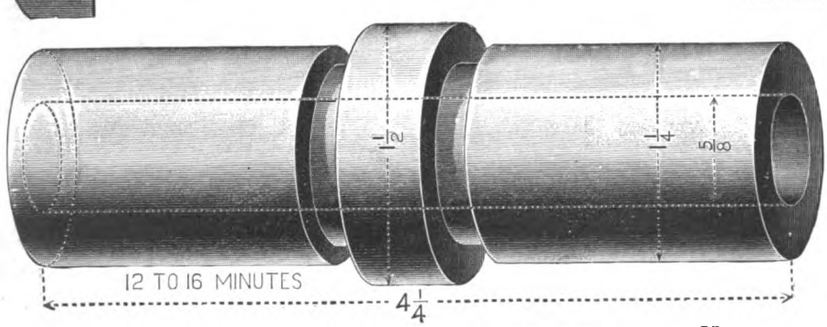


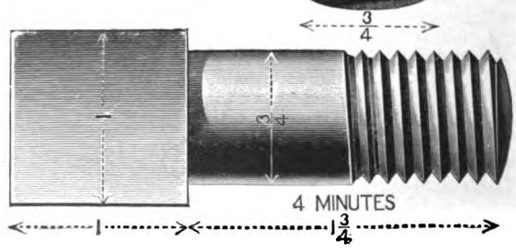


These pieces are made from rough bar.



Finished washers made from bar.





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SPECIAL TURRET LATHES.

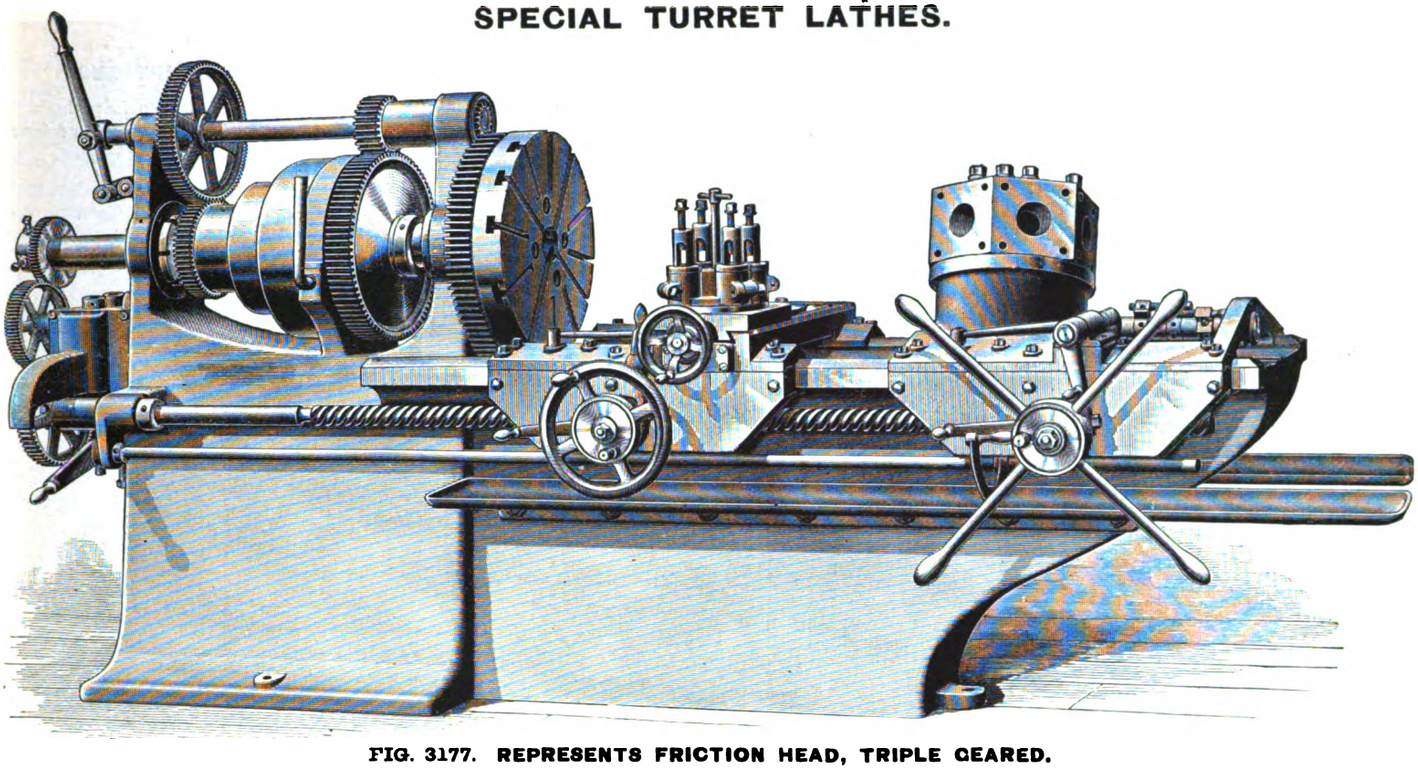


FIG. 3177. REPRESENTS FRICTION HEAD, TRIPLE GEARED.

It is suitable for the heaviest work that can be finished from the turret, such as large gears, pistons, cylinder heads, eccentrics and eccentric straps, valve bonnets, sleeves, valve bodies, etc.

They are fitted with friction headstock, hollow spindle, quadruple feed motion, instantly adjustable, seven change gears, hexagonal inclined turret, screw cutting turret, independent adjustable stop motion to feed controlled from turret slide, instantly reversible feed, independent dead stops, oil pan and oil pumps, geared face plate of diameter noted below, that can be instantly removed, three-speed countershaft and wrenches.

PRINCIPAL DIMENSIONS.

Size No.	Diameter in front bearing.	Swing.	Bore of spindle.	Traverse of turret.	Holes in turret.	Cone pulley.			Width of belt.	Length over all.	Diameter of face plate.	Thickness of face plate.
						Large step.	Middle step.	Small step.				
G 4	2¾ in.	12 in.	1⅛ in.	34 in.	1½ in.	11 in.	8¼ in.	5½ in.	3 in.	7 ft. 5½ in.	13½ in.	1⅞ in.
H 4	3½ "	18 "	1⅜ "	40 "	2¼ "	15 "	12⅜ "	7½ "	3½ "	9 " 13⅜ "	18 "	2⅞ "
I 4	4¼ "	21 "	2¼ "	44 "	3 "	17½ "	13½ "	8¾ "	4 "	10 " 2½ "	21 "	3¼ "
J 4	5⅛ "	24 "	3¼ "	54 "	3½ "	20 "	15 "	10 "	4½ "	11 " 8½ "	25½ "	3¾ "
K 4	6½ "	30 "	4¼ "	54 "	4 "	24 "	18 "	12 "	6 "	13 " 1¼ "	30 "	4½ "

This is also made as a friction geared gap lathe, and is suitable for chucked work, and is strong enough to face off with shaving cutters up to two-thirds of the nominal swing of the lathe, and for boring pulleys, gears, etc., up to the full swing. For the five sizes the swing and width of gap is respectively as follows: G, 20 x 10 inches; H, 30 x 16 inches; I, 36 x 17½ inches; J, 42 x 20½ inches; K, 50 x 24 inches. They are also made both styles, with a plain cone on spindle. **PRICES ON APPLICATION.**

26 AND 22 INCH TURRET HEAD CHUCKING LATHES.

GENERAL DESCRIPTION, FIG. 3177 A.

This lathe swings 26 inches, with the facing attachment under turret, and 22 inches without it. Length of bed, 6½ feet. Distance between centers, 28 inches. Length of turret slide, 24 inches. Length of power feed, 18 inches. Will face up with cross feed 16 inches. Diameter hole through spindle, 1⅜. The turret is 10 inches in diameter and has six holes, each 1¾ inches diameter. There are three steps on the cone for 4 inch belt; largest step, 12 inches diameter.

Weight, facing attachment ..... 2,400 lbs.
" plain ..... 2,300 "
Fast and loose pulleys, 15 x 4, 125 revolutions per minute.

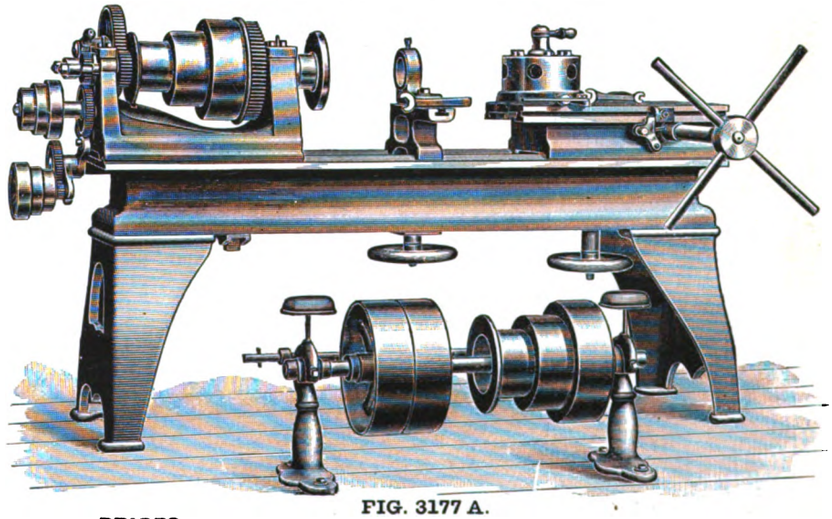


FIG. 3177 A.

PRICES.

26 inch, with facing attachment and power cross feed $425.00
26 " " " " " no power cross feed 400.00
22 " plain 350.00

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54, 50, 40 AND 36 INCH TURRET HEAD CHUCKING LATHES.

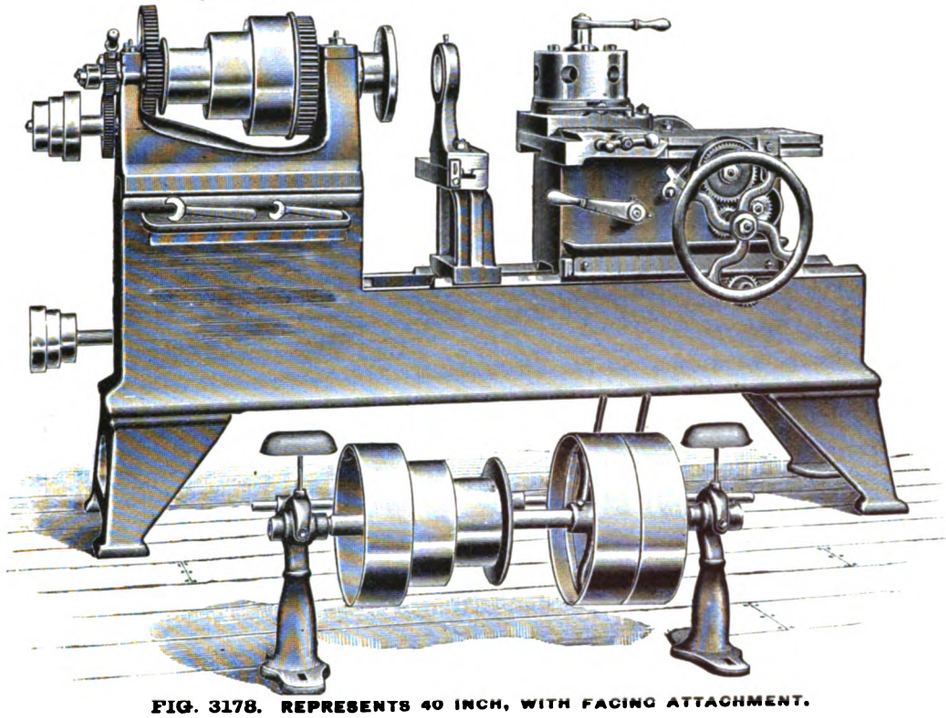


FIG. 3178. REPRESENTS 40 INCH, WITH FACING ATTACHMENT.

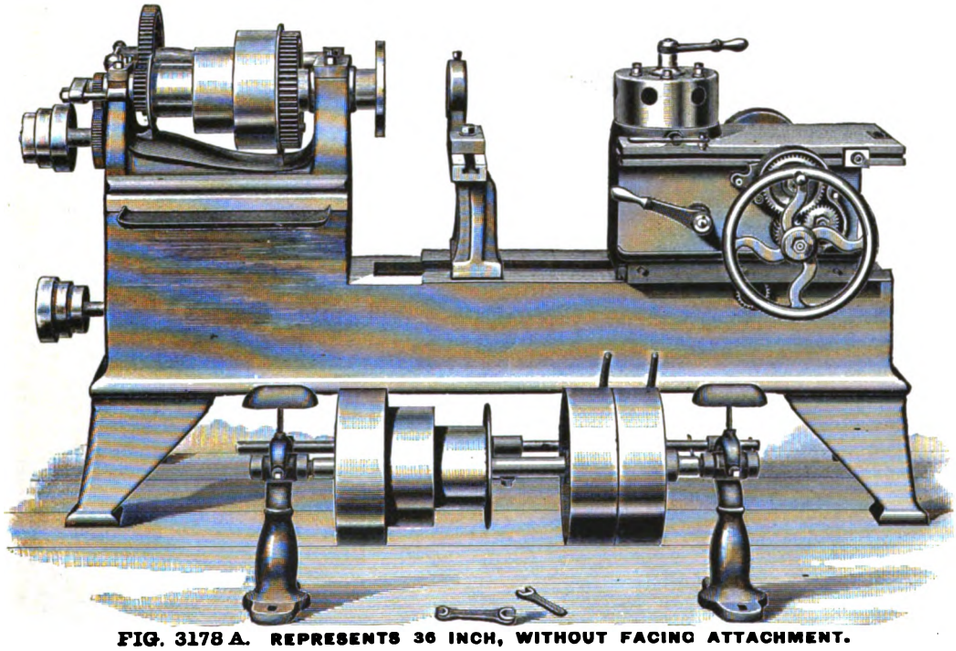


FIG. 3178 A. REPRESENTS 36 INCH, WITHOUT FACING ATTACHMENT.

GENERAL DESCRIPTIONS.

The 54 and 50 inch lathes have beds 8 feet long. The cone has 4 changes for a four inch belt and is powerfully back geared.

Head spindle is 4 inches in diameter, and has a hole 1⅝ inch diameter through its entire length. Front bearing, 6½ inches long.

Distance between centers, 36 inches. Turret slide is 36 inches; length of power feed, 20 inches; will face up with cross feed 32 inches. Turret is 14 inches diameter and has 6 holes, each 2 inches diameter. Weight, 5,000 to 5,500 lbs.

The 40 and 36 inch lathes have beds 6 feet 4 inches in length. Distance between centers, 28 inches.

Spindle has 1⅜ inch hole through its entire length. Cone has three steps for a four inch belt, the largest section being 12 inch diameter.

It is powerfully back geared. The turret is 10 inch diameter, and the slide has an automatic feed 18 inches long. It is furnished with a stop motion, which can be set to stop automatically at any given point. The turret has six holes, each 1¾ inch diameter. Its power cross feed is 12 inches. The automatic feed has three changes for a 1½ inch belt.

Each machine is provided with the combination chucking rest, shown in the cut. It is bored to receive bushings to support long cutter bars and drills.

The countershaft has tight and loose pulleys, 15 inch diameter, 4 inch face, and should run 125 revolutions per minute.

PRICES.

54 inch, with power cross feed to facing attachment	$825.00
54 inch, with facing attachment	800.00
50 " " " "	775.00
50 " plain	700.00
40 " with power cross feed to facing attachment	550.00
40 inch, with facing attachment	525.00
36 " plain	450.00

Holes in spindles and traverse of slides may be changed to suit requirements of special work.

48-24 GAP CHUCKING LATHE.

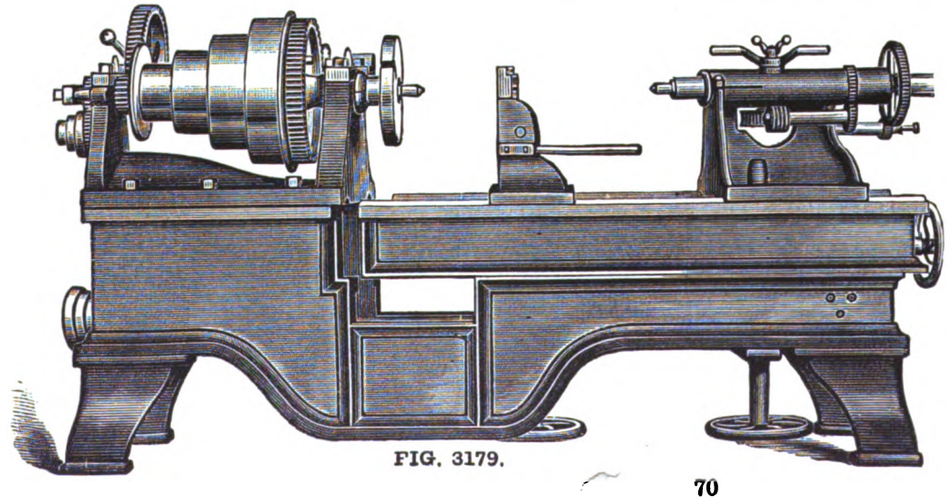


FIG. 3179.

This machine is used for chucking holes in pulleys, gears, couplings, etc. The cone has 4 steps and is double geared. The tail spindle has power feed and quick return. Length of bed, 7 feet. Distance between centers, 3 feet. Swing over top of bed, 24 inches; swing over gap, 48 inches. Length of gap, 24 inches. Tail spindle has 15 inch traverse. Tight and loose pulleys for countershaft, 18 inch diameter, 4¼ inch face. Speed, 100 revolutions. Weight, 3,500 lbs.

PRICES.

With power feed	$425.00
Without power feed	350.00

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CAP BORING AND CHUCKING LATHE.

Swings 24 inches over guides; 48 inches diameter, by 13 inches wide through gap; cone has three changes for 3½ inch belt; back geared; 8 inch diameter face plate; front journal 3 x 5 inches; 1½ inch hole through live spindle; with or without self-feed attachment as required. With the self-feed the shank of cutter bar is fitted to sliding spindle, the other end is supported in an adjustable bushing in live spindle; thus supported, the cutter bar will bore a straight hole; improved rest, as shown on cut, with hardened steel jaws for flat drills of any width and thickness. The sliding spindle, 30 x 2¼ inches, is provided with a quick return, also with adjustable stop motion when automatic feed is used; countershaft, hangers and pulleys, 20 x 4 inches, to run 70 turns per minute.

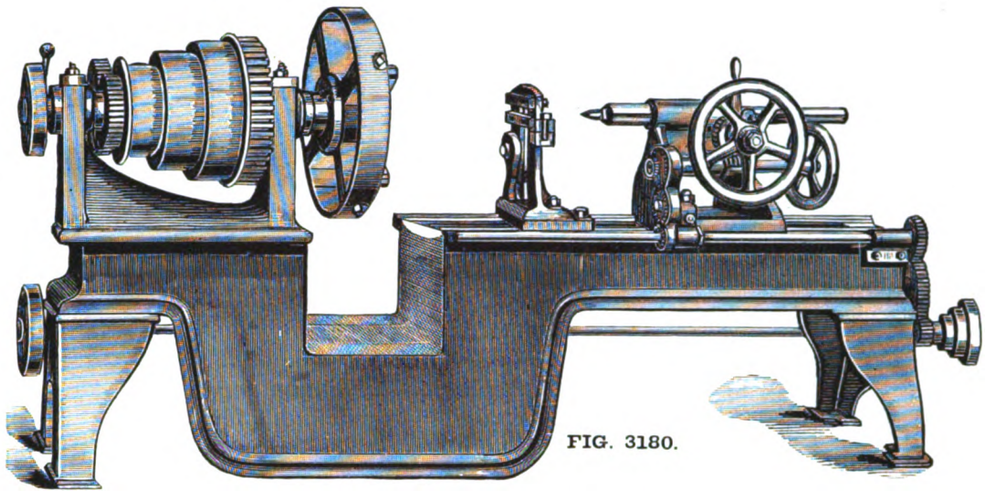


FIG. 3180.

With 8 foot bed, 4½ feet between centers, weight, ...lbs.

PRICE, $ .....

Per extra foot of bed, $ ..... 24 inch chuck, fitted to spindle, $.....

CAP CHUCKING LATHE.

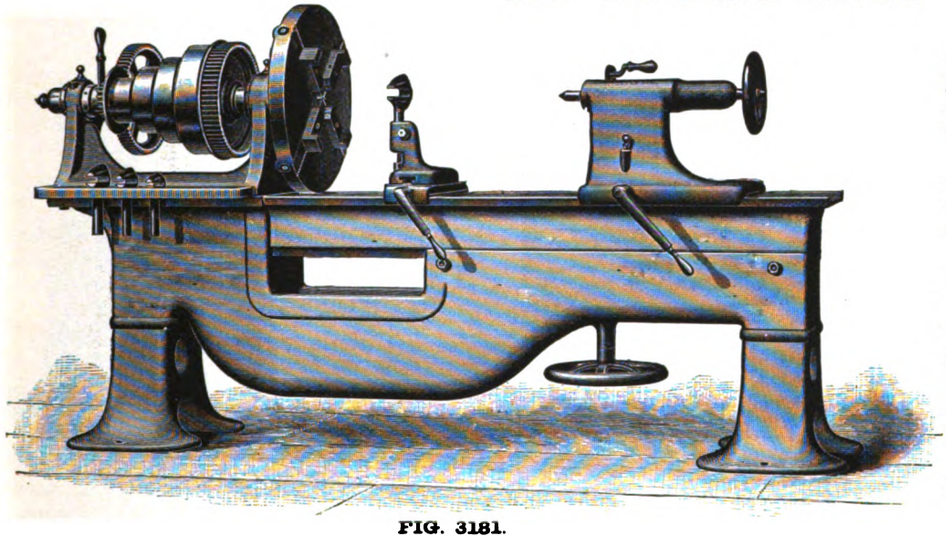


FIG. 3181.

Cone is balanced, and has four shifts for a wide belt. Headstock has patent ground journals with anti-friction metal boxes, which compensate for wear and preserve the original alignment of the live and dead centers.

Spindle boxes are made of one piece of metal; are so constructed as to be susceptible of accurate adjustment; are interchangeable and easily duplicated.

Tailstock is secured to bed by side screw binder.

Bed slider is operated by rack and pinion, which, when open, give ample swing through gap, and additional distance between centers.

Furnished with countershaft, four-arm face plate, two pointed centers, one set of improved chucking rests, and wrenches.

Top of bed is hand-scraped to surface plates.

21 AND 37 1-2 INCH SWING CAP CHUCKING LATHE.

CAP, 18 INCHES LONG.

Length of bed.	Swing over carriage.	Swing through gap.	Distance between centers, closed slide.	Distance between centers, slide open.	Weight.	Price.
6 ft.	16 in.	37½ in.	2 ft. 10 in.	5 ft.	1,850 lbs.	$
7 "	16 "	37½ "	3 " 10 "	6 "	1,950 "	
8 "	16 "	37½ "	4 " 10 "	7 "	2,050 "	
9 "	16 "	37½ "	5 " 10 "	8 "	2,250 "	
10 "	16 "	37½ "	6 " 10 "	9 "	2,450 "	
11 "	16 "	37½ "	7 " 10 "	10 "	2,650 "	
12 "	16 "	37½ "	8 " 10 "	11 "	2,850 "	

Tight and loose pulleys on counter, 14 inch diameter, 4 inch face.
20 inch 4 jawed chuck, fitted.....$75.00 extra.
Back-geared headstock.....$50.00 extra.
Automatic revolving turret head.....$.....extra.
Countershaft should make 80 revolutions per minute.

25 AND 50 INCH SWING CAP CHUCKING LATHE.

CAP, 20 3-4 INCHES LONG.

Length of bed.	Swing over rest.	Swing through gap.	Distance between centers, closed slide.	Distance between centers, slide open.	Weight.	Price.
8 ft.	20 in.	50 in.	4 ft 4 in	7 ft.	2,950 lbs.	$
10 "	20 "	50 "	6 " 4 "	10 "	3,250 "	
12 "	20 "	50 "	8 " 4 "	13 "	3,500 "	
14 "	20 "	50 "	10 " 4 "	16 "	3,800 "	

Tight and loose pulleys on counter, 16 inch diameter, 4½ inch face.
Countershaft should make 75 revolutions per minute.
24 inch 4 jawed chuck, fitted.....$100.00 extra.
Back-geared headstock.....$75.00 extra.
Automatic revolving turret head.....$.....extra.

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CAP SCREW CUTTING ENGINE LATHES.

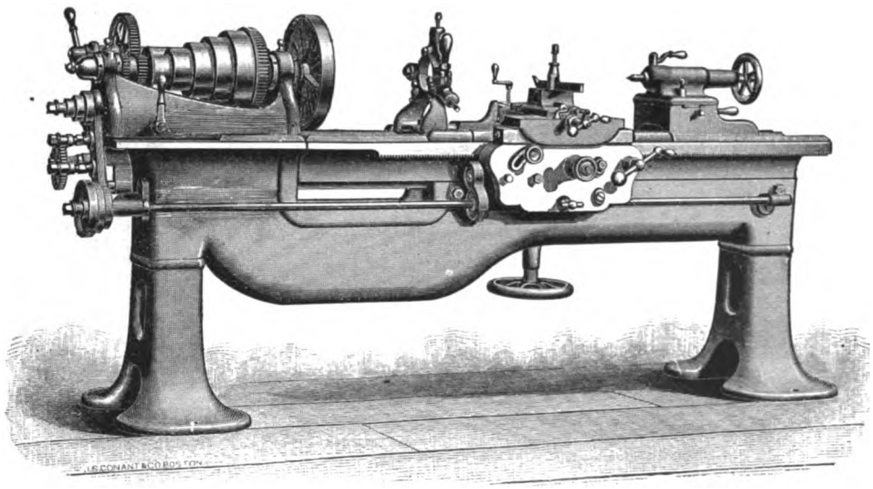


FIG. 3182.

FIG. REPRESENTS 16 X 32 1-2.

GENERAL DESCRIPTION.

Driving cone has five shifts for a wide belt. Headstock gears are powerful, speeds are proportioned to give velocities in uniform progression. Live spindle is made from a high grade of crucible steel. Journals are ground to secure rotundity and accuracy, and are susceptible of accurate and easy adjustment.

Carriage is elevated by back screw, with ball and socket joint. Compound rest furnished when ordered.

Bed is designed to impart strength and resist vibration, deflection and torsional strains.

Lathe is furnished with countershaft, large and small face plates, open adjustable 3 jawed back rest with lever handle lock-nut, traverse rest and wrenches.

The 16 by 32½ inch lathe is made in lengths 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16 feet, and no screw-cutting attachment. The 18 by 43 inch lathe is made in lengths 8, 10, 12 and 14 feet, and may have screw-cutting attachment; also offset carriage with power cross feed and 1⅛ hole through live spindle. Prices on application.

25 X 41 INCH CAP SCREW CUTTING ENGINE LATHE.

Swings 25 inches over shears; 41 inch diameter in gap, 13 inches face through gap; 19 inches over rest carriage; cone has four changes for 3 inch belt; back geared; forged steel spindles; composition metal boxes; dead spindle clamped by adjustable conical binder; hand movement of carriage by means of balance wheel and steel pinion engaging in steel rack on bed; independent geared friction feed; cross feed and reverse feed motions in apron attached to carriage; turning and screw cutting feeds cannot become engaged at the same time; steel lead screw on front of lathe, clamped by open and shut nut; screw threads are not used, except when cutting screws; screw gearing; steady and following rests; large and small face plates; steel wrenches; side block, for turning full swing of lathe, and cross feed stop are included; all gearing is cut; all pinions of steel; countershaft, hangers, one set of three pulleys, each 16 x 7 inches, for regular work; making 90 turns per minute; one set of two pulleys, each 22 x 4 inches, for large work through gap.

With 8½ foot bed, 4 feet between centers, with compound rest and cross feed. Shipping weight, ...lbs.

PRICE, $.....

PER EXTRA FOOT OF BED, $.....

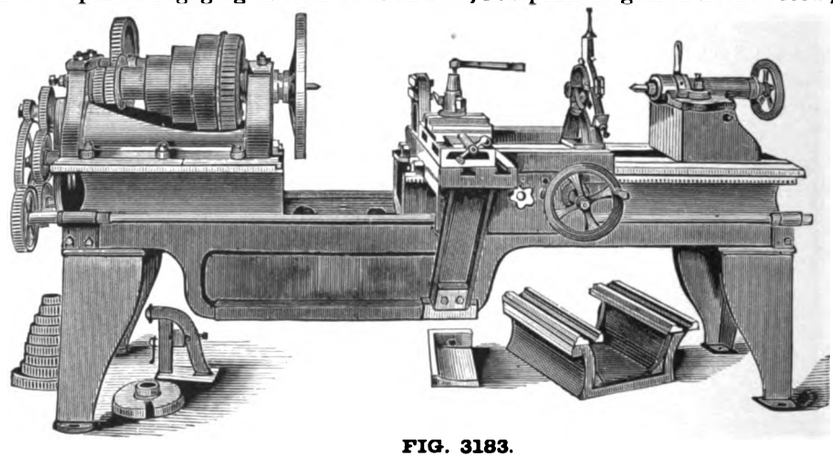


FIG. 3183.

EXTENSION CAP SCREW CUTTING ENGINE LATHES.

48 AND 72 INCHES SWING.

Swings 48 inches over top shears; 72 inches over lower guides through gap; 29 inches over rest carriage; cone has 5 changes for 4 inch belt; back geared and geared face plate; 60 inch diameter, keyed to spindle, unless otherwise ordered; top slides are carefully fitted on bottom guides, to be drawn back by means of screw at rear end; carriage will traverse full length of top slide when drawn back; overhang of carriage, for turning full swing of lathe, is rigidly supported by an angle or bracket having an adjustable shoe on guide on bottom of bed. This insures a firm support for the turning tool, so that a heavy cut may be taken when turning 72 inch diameter. Forged steel spindles; composition metal boxes; hand movement of carriage by means of balance wheel and steel pinion engaging in steel rack on bed; independent geared friction feed; cross feed and reverse feed motions in apron attached to carriage; lead screw on front of lathe is made of steel, and is clamped by open and shut nut; screw threads are not used, except when cutting threads; countershaft, hangers, 3 pulleys, 24 x 8, to run 53 turns per minute; screw gearing; steady rest; steel wrenches and cross feed stop are included.

With 14½ foot bed; 8 feet between centers when closed; 16 feet when drawn back; compound rest, cross feed. Shipping weight, ...lbs.

PRICE, $.....

PER EXTRA FOOT OF BED, $.....

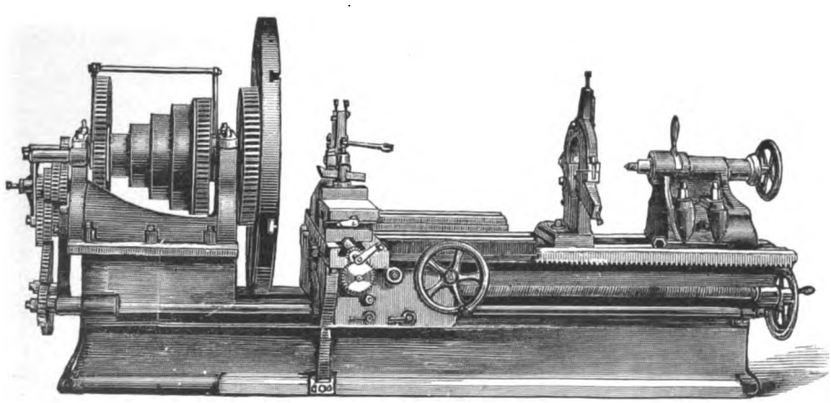


FIG. 3184—IN 4 SIZES.

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36 AND 60 INCHES SWING. FIG. 3184.

Swings 36 inches over top shears; 25½ inches over rest carriage; 60 inches over lower guides through gap; back geared and geared face plate, 48 inch diameter, keyed to spindle unless otherwise ordered; top slides are carefully fitted to bottom guides, to be drawn back by means of a hand wheel and screw at rear end; carriage will traverse full length of top slide when drawn back; overhang of carriage, for turning full swing of lathe, is rigidly supported by an angle or bracket, having an adjustable shoe on guide on bottom of bed; this insures a firm support for the turning tool, so that a heavy cut may be taken when turning 60 inch diameter; forged steel spindles; composition metal boxes; hand movement of carriage by means of balance wheel and steel pinion engaging in steel rack on bed; independent geared friction feed; cross feed and reverse feed motions in apron attached to carriage. Lead screw on front of lathe is made of steel, and is clamped by open and shut nut; screw threads are not used, except when cutting threads; countershaft, hangers, 3 pulleys, 8 x 24, to run 65 turns per minute; screw gearing; steady rest; steel wrenches.

With 14 foot bed; 8 feet between centers when closed; 16 feet when opened or drawn back; compound rest and cross feed.

SHIPPING WEIGHT,.....LBS. PRICE, $.....

PER EXTRA FOOT OF BED, $.....

28 AND 48 INCHES SWING. FIG. 3184.

Swings 28 inches over top shears; 21 inches over rest carriage; 48 inches over lower guides through gap; cone has 4 changes for 3½ inch belt; back geared and geared face plate; extra tool block for turning pulleys 48 inch diameter; top slides are carefully fitted to lower guides, to be drawn back by means of hand wheel and screw at rear end; carriage will traverse full length of top slides when drawn back; overhang of carriage, for turning full swing of lathe, is rigidly supported by an angle or bracket, having an adjustable shoe on guide on bottom of bed; this insures a firm support for the tool, so that a heavy cut may be taken when turning 48 inch diameter; independent geared friction feed; cross feed, and reverse feed motions in apron attached to carriage; turning and screw cutting feeds cannot become engaged at the same time. Lead screw on front of lathe is made of steel, and is clamped by open and shut nut; screw threads are not used except when cutting screws. Countershaft; hangers; 3 pulleys, 22 x 8, to run 70 turns per minute. Screw gearing; steady and following rests; large and small face plates; steel wrenches.

With 12½ foot bed; 8 feet between centers when closed; 16 feet when drawn back, with cross feed and compound rest.

SHIPPING WEIGHT, 8,000 LBS. PRICE, $.....

PER EXTRA FOOT OF BED, $.....

22 AND 36 INCHES SWING. FIG. 3184.

Swings 22 inches over top slides; 16 inches over rest carriage; 36 inches over lower guides through gap; cone has 4 changes for 3⅛ inch belt; back geared and geared face plate; extra tool block for turning pulleys 36 inch diameter; top slides are carefully fitted to lower guides to be drawn back by means of hand wheel and screw at rear end; carriage will traverse full length of top slide when drawn back; extended portion of carriage, for turning full swing of lathe, is rigidly supported by an angle or bracket, having an adjustable shoe on guide on bottom of bed; this insures a firm support for the turning tool, so that a heavy cut may be taken when turning 36 inch diameter. Hand movement of carriage by means of balance wheel and steel pinion engaging in steel rack on bed. Independent geared friction feed; cross feed, and reverse feed motions in apron attached to carriage; turning and screw cutting feeds cannot become engaged at the same time. Steel lead screw on front of lathe is clamped by open and shut nut; screw threads are not used, except when cutting screws. Countershaft; hangers; 3 pulleys, 7 x 16, to run 90 turns per minute, for regular work; 2 pulleys, 4½ x 20 inches, for turning full swing through gap. Screw gearing; steady and following rests; large and small face plates; steel wrenches.

With 12 foot bed; 8 feet between centers when closed; 16 feet when extended, with compound rest and cross feed.

SHIPPING WEIGHT,.....LBS. PRICE, $.....

PER EXTRA FOOT OF BED, $.....

2 1-2 CUTTING-OFF MACHINE.

The tool carriage has side adjustment and can be quickly set to cut off a number of short pieces without moving the bar in the chucks. The tool post is made so as to raise and lower the tool, and a gauge is provided for cutting duplicate pieces to same length. The support at back end of machine for holding up long bars has vertical adjustment for different sizes of stock, and also has a roll to carry the stock easily. The receptacle for chips is drained of oil, and the chips can be easily removed. The machine is provided with two good 4 jawed chucks, and the one next to the cutting tool is well up out of the way of chips.

The front bearing is 4⅜ inch diameter x 6 inches long.

The back bearing is 4 inch diameter x 4½ inches long.

Diameter of cones is 9, 11 and 13 inches for four inch belt.

Size of tight and loose pulleys on countershaft, 16 inches x 4 inches.

Speed of countershaft, 90 revolutions.

Weight, 1,400 lbs.

PRICE, $225.00.

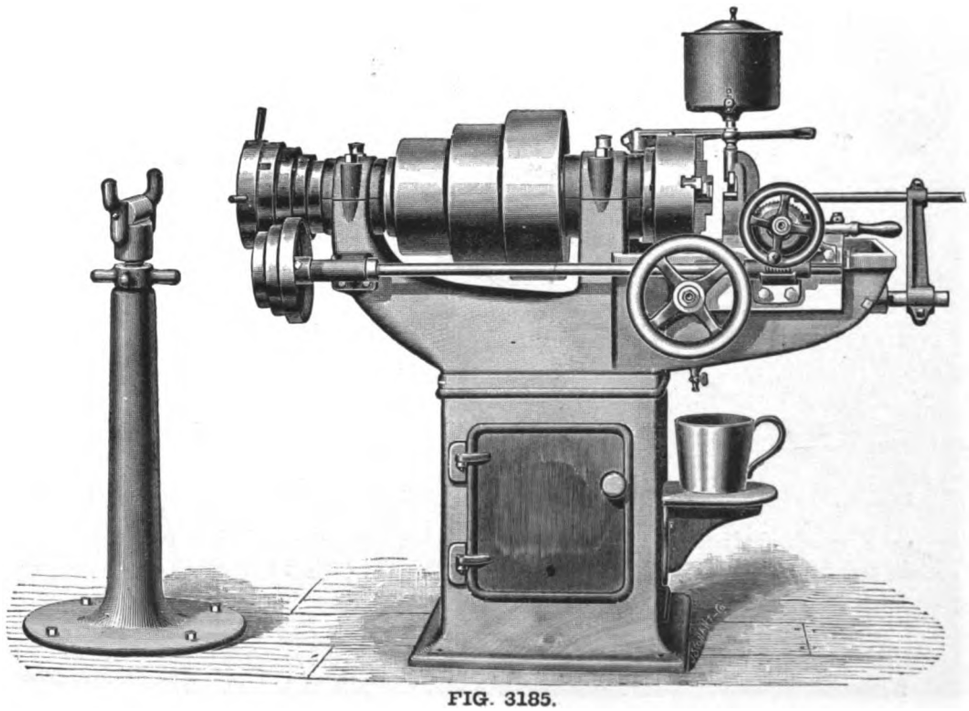


FIG. 3185.

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CUTTING-OFF MACHINES.

6 INCH MACHINE.

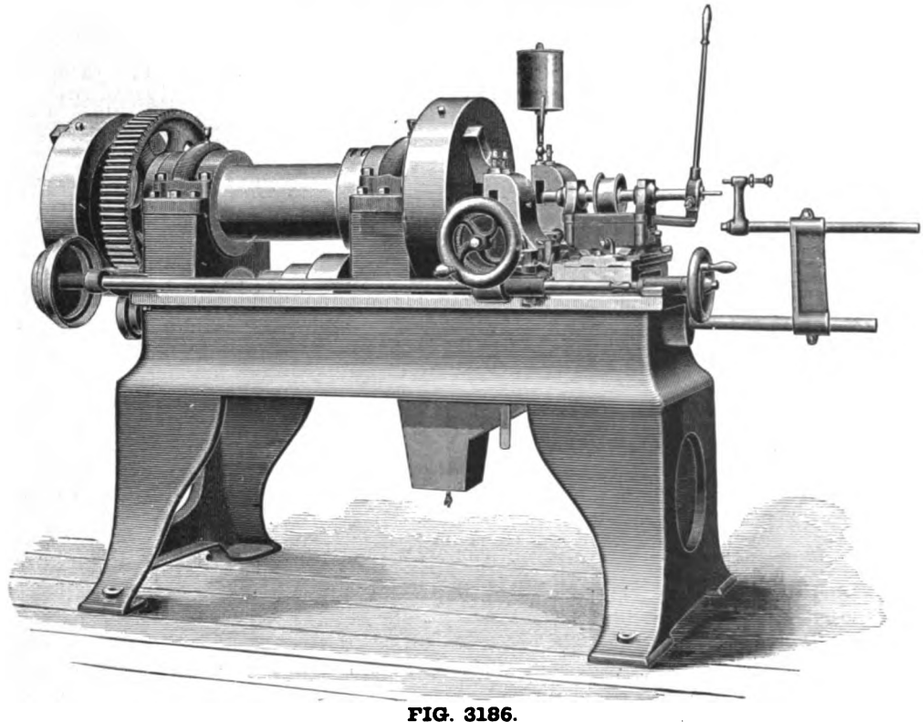


FIG. 3186.

Cuts rough shaft from 1 to 6 inch diameter. Spindle bearings, 8⅛ inch diameter. Chucks, very heavy, 20 inch diameter. Countershaft has two speeds, and is furnished with two pairs of T. and L. pulleys, and patent belt shipper.

PRICES.

Complete, with centering attachment	$640.00
Without " "	600.00

5 INCH MACHINE.

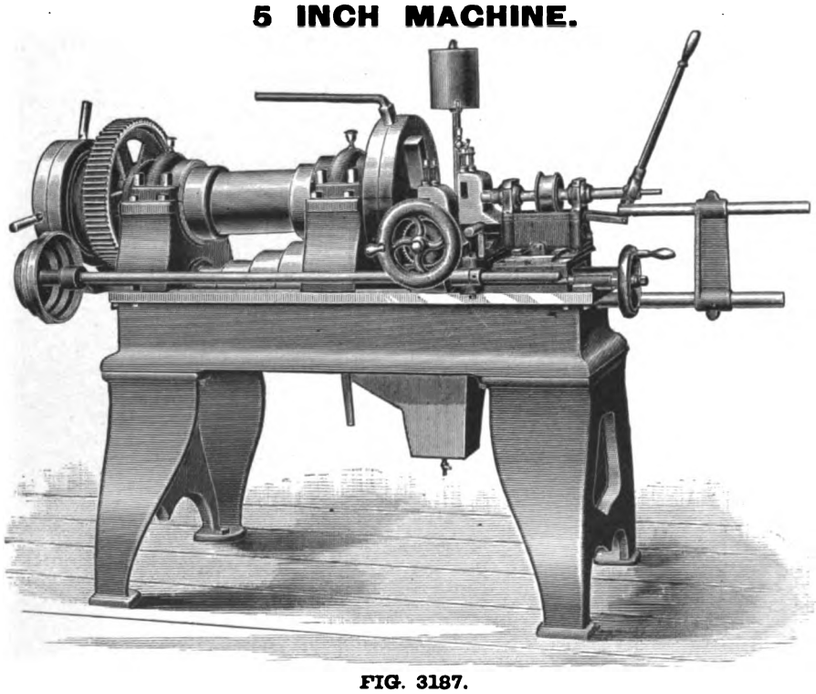


FIG. 3187.

Cuts rough shaft from ¾ to 5 inch diameter. Countershaft has two speeds, and is furnished with two pairs of T. and L. pulleys, 3½ x 14 inches, and patent belt shipper. Speeds, 100 and 180.

PRICES.

Complete, with centering attachment	$500.00
Without " "	475.00

GENERAL DESCRIPTION, FIGS. 3186 TO 3190.

The two tools will cut twice as fast as one, and each tool is a rest for the other. One tool presses up and the other down, which relieves the strain and leverage on chucks and bearings. The same amount of work can be done with less power, and, consequently, with less strain on tools and machine, by grinding one of the tools V-shaped to take out the middle of the cut, and leaving the other square to take out the corners, just as in planing a slot the work is done much easier by taking a narrow tool first. In cutting off rolls or studs a tool can be set in one tool block to bevel or round the ends.

The patent nut on back tool block enables the operator to make that tool block independent of the other, and quickly set tools to cut alike, even when machine is running.

The chips and oil are caught in a hinged receptacle under the machine, which drains the oil from the chips; chips can then be dumped dry. This makes a neat, convenient and economical arrangement.

The centering attachment runs with a separate belt and countershaft, and makes a perfect centering machine.

It is conveniently arranged and easy to operate, and is so constructed that it is adjustable to center of machine in case bearings ever wear. Boxes take up to wear, and spindle is carefully ground to fit. The socket in spindle is made to fit the Morse standard taper No. 1.

One great advantage of centering with this machine is that the work can revolve while centering, which is sure to bring the center true.

Chucks, tool blocks and carriages are very solid and stiff, which is of first importance in a cutting-off machine.

All sizes are furnished with automatic feed, automatic throw-off, two patent cutting-off tools, and a pedestal rest for long shafts.

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CUTTING-OFF MACHINES.

4 INCH MACHINE.

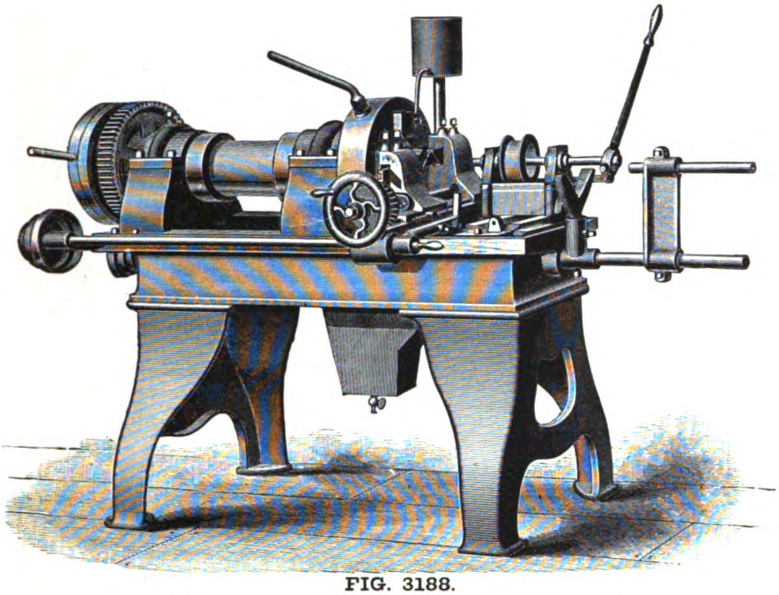


FIG. 3188.

GENERAL DESCRIPTION, SEE PAGE 74.

This machine cuts rough shaft from ½ to 4 inches diameter. Cone pulley has four steps. Countershaft has two speeds, and is furnished with two pairs fast and loose pulleys, 3 x 12 inches, and patent belt shipper. Speeds, 100 and 160.

PRICES.

Complete, with centering attachment..... $400.00
Without " " 375.00

2 INCH MACHINE.

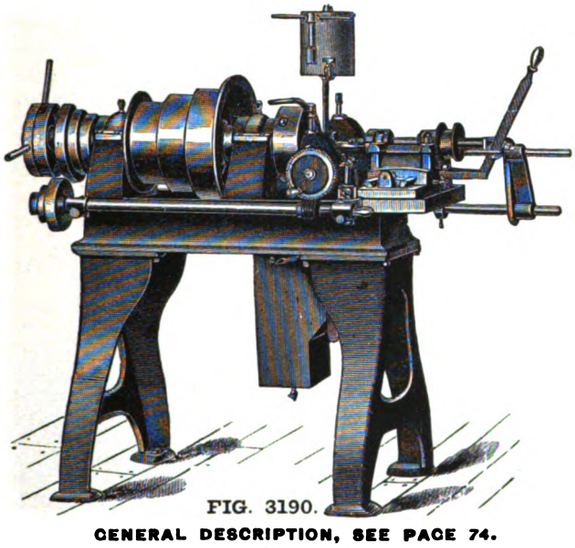


FIG. 3190.

GENERAL DESCRIPTION, SEE PAGE 74.

Cuts off rough iron from ¼ to 2 inches diameter. Countershaft has fast and loose pulleys, 3 x 10 inches. Speed, 100 revolutions per minute.

PRICES.

Complete, with centering attachment..... $175.00
Without " " 150.00

GENERAL DESCRIPTION, FIGS. 3191, 3192 AND 3193.

These machines will cut bars to length. They have a hollow spindle, to each end of which is secured a concentric chuck, for holding the bars while they are being cut.

The angle and movement of the tool are wholly different from those of a lathe, which cannot be used to advantage for such work; the tool has a uniform section, and is supported to the end, at its bottom edge, in a special tool clamp, having a new adjustment to alter the angle of the cutting edge of the tool, in operating on soft or hard material; the tool requires no dressing, can be ground by any one, and the machine can be operated by unskilled workmen.

It has a variable self-acting feed, conveniently located for the operations of the workman.

Each machine is furnished with one tool, two oil pots and cocks; the countershaft has one fast and two loose pulleys on it, to change the speed of the machine while in operation without shifting the cone belt. The hangers have a vertical adjustment to keep the belt tight. If desired, a centering attachment can be furnished.

3 INCH MACHINE.

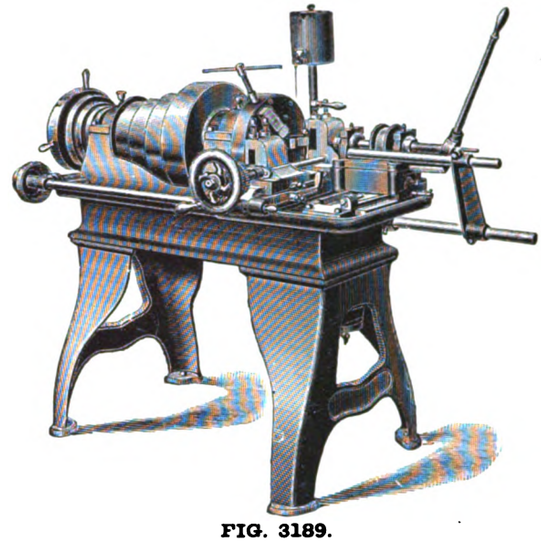


FIG. 3189.

GENERAL DESCRIPTION, SEE PAGE 74.

Cuts rough shaft from ⅜ to 3 inches diameter. Countershaft has two speeds, and is furnished with **two pairs of fast** and loose pulleys, 3½ x 14 inches, and patent belt shipper. Speeds, 60 and 100.

PRICES.

Complete, with centering attachment..... $300.00
Without " " 275.00

6 INCH MACHINE.

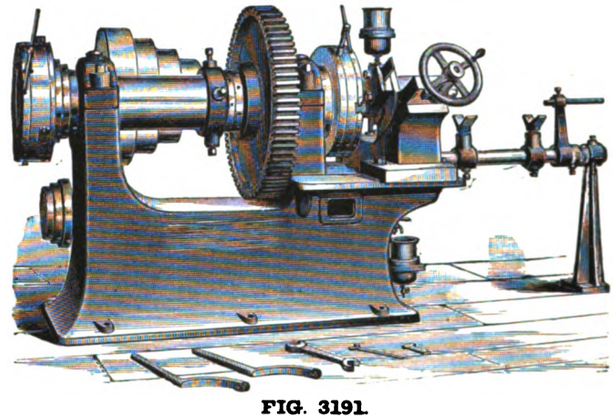


FIG. 3191.

Weight, 4,725 lbs. Fast and loose pulleys, 22 x 5½ inches. Speed, 85 and 170 revolutions. **PRICE, $**.....

4 INCH MACHINE.

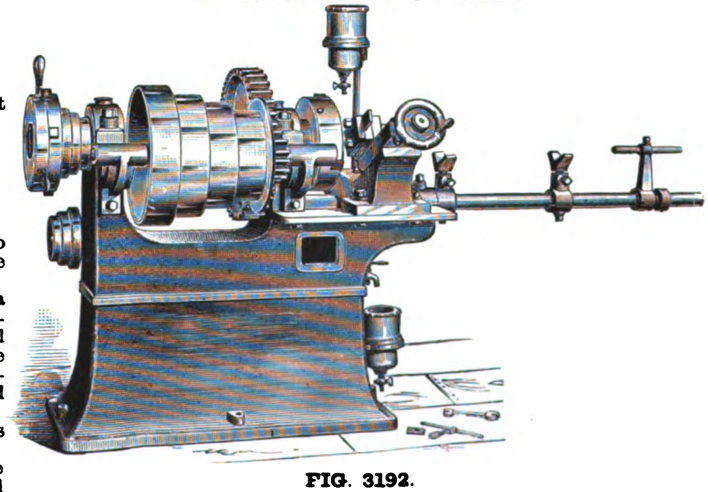


FIG. 3192.

Weight, 2,400 lbs. Fast and loose pulleys, 20 x 4¼ inches. Speed, 75 and 150 revolutions. **PRICE, $** .....

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2 1-2 CUTTING OFF MACHINE.

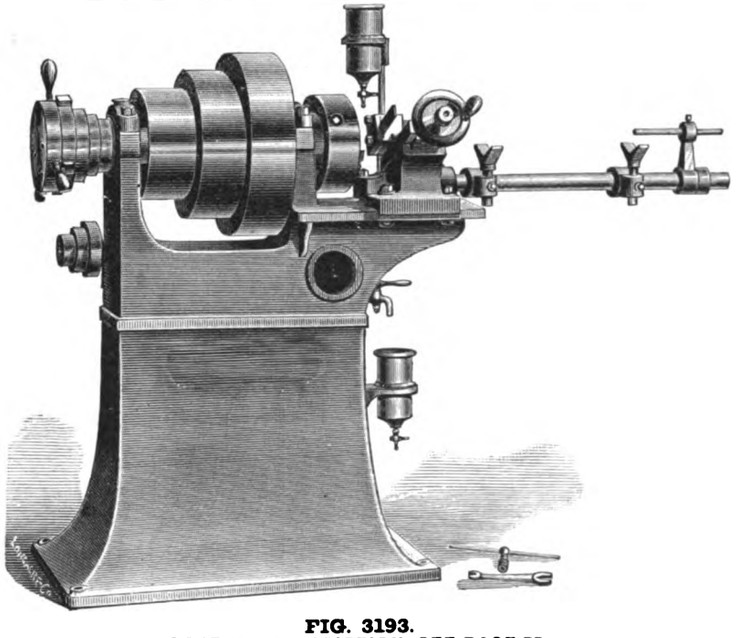


FIG. 3193.

GENERAL DESCRIPTION, SEE PAGE 75.

Weight, 1,330 lbs. Fast and loose pulleys, 14 x 4¼ inches. Speed, 50 and 100 revs.

PRICE, $.....

4 1-2 INCH CENTERING MACHINE.

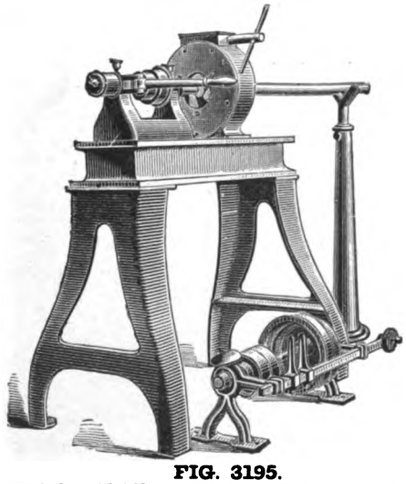


FIG. 3195.

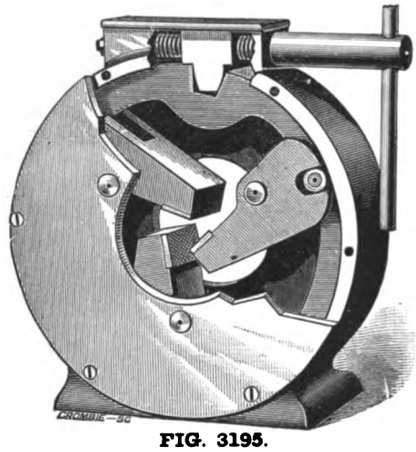


FIG. 3195.

REPRESENTS DETAIL OF CHUCK.

Weight, 425 lbs. Tight and loose pulleys on countershaft are 5 inch diameter. Speed of countershaft, 240 revolutions per minute.

PRICE, INCLUDING COUNTERSHAFT AND SUPPORT, $100.00.

BENCH CENTERING CHUCK.

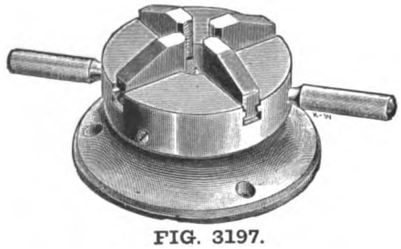


FIG. 3197.

This is simply a scroll chuck with a steel center. It is made to fasten on a bench, and will perfectly center round, square and octagon stock, from ¼ to 1½ inch. It is furnished at a very low price, but it is fully guaranteed in every respect.

PRICE, $12.00.

PORTABLE CENTERING CHUCK.

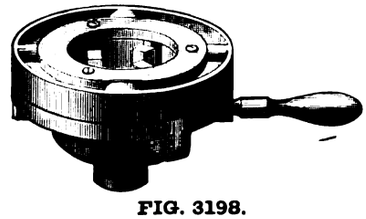


FIG. 3198.

This chuck will perfectly center round stock from ½ inch to 3 inches in diameter. One end of a bar or shaft may be raised from the floor and quickly centered by clamping on the chuck and driving in the punch from the back side.

PRICE, $14.00.

CENTERING AND COUNTER BORING MACHINE.



FIG. 3194.

CENTERS FROM 1-2 TO 2 1-2 INCH STOCK.

It makes a drilled and countersunk center by one setting in the vise. It has two spindles controlled by one lever or handle in a stationary head.

An adjustable rest is fitted to the rocking bar convenient for supporting long shafts of different diameters.

The bed is 48 inches long. A countershaft is furnished with the machine, with tight and loose pulleys, 5 inch diameter, 2 inch face, and should make 320 revolutions per minute.

WEIGHT, 375 LBS. PRICE, $100.00.

2 SPINDLE CENTERING MACHINE.

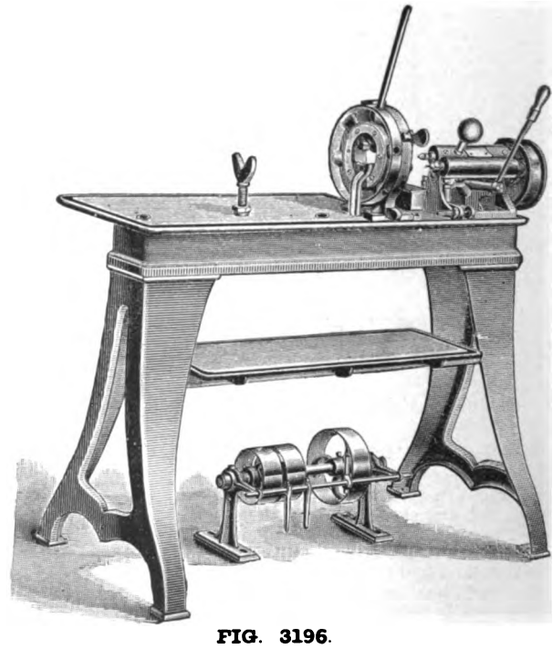


FIG. 3196.

CENTERS FROM 1-4 TO 4 INCH STOCK.

Countershaft has tight and loose pulleys, 6 inch diameter by 2 inch face, and should make about 300 revolutions per minute.

PRICE, $125.00.

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CENTERING MACHINES.

NO. 1.

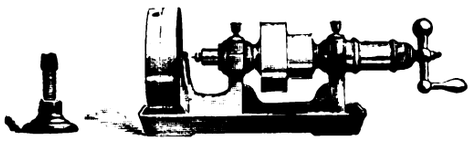


FIG. 3199.

At one operation it will center and drill any size of round iron, from ¼ to 3 inches in diameter. The spindle is fitted with a split chuck for holding a ⅛ inch twist drill, which may be ground if broken, and replaced when used up, with but little trouble.

Machines with four jaws, for holding square iron, are made to order.

PRICES.

Complete, including split drill chuck, twist drill and rest, for end of bar,	$50.00
With four jaw chuck,	54.00
Mounted on iron table,	75.00
Table, extra,	25.00
Countershaft, with tight and loose pulleys, 6 inch diameter by 2 inch face, extra,	9.00

Countershaft should make about 400 revolutions per minute.

NO. 2.

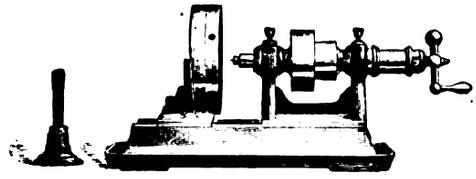


FIG. 3200.

This machine will center iron from ¼ inch to 4½ inches diameter. It is set on a bed about 2 feet long, and the chuck is bolted to a separate stand, which is fitted to the bed and can slide 5 inches, thus giving more or less room between the work and drill, as required.

Machines with four jaws, for holding square iron, made to order.

PRICES.

Complete, same as No. 1,	$68.00
Complete, with four jaw chuck,	72.00
Mounted on iron table,	93.00
Countershaft, same as No. 1, extra,	9.00
Table, extra,	25.00

NO. 4 MACHINE.

The No. 4 machine is made only to order, being designed for heavy work, as locomotive and car axles. It will center shafts 7½ inches in diameter. In appearance it resembles the No. 2 machine, but is much larger and heavier.

PRICE.

Complete, including countershaft, $125.00

NO. 3.

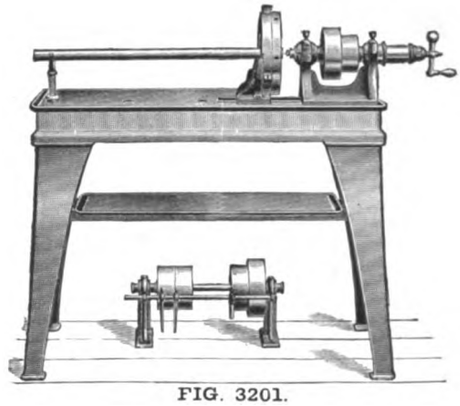


FIG. 3201.

This machine has a capacity of from ¼ to 5½ inches; is set on a bed three feet long with iron legs; is furnished with counter and hangers, complete. The chuck can slide on the bed eighteen inches, giving ample room for any work required.

Machines with four jaws, for holding square iron, made to order.

PRICES.

Complete, same as No. 1,	$100.00
With four jaw chuck,	105.00

Countershaft same as No. 1, included.

HAND AND POWER PLANER.

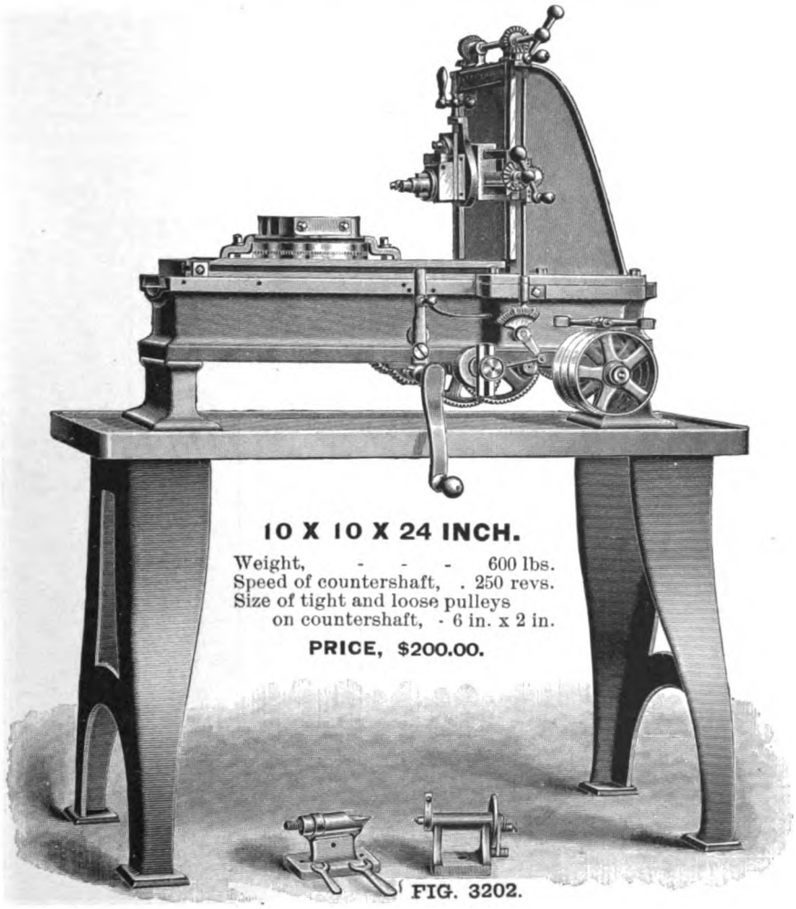


FIG. 3202.

This cut represents a combination hand and power planer. It is made from new designs. The machine is run by two belts running at a high rate of speed, and is capable of taking a heavy cut. It has automatic horizontal feed, and the head is graduated to plane at any angle. The table is gibbed to the bed to prevent lifting on a heavy cut. Holes in table are drilled and reamed and bolt slot in table is milled. The feed screws are of steel, with square threads. To run by hand power with crank, a gear is simply moved back on shaft out of mesh with other gears, and to run by power is moved back again. This is a very simple arrangement and easily and quickly done. With this machine we furnish an iron bench or table for machine to stand on, indexed centers, graduated swivel vise, crank for hand power, countershaft and necessary wrenches.

CRANK PLANER.

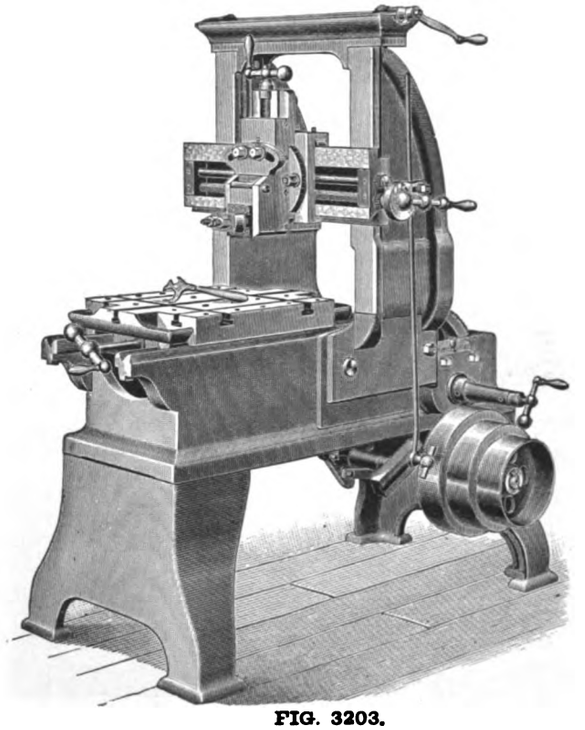


FIG. 3203.

It has a stroke of twelve inches, with a variable connecting rod attachment to the table, so that the whole length of the table, 25 inches, may be planed. It also has a quick return motion, giving to the cutting stroke a movement nearly uniform, and is so constructed that the traverse of the table can be at will and with ease shortened or lengthened, while the machine is in operation, which is a very desirable improvement in this kind of tool. It planes between posts 16 inches wide and 16 inches high, and has the latest approved self-acting cross, angular, and vertical feed. Its weight is 2,000 pounds.

PRICE, $600.00.

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GENERAL DESCRIPTION OF PLANERS, PAGES 79 TO 81.

Driving works can be arranged so that planers may stand parallel with, or at right angles to, the line shafting.

Beds are nearly twice the length of the tables, with cross girts of box form, and on the larger sizes have double walls where the gearing and uprights are mounted. Have oil pockets with rollers for lubricating the tables. Have two wide V tracks on the smaller and one V and one flat track on the larger sizes to provide for unequal expansion between beds and tables.

Uprights of box form, with base wide enough to resist heavy cuts without jar when tool is at highest point; have a bearing the entire depth of beds where bolted to them, and are tied at their tops by deep arches of great strength. The tables have planed T bolt slots, drilled and reamed pin holes, and are driven by means of cut gearing and racks from crossed belts for the cutting and open belts for the return motion.

The patented belt shifters guide one belt entirely off the pulley before starting the other on; permit stopping the tables instantly without stopping the belts; are independent of the feed and arranged to clear reversing dogs, allowing the work to be run from under the tools for inspection.

Motion of the tables can be controlled from either side of the tables.

Pulleys of large diameters and wide faces are proportioned to return the tables at highest practical speeds, eighty feed or more per minute on smaller sizes.

Cross-rails of box girder form have deep arched backs, large wearing surfaces, taper packings for adjustment of the saddles, and sufficient length for two saddles without one interfering with the other when planing the entire width between the uprights; are elevated by power, except the 30-inch and one type of 36-inch.

When required, counterbalanced saddles can be fitted to either or both uprights, with compound and swiveling motions for cutting at any angle from in line with the tables to the highest position of the cross-rails. Can be moved quickly by hand and by variable self-acting feeds in either direction.

Patented feeding device operated by the driving gears positively instead of by friction, requiring no power except at the instant of feeding; provides self-acting, variable feeds across, down, and at all angles and at either end of the cut.

All feeds can be operated by hand from both ends of the cross-rail.

All wearing parts are scraped to a bearing upon each other over their entire surfaces.

Countershafts and wrenches are furnished.

GENERAL DIMENSIONS OF PLANERS, FIGS. 3204 TO 3209.

Fig. No.	Planes in			Weight. Pounds.	Price.	Per foot to plane.		Extra saddle on cross-rails.		Extra saddle on either upright.	
	Width. Inches.	Height. Inches.	Length. Feet.			Weight. Pounds.	Price.	Weight. Pounds.	Price.	Weight. Pounds.	Price.
3209	30	30	5		$		$		$		$
3209	36	36	6								
3208	36	36	6								
3207	42	42	8								
3206	48	48	10								
3206	54	54	10								
3206	60	60	10								
3206	72	72	10								
3206	84	72	10								
3205	72	72	10								
3205	84	84	10								
3205	96	84	10								
3205	120	84	10								
3204	84	84	14								
3204	96	96	14								
3204	120	96	14								
3204	120	120	16								

In ordering, specify whether the motion of table shall be parallel with, or at right angles to, the overhead line shafting, as on the smaller sizes we build them both ways. See page 81 for parallel driving gear, and page 80 for square driving gear.

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POND 120, EXTRA HEAVY 120, 96 AND 84 EXTRA HEAVY PLANERS.

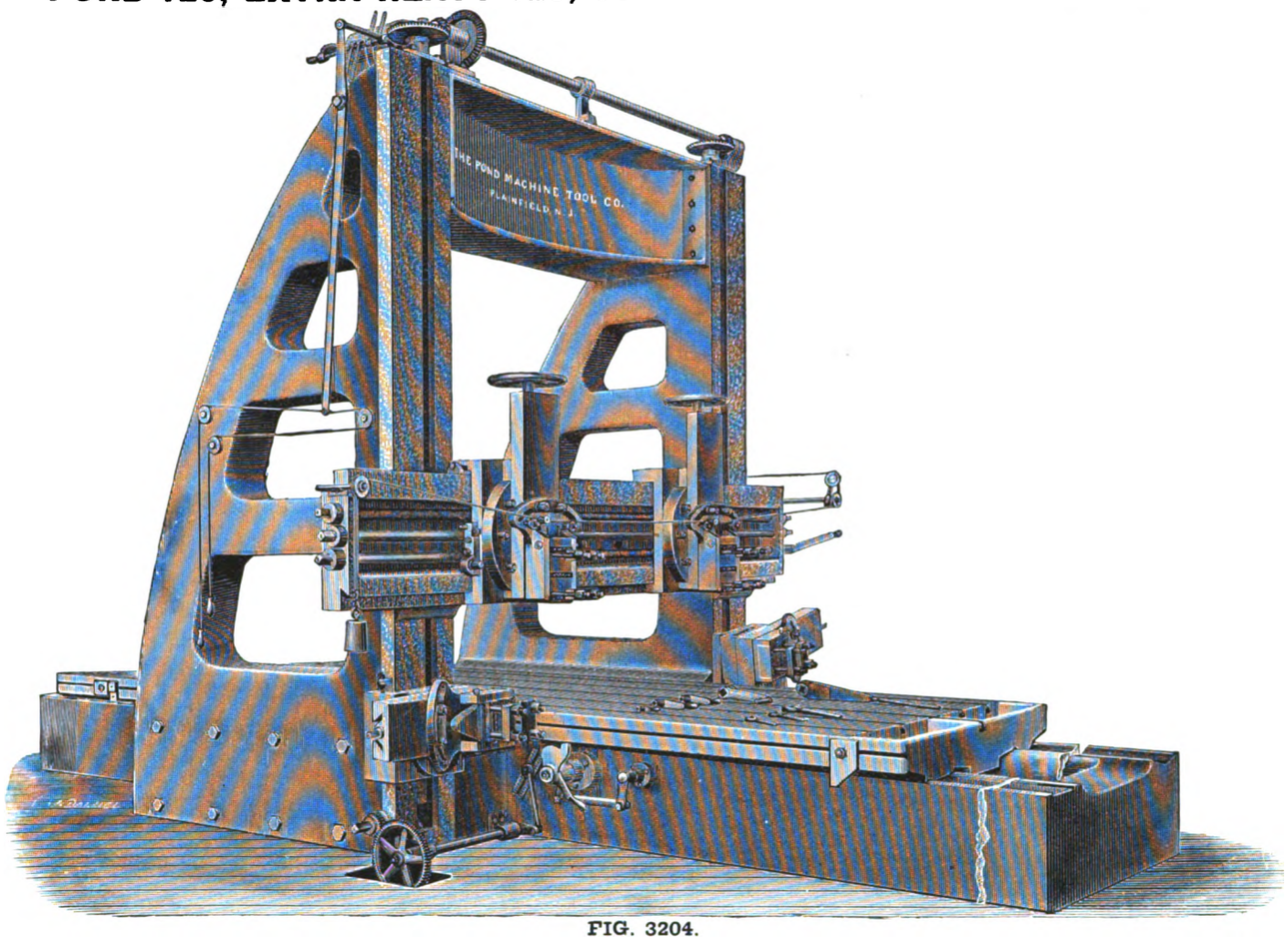


FIG. 3204.

POND 120, 96, 84 AND 72 INCH EXTRA HEAVY PLANERS.

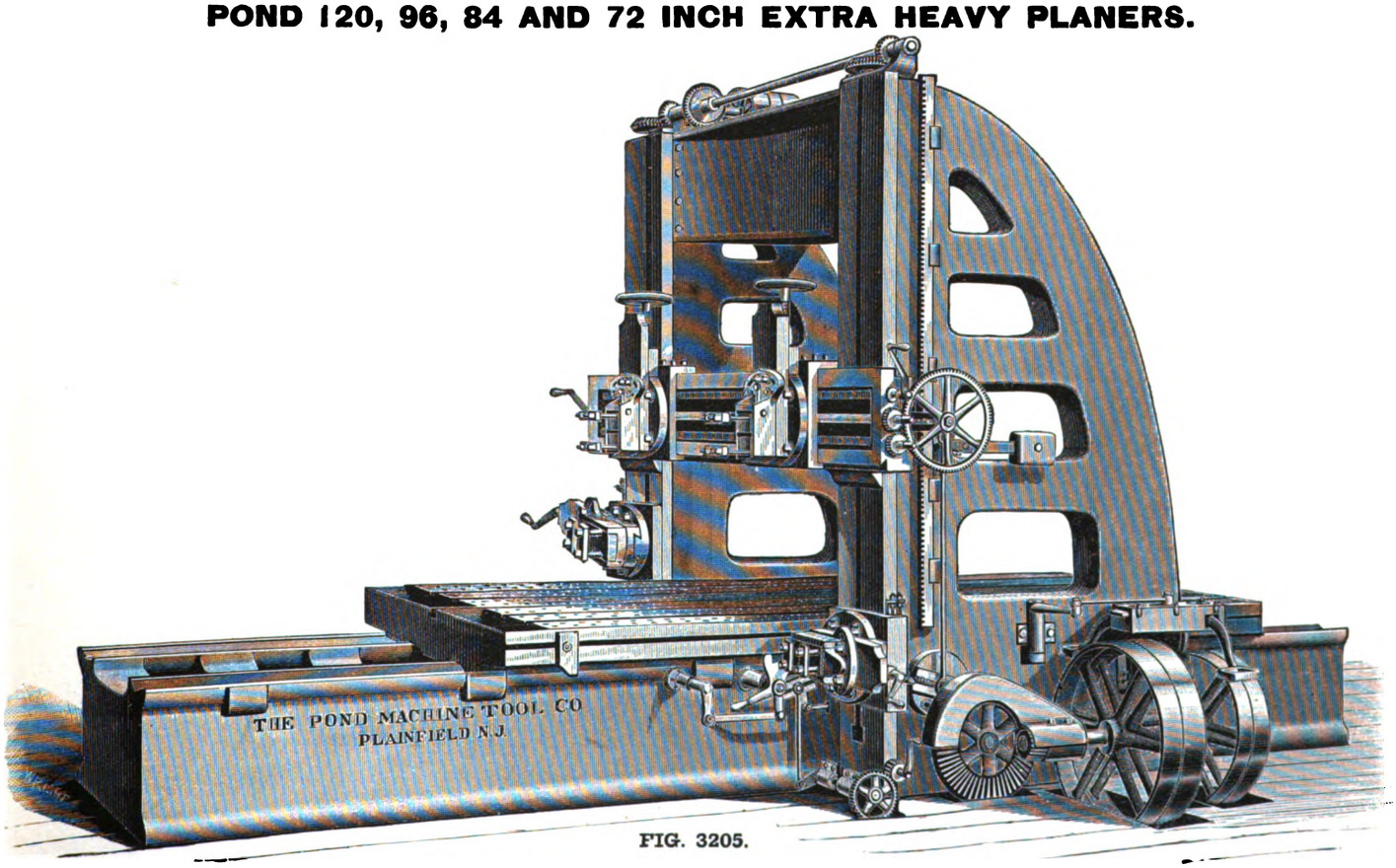


FIG. 3205.

FOR GENERAL DESCRIPTION AND TABLE OF DETAILS, SEE PAGE 78.

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POND 84, 72, 60, 54 AND 48 INCH PLANERS.

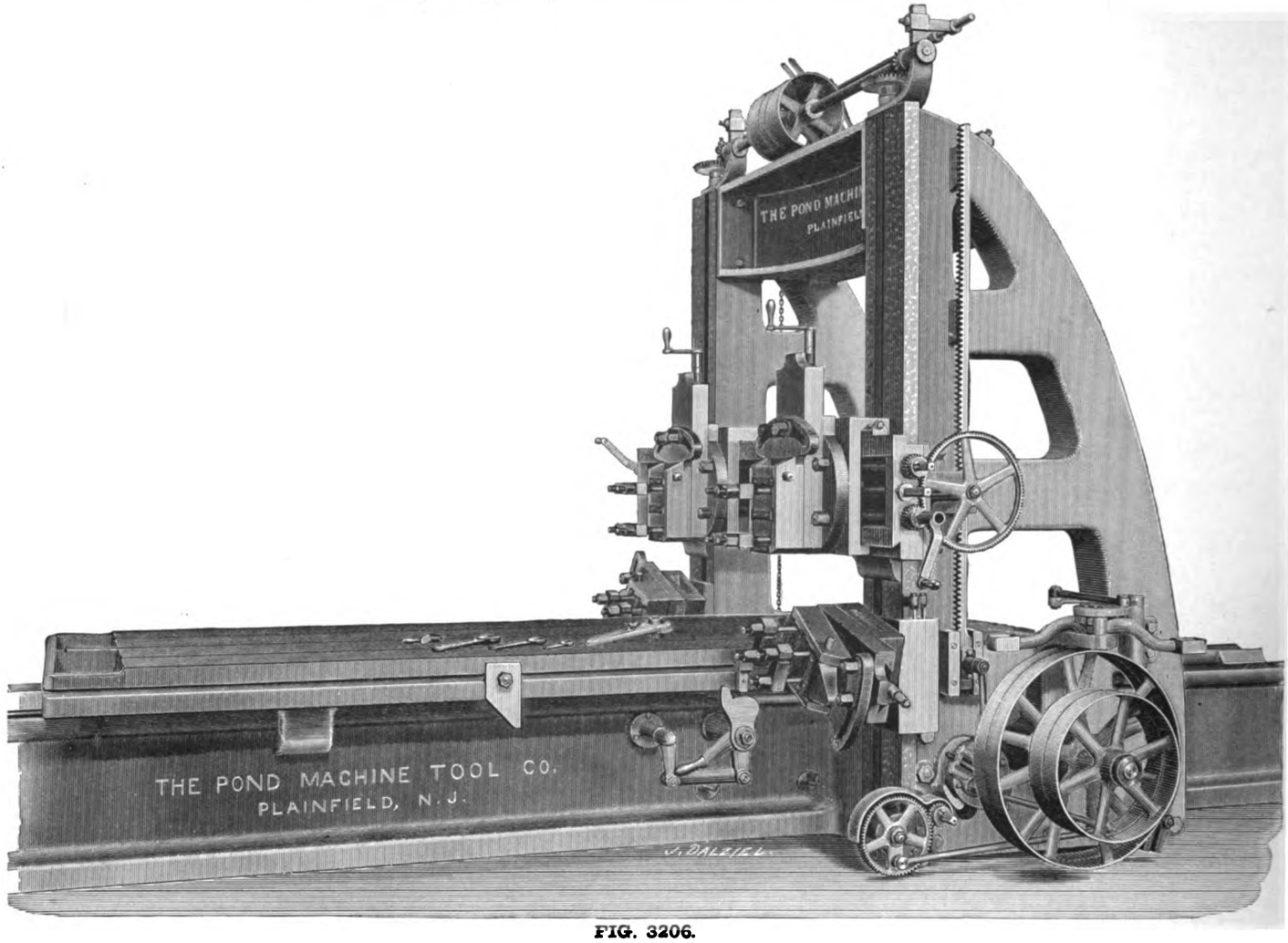


FIG. 3206.

POND 42 INCH PLANERS.

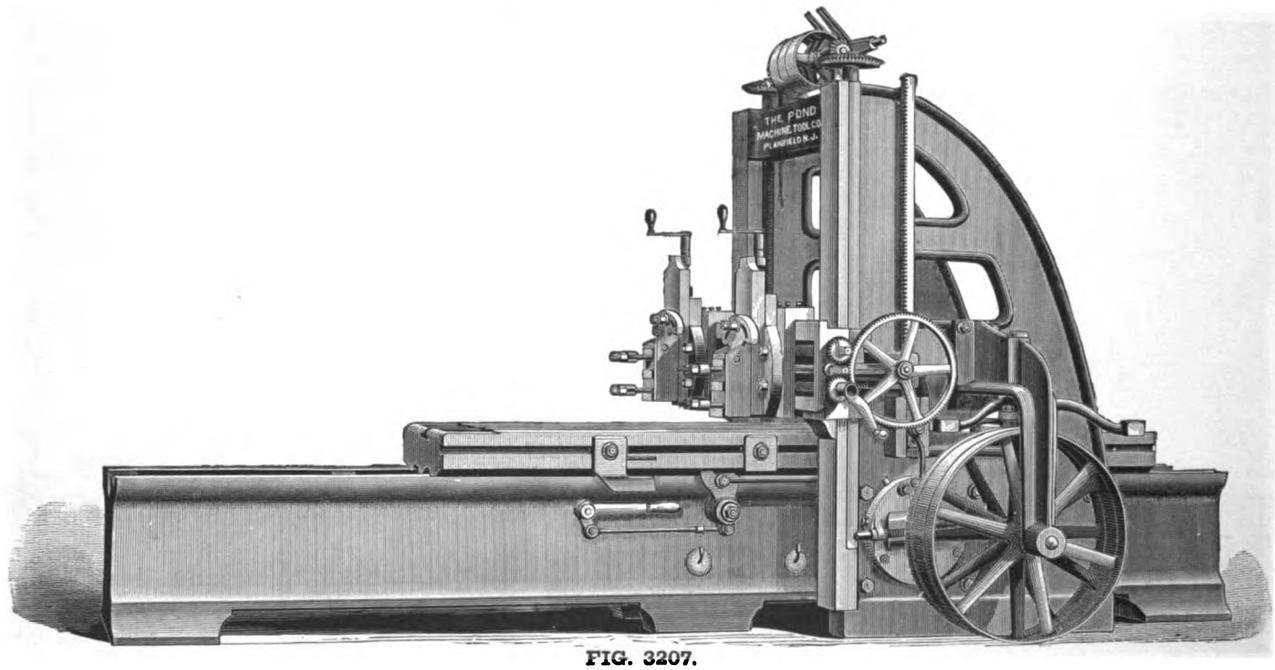


FIG. 3207.

The uprights furnished with this planer will be of box design, like Fig. 3206.

FOR GENERAL DESCRIPTION AND TABLE OF DETAILS, SEE PAGE 78.

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POND 36 INCH PLANER, WITH SIDE SADDLES.

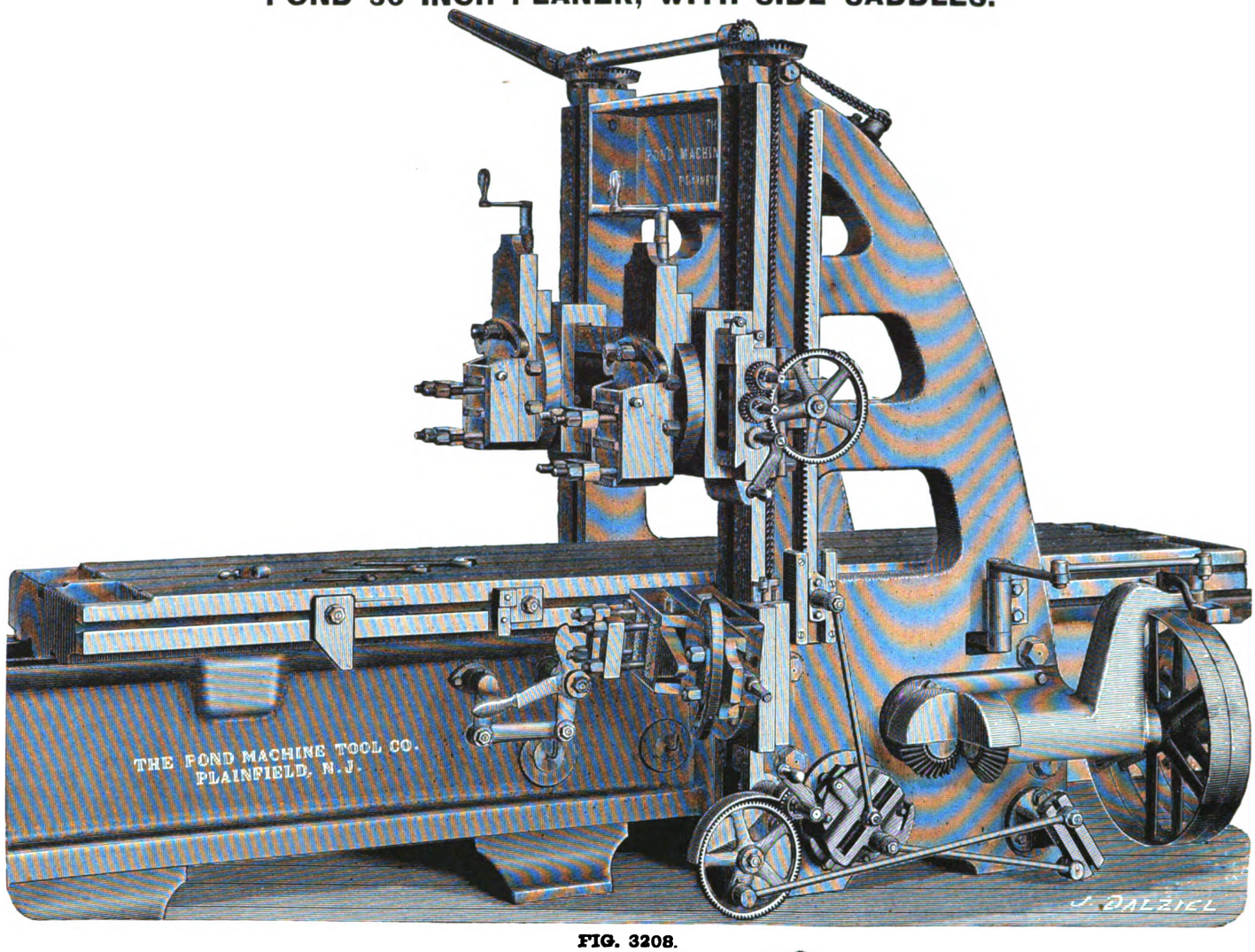


FIG. 3208.

POND 36 AND 30 INCH PLANERS. NO SIDE SADDLES.

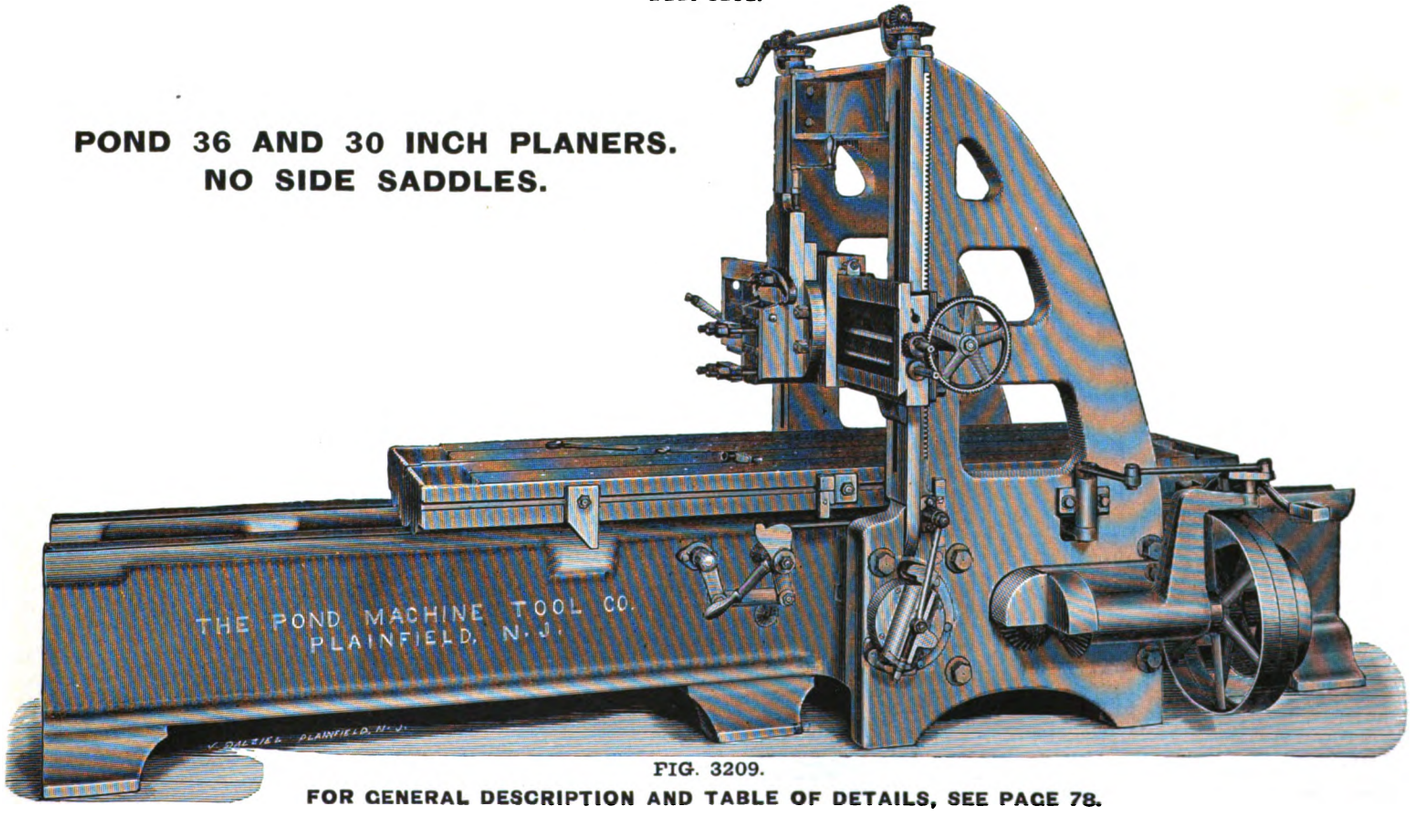


FIG. 3209.

FOR GENERAL DESCRIPTION AND TABLE OF DETAILS, SEE PAGE 78.

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48, 42, 38, 36, 32 AND 30 INCH PLANERS.

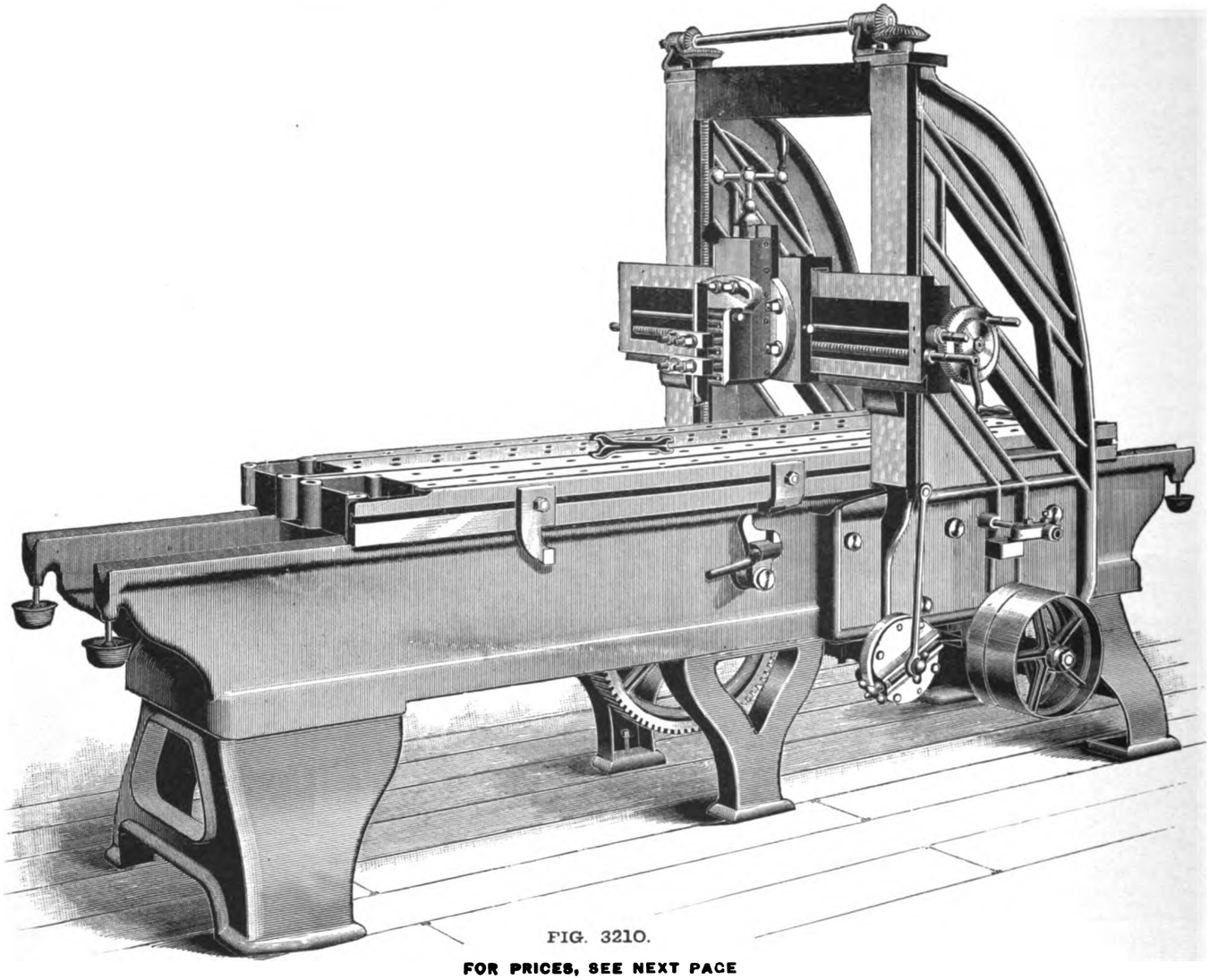


FIG. 3210.

FOR PRICES, SEE NEXT PAGE

28 INCH PLANER.

GENERAL DESCRIPTION, FIG. 3211.

Will plane 28 inches wide and 28 inches high. Width of table, 24½ inches, with three T slots and 6 rows of 13-16 holes drilled and reamed in same. Length of bed, 10 feet; length of table, inside pans, 6 feet; extreme length of table, 7 feet, and it will plane 7 feet in length. The rack and driving gear are 3½ inches wide, 4 diametrical pitch. All the racks and gears are cut. It has a friction feed, and it will feed across, down or up, or at any angle desired. It will feed from nothing to ½ inch across and ¼ down. All screws and shafts are made of steel. The head is all scraped. The machine is run with two belts 2 inches wide, one on each side. The belts run 42 feet to move the table 1 foot in length. In starting up the planer the cross belt should always be run on the large pulleys of the machine, even if you have to cross the belt on the countershaft to do it. Speed of countershaft, 260 revolutions per minute; size of driving pulley on countershaft, 12 inch diameter, 4 inch face.

The small driving pulley on countershaft should belt on to large driving pulley on machine.

FOR PRICES, SEE NEXT PAGE.

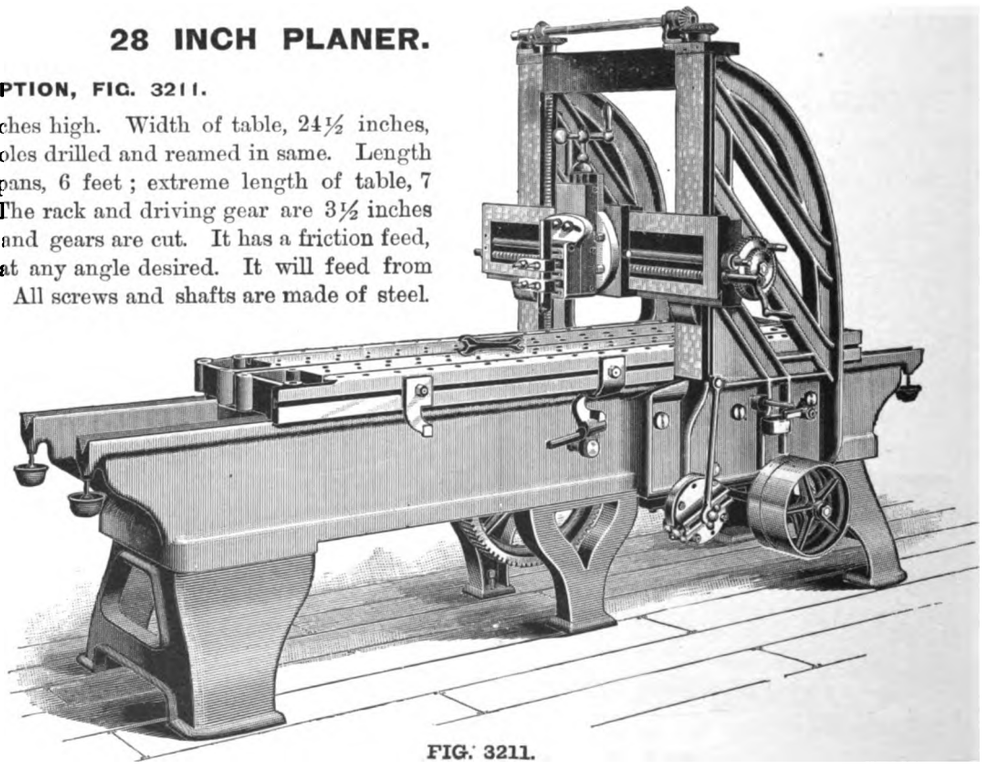


FIG. 3211.

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22 AND 20 INCH PLANER.

Will plane 22 inches wide and 22 inches high. Width of table, 19 inches, with three T slots and six rows of ¾ holes drilled and reamed in same. Length of bed, 8 feet 4 inches; length of table, inside pans, 5 feet; extreme length of table, 6 feet; and it will plane 6 feet in length. The rack and driving gear are 3 inches wide, 4 diametrical pitch. All the racks and gears are cut. It has a friction feed, and it will feed across, down or up, or at any angle you may desire. It will feed from nothing to ½ inch across and ¼ down. All screws and shafts are made of steel. The head is all scraped. The machine is run with two belts 1¾ inches wide, one on each side. The belts run 31 feet to move the table 1 foot in length. In starting up the planer the cross belt should always be run on the large pulleys of the machine, even if you have to cross the belt on the countershaft to do it. Speed of countershaft, 265 revolutions per minute; size of driving pulley on countershaft, 10 inch diameter, 3 inch face.

The small driving pulley on countershaft should belt on to large driving pulley on machine.

We make from this pattern planers to plane 4, 5 or 6 feet, or any length desired, and for each foot additional to the table we add 20 inches of bed.

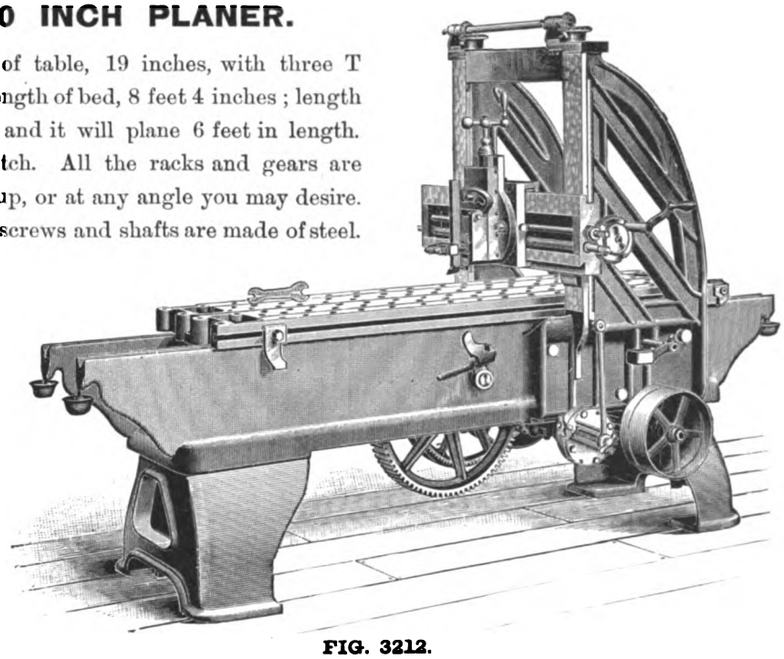


FIG. 3212.

PRICES, FIGS. 3210, 3211 AND 3212.

To plane.			Length of table between pans.	Price.	Extra, per foot, additional length of table.	Extra, for double heads.
Width.	Height.	Length.				
20 inch.	20 inch.	5 feet.	4 feet.	$530.00	$27.00	
22 "	22 "	5 "	4 "	557.00	29.00	
24 "	24 "	6 "	5 "	638.00	38.00	
27 "	26 "	6 "	5 "	700.00	41.00	
28 "	28 "	6 "	5 "	800.00	46.00	
30 "	30 "	8 "	7 "	1,015.00	54.00	$192.00
32 "	32 "	8 "	7 "	1,138.00	62.00	208.00
36 "	36 "	9 "	8 "	1,353.00	70.00	230.00
38 "	38 "	10 "	9 "	1,570.00	77.00	255.00
42 "	42 "	12 "	10 " 6 in.	2,845.00	146.00	285.00
48 "	48 "	12 "	10 "	3,385.00	185.00	323.00

Our planers are so constructed that you can fasten and plane a piece the extreme length of the table, and we rate them at what they will plane in length. Countershaft and hangers are included in price.

17 X 17 INCH PLANER.

FIG. 3213 REPRESENTS 4 FEET IN LENGTH.

These machines are very heavy, substantial and well proportioned in all parts. They have large steel shafting, extra long bearings and cap boxes. Gears and racks all cut from solid blanks. Cross-head fits all scraped. Holes in table drilled and reamed. Slots in table planed from the solid. Best self-acting horizontal, vertical and angular feeds. Quick return. Patent cross-head fastening, operating instantaneously, effectual and durable. Patent friction feed, entirely disconnected from shipper. Patent track lubricators, an exceedingly valuable device which keeps tracks perfectly oiled, thereby preventing grinding. Offsets in uprights increase capacity of machine by about two inches in width for 5 inches above the table. Countershaft and wrenches with each machine. Countershaft should make 200 revolutions per minute. Tight and loose pulleys, 10 inch diameter, 3 inch face.

To plane 3 feet long, weight, 2,500 lbs. **PRICE, $590.00.**

To plane 4 feet long, weight, 2,800 lbs. **PRICE, $600.00.**

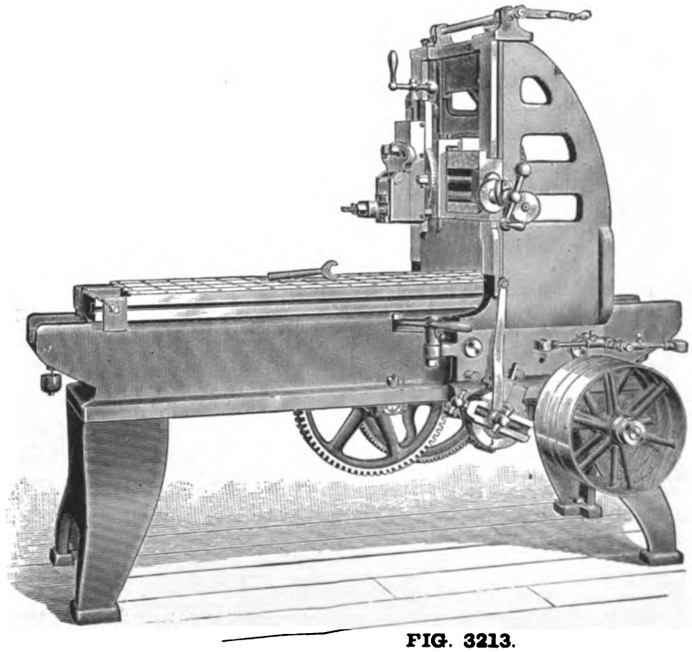


FIG. 3213.

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32 INCH TO 16 INCH PLANERS.

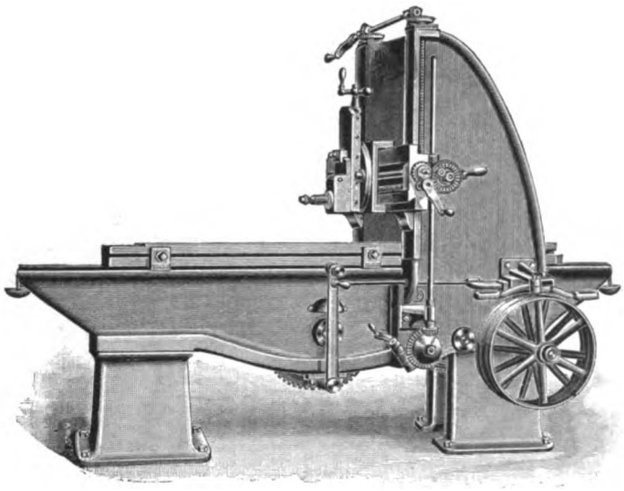


FIG. 3214. REPRESENTS 22 IN. X 22 IN. X 4 FT.

GENERAL DESCRIPTION, 22 INCH PLANER.

The bed is made in truss form, being very deep, well braced on the inside, long in proportion to length of table, and supported on heavy box legs. The table is thick and heavy; the three bolt slots are planed from the solid metal, and bolt heads will pass from end to end. The holes in table are drilled and reamed by jig, and are square across. Table receives back and forward motion from an open and cross belt, through a powerful train of cut-gears and rack. Driving pulleys are of large diameter, and the proportion of belt speed to speed of table is 44 to 1, and one belt shifts before the other. The feed is arranged to work in all directions and is adjustable from 0 to $\frac{7}{16}$ inch wide. Feed is obtained by an oscillating disk controlled by stops, and is adjusted by worm and worm gear, as shown in cut, and can be set very quickly.

PRICES.

16 in.	x	16 in.	x	4 ft.	truss	form	bed	weight, 2,200 lbs.	$400.00
22 "	x	22 "	x	5 "	"	"	"	" 4,000 "	550.00
24 "	x	24 "	x	6 "	"	"	"	" 5,000 "	625.00
27 "	x	27 "	x	6 "	"	"	"	" 5,800 "	700.00
27 "	x	27 "	x	8 "	"	"	"	" 6,600 "	800.00
30 "	x	30 "	x	6 "	"	"	"	" 7,000 "	850.00
30 "	x	30 "	x	8 "	"	"	"	" 8,000 "	950.00
32 "	x	32 "	x	8 "				" 10,000 "	925.00
32 "	x	32 "	x	10 "				" 11,000 "	1,000.00
32 "	x	32 "	x	12 "				" 12,000 "	1,085.00

POND PROUTY PLANER CHUCKS.

ROUND SWIVEL BASE.

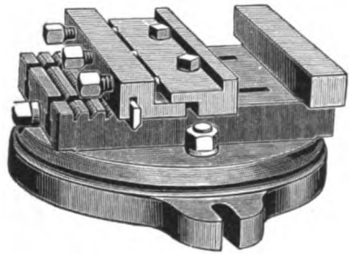


FIG. 3215.

Jaws.	Takes in.	Diam. of base.	Weight.	
6 in.	3¼ in.	8 in.	36 lbs.	$25.00
8 "	3¾ "	10½ "	74 "	30.00
10 "	4 5/16 "	13 "	124 "	36.00
12 "	6¼ "	16 "	166 "	40.00
15 "	8 "	19 "	310 "	50.00
18 "	9½ "	22 "	440 "	60.00
24 "	12½ "	30 "	856 "	90.00
30 "	15½ "	36 "	1,126 "	120.00

SQUARE BASE.

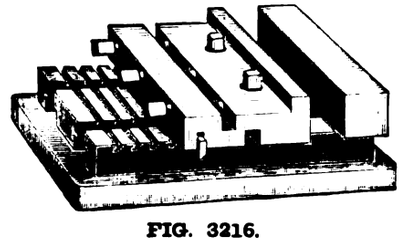


FIG. 3216.

Jaws.	Takes in.	Size of base.	Weight.	
8 in.	5 in.	11⅜ x 8½ in.	54 lbs.	$25.00
10 "	5¾ "	13½ x 10 "	103 "	30.00
12 "	7⅛ "	15½ x 12 "	146 "	35.00
15 "	9½ "	18⅜ x 14¾ "	226 "	45.00
18 "	11 5/16 "	21⅜ x 17⅜ "	340 "	55.00
24 "	14⅝ "	28 x 22⅝ "	594 "	75.00
30 "	18 "	32¼ x 28½ "	826 "	100.00

ROUND BASE PLANER CHUCK.

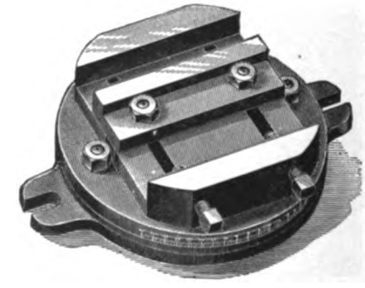


FIG. 3217.

WITH ROUND SWIVEL BASES.

Size.	Opening of jaws.	Length of jaws.	Depth of jaws.	Price.
18 in. diam.	8½ in.	12½ in.	2½ in.	$30.00
12 " "	5 "	9 "	2½ "	25.00

PLANER CENTERS.

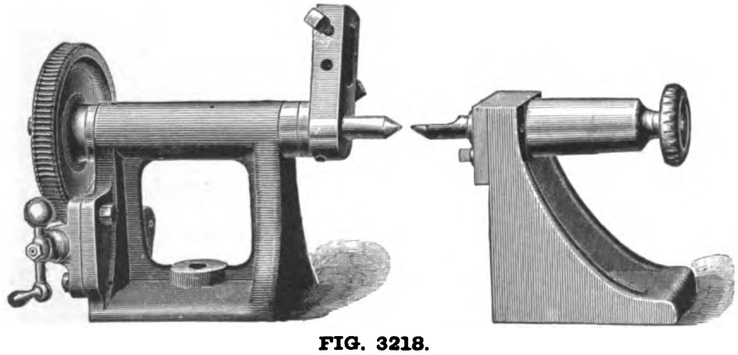


FIG. 3218.

The improvement claimed is in the device for dropping the worm out of gear, as in many cases it is not needed, thereby saving time.

Dials are so drilled that they are calculated to plane any shape that is generally required, and for fluting taps, reamers, etc.

Spindles and screws are steel.

PRICES, FIG. 3218.

10 in. swing	$
12 " "	
16 " "	

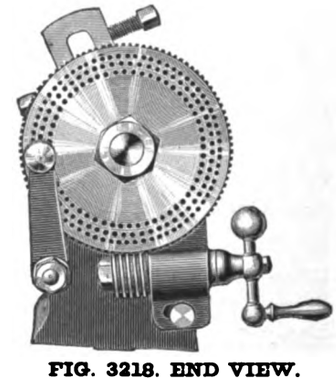


FIG. 3218. END VIEW.

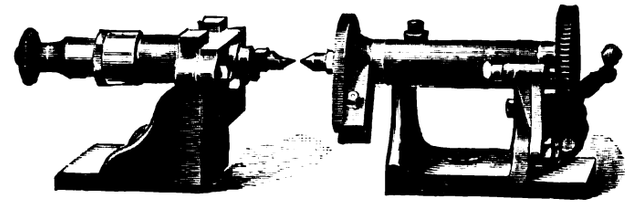


FIG. 3219.

No. 1, swings 16 in.	$50.00
No. 2, " 10 "	40.00

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GREENWOOD UNIVERSAL PLANER CHUCK.

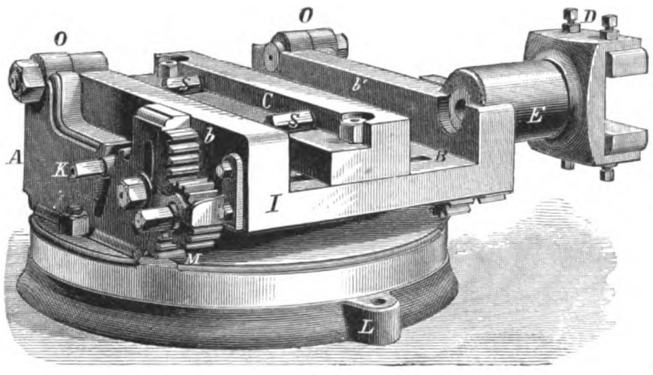
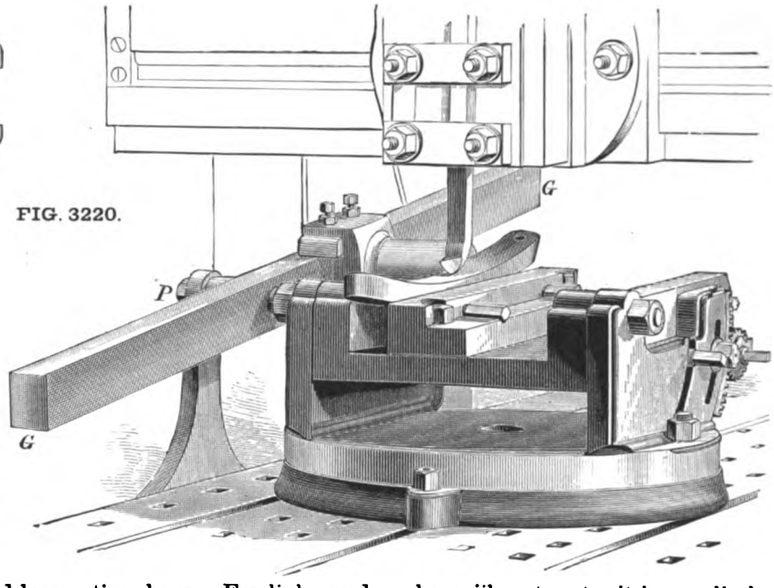


FIG. 3220.



This chuck makes possible the planing of concave or convex and tapering surfaces, or it can be used as an ordinary swivel vise chuck. For concave or convex surfaces, the guide bar *G*, fixed on stand *P* (which is bolted to the planer bed), causes the upper part of the chuck to swing on the pivots *OO*. The cross-head *D* is provided with nuts to take up the wear, and the whole tool is well and substantially made.

We especially recommend the standard size for railway and locomotive shops. For links, wedges, keys, jibs, etc., etc., it is peculiarly well adapted. It is also heavy and strong enough for any work that is likely to be required, and when once used we feel confident it will be found almost as indispensable as the lathe or planer.

We furnish with each chuck one of the patent templet gauges, for determining the radius of the work.

Jaws, 22 inches long.

PRICE, $275.00.

PLANER TOOL FOR LOCOMOTIVE DRIVING BOXES AND CURVED SURFACES.

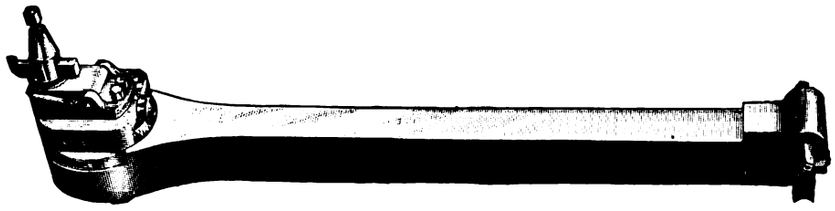


FIG. 3221.

The bar, or tool, is placed in planer tool post and properly secured and adjusted. At the lower end of the bar is a circular enlargement, and at the rear of the bar is a groove and a shaft, or spindle, upon which is mounted a gear; at the front of the bar is a face plate, or head, with a vertical guide for tool carrier.

The carrier is made with a vertical adjustment, by means of a screw and nut. The gear fastened to face plate, or head, is driven by the gear pinion upon the end of rear shaft, which rests within the groove at rear of the bar, which gives the rotation of face plate and tool holder, and can be driven by hand or feed gear wheels. This tool is not confined solely to the planing of driving boxes, but can be, and is, used for performing any work requiring accuracy and the movement in circular form.

PRICE, $175.00.

RADIUS LINK PLANER ATTACHMENT.

This attachment is used in planing curves of any radius, and perfectly parallel curves as applied to the ordinary planing machines. A pin projecting from a plate bolted to the table of the planer holds an upper table *A* upon which the work is fastened.

Thus the work may be moved forward and backward, and to a greater or less distance from the center pin, the amount of circular movement determining the radius of the circular to which the work is finished.

From the corner of the table *A*, a wrist projects upward and takes hold of a slide which is fastened at the required angle to the beam of the planer.

When the slides stand parallel to the bed of the planer, the table *A* will move in a straight line. In proportion to the angle of the slide with the bed of the planer, the table *A* will be deflected from a straight line into a true curve of greater or less radius.

The planing tool, if changed on the same piece of work, must be the same distance from the back of the tool to the point as the one removed, or it will vary the radius.

Instead of the table *A* having square holes, as shown in cut, we now build them with T head slots, making it more convenient for bolting the work on.

PRICE, $90.00.

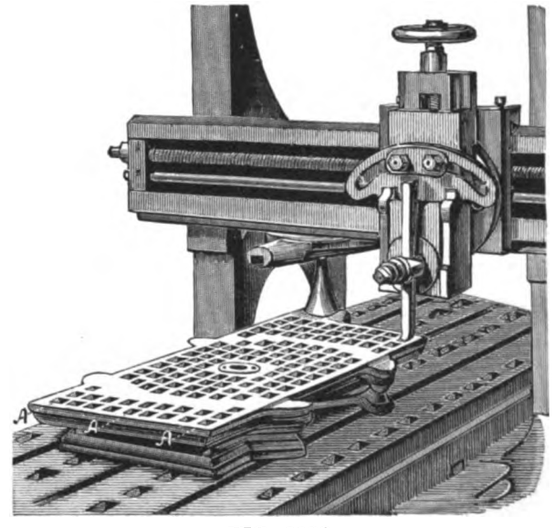


FIG. 3222.

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OPEN SIDE PLANER.

The open side planers present many advantages in the performance of every variety of machine work, and are an invaluable acquisition to machine shops. They are guaranteed to embody an accuracy and efficiency equal to the ordinary style of planers, for the regular line of work, with a capacity and adaptability unequaled by any metal planing tool. These machines are heavy and powerful. The spiral planer motion is used as the driving mechanism, while the feeding mechanism is simple, effective, and consumes power only when feeding. The slots in the platen fit the heads of the standard machine bolts, and are cored through, relieving the platen of chips. The return speed is 4 to 1 in the smaller sizes, and 3½ to 1 in the larger sizes.

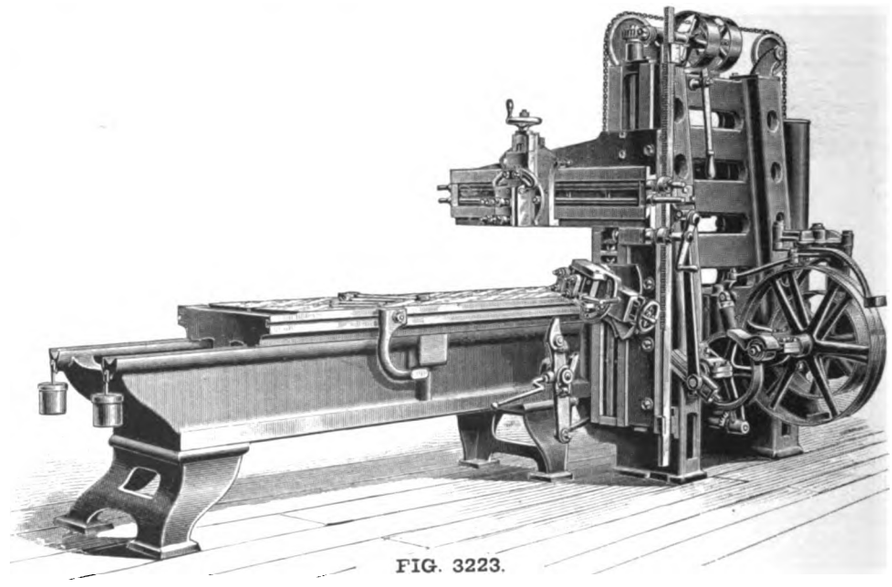


FIG. 3223.

FOR DIMENSIONS AND WEIGHTS, SEE PAGE 87.

Extra side head can be furnished for all sizes, having independent, automatic vertical feed, and can be used simultaneously with, or independently of the regular head on the beam. A supplemental rolling table, moving simultaneously with the planer platen, can also be furnished when desired. This table is used for the support of extra wide work, etc.

OPEN SIDE EXTENSION PLANERS.

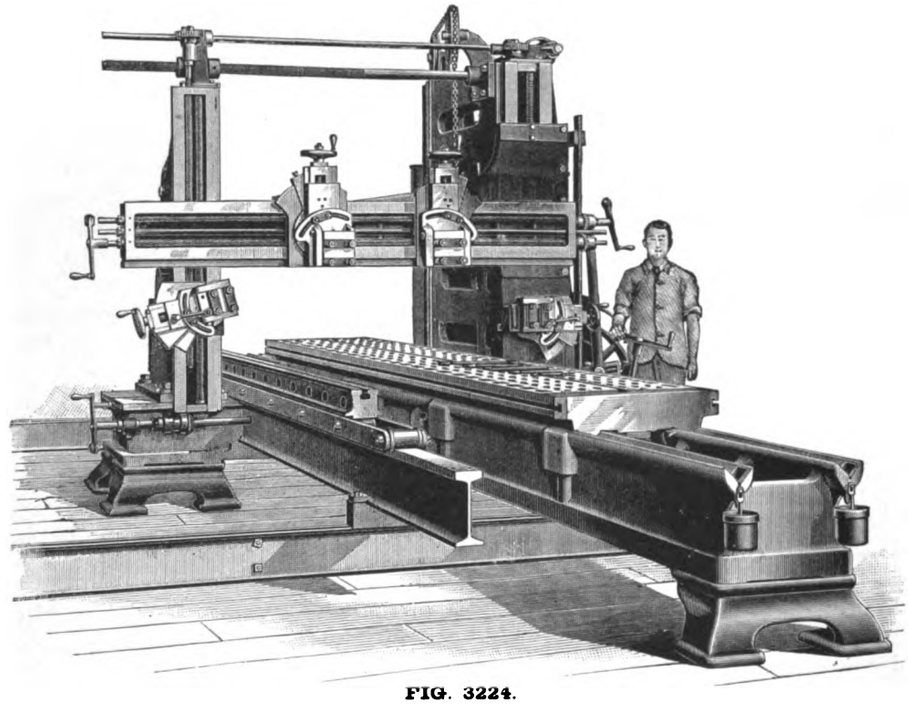


FIG. 3224.

These planers differ from the standard open side planers in having an extra long beam, an extra outer post, and extra side bed. The extra post is adjustable to and from the main bed, and when desired can be removed and the tool used as a regular open side planer. An extra head is usually fitted on this extra post.

These extension planers have the same capacity without the high cost and great weight of the extra large planers of the regular style.

They can be used most economically on medium size work, and need not stand idle, waiting for the extra large work, as is often the case with very large two post planers of equal capacity.

These tools are made in the following sizes :

Size "D"—will plane 60 in. wide by 36 in. high by any length. Can be furnished with two heads on beam and two side heads.
Size "E"—will plane 72 in. by 48 in. by any length.
" "F"— " 84 " 60 " "
" "G"— " 120 " 96 " "

PRICES AND WEIGHTS ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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DIMENSIONS AND WEIGHTS, FIG. 3223.

SIZE "C."

Planes wide.	Planes high.	Planes long.	Weight.	PRICE.
30 inch.	30 inch.	6 feet.	8,750	$.....
30 "	30 "	8 "	9,650	.....
30 "	30 "	10 "	10,550	.....
30 "	30 "	12 "	11,450	.....

SIZE "D."

Planes wide.	Planes high.	Planes long.	Weight.	PRICE.
36 inch.	36 inch.	8 feet.	14,000	$.....
36 "	36 "	10 "	15,700	.....
36 "	36 "	12 "	17,400	.....
36 "	36 "	14 "	19,000	.....

SIZE "E."

Planes wide.	Planes high.	Planes long.	Weight.	PRICE.
42 inch.	42 inch.	10 feet.	23,500	$.....
42 "	42 "	12 "	25,300	.....
42 "	42 "	14 "	27,100	.....
42 "	42 "	16 "	28,900	.....

SIZE "F."

48 inch.	48 inch.	10 feet.	28,500	$.....
48 "	48 "	12 "	31,100	.....
48 "	48 "	14 "	33,700	.....
48 "	48 "	16 "	36,300	.....

SIZE "F" 1.

60 inch.	48 inch.	10 feet.	30,000	$.....
60 "	48 "	12 "	32,600	.....
60 "	48 "	14 "	35,200	.....
60 "	48 "	16 "	37,800	.....

SIZE "F" 2.

60 inch.	60 inch.	10 feet.	33,000	$.....
60 "	60 "	12 "	35,600	.....
60 "	60 "	14 "	38,200	.....
60 "	60	16 "	40,800	.....

SIZE "C."

Planes wide. 72 inch. Planes high. 72 inch. ANY LENGTH. WEIGHT AND PRICES ON APPLICATION.

SUPPLEMENTAL ROLLING TABLES.

SIZE "C."

For 6 foot platen, weight, 630 lbs., PRICE, $.....
For 8 foot platen, weight, 750 lbs., " .....
For 10 foot platen, weight, 850 lbs., " .....

SIZE "D."

For 8 foot platen, weight, 870 lbs., PRICE, $.....
For 10 foot platen, weight, 1,000 lbs., " .....
For 12 foot platen, weight, 1,230 lbs., " .....

SIZE "E."

For 10 foot platen, weight, 1,700 lbs., PRICE, $.....
For 12 foot platen, weight, 2,240 lbs., " .....
For 14 foot platen, weight, 2,420 lbs., " .....

SIZE "F."

For 10 foot platen, weight, 2,500 lbs., PRICE, $.....
For 12 foot platen, weight, 3,000 lbs., " .....
For 14 foot platen, weight, 3,500 lbs., " .....

SIZE "G."

For 10 foot platen, weight, 3,300 lbs., PRICE, $.....
For 12 foot platen, weight, 4,000 lbs., " .....
For 14 foot platen, weight, 4,700 lbs., " .....

ROTARY PLANERS.

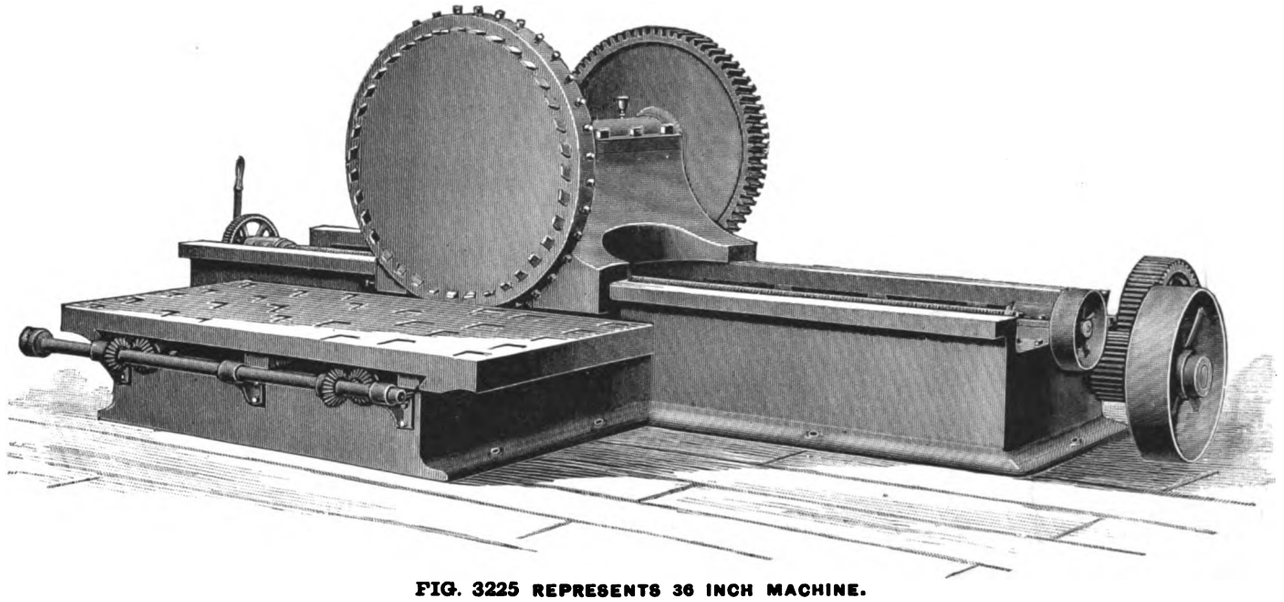


FIG. 3225 REPRESENTS 36 INCH MACHINE.

DESIGNATION OF MACHINE.	24 IN.	30 IN.	36 IN.	42 IN.
Length of bed	8 ft.	8 ft.	11 ft. 6 in.	11 ft. 6 in.
Diameter of cutter head	24 in.	30 in.	36 in.	42 in.
Size of table	4 ft. × 30 in.	4 ft. × 30 in.	6 ft. × 36 in.	6 ft. × 36 in.
Size of tools	1¼ in. × ¾ in.	1¼ in. × ¾ in.	1¼ in. × ¾ in.	1¼ in. × ¾ in.
Number of tools	24	30	36	42
Diameter of spindle	4½ in.	5 in.	6 in.	6½ in.
Diameter of steel worm	5½ in.	6 in.	7 in.	7½ in.
Diameter of feed screw	2¼ in.	2½ in.	3 in.	3 in.
Diameter of worm shaft	2¼ in.	2½ in.	3 in.	3 in.
Diameter of worm wheel	24 in.	36 in.	40 in.	48 in.
Face of worm wheel	3 in.	3½ in.	4 in.	4½ in.
Length of nut on feed screw	10 in.	12 in.	14 in.	15 in.
Feed per revolution	⅛ in.	⅝ in.	¾ in.	⅞ in.
Revolutions per minute	3½	3	2½	2¼
Travel of head per minute	1¾ in.	1⅞ in.	1⅞ in.	1⅞ in.
Will face surface	24 in. × 48 in.	30 in. × 48 in.	36 in. × 72 in.	42 in. × 72 in.
Weight	8,000 lbs.	9,000 lbs.	15,000 lbs.	16,000 lbs.

These machines have been carefully designed, and as carefully constructed. They are speeded to turn out in a given time the utmost possible amount of good work. The automatic feed is a continuous one. The head has quick return by separate countershaft. Only the best material is used in their construction, and an abundance of it.

The machines are guaranteed to make true, smooth work, and are indispensable tools in bridge, architectural iron or other works where columns and large surfaces have to be truly faced.

PRICES.

24 in. complete, with one set cutting tools, $.....
30 in. complete, with one set cutting tools, ...
36 in. complete, with one set cutting tools, $.....
42 in. complete, with one set cutting tools, ...

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TRAVERSE HEAD MILLERS' OR ROTARY PLANERS.

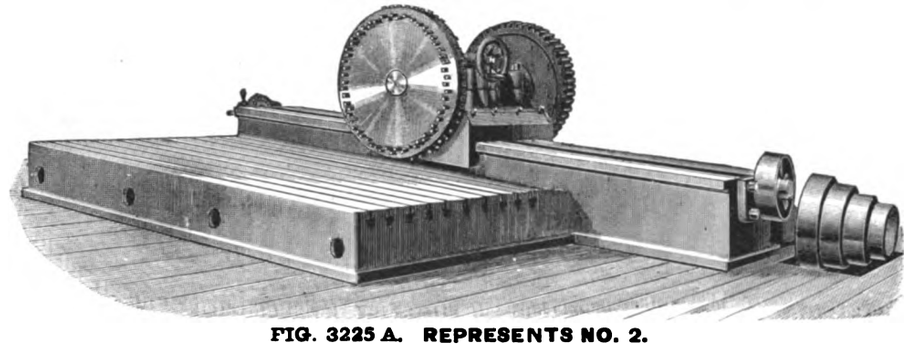


FIG. 3225 A. REPRESENTS NO. 2.

The No. 1 machine is especially designed for facing plane surfaces on columns, chords, etc., or iron bridge building, architectural iron work, and many other classes of work where there is a broad, flat surface to be finished. In many classes of work that do not require the head to traverse but a short distance, two or more pieces can be set side by side and finished at one time. Cutters are secured in a heavy plate wheel which has a large spindle, which is carried in a traveling head on base-plate. The cutter is driven by a spur-gearing worm and worm-wheel. Machines have automatic feed. All spur, bevel and worm gearing are accurately cut. Has a cutter 24 inches diameter, and will mill 5 feet in length ; can be made to mill any length. Has variable automatic feed and quick return, automatic stops for feed and return. Cutter can be adjusted 2 inches in and out from work table. **WEIGHT, 9,650 LBS.**

The No. 2 machine is specially designed for facing plane surfaces on columns, chords, etc., or iron bridge building, architectural iron work, and many other classes of work where there is a broad flat surface to be finished. In many classes of work that do not require the head to traverse but a short distance, two or more pieces can be set side by side and finished at one time. Cutters are secured in a heavy plate wheel which has a large spindle, which is carried in a traveling head on base-plate. The cutter is driven by a spur-gearing worm and worm-wheel. Machines have automatic feed. All spur, bevel and worm-gearing are accurately cut. Has a cutter 30 inches in diameter, and will mill 6 feet in length ; can be made to mill any length. Cutter has an adjustment of 3 inches in and out from work table. **WEIGHT, 15,000 LBS.**

The No. 3 machine is specially designed for facing plane surfaces on columns, chords, etc., or iron bridge building, architectural iron work, and many other classes of work where there is a broad, flat surface to be finished. In many classes of work that do not require the head to traverse but a short distance, two or more pieces can be set side by side and finished at one time. Cutters are secured in a heavy plate wheel which has a large spindle, which is carried in a traveling head on base-plate. The cutter is driven by a spur-gearing worm and worm-wheel. Machines have automatic feed. All spur, bevel and worm-gearing are accurately cut. Has a cutter 36 inches diameter, amd will mill 8 feet in length ; can be made to mill any length. Has an adjustment of 3½ inches to cutter in and out from work table. **WEIGHT, 23,000 LBS.**

DUPLEX TRAVERSE HEAD MILLERS' OR ROTARY PLANERS.

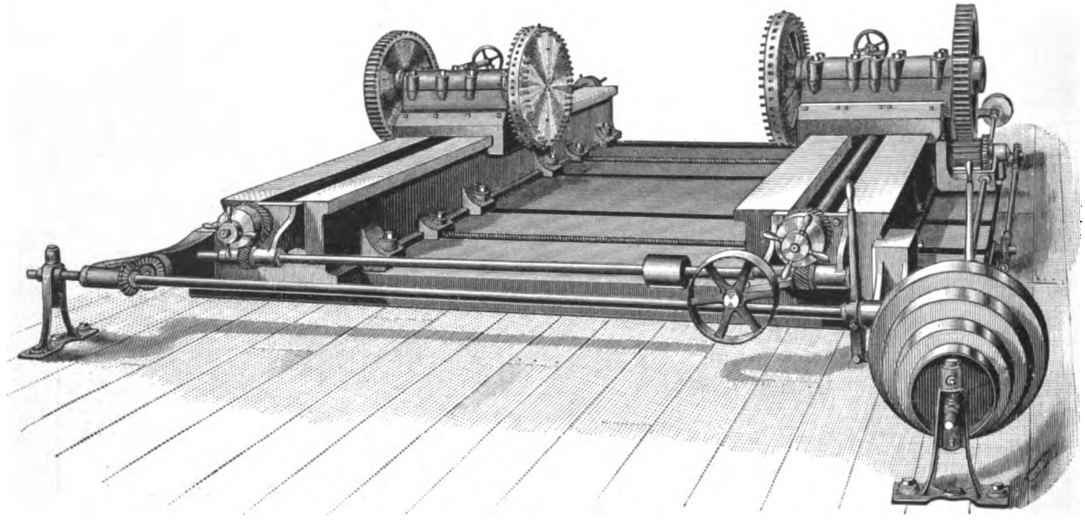


FIG. 3225 B.

These machines are specially designed for facing plane surfaces on columns, chords, etc., or iron bridge building, architectural iron work, and many other classes of work where there are two broad, flat surfaces to be finished. In many classes of work that do not require the heads to traverse but a short distance, two or more pieces can be set side by side and finished at one time. The machine can be furnished without the base plate, or will furnish the base plate of any desired length. One bed is secured to base plate and the other is adjustable to suit any width of work. The movable bed has a power adjustment. Each head has automatic feed and quick return. The heads can be operated entirely independent of each other. Cutters are secured in heavy plate wheels which have large spindles, and are carried in a traveling head on base-plate. The cutter is driven by a spur-gearing worm and worm-wheel. All spur, bevel and worm gearing are accurately cut.

No. 1 has cutters 24 inches diameter, and will mill 5 feet in length ; No. 2 has cutters 30 inches diameter, and will mill 6 feet in length ; No. 3 has cutters 36 inches diameter, and will mill 8 feet in length. Can make the distance between the facing heads any desired length.

Any of these machines can be made to mill any length.

WEIGHT.

No. 1, 21,000 lbs.; No. 2, 30,000 lbs.; No. 3, 46,000 lbs.

PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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ROTARY PLANERS ON REVOLVING BEDS.

Where it is desired to economize space, we build four sizes of rotary planers, that can be revolved at any angle. Iron bridge works, architectural iron works, and other firms will find this a most useful tool, as the machine can be swung to suit any angle of work, the work remaining stationary. The cutter is driven with heavy spindle and large spur gear, and worm wheel on the pinion, having a desired number of changes of automatic feed and power quick movement in both directions to heads. We build this machine in four sizes, or can make the cutter any desired diameter.

No. 1 has cutter 24 inches diameter, and will mill 5 feet in length. Has 2 inch transverse adjustment to spindle. Weight, 15,000 lbs.

No. 2 has cutter 30 inches in diameter, and will mill 6 feet in length. Cutter has 3 inch transverse adjustment to spindle. Weight, 21,000 lbs.

No. 3 has cutter 36 inches in diameter, will mill 7 feet in length. Cutter has 3½ inch transverse adjustment to spindle. Weight, 30,000 lbs.

No. 4 has cutter 48 inches in diameter, will mill 8 feet in length. Cutter has 4 inch transverse adjustment to spindle. Weight, 40,000 lbs.

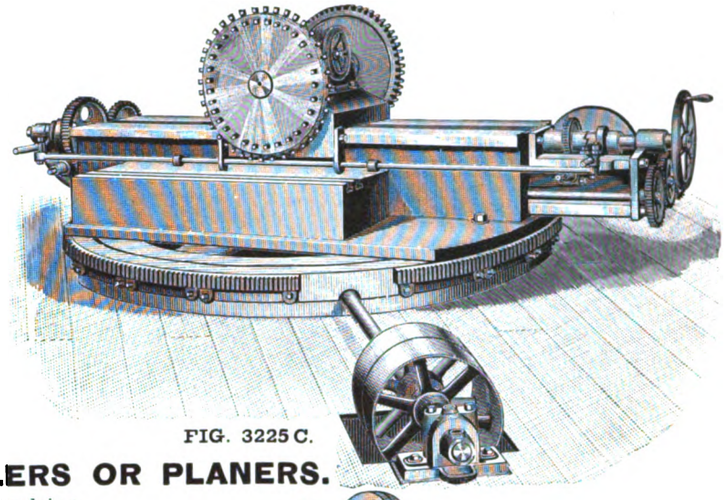


FIG. 3225 C.

VERTICAL ROTARY MILLERS OR PLANERS.

These machines are designed specially to economize in shop space and for doing many operations of facing where the handling of work is of great importance. As shown, machine has plain table for clamping the work to, intended for facing off the ends of columns, locomotive driving boxes or other work within the range of the tool. For work of locomotive driving boxes, or other similar work, the machine can be provided with a rotary table, one piece being clamped, the cutters started into the work, and on the reverse side of the table the operator can be clamping another piece; when the work is finished, the head, which has a power return, is returned to the top of the upright and the table is then reversed, bringing the unfinished piece to the cutter. Almost a continuous operation of milling is performed in this way.

The head is counterweighted so it can be readily adjusted in any position on the upright, and is provided with automatic feed and stop, also automatic quick return. The table can be adjusted in and out from the cutter to suit the work.

We build these machines in four sizes or can make them of any size desired to suit our customers.

No. 1 has a cutter 18 inches diameter, and will surface off work 18 inches broad, 20 inches high. Weight, 9,000 lbs.

No. 2 has a cutter 24 inches diameter, and will surface off work 24 inches broad, 30 inches high. Weight, 13,500 lbs.

No. 3 has a cutter 30 inches diameter, and will surface off work 30 inches broad, 40 inches high. Weight, 16,000 lbs.

No. 4 has a cutter 36 inches diameter, and will surface off work 36 inches broad, 42 inches high. Weight, 23,000 lbs. **PRICES ON APPLICATION.**

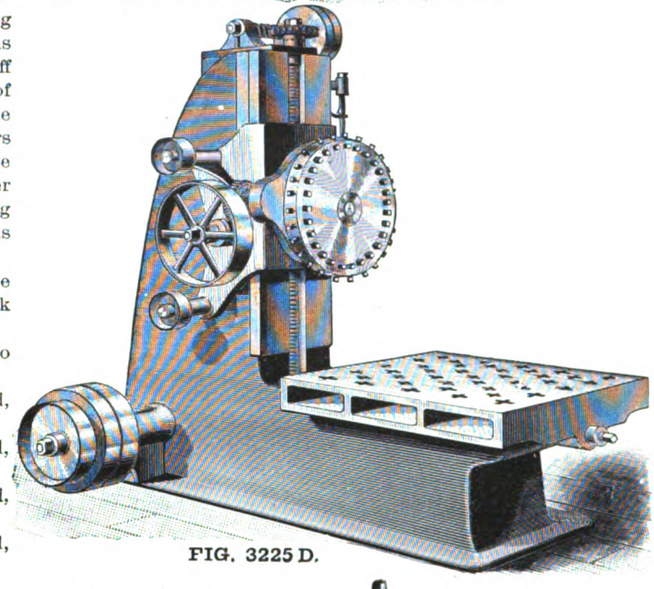


FIG. 3225 D.

30 X 12 SHAPER AND PLANER.

This machine planes 12 inches wide and 30 inches long. It is a column machine, with an adjusting table 14½ inches long and 14¼ inches wide, and an auxiliary table 11 inches long, to bolt to same, when a longer table is desired. This smaller table takes off and leaves an angle plate to bolt long pieces against the table proper. This table is raised and lowered by crank and screw with gibs, that carries it true in its upward and downward travel. The arm that travels and carries the cutting tool is designed to resist all cutting strains, and as true work is done at outer end of arm as close to the column. The tool slide has a downward feed by hand of 6 inches, and a cross feed by power; it is on a swivel base and angle work can be planed. The machine is driven by 12-inch pulleys and a 2-inch double thread screw to the desired cutting speed, with a quick return 2½ times as fast as cutting speed. It is particularly valuable for cutting key-ways in center of long shafts. No chuck is required with this shaper, as the column forms one side of a chuck, with jaws any desired depth, by lowering the table and using dogs and screw points and clamping against it.

The tool is always cutting at the same speed, whether on long or short work, not varying speed at all points of travel, as is the case with crank movements; the screw gives the tool a regular smooth cutting speed, producing the finest kind of a surface on all metals; water cuts on iron or steel can be taken, and as good results obtained as water turning can be done on a lathe. The stroke of machine can be altered while machine is running and readily adjusted; it will take cut and reverse in 1½ inches, and very short cuts can be taken. The belt runs at high speed with positive cams operating, the belt shifters enabling the machine to work up to a line either way. All bearings are self-oiling and are bushed with bronze; all loose pulleys are self-oiling, with bronze bushings; countershaft has self-oiling bearings, and pulleys are nicely balanced. All gibs are of wedge pattern, forced, and held by two nuts or studs, allowing fine adjustment and all metal surface. The screw passes through two bronze nuts that are made in duplicate, and can be furnished at small cost.

The machine is so constructed that there is absolutely no spring to the arm when cutting out at extreme end, as in this position the cutting tool hugs the guides tighter, and will not gouge in or raise up.

PRICE, $550.00.

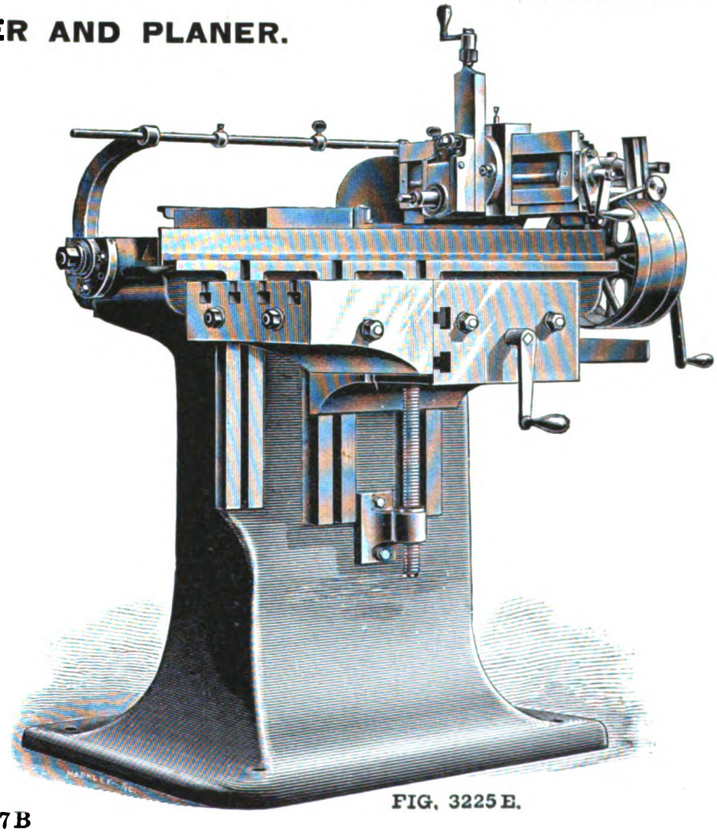


FIG. 3225 E.

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OPEN SIDE PLANER AND SHAPER.

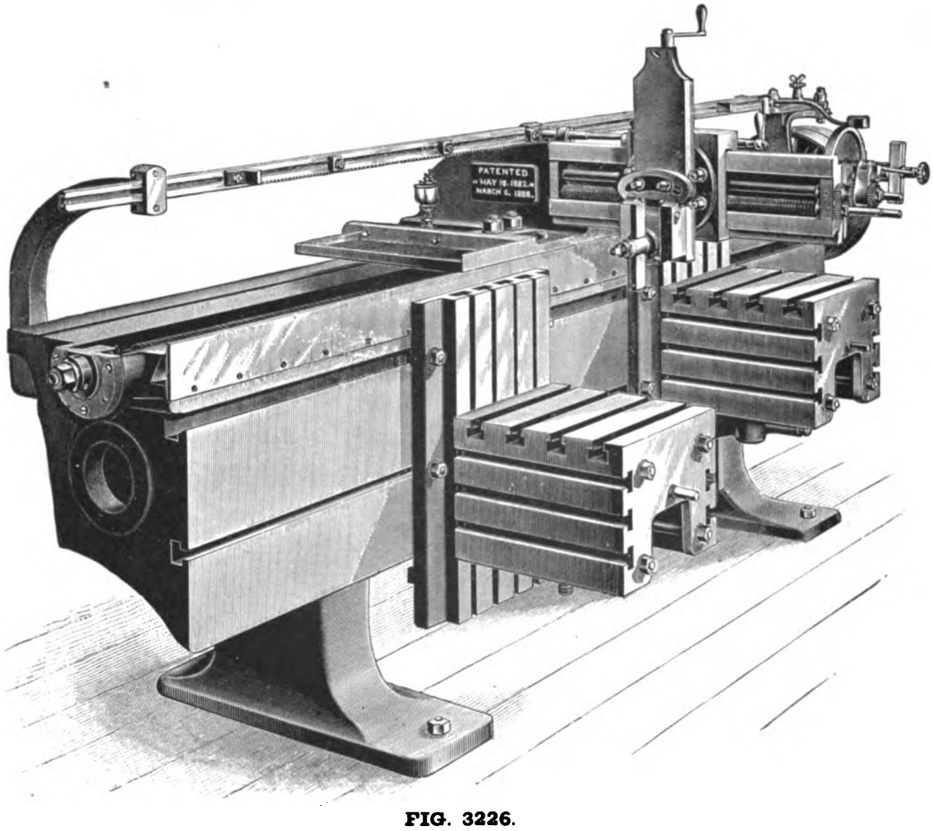


FIG. 3226.

The above cut represents a useful metal planing machine-tool of great capacity, that combines many of the advantages of both planer and shaper in one convenient and substantial machine.

Machinists and others familiar with such tools, will readily see that for many odd and difficult jobs it would have no equal.

They are built in different sizes, as required, with more or less variety in detail, but are all constructed on the same general plan, and a description of the one illustrated may apply to nearly all.

The bed shown is 10 feet 6 inches long, and the machine will plane 8 feet in length, 25 inches in width, and 24 inches in height, when using the square tables.

Pieces 42 inches high will clear the arm when setting on the floor, and if the machine is located over a pit, its capacity for difficult work is increased, and by taking advantage of the open side, pieces of unusual dimensions may be planed with comparative ease.

The screw running the entire length of the bed is driven by high-speed pulleys and shifting belts without the use of gearing, and imparts a smooth and quiet movement to the traveling carriage and arm that supports the swivel head and cutting tool.

This overhanging arm is so proportioned and constructed as to ensure the requisite stiffness when used at its outer end, and is cast with or firmly bolted to the carriage or saddle, which is well gibbed to the bed of the machine.

The shifting of the belts is accomplished, and the movement of the saddle reversed by means of adjustable tappets on the belt-shifting rod above the screw, and the proper speed forward, and the quick return or backward movement is governed by the relative diameters of the pulleys upon the countershaft.

The slotted plates and square tables can be set in any position along the bed, or removed entirely when planing heavy frames and castings that require more room in setting, and could not well be done at all, except on large and costly machines.

The movement of the cutting tool being parallel with the bed and extending over both tables in the same direction, one of the tables may be set to take the tool thrust at the proper height, saving time in the setting and fastening of work, as well as providing a solid and convenient stop.

Pieces may be planed on one of the tables while fastening work upon the other, and when used in this way will fill the place of two machines.

The arrangement of the slotted plates and tables will admit of many changes in the way of fastening work, but whenever a continuous support is needed, or the space between the tables not required, an extra plate or filling piece is bolted between them, making one continuous bed or table of the length required.

The length of the stroke permits the use of the table at different points along the bed, and prevents the undue wear that might take place if used for a long time in one position.

Some of the advantages claimed for a movable cutting tool are, that the weight and friction of the sliding carriage or saddle is the same at all times, and does not increase with the weight of the work or length of machine bed. The work remains stationary, and may be conveniently and securely fastened to the slotted plates or tables, so that the cutting tool, when planing large or heavy work, may operate at the same height or level as when used upon the medium and smaller pieces.

PRICES.

20 in. x 50 in.	$1,100.00	25 in. x 10 ft., 2 tables	$1,800.00	Extra tables for 20 inch planer	$150.00
20 " x 6 ft. 2 tables	1,200.00	25 " x 12 " "	2,000.00	" " " 25 " "	150.00
20 " x 8 " 2 tables	1,300.00	30 " x 8 " "	2,000.00	" " " 30 " "	300.00
25 " x 6 " 2 tables	1,400.00	30 " x 12 " "	2,200.00		
25 " x 8 " 2 tables	1,650.00	30 " x 12 " 3 "	2,500.00		

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36 INCH OPEN SIDE PLANER AND SHAPER.

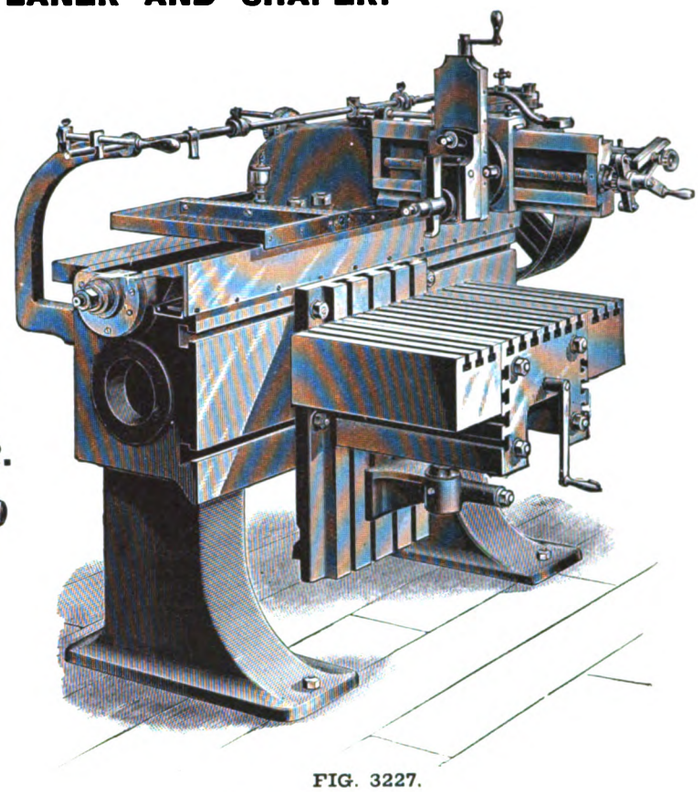


FIG. 3227.

DESCRIPTION, FIG. 3227.

Revolutions of countershaft	per minute,	360
Speed of cutting tool	in feet, "	18
Width of straight-faced pulley required on main line	in inches,	9
Width of belt for pulleys on countershaft	"	4
Width of open and cross belts for pulleys on end of screw	"	2¼
Diameter of fast and loose pulleys on countershaft	"	10
Diameter of fast and loose pulleys on end of screw	"	20
Length of machine over all	in feet, about	7
Length of machine bed	" "	5
Planes, in length	in inches,	32
Planes, in width, without resetting tool	"	20
Planes, in height from table, when down	"	24
Planes, in height from level of floor	"	42
Weight	about	4,500 lbs.

PRICES.

36 x 20 inch shaper, without down feed	$800.00
36 x 20 inch shaper, with down feed	850.00
20 x 20 inch shaper, without down feed (see Fig. 3225 E)	550.00

PORTABLE ROTARY VALVE SEAT PLANER.

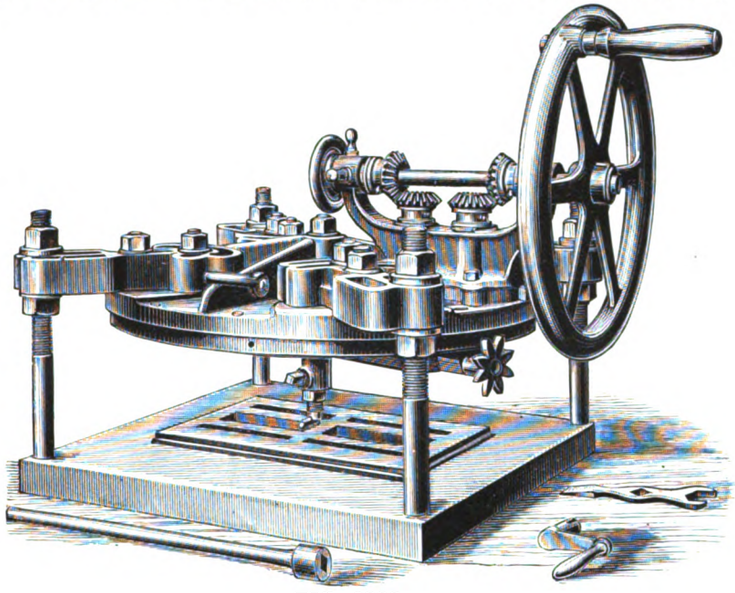


FIG. 3228.

PRICES.

18 inch machine	$250.00
22 inch machine	275.00
26 inch machine	325.00

DESCRIPTION, FIG. 3228.

This machine will face off the old valve seats of locomotives and other engines in a manner at once expeditious and correct. Its construction and method of attachment and operation are easily understood after an examination of the cut. There are two horizontal disks, the upper secured by radial arms, adjusted to suit the position of the studs in the valve seat; the lower, carrying the cutter and its slide, revolves freely against the upper, and is held in place by a king bolt passing through its center. This lower plate is also secured by a circular gib upon its circumference, which admits of taking up the wear. It is an annular gear, having teeth cut on its inner periphery, from which it receives its rotary motion by means of its connections with the bevel gears and crank. The crank may be replaced by a pulley if power be convenient. The double bevel shaft acts like a back gear and admits of a change of speed. Either bevel is thrown into gear at pleasure by the movement of a pin in a slot operated by the hand-wheel. If the outer bevel is in action, it gears directly into the lower plate; if the inner bevel, it is slow geared to the outer, and that to the plate. The revolving lower plate is fitted with the V slide and the tool post, and is fed by a screw and star wheel, arranged to give a large variation in the feed, from roughing to finishing, etc. The cutter is conveniently fed down by the operation of a nut on the cutter spindle acting against the tool post. The radial arms which secure this machine to the studs are so finished with slots as to give a wide range of adjustment.

Great care has been taken to have the nuts and washers that are furnished on the studs for holding the machine, clamp the radial arms, so as not to spring the machines. The nuts are turned convex, and the washers are bored out concave, so that a perfect ball and socket joint is formed, allowing adjustment of the machine, and holding it firm and solid, even though the stud should be out of line. In case the stud holes in a small seat should come inside the plates, four other radial arms are furnished with the machine, fitted with a T slot, and with a hole at the other end corresponding to the hole for the old stud, thus affording facilities for extreme cases.

It is readily seen that the work done is exactly in line with the travel of the valve stem, thereby preventing the yoke from slipping up and down the valve, as well as all extra friction on the valve stem. No more material need be removed than is absolutely necessary to true up, thus saving the seat. The work is done by a continuous cut, and the loss of time from the return motion of the ordinary planer avoided. There is also no breaking out of the edges. It is estimated that an ordinary locomotive valve seat can be trued up in two hours. These machines are strong and well fitted up, are easily handled, and will be found an excellent tool in every respect.

VALVE CHUCK FOR ABOVE TOOL.

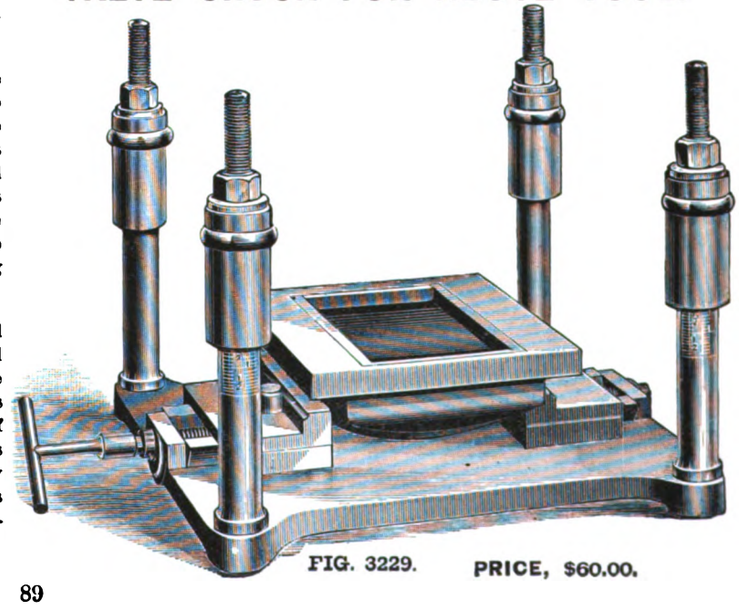


FIG. 3229. PRICE, $60.00.

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PORTABLE ROTARY PLANER.

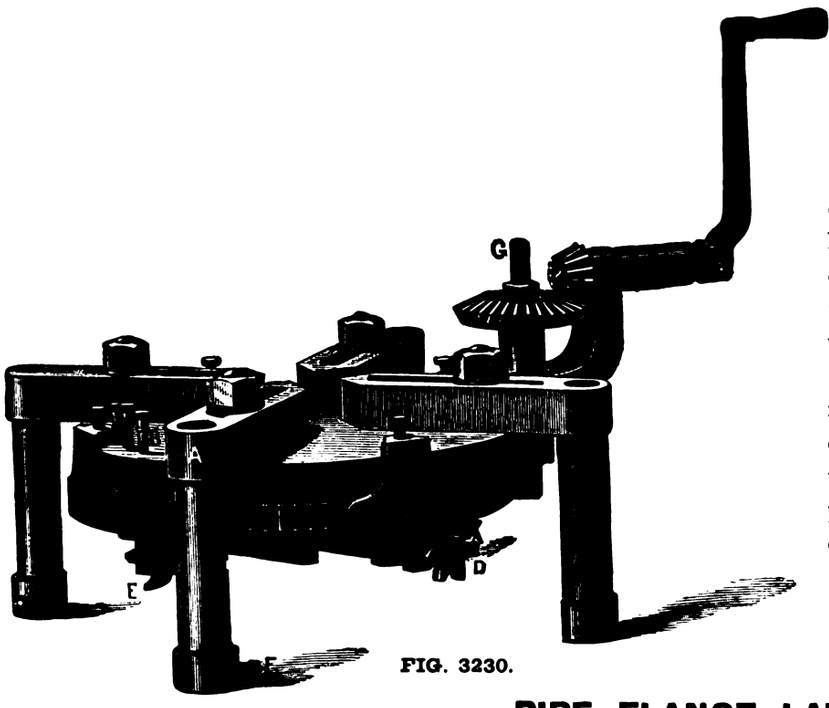


FIG. 3230.

This machine is made to face locomotive valve seats. It will face all sizes of locomotive valve seats; also cylinder and dome joints, to 26 inches. It is secured to the cylinders for facing valve seats by placing the four tubular legs A on to the four corners, or any of the steam chest studs, and tightening up the set screws F of said legs, and is secured in the same manner to the dome or cylinder head studs. With this machine you can face a valve seat in about the same time it takes to plane the valve on a common planer, and it leaves the surface perfectly true, therefore they require no scraping or grinding. To connect the feed, screw in screws B, which come in contact with star wheel D at each revolution of tool E. Should be particular to adjust gib screws H properly, so as to make the machine run steadily. To change the speed, connect the handle to shaft G.

PRICE OF NO. 1 MACHINE, $250.00.

PIPE FLANGE LATHE.

This machine is designed for facing both ends of flanged pipe at once. Each head carries two facing arms, *i. e.*, for roughing and finishing tools. The spindles are very large, and being worm driven have a very even motion. The tail end traverses the shear or bed, hence can be run close up to headstock to work on crosses or special short lengths. The tail end can be thrown out of gear if not needed. The feed is by star, and variable by using more or less of the tripping pins; bracket carrying the tripping pins is adjustable along the bed so as to permit feeding *in* or *out*.

Has two cross tables carrying adjustable V blocks, accommodating pipe from four to forty-eight inches (inside diam.) Bed is 23 ft. in length. Distance between cutting tools, 14 ft.

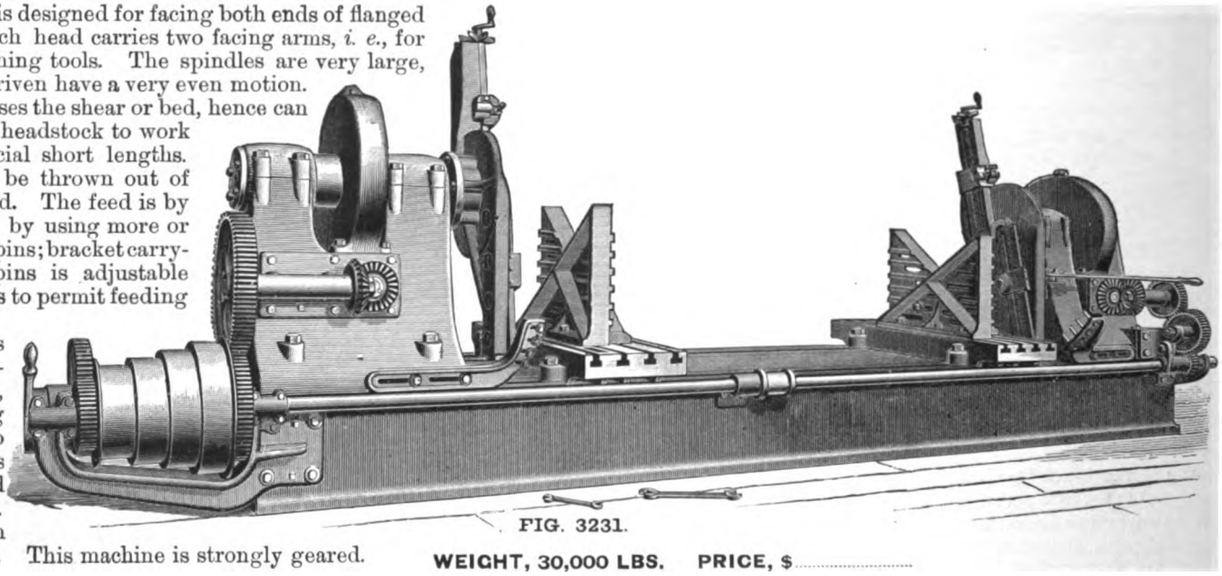


FIG. 3231.

This machine is strongly geared.

WEIGHT, 30,000 LBS. PRICE, $.....

DOUBLE-HEAD MILLING MACHINE.

This machine is strong and powerful, and is designed for milling the ends of girts, beams, and a large variety of other long work. It is provided with one sliding head, to admit of milling any length desired on both ends at the same time. The heads can be used together or separately.

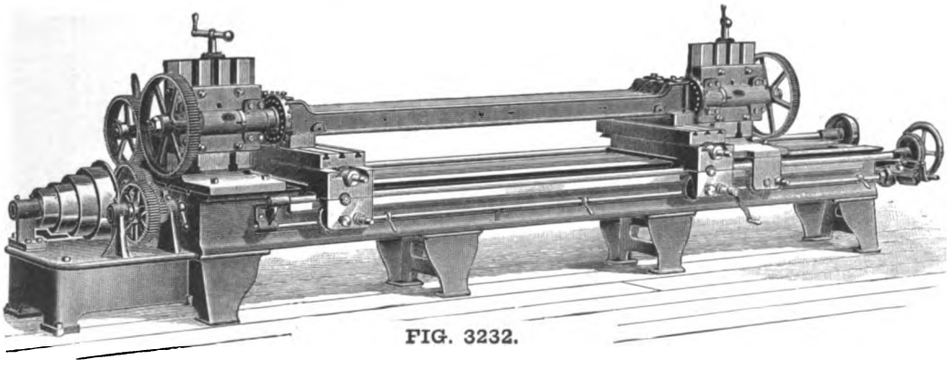


FIG. 3232.

The shoes, in which the tables slide, can be moved together or separately, by means of rack and pinion gear.

Tables have automatic feed, or can be run by hand, together or separately.

It can be made of any length of bed desired; the illustration represents a bed 17 feet long.

Driving pulleys on countershaft are 16 inches diameter by 5 inches face, and should make 90 revolutions per minute.

Greatest distance between cutters, 13 ft.

Vertical adjustment of spindles, 15 in.

Length of tables, 36 in.; traverse of tables, 28 in.

Width of tables, 12 in.

WEIGHT,.....LBS. PRICE, $.....

EXTRA, PER FOOT, $25.00.

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TRAVELING HEAD SHAPERS, ONE OR TWO HEADS.

This shaper has a stroke of head of 20 inches and travel of head of 72 inches, on a bed of 8 foot length.

The top of table is 18 inches square and 18 inches deep.

Greatest distance between face of table and under side of ram 20 inches.

Saddle is traversed by rack and pinion operated by hand ratchet.

Traveling head has also quick traverse motion with rack and pinion operated by large hand wheel. An open and shut nut is also provided within easy reach of operator, which can be readily closed and ordinary feed motion of machine used.

Ram is operated by Whitworth quick return motion, giving a very uniform forward motion and a quick return of about 3 to 1.

Crank plate is graduated in fractions of an inch with a corresponding line on crank washer, so that length of stroke required can be set at once.

Tool head is provided with clamps and has a down feed of about 8 inches.

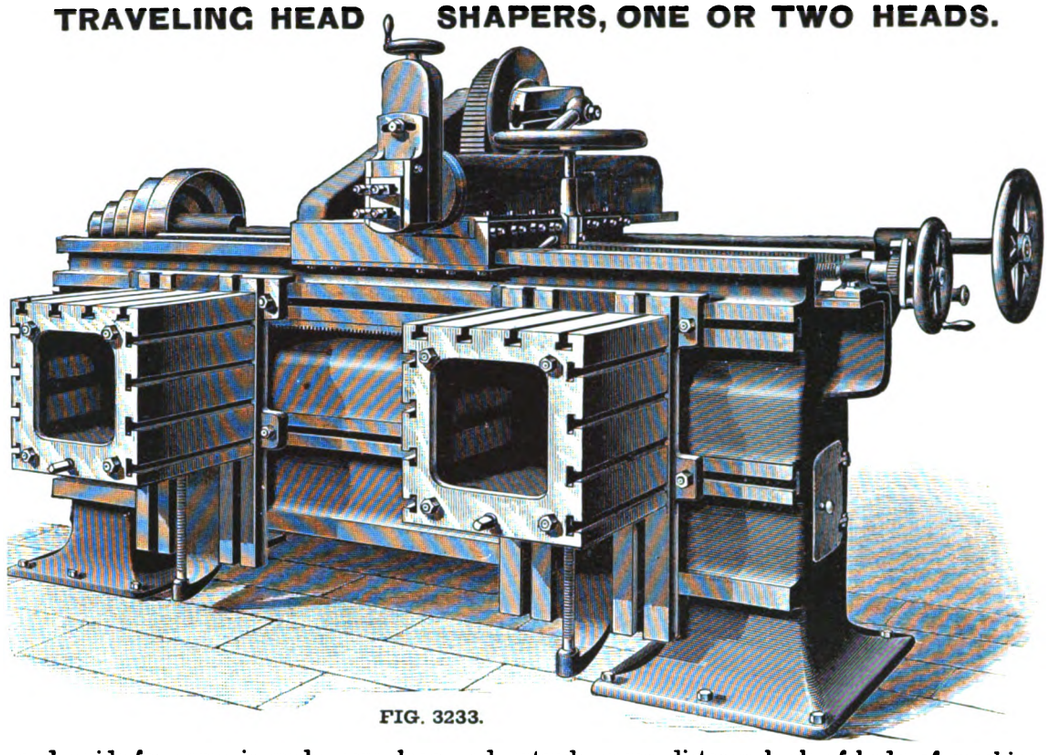


FIG. 3233.

Ram is very stiff, of box design, and guide for same is made very long and extends some distance back of body of machine.

Driving pinion shaft and longitudinal screw are provided with hand wheels.

A circular attachment and cone washers are furnished with each machine; also one chuck similar to one shown in Fig. 3233 A.

A complete set of wrenches and a countershaft are furnished with each machine. Countershaft, tight and loose, 16 x 5 inches. 140 revolutions per minute. Weight about 10,000 lbs. **PRICE,** 20 in. x 72 in.,

The same machine is made with 2 heads on an 8 foot bed. Closest distance between heads, 20 in.; greatest, 56 in. **PRICE,**

Extra lengths of bed, varying by lengths of 2 feet, per foot, On double head machines, feeds, counters and cones are each independent.

DESCRIPTION OF 26-INCH STROKE TRAVELING HEAD SHAPER.

This machine is of the same general design and possesses the same features as the 20 inch, except that it is more powerfully geared, and the tables are 6 inches longer. **PRICE,** for 26 inch stroke, 8 ft. bed, or 6 foot travel of head, Extra, per foot of bed,

DOUBLE HEAD MACHINE.

PRICE, for 26 inch stroke, 8 ft. bed; shortest distance between heads, 20 in.; greatest distance between heads, 60 in.,

Extra per ft. of bed, The feed motions are entirely separate; separate cones on the machine and separate countershafts are furnished.

20 AND 16-INCH CRANK SHAPERS.

DESCRIPTION, FIG. 3233 A.

These shapers have quick return motion.

The stroke can be changed from a point outside the machine, within easy reach of the operator.

It is so constructed that a shaft can be passed entirely through the center of the machine without interfering with the working parts, enabling the operator to cut splines or key-seats at any point on the longest shaft. It is powerfully geared, and the gear is so arranged that a change can be made, from direct to triple gearing, by the simple movement of a handle, thus giving great range of speeds, or eight speeds on the cone.

The guide on the face of machine is arranged so that a very long bearing is gotten by extending the wings on the cross-head above and below the body of it.

The table is made large and very heavy, is bolted to the saddle, so that it can be removed and any special contrivance substituted; or work can be bolted to the saddle. It has "T" slots on top and both sides, and on one side there is a "V" groove planed in a vertical direction for the easy setting of shafts, when the ends are to be squared off, or any other planing done.

A chuck is provided with each machine, having swivel motion and graduated base, and can be swung around to any angle, set accurately and held rigidly in position.

Size of pulleys on countershaft, 10 in. x 3 in. Speed, 240 revolutions per minute.

Weight, 2,500 lbs. **PRICE,** 20-inch,

16-INCH SHAPER.

Similar to 20-inch, described above, except that it is direct geared. Counter the same.

Weight, 1,800 lbs. **PRICE,**

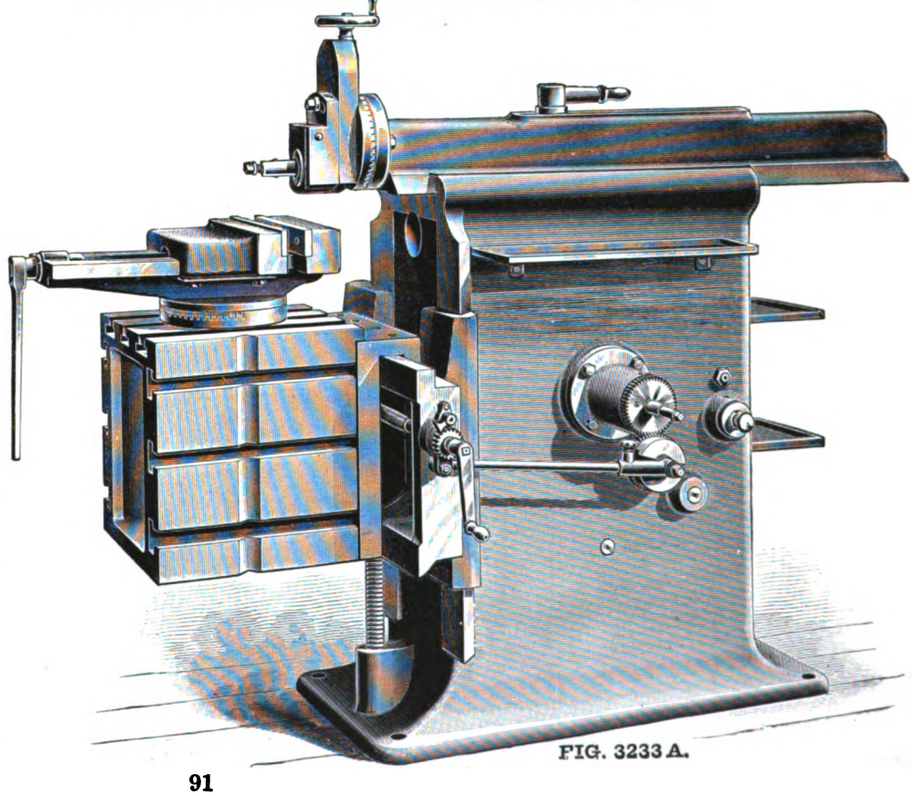


FIG. 3233 A.

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30 STROKE 72 INCH TRAVERSE SHAPER.

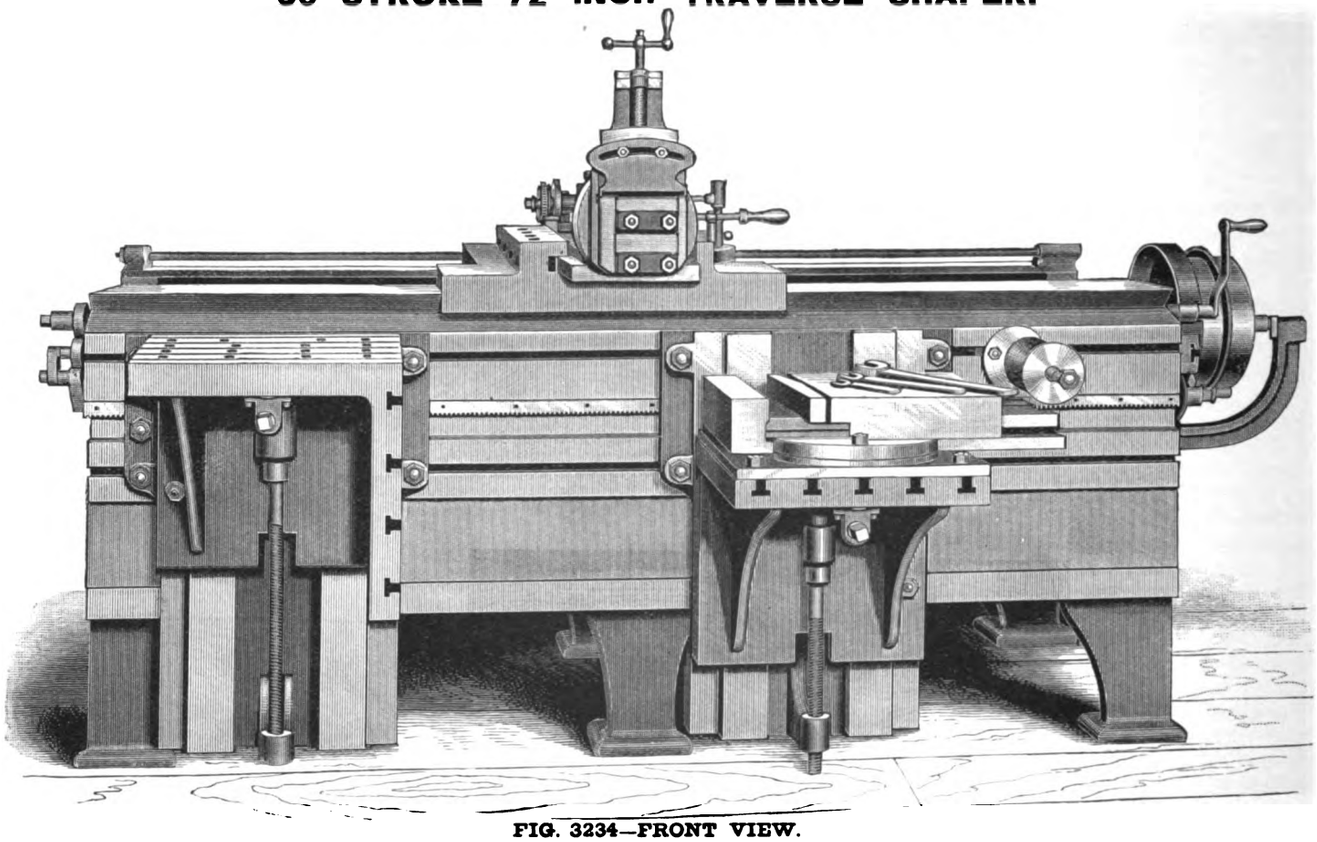


FIG. 3234—FRONT VIEW.

This shaper is designed for railroad and other heavy work. It has a stroke of 30 inches, and can be set to any length of stroke from 1 to 30 inches while the machine is in motion, thereby making a saving in time over the crank shaper. The saddle has a traverse on the bed of 72 inches, but the machine can be made of any length desired to suit special work. The machine has feed works at each end to feed the saddle back and forth, so that in using the tool on one end or the other the feed is always convenient to hand. The saddle can be run fast by hand from one end to the other, when desired, to change the position on bed, each turn of crank moving it 2⅜ inches. It also has an adjusting handle on the saddle to use in setting tool close to work when starting the machine. The head has automatic vertical feed, and can be set to any angle. The circular arbor also has independent feed, and is operated from the pulley end of the machine. The tables are raised and lowered by screws, and the aprons on which the tables work are moved on bed by rack and pinion. The aprons have a bearing low down on the bed to insure solidity when taking a heavy cut. The vise jaws open 15 inches and are 15 inches long. Vise is graduated and swivels on a heavy base plate. The vise is operated by one screw 1¼ inches in diameter. Vise is also provided with extra jaws to hold taper work, and eye bolt to lift it off by tackle, as the weight (500 lbs.) is too much to lift by hand. The screws and shafts are all of steel, and bearings are of hard bronze. The rack gear and pinion and other small gears are of steel.

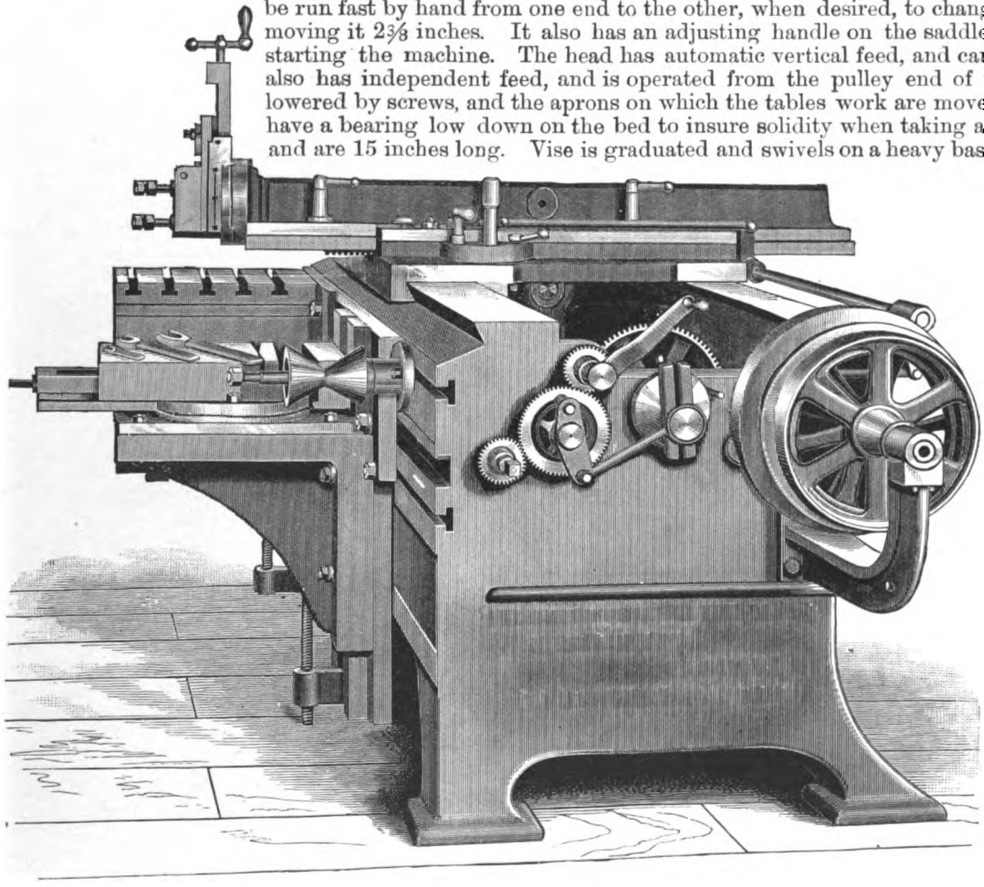


FIG. 3234—END VIEW.

The machine should stand on a brick or stone foundation, and for large work which is to be worked from the floor, we can provide heavy cross beams to stand the machine on, and a heavy cast iron table, with slots and holes like a planer table, to bolt work to; from the top of this table to slide is 44 inches. The tables on machine can be run off easily to make room for large work, and work can be bolted to front of machine.

The countershaft has two sets of tight and loose pulleys 12 inches in diameter and 15 inches in diameter, 4 inch face. The speed of countershaft with 12 inch pulleys can be set to get any speed required; 12 turns of pulley on machine moves cutter bar one foot. The speed of countershaft with 15 inch pulleys should be 225 revolutions per minute. This will give 14⅓ feet per minute to cutter bar on slow speed, and 20 feet per minute on fast speed.

Weight of machine, without foundation beams and plate, 10,000 lbs. **PRICE, $2,500.00.**

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20 STROKE 60 INCH TRAVERSE SHAPER.

This machine is designed for heavy work. It has a stroke of 20 inches, and the head has a traverse of 60 inches. It has automatic horizontal, vertical and angular feed. The circular arbor has independent automatic feed, operated from pulley end of machine. The vise has extra jaws to hold taper work. It has two tables, one of them our patent adjustable table for planing taper work. This table is made square or box form, with bolt slots on each side and on top, so that work can be bolted on either side. For a more detailed description, see Fig. 3234. It should stand on a solid foundation, and, if desired, we can provide heavy cross beams to stand the machine on, and a heavy cast iron table with slots and holes like a planer table, to bolt work to; from the top of this table to slide is 45 inches. The tables on machines can be run off easily, to make room for large work to be bolted to front of machine.

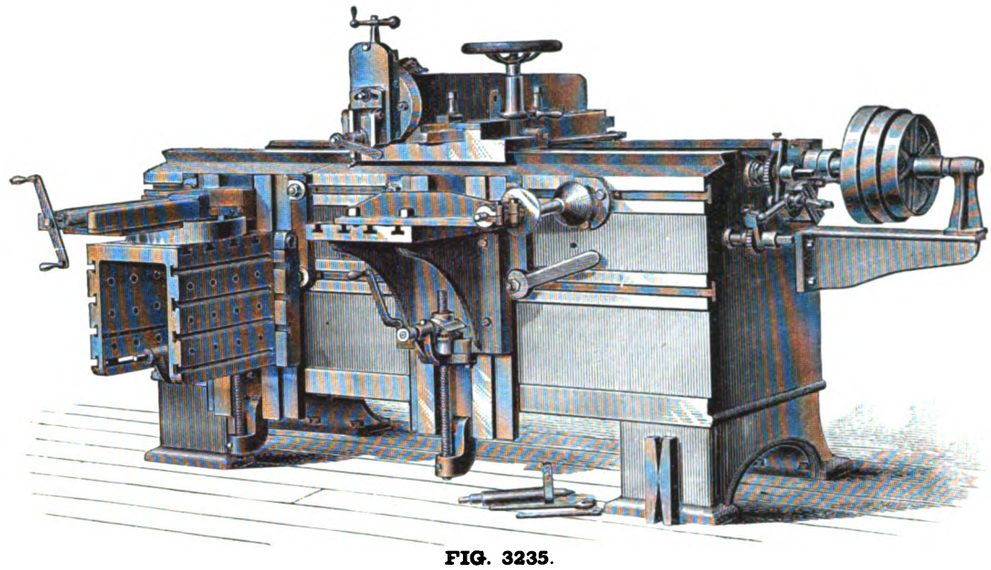


FIG. 3235.

Weight of machine, without foundation beams and plate ..... 6,700 lbs.
Speed of countershaft ..... 240 revs.
Size of tight and loose pulleys on countershaft ..... 10 x 3 ins.

PRICE, $1,500.00.

15 STROKE 27 INCH TRAVERSE SHAPER.

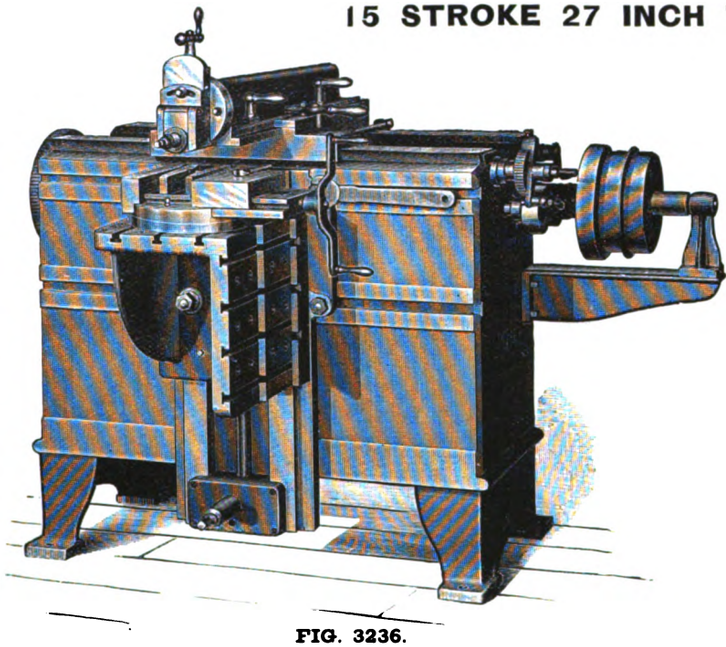


FIG. 3236.

This shaper has 15 inch stroke of cutter bar and 27 inch traverse of saddle on bed, and will plane a piece on table 14 inches high. The stroke can be changed while machine is in motion, the cutting speed remaining the same entire length of cut. The table and saddle can be moved on one side, or entirely removed from bed, so that work may be fastened to front or face of bed, as shown by bolt slots. The vise has graduated swivel base and will open 8 inches to receive work. The jaws are faced with steel, and extra jaws are furnished to hold irregular shaped work.

Weight ..... 2,300 lbs.
Speed of countershaft ..... 180 revs.
Size of tight and loose pulleys on countershaft ..... 8 x 2¼ ins.

PRICE, $600.00.

25 INCH PILLAR SHAPER.

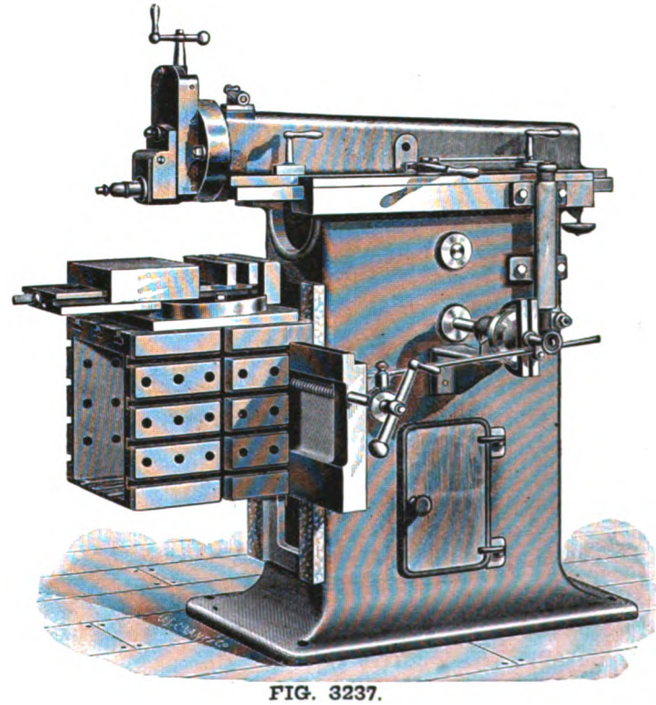


FIG. 3237.

This shaper has a stroke of 25 inches, cross feed of table 27 inches, and will plane work 20 inches high. It has automatic feed in all directions, very simple in operation, and within easy reach of the operator.

The table is made in the form of a four-sided box, which makes it very strong and solid under a heavy cut. It has bolt slots on the sides as well as the top for clamping work thereon.

The cutter bar is driven by two rack gears of large diameter, on a heavy steel shaft supported on bearings at each end. A bar of iron 4 inches in diameter can be passed under the cutter bar for cutting key seats or other similar work. Driving pinion and gear are on outside of the machine, allowing use of extra large gear, obtaining thereby increased speed of pulley, and consequent gain of power on cutter bar. All pinions are made of best machine steel.

The vise is graduated, swings on a ring, jaws are faced with steel, and open 12 inches.

Weight ..... 3,000 lbs.
Size of tight and loose pulleys on countershaft ..... 12 x 3 ins.
Speed of countershaft ..... 250 revs.

PRICE, COMPLETE, $650.00.

FOR EXTRAS, SEE PAGE 95.

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PILLAR SHAPERS.

24 INCH STROKE.

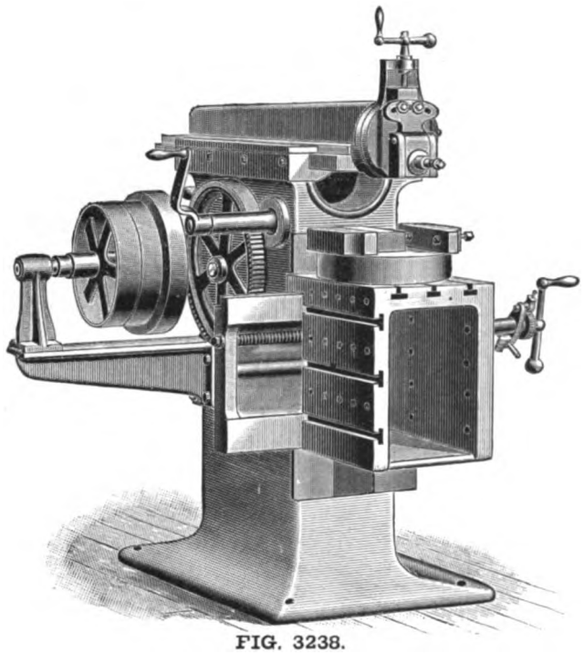


FIG. 3238.

DESCRIPTION, FIG. 3238.

This shaper has a stroke of 24 inches, cross feed of 23 inches, and will plane work 18 inches high. It will reverse and feed with ½ inch stroke. Cutting speed is uniform entire length of stroke. Feed works and dogs to change length of stroke are easily accessible. It has horizontal, vertical and angular feeds all automatic. There is a space under cutter bar to put through a shaft or other work 3¼ inches in diameter, for cutting key seats and work of a like nature. The table is large, and being one solid casting will stand the strain of a heavy cut. It has bolt slots on each side as well as on top, so that work can be bolted on sides. If it is desired to fasten the vise on side of table, it can be done and found very convenient for vertical work. The vise swings in a ring, is graduated, has steel faced jaws, and takes in work 5 inches between jaws.

Weight of machine.....2,200 lbs.
Size of tight and loose pulleys on countershaft...10 x 3 in.
Speed of countershaft....200 revs.

PRICE, $450.00.

We can furnish extra table and centers to swing 9 inches for this machine. See page 95.

15 INCH STROKE.

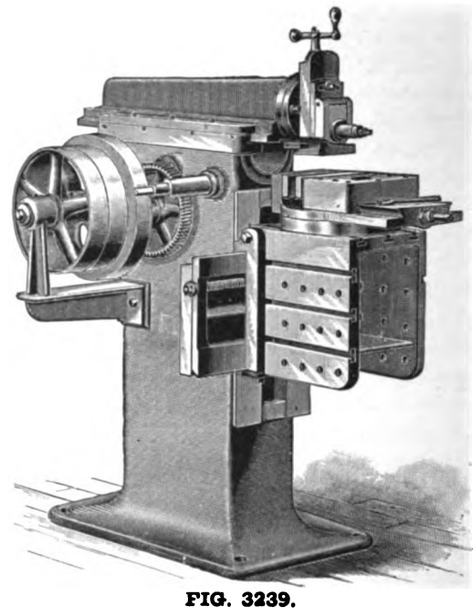


FIG. 3239.

DESCRIPTION, FIG. 3239.

This shaper has a stroke of 15 inches, cross feed of 15 inches, and will plane 14 inches high. Description similar to Fig. 3238. 2¼ inch bar can be admitted. When table is removed can be fastened on saddle or front of machine. We also make this machine with solid or fixed table (see cuts of tables.) This cut shows machine with improved vise taking in work 8 inches between jaw. The old style vise can be furnished if desired. It opens 4 inches to take in work. Both are graduated, swing in a ring, and jaws are faced with steel.

Weight, complete.. .....1,200 lbs. Speed of countershaft.....250 revs. Size of tight and loose pulleys on countershaft, 8 x 2¼ in.

PRICE.

As per cut above.....$300.00
With common vise.....275.00

We can furnish extra table and centers to swing 7 inches for this machine. See page 95.

VARIOUS TABLES FOR FIGS. 3237, 3238 AND 3239.

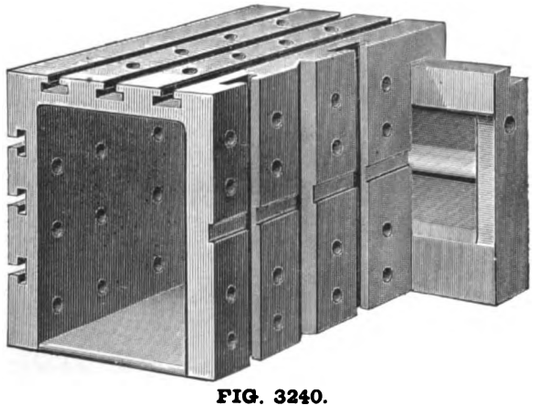


FIG. 3240.

SOLID OR NON-ADJUSTABLE TABLE.

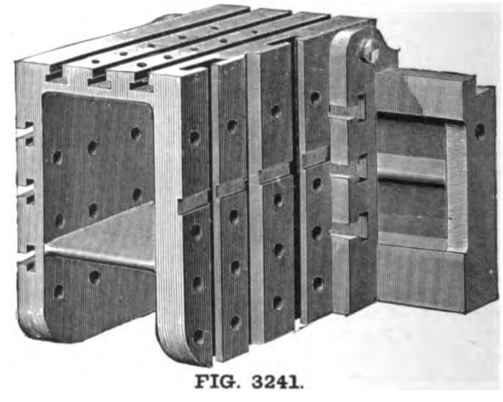


FIG. 3241.

ADJUSTABLE TABLE SET PARALLEL WITH CUTTER BAR.

THESE CUTS SHOW THE TWO STYLES OF TABLES FOR OUR SHAPERS.

THE LAST THREE CUTS SHOW THE DIFFERENT USES OF OUR ADJUSTABLE TABLE.

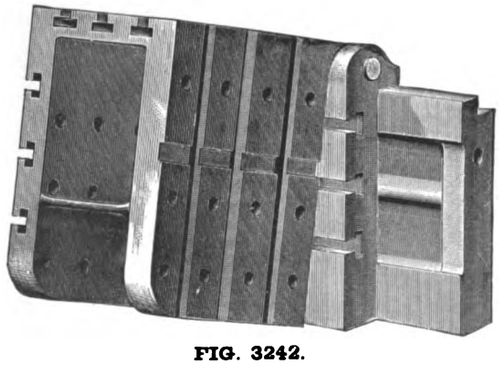


FIG. 3242.

ADJUSTABLE TABLE SET TO PLANE TAPER.

Work can be held in vise or strapped on table.

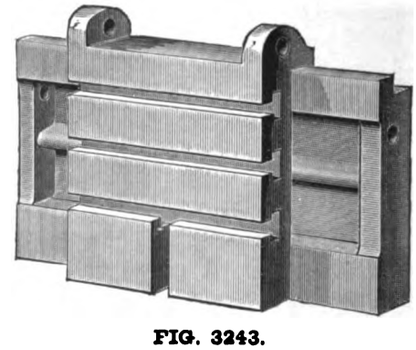


FIG. 3243.

CROSS-HEAD AND SADDLE WITH TABLE REMOVED.

FOR EXTRAS, SEE PAGE 95.

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SHAPER VISES.

IMPROVED OR LARCE VISE.

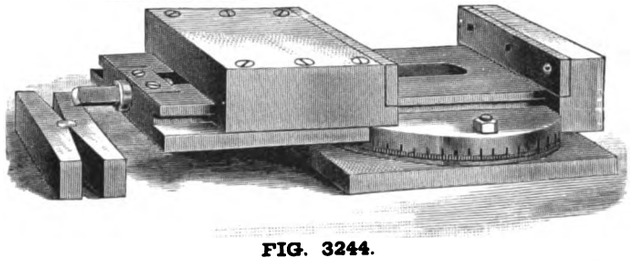


FIG. 3244.

The square base plate has a tongue to fit in slot of shaper table. It is graduated and swivels in a ring. They can be set at any angle, and are brought to and held at right angles by a taper pin, which is sure to bring them square. It has a single screw made of steel, with square thread. Jaws are faced with steel. The vise is held down by screw in center. The extra jaws, shown in cut and furnished with each vise, are very useful for holding taper or irregular work.

No.	Size of base plate. Square.	Diameter of graduated circle.	Length of jaws.	Depth of jaws.	Jaws open.	Weight.	Price.
1	20 in.	20 in.	15 in.	2 in.	15 in.	500 lbs.	$125.00
2	14½ "	14½ "	10 "	2 "	12 "	250 "	75.00
3	10½ "	10½ "	8½ "	1½ "	8 "	100 "	45.00

PLANER AND SHAPER VISE.

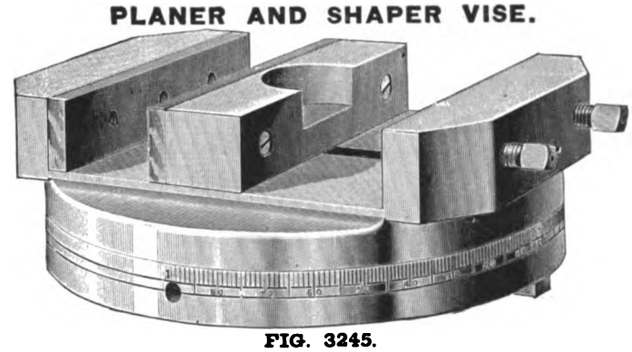


FIG. 3245.

These vises are graduated and swing in a ring. They can be set at any angle and are brought to and held at right angles by a taper pin, which is sure to bring them square. The jaws are faced with steel. Planer vise is held down by two steel clamps ; shaper vise by one screw in center.

Diam.	Takes in between jaws.	Length of jaws.	Depth of jaws.	For	Price.
10 in.	4 in.	8½ in.	1½ in.	Shaper.	$20.00
12 "	5 "	10 "	1¾ "	Planer or shaper.	25.00
14 "	7 "	10 "	2 "	Planer or shaper.	30.00
16 "	8½ "	11 "	2 "	Planer.	35.00

CENTERS FOR 25 INCH PILLAR SHAPER, FIG. 3237.

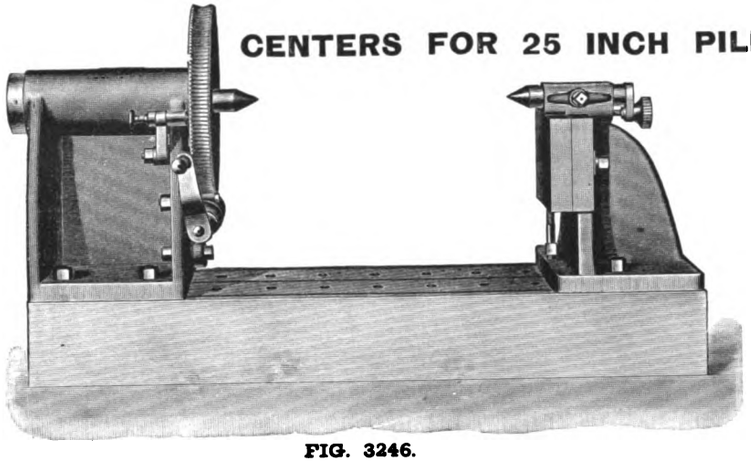


FIG. 3246.

These shaper centers will be found a very useful and convenient tool for a great variety of work, such as fluting taps and reamers, graduating and laying out work, or planing bolt heads and nuts or irregular forms. They are fitted to a separate table which has holes and slots to bolt work on. These holes and slots are of same size as those in table on shaper. The table is 40 inches long and 12½ inches wide. The head is fitted with index plate, having worm and worm wheel feed. The spindle is of steel and has center fitted in it. Index plate has four rows of holes, 36, 48, 60, 84. The back center can be raised and lowered to plane taper work. These centers swing 24 inches in diameter and take in 18 inches between centers.

Weight, with table, 600 lbs.

PRICE, $100.00.

CENTERS FOR 24 INCH PILLAR SHAPER, FIG. 3238.

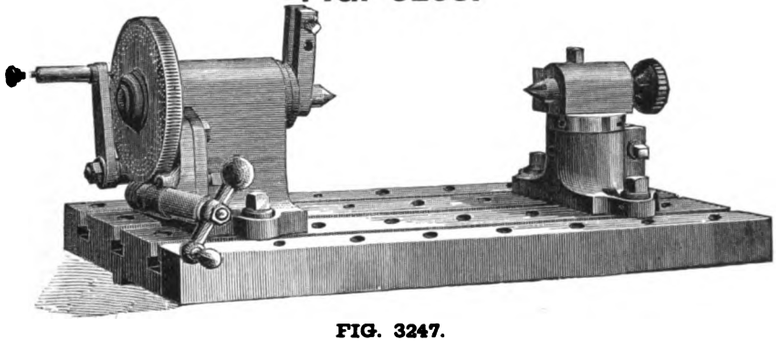


FIG. 3247.

Swings 9 inches, and takes 16 inches between centers.

WEIGHT, 200 LBS. PRICE, $55.00.

CENTERS FOR 15 INCH SHAPER, FIG. 3239.

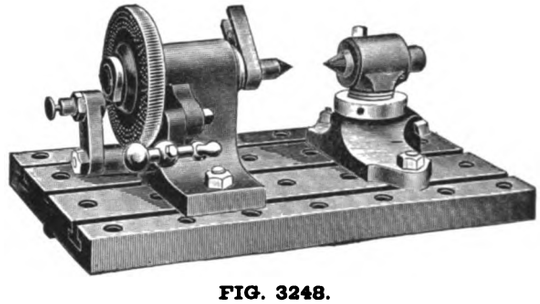


FIG. 3248.

Swings 7 inches, and takes 9 inches between centers.

WEIGHT, 120 LBS. PRICE, $40.00.

The above cut represents our 24 inch shaper centers. For such work as fluting taps and reamers, squaring bolts and nuts, graduating and laying out work or planing irregular forms, they will be found very useful. They can also be used on a planer or drill. The head is fitted with index plate and has worm and worm wheel feed. The index plate has four rows of holes, numbering 36, 48, 60, 84. The head has a heavy steel spindle fitted with a center and clamp to hold a dog on work to be planed. The head can be used with or without back center. The back center is used to support long work and can be raised or lowered to plane taper work. This table will be convenient to use on shaper independent of centers.

PLANER CENTERS.

The planer centers are similar in construction to above shaper centers, except that they are much stronger, being capable of holding heavy work. The head is fitted with index plate and has worm and worm wheel feed. This plate has four rows of holes, numbering 36, 48, 60 and 84. The back center can be raised or lowered to plane taper work. They swing 12 inches in diameter.

PRICE, $60.00.

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LOCOMOTIVE DRIVING-BOX SHAPING MACHINES.

DESCRIPTION, FIG. 3249 A.

These machines have a rotary cutting-bar, in the end of which the tool is placed; the box is then placed on the angle-plate on the knee, which is adjustable in all directions; the semi-circle is then planed or shaped out to the proper dimensions, to admit the brass bushing. They have automatic feed and the Whitworth quick return.

WEIGHT, 7,500 LBS.

PRICES ON APPLICATION.

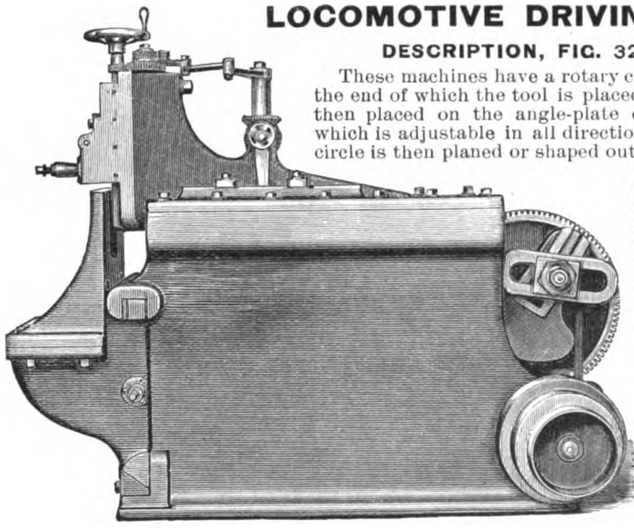


FIG. 3249.

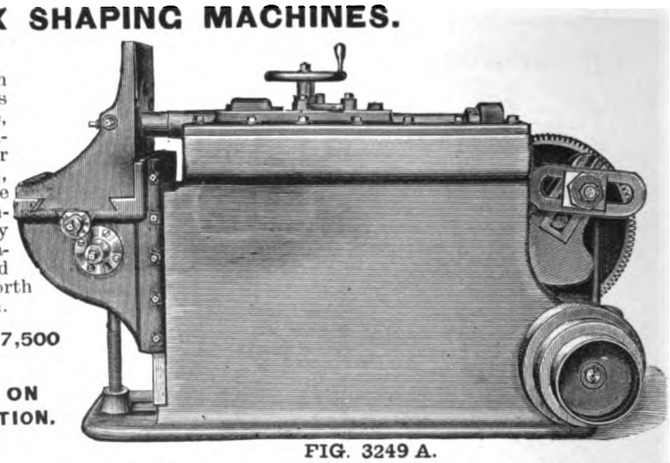


FIG. 3249 A.

Fig. 3249 is same as Fig. 3249 A, but is designed to plane the straight sides of the box to admit the collar.

PRICES ON APPLICATION.

COLUMN SHAPERS.

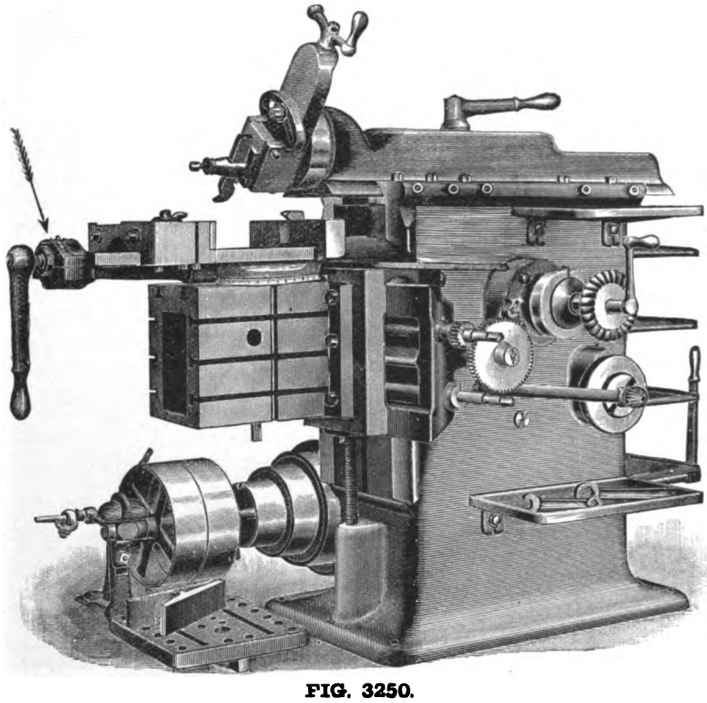


FIG. 3250.

Work can be fastened as quickly as in a common vise, at any angle, or to plane any bevel. The vise can be locked in three distinct positions, at right angles to each other. The vise jaws project outside to hold long or short work, to plane off the ends of punches, rods, etc. The vise is quickly replaced with a face plate by loosening one bolt; a pair of adjustable centers go on each vise for doing small work, such as fluting taps, reamers, etc., also a set of jaws for holding taper work. The vise may be fastened to the side of the angle plate for holding large and heavy work. It has a large circular base, with graduations to read plainly from the side.

The tool bar is very strong and stiff, and worked by an adjustable crank motion and slotted lever, which can be set instantly to give any required stroke, while in motion or at rest. The stroke on each machine is graduated, and a pointer indicates the length it planes.

All bearings and wearing surfaces are made very large and long.

Cross slide stops automatically at each end and is self-feeding across or circular, controlled by a new catch. A patent automatic brake is attached to countershaft to stop quickly.

All shapers have a 4 step cone. The 16 and 24 inch stroke shapers can run on a 2 inch stroke. Run top of cone on 12 inch toward back, and all others toward front of machine. We furnish face plate, countershaft and wrenches.

Increased power, extra heavy shapers to order.

All wrought iron work, bolts, nuts, wrenches, etc., are case-hardened.

PRICES.

Planes—Inches.			Takes bet. jaws.	Counter pulleys.			Weight, about.	Prices
Stroke.	Width.	Height from angle.		Diam.	Face.	Rev. min.		
12 in.	14 in.	9 in.	8 in.	9 in.	2 in.	130	1,000	$260
16 "	17 "	14 "	10 "	12 "	3 "	180	1,900	350
20 "	20 "	17 "	12 "	12 "	3 "	180	2,200	400
24 "	24 "	18 "	14 "	12 "	3 "	200	3,000	450
28 "	28 "	24 "	14 "	14 "	3 "	220	3,700	600
32 "	35 "	26 "	16 "	16 "	4 "	220	6,400	1,000

INDEX CENTERS.

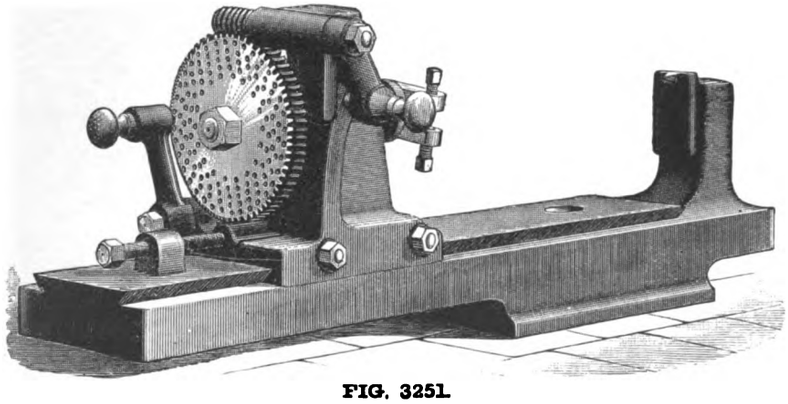


FIG. 3251.

They can be used on either shaper, planer, or milling machine. The dials are drilled accurately with the following number of holes: 24, 28, 30, 36. They can be made to take in any length between centers.

First size, used on 12 inch shaper, swings 6 inch diameter by 12 inches long; length, over all, 20½ inches. Weight, about 62 lbs.

PRICE, $45.00.

Second size, used on 16 inch and 24 inch shapers, swings 7 inch diameter by 14½ inches long; length, over all, 25 inches. Weight, about 105 lbs. **PRICE, $55.00.**

Third size, used on 26 inch and 30 inch shapers, swings 8 inch diameter by 17½ inches long; length, over all, 30 inches. Weight, about 145 lbs. **PRICE, $75.00.**

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ATTACHMENTS FOR SHAPERS, FIG. 3250.

TO KEY WAY OR SLOT A HOLE.

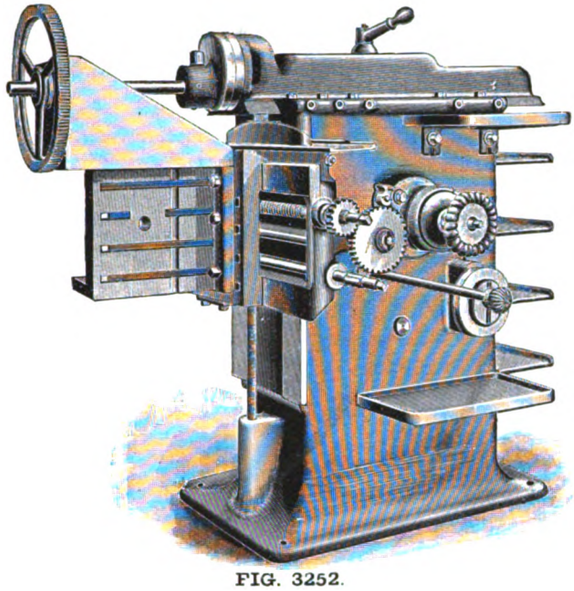


FIG. 3252.

With this attachment, key ways, slots, and oil grooves can be rapidly cut in change wheels, collars, and work of a similar nature.

PRICES OF ATTACHMENT WITH 1 CUTTER BAR.

16 and 24 inch, - - - - - - - -	$60.00
26 " 30 " - - - - - - - - -	70.00

CONCAVE ATTACHMENT.

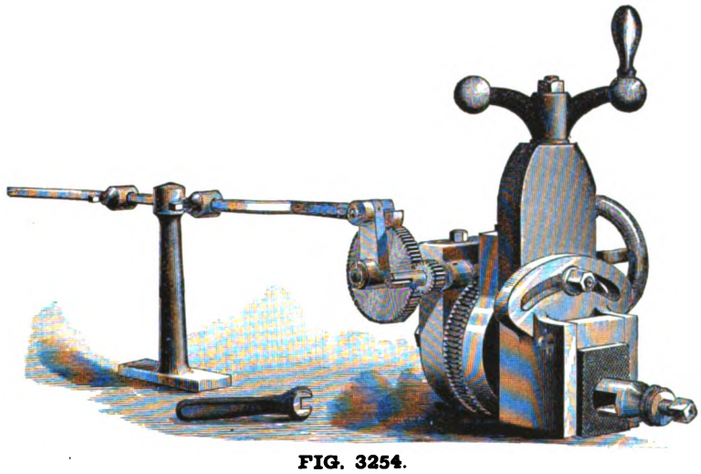


FIG. 3254.

This attachment is used in connection with our patent shapers, for planing concave circles in heavy work, or can be used on various other classes of work. It is very simple, and adds greatly to the utility of the machine.

ADDITIONAL COST WHEN APPLIED IN PLACE OF REGULAR HEAD:

16 and 24 inch, - - - - - - - -	$50.00
26 " 30 " - - - - - - - - -	70.00

TO KEY SEAT SHAFTING.

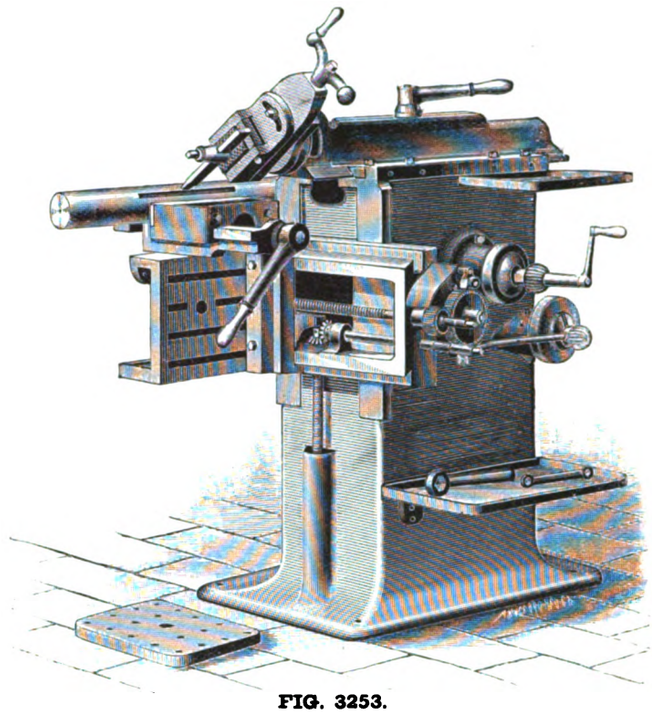


FIG. 3253.

The above illustrates the manner by which shafting of any diameter or length can be key seated.

By shifting the shaft, any desired length of key way may be cut. **PRICE, SHAPER, SEE FIG. 3250.**

CIRCULAR, SPIRAL AND CONCAVE ATTACHMENT.

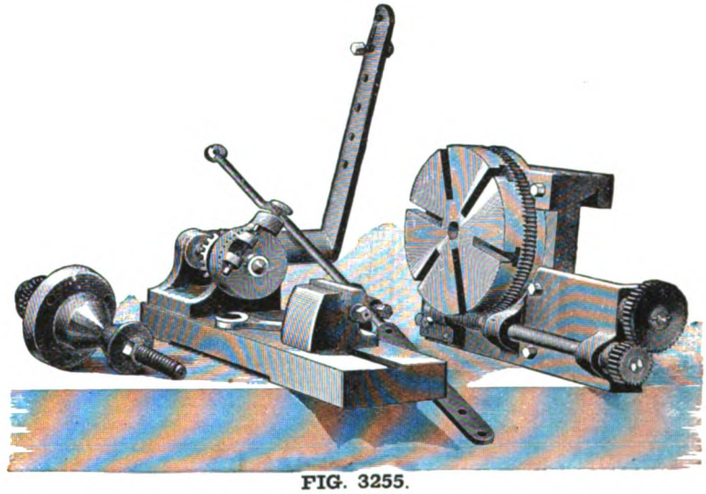


FIG. 3255.

The circular mandrel has two conical bushes, on which work may be fastened, having holes within range of the cones.

PRICES.

12, 16 and 24 inch, $25.00. 26 and 30 inch, $35.00.

The spiral cutting attachment (center cut) is capable of cutting almost any spiral 12 inches long, useful for cutters, cylinders, etc. Work is fastened between the centers, which are adjustable.

PRICES.

16 and 24 inch, $60.00. 26 and 30 inch, $80.00.

The convex attachment has a circular plate with **T** slots against which work may be fastened, for planing large and heavy parts of circles.

PRICES.

16 and 24 inch, $60.00. 26 and 30 inch, $80.00.

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10 INCH TRAVERSE HEAD SHAPER.

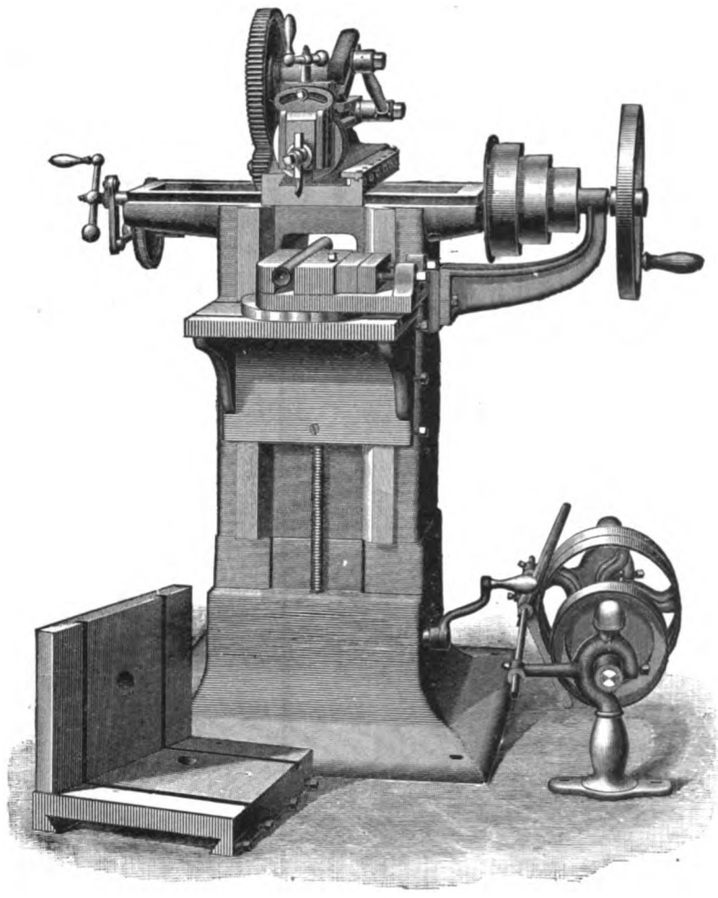


FIG. 3256.

Length of stroke, 10 inches. Length of traverse, 15 inches.
Greatest distance between tool and table, 18 inches.
Distance under tool, after removing table, for long work, 36 inches.
Driving pulley on countershaft, 10 by 2½ inches. 100 revolutions.
Cone pulleys, 3 steps, 4¾, 6⅜, 8 by 2 inches.
Size of swivel chuck, 9½ inches long, 6 inches between jaws, 1½ inches deep. Weight, 1,000 lbs.

PRICE.

With swivel chuck	$250.00
Price of front face plate, extra	16.00
Price of angle plate, extra	14.00
Price of plain chuck, 15 inches long, extra	15.00

8 INCH TRAVERSE HEAD SHAPER.

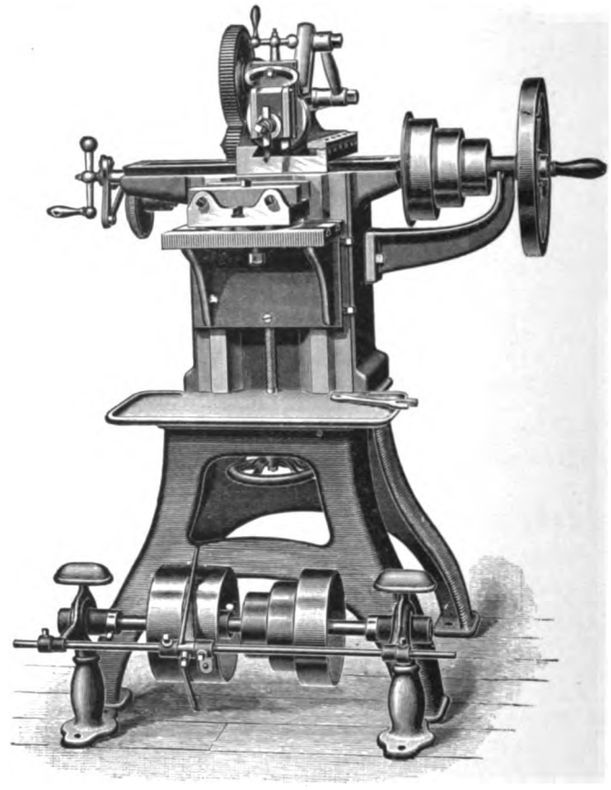


FIG. 3257.

Length of stroke, 8 inches. Length of traverse, 12 inches.
Greatest distance between tool and table, 10 inches.
Driving pulleys on countershaft, 8 by 2½ inches. 100 revolutions.
Cone pulley, 3 steps, 4¾, 6⅜, 8 by 2 inches.
Size of swivel chuck, 8 inches long, 5½ inches between jaws, 1¼ inches deep.
Weight, 750 lbs.

PRICE.

With swivel chuck complete, as shown	$200.00
Price of plain chuck, 12 inches long, extra	12.00

6 INCH TRAVERSE HEAD SHAPER.

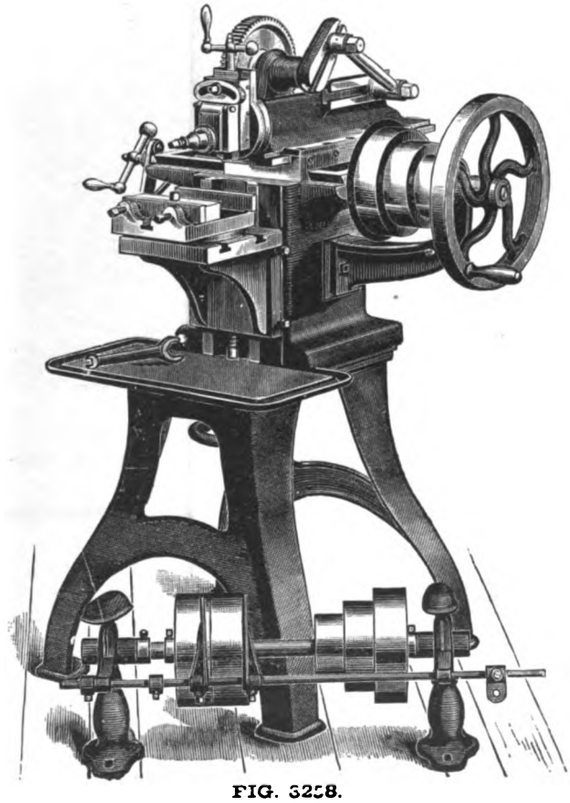


FIG. 3258.

DESCRIPTION, FIG. 3258.

Length of stroke, 6 inches. Length of traverse, 9 inches.
Greatest distance between tool and table, 8 inches.
Driving pulleys on countershaft, 6 by 2½ inches. 220 revolutions.
Cone pulley, 3 steps, 3, 4½, 6 by 1¾ inches.
Size of swivel chuck, 7 inches long, 4¼ inches between jaws, 1¼ inches deep.
Weight, 450 lbs.

PRICE.

With swivel chuck complete, as shown in cut	$135.00
Price of hand machine, without cone and countershaft	120.00
Price of hand machine on bench, without stand, etc.	110.00
Price of plain chuck, 9 inches long, extra	9.00

SPECIAL.

Price of above machine, with countershaft and swivel chuck, with length of traverse 14 inches, including plain chuck 14 inches long, $160.00.

SHAPER CENTERS.

	No. 1.	No. 2.
Distance between centers	9 in.	12 in.
Diameter of swing	6 "	10 "
Price	$12.00	$18.00

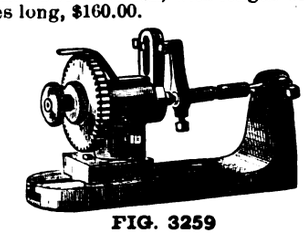


FIG. 3259

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POND 6 AND 5 FOOT RADIAL DRILLS.

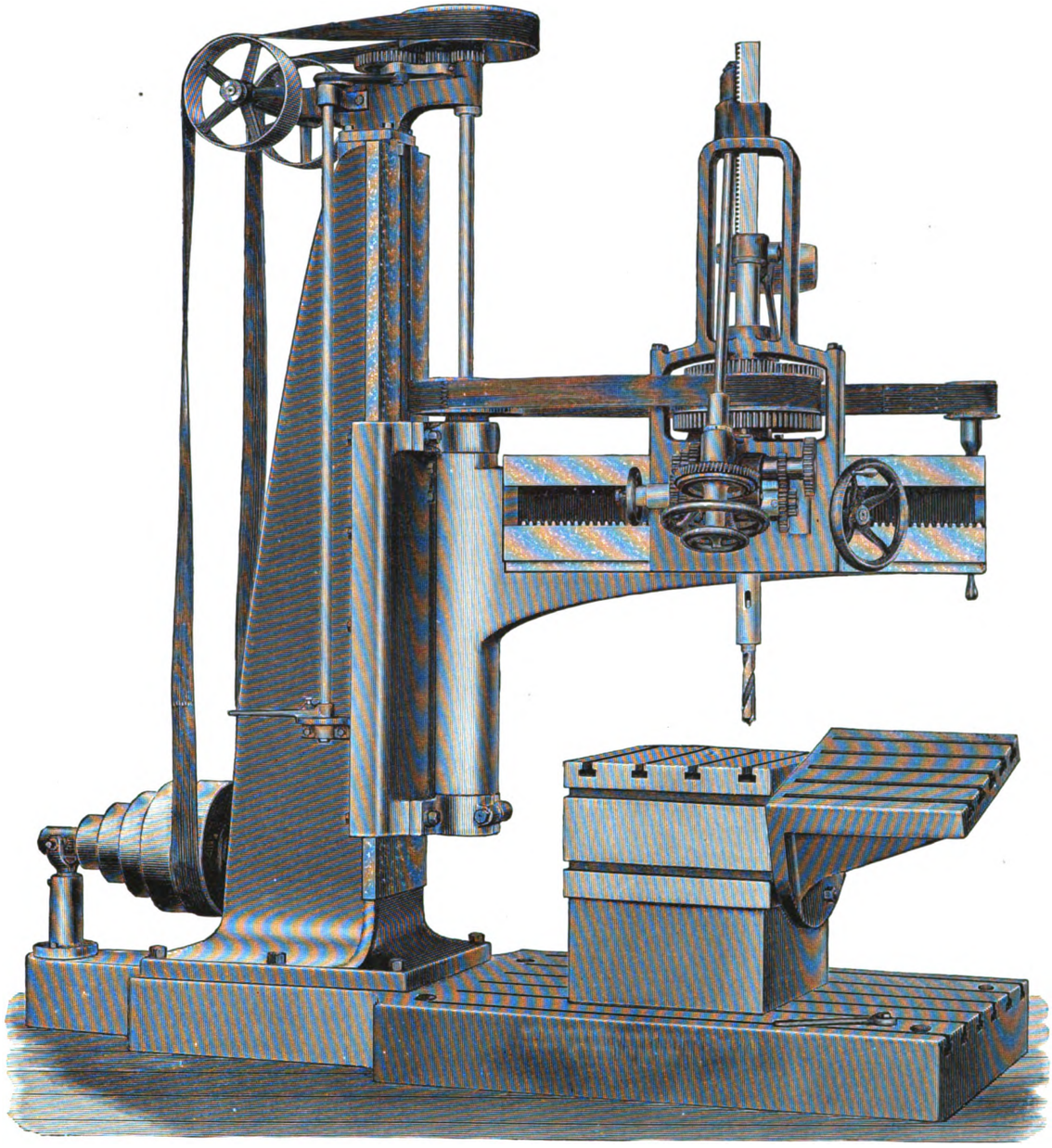


FIG. 3260.

Each of these drills has a large and very stiff slotted floor plate, to which is bolted an upright, designed to give great strength and large flat surfaces. To the upright a saddle is attached which can be moved up or down by power, and is of such length and so accurately fitted as to avoid the necessity of tight clamping to hold swinging arm parallel.

The swinging arm is so fitted to saddle that the workman can swing it with ease. A clamp holds it firmly in place when boring with single end cutter, and when using drills that are properly ground there is no necessity for, and it should not be clamped.

The traverse of the saddle on the swinging arm, and of the spindle, which is counterbalanced, is by quick hand movement by means of a rack and pinion, so placed that workman can operate both, and swing the arm at the same time, enabling him to bring the drill to the work more readily and with greater ease than with any other machine of this class. Automatic friction feed with a wide range is applied to the spindle.

The cone pulley is placed at the base of upright, in a position convenient for changing speeds. The belt is applied to a pulley locked to the spindle in the same manner that the cone of an engine lathe is locked to its spindle. The back gears are arranged same as on a lathe, and as readily thrown in or out. Thus, for ordinary drilling, the smooth motion given by a belt is obtained, and for heavy drilling or boring, the power obtained by use of the back gears is applied directly to the spindle, in place of being transmitted through shafts and several pairs of bevel gears. Vertical travel of arm on the upright is 48 inches. The spindle has a traverse of 18 inches. The greatest height from floor plate to nose of spindle is 89 inches. The shortest radius of the spindle is 16 inches; the longest on 5 foot drill, 60 inches, and on 6 foot drill, 72 inches. Shortest distance from face of upright to drill is 25 inches.

Countershaft has one tight and one loose pulley, each 20 inches diameter by 5 inch face, which should make 250 revolutions per minute. When required for tapping a friction countershaft is furnished with two pulleys, 20 inches diameter, for a 5 inch belt that should make 250 revolutions per minute.

A table of convenient height is furnished, if desired, having bolt slots on the top and side; and the top is so constructed that a part of it can be set and firmly fastened so as to hold work at any desired angle for drilling.

Countershaft has one tight and one loose pulley, each 12 inches diameter by 5 inch face, which should make 220 revolutions per minute.

6 foot, weight, with table, ...pounds. **PRICE, $**.....
6 " " without " ..... " " **$**.....

5 foot, weight, with table, ...pounds. **PRICE, $**.....
5 " " without " ..... " " **$**.....

Extra for friction countershaft.

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RADIAL DRILLS.

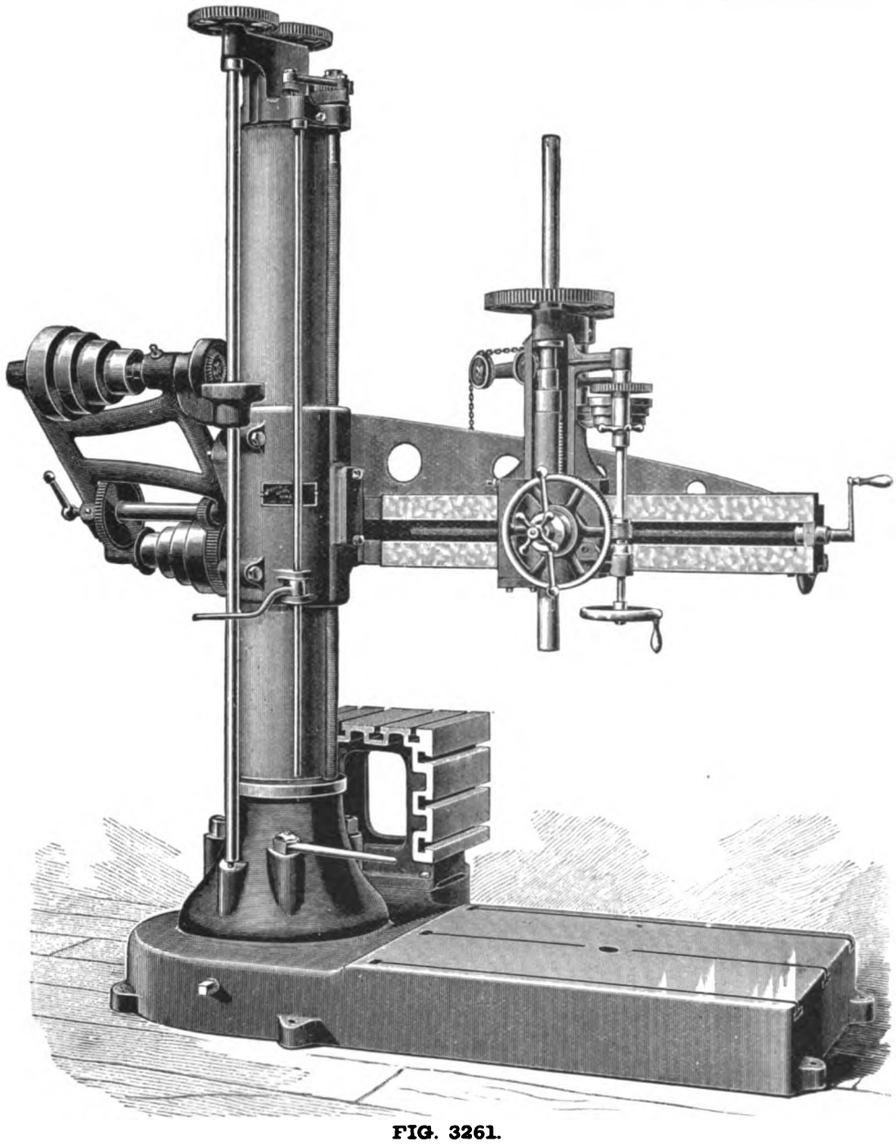


FIG. 3261.

These machines will drill or bore a number of holes parallel with each other—vertically downward—anywhere within the range of the arm.

The spindle is geared, has quick return, and is counterbalanced.

The column which carries the arm, driving gear, frame, etc., is bored and fitted over a stationary stump, bolted fast to the sole plate. This stump has sufficient length of bearing to prevent column from swaying, and is provided with an adjustable pivot bearing upon an elastic diaphragm in the column, which, when the bolts in flange at the lower end of column are slackened, takes the weight of the machine off the flange bearing, and allows the column, with arms, etc., to revolve easily the entire circle. For ordinary drilling, the bolts in flange need not be tightened; but when extraordinary rigidity is required, a partial turn of the wrench will bind the column fast to the sole plate. The sleeve which carries the arm and gear frame is fitted snugly to the column, and may be raised and lowered by power, and is provided with clamping bolts. The table has both horizontal and vertical faces, and is provided with planed T slots.

The countershaft consists of a frame with horizontal shaft and T and L pulleys, and a pair of cut miter gears to connect with vertical shaft at center of top of column.

The spindle, feed screw, and elevating screw are made of machinery steel, and the feed worm is made of the best tool steel and hardened; all thrust bearings are provided with phosphor bronze washers.

DIMENSIONS, WEIGHTS AND PRICES.	No. 0.	No. 1.	No. 2.
Diameter of column	10 in.	11 in.	13 in.
Height of column	6 ft.	7 ft. 6 in.	8 ft. 6 in.
Length of arm	4 ft.	5 ft.	6 ft.
Drills to center of circle outside of column, of	6 ft.	8 ft. 2 in.	10 ft.
Greatest distance from sole plate to end of spindle	4 ft. 1 in.	5 ft. 5 in.	6 ft. 3 in.
Greatest distance from floor to end of spindle	4 ft. 5⅛ in.	6 ft. 1 in.	7 ft.
Total height of machine, without countershaft	7 ft. 5 in.	9 ft. 2 in.	10 ft. 5 in.
*Total height of machine, including countershaft	8 ft. 8½ in.	10 ft. 9 in.	12 ft. 8 in.
Total height of table from sole plate	20 in.	20 in.	24 in.
Size of table	20 in. x 20 in.	20 in. x 20 in.	26 in. x 26 in.
Diameter of spindle	1⅜ in.	1⅜ in.	2½ in.
Size of hole in spindle, Morse socket No. 4	1¼ with ⅝ taper.	1¼ with ⅝ taper.	1¼ with ⅝ taper.
Traverse of spindle	15 in.	15 in.	20 in.
Size of countershaft pulleys	16 in. x 4 in.	16 in. x 4 in.	16 in. x 4 in.
Speed of countershaft pulleys, per minute	180 revs.	180 revs.	180 revs.
Width of belts on cones	2½ ins.	2½ in.	3 in.
Floor space required for base	63 in. x 51 in.	80 in. x 54 in.	92 in. x 60 in.
Weights, about	3,800 lbs.	5,400 lbs.	8,500 lbs.
Prices	$	$	$

* To allow for the difference in height of ceilings, we furnish a shaft 8 ft. long, with key seat whole length, to connect from countershaft to driving wheel on top of column. This will accommodate any ceiling to 15 ft. in height.

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NO. 3 RADIAL DRILL.

This machine differs in design from Fig. 3261 in having a quarter circle—fan-shaped—base and an outside pillar. The base, being of unusual size, will accommodate very large work. The outside pillar is moved by pinion engaging circular rack on periphery of base. It can be bolted rigidly to arm and base for extraordinary work, or entirely removed to admit work too large, otherwise, to get under spindle. The arm has bearing 32 inches in length around column, a deep strengthening web on top, and is very rigid under working strains. The spindle frame is moved along arm by means of the crank at left of the feed worm wheel, enabling the operator to stand immediately at the spindle while bringing it to desired point. It will drill or bore a number of holes parallel with each other—vertically downward—anywhere within the range of the arm.

The spindle is geared with unusual power, has quick return, and is counterbalanced.

The arm has 8 feet radius; column, 15 inches diameter, and 9 feet 6 inches high; height under spindle, 6 feet 10 inches; weight, 15,000 pounds.

PRICE ON APPLICATION.

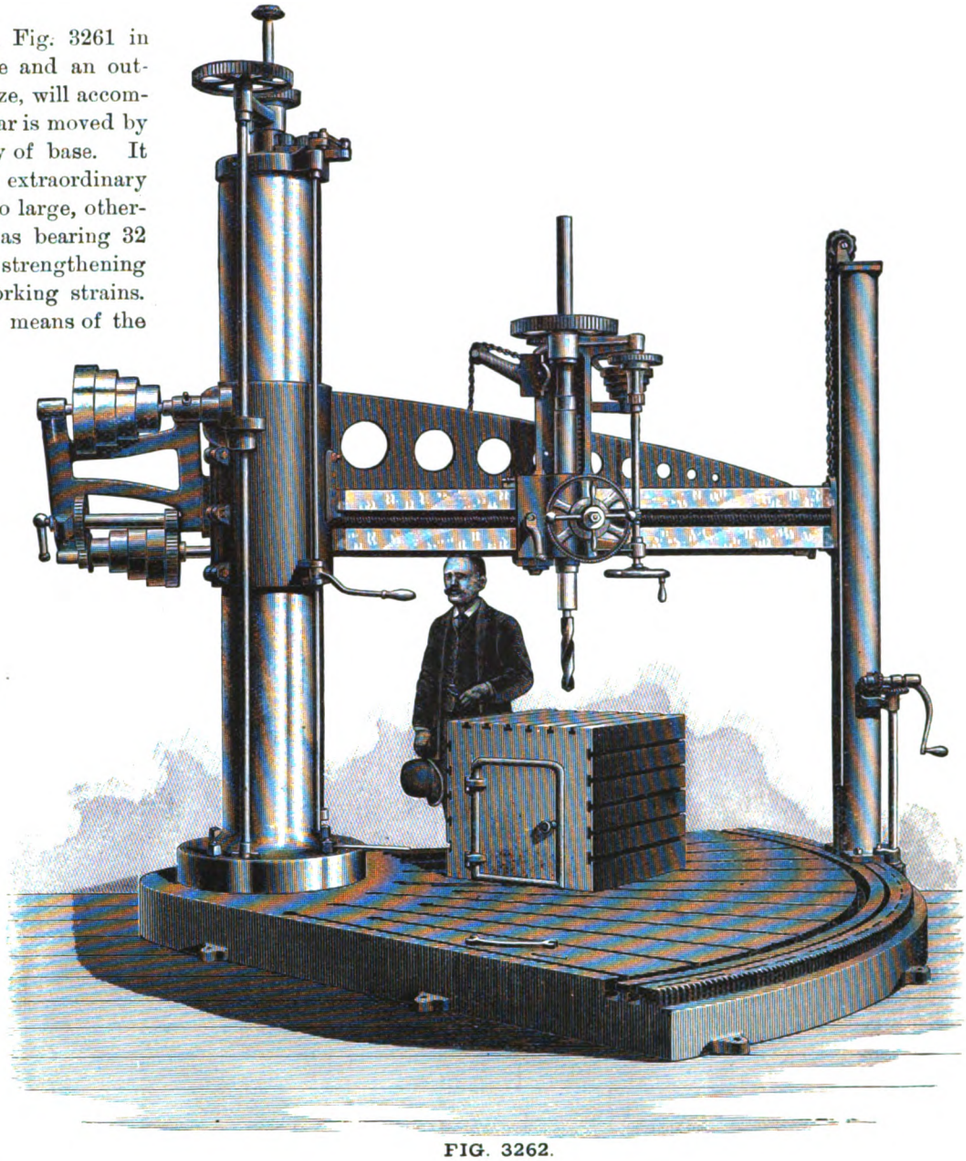


FIG. 3262.

ELEVATING UNIVERSAL TABLE.



FIG. 3263.

This table may be used with drills, Figs. 3261 and 3262, and has movements vertical, angular and rotary. Vertical movement is 14 inches. Weight, 500 pounds.

PRICE, $.....

UNIVERSAL TABLE.

This Universal Table is made to suit the extension base part of all "Radial" drills, and for work that can be handled on a table it has advantages over the plain square table.

The base piece, fitting to base of machine, is graduated to a stump. Over this is fitted the sleeve or center piece, which revolves on the stump, and also carries the swivel bolt through the bearings of the top piece or tilted leaf.

This top presents true horizontal and vertical faces at extremes of its movement, and can be securely fixed at any intermediate angle.

Weight, 500 pounds.

PRICE, $.....

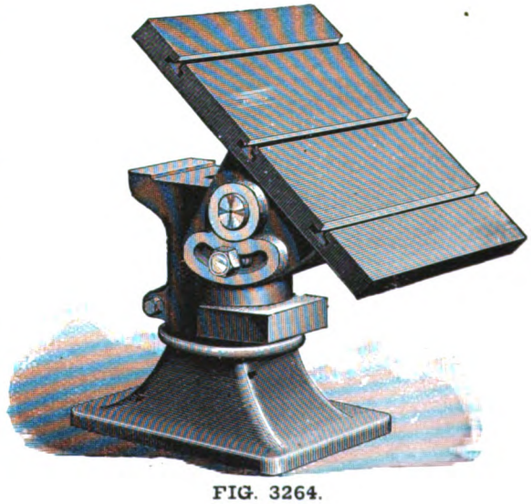


FIG. 3264.

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NO. 4 RADIAL DRILL.

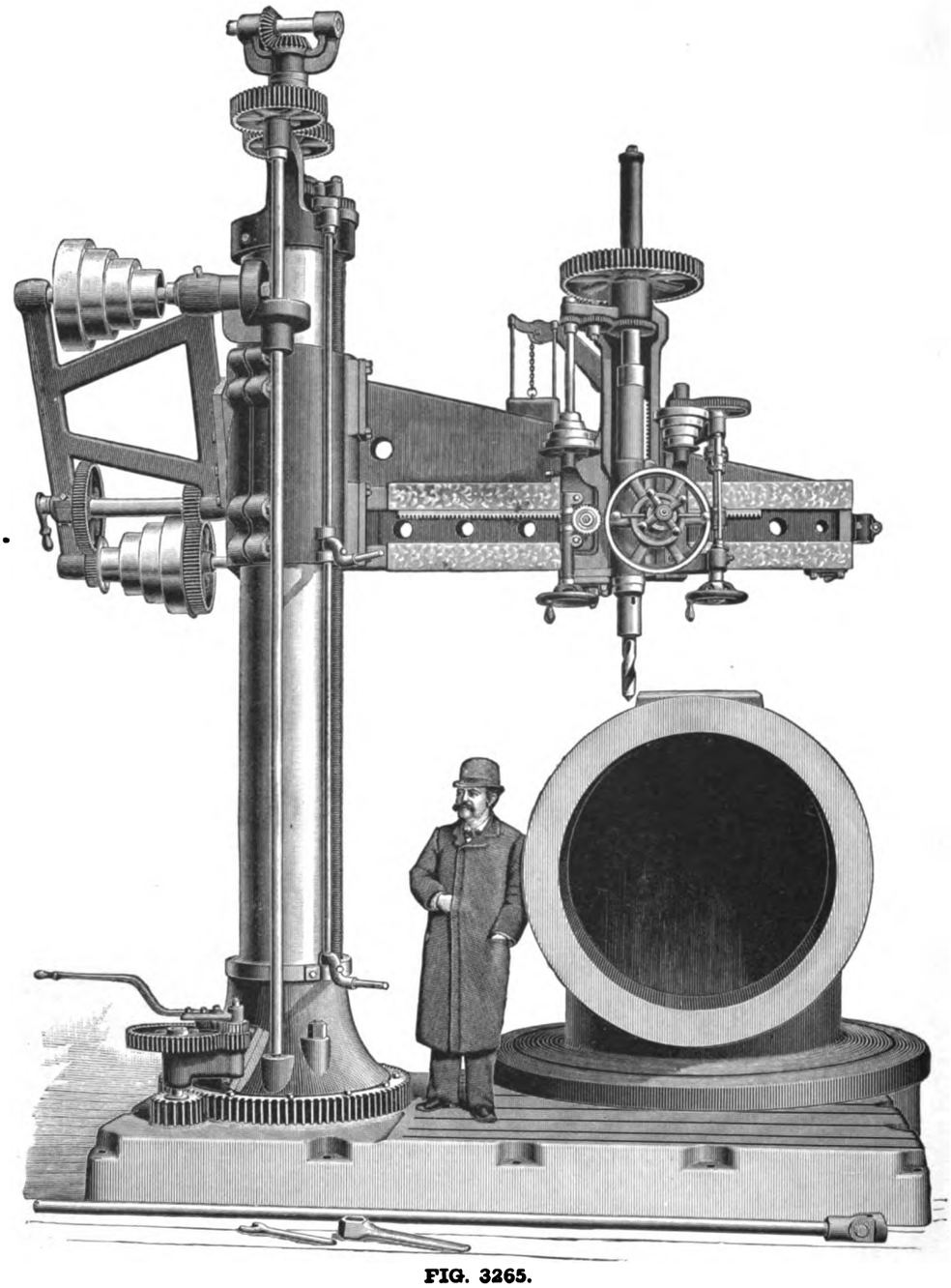


FIG. 3265.

The special features of this drill are the rotating device for swinging the arm by means of the lever attached to the gearing where the column rests on the base plate, also the movement of the spindle head by means of worm and hand wheel located to the left of the spindle. The vertical traverse of the arm on column is controlled by either of two levers; one follows the arm, and one is fixed at the base.

Lying in front of the base is a tie rod that may be used for extreme heavy work.

DIMENSIONS.

Diameter of column	18 in.
Height of column	13 ft. 6 "
Length of arm	9 "
Drills to center of circle outside of column of	15 "
Greatest distance from sole plate to end of spindle	9 " 6 "
Total height of machine, without countershaft	17 " 2 "
Diameter of spindle	4 "
Hole in spindle No. 5 Morse taper.	
Traverse of spindle	27 "
Width of belts on cones	5 "
Weight	33,000 lbs.

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NO. 00 RADIAL DRILL.

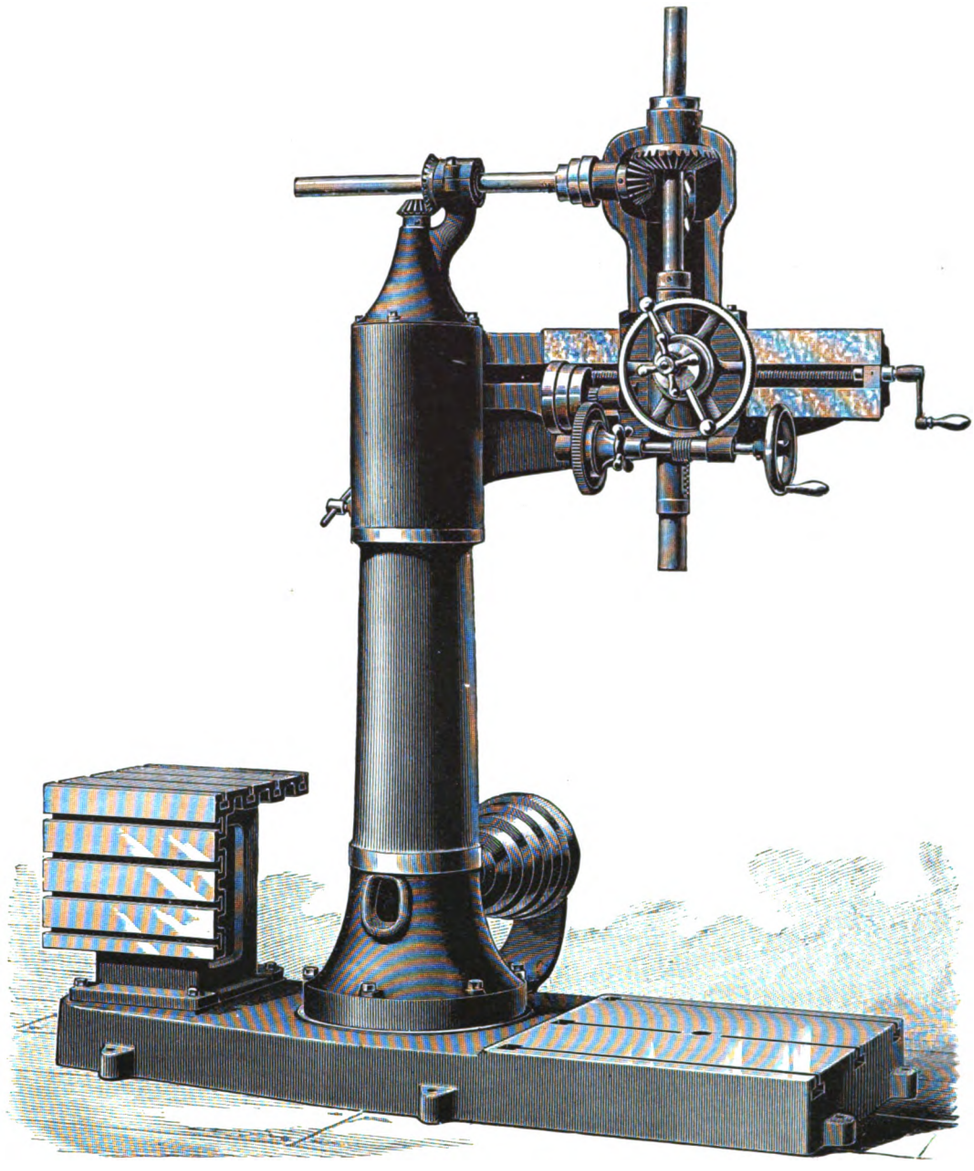


FIG. 3266.

The machine will bore or drill a number of holes parallel with each other—vertically downward anywhere within the range of the arm. The spindle is geared with unusual power, has quick return, is counterbalanced, and has automatic feed. Will readily bore holes in solid cast iron two inches in diameter. The column which carries the arm, driving gear, spindle frame, etc., is bolted fast to base plate, making it perfectly rigid and firm. The arm is pivoted at top of column, and has radial movement of over three-quarters of a circle. The table has both horizontal and vertical faces, and is provided with planed T slots.

DIMENSIONS, WEIGHT, ETC.

Length of arm	3 ft. 6 in.
Greatest distance from sole plate to end of spindle	52 "
Greatest distance from floor to end of spindle	56 "
Total height of machine, without countershaft	7 ft.
Total height of machine, including countershaft	8 ft. 6 in.
Total height of table from sole plate	20 "
Size of table	18 in. x 18 "
Diameter of spindle	$1\frac{15}{16}$ "
Size of hole in spindle, Morse socket No. 4	$1\frac{1}{4}$ with $\frac{5}{8}$ taper.
Traverse of spindle	15 in.
Size of countershaft pulleys	12 in. x $3\frac{1}{2}$ "
Speed of countershaft pulleys, per minute	240 revs.
Width of belts on cones	$2\frac{1}{2}$ in.
Floor space required for base	78 in. x 44 "
Weight, about	3,300 lbs.
Drills, to center of	64 in.

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UNIVERSAL RADIAL DRILLS.

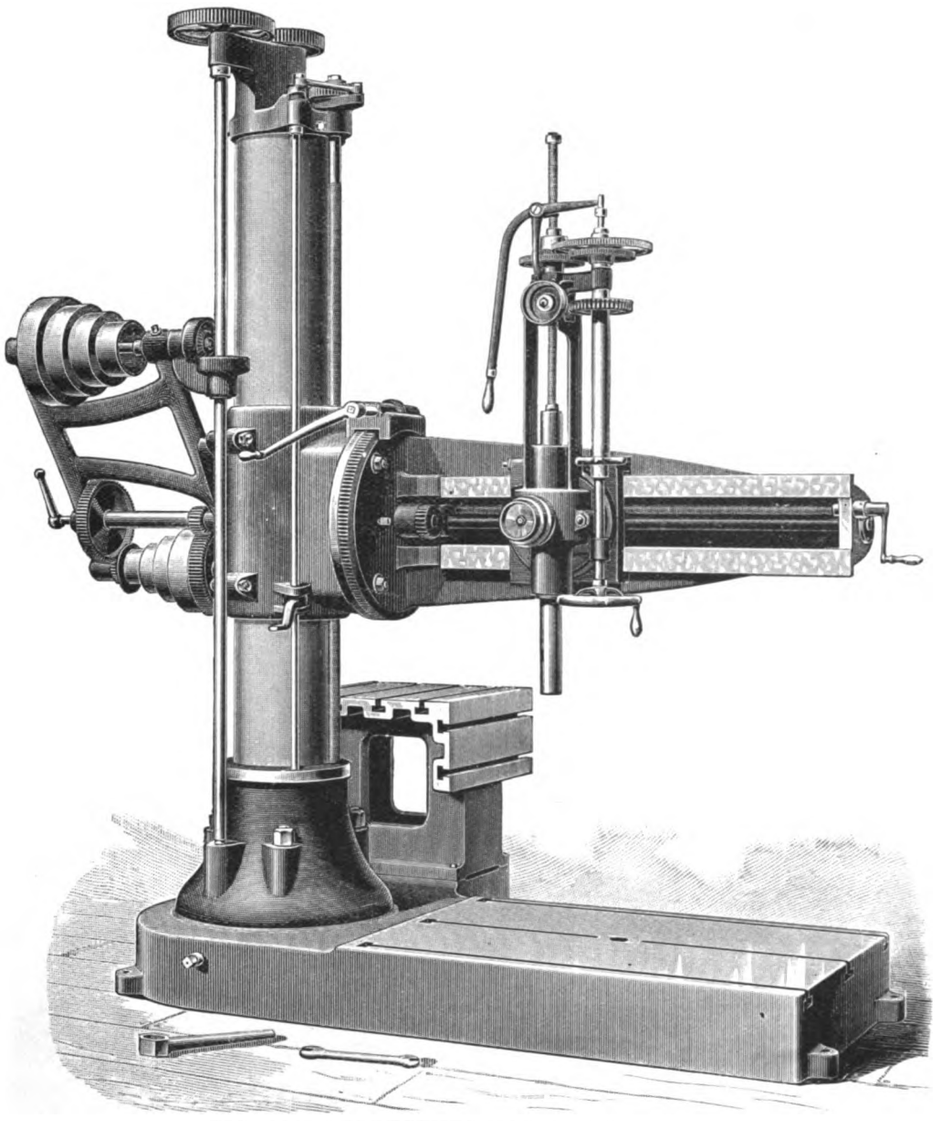


FIG. 3267 REPRESENTS NOS. 1 AND 2.

THE GENERAL DESCRIPTION OF THESE DRILLS IS THE SAME AS FIG. 3261.

The arm and spindle frame have swivels that will revolve the entire circle—so that a horizontal line of holes may be drilled at any angle parallel with each other by adjusting the angle of the arm, and traversing the saddle on the arm, and a vertical line may be drilled at any angle by adjusting the angle of the spindle frame, and moving the arm vertically to any point desired on the column. A hole may be drilled vertically downward, vertically upward, or at any angle within the range of the arm.

The countershaft consists of a frame with horizontal shaft and tight and loose pulleys, and a pair of cut miter gears to connect with vertical shaft at center of top of column.

DIMENSIONS, WEIGHTS, PRICE, ETC.	NO. 1.	NO. 2.	NO. 3.
Diameter of column	11 in.	13 in.	15 in.
Height of column	7 ft. 6 in.	8 ft. 6 in.	10 ft.
Length of arm	5 ft.	6 ft.	7 ft. 6 in.
Drills to center of circle, outside of column of	8 ft. 2 in.	10 ft.	12 ft. 2 in.
Greatest distance from sole plate to end of spindle	5 ft. 9 in.	6 ft. 5 in.	7 ft. 5 in.
Greatest distance from floor to end of spindle	6 ft. 5 in.	7 ft. 2 in.	8 ft. 4 in.
Total height of machine, without countershaft	9 ft. 2 in.	10 ft. 5 in.	12 ft. 1 in.
*Total height of machine, including countershaft	10 ft. 9 in.	12 ft. 8 in.	14 ft.
Total height of table from sole plate	20 in.	24 in.	28 in.
Size of table	20 in. × 20 in.	26 in. × 26 in.	28 in. × 28 in.
Diameter of spindle	2¼ in.	2⅝ in.	3⅛ in.
Size of hole in spindle, Morse socket No. 4	1¼ with ⅝ taper.	1¼ with ⅝ taper.	1¾ with ⅝ taper.
Traverse of spindle	11 in.	19 in.	20 in.
Size of countershaft pulleys	16 in. × 4 in.	16 in. × 4 in.	20 in. × 5 in.
Speed of countershaft pulleys, per minute	180 revs.	180 revs.	180 revs.
Width of belts on cones	2½ in.	3 in.	4 in.
Floor space required for base	80 in. × 54 in.	92 in. × 60 in.	120 in. × 60 in.
Weight, about	5,400 lbs.	8,500 lbs.	15,000 lbs.
Prices	$	$	$

*To allow for the difference in height of ceilings, we furnish a shaft 8 feet long, with key seat whole length to connect from countershaft to driving wheel on top of column. This will accommodate any ceiling to 15 feet in height.

NOTE.—No. 3 has rectangular base (no extension), 5 feet x 10 feet, and box table, same as Fig. 3262.

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UNIVERSAL BEAM DRILL.

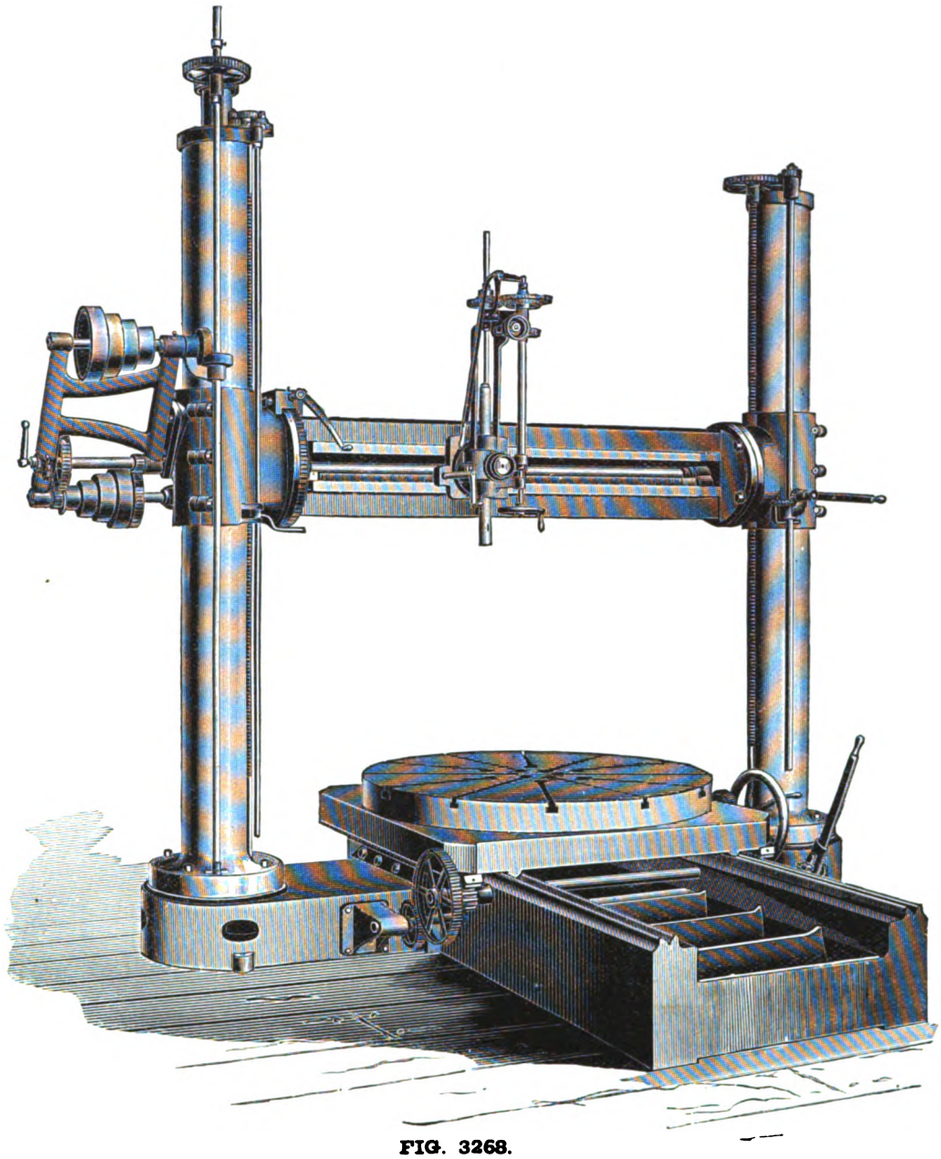


FIG. 3268.

In operation work is placed upon the round chucking table, and by the traverse of the square table on the shears it is run under the spindle, and as the head travels horizontally on the beam, and round table can be revolved to any point, it is easy to bring the spindle to any desired place on top of the work. When top drilling is finished, both tables are run forward on the shears, the beam is lowered to an approximate position by power, then swiveled till the spindle is in a horizontal position, when side drilling, at any angle, upon the work can be done, and on one or all sides of any piece of work, by revolving each side or face of the work into position before the spindle. There is a hand movement for delicate adjustment of the beam in a vertical line. Both the revolving chucking table and square table have clamping device to secure them in proper position.

Columns	13 in. diameter, 12 ft. high.
Total height of machine	14 ft. 5 in.
Distance between columns	9 ft. 10 in.
Spindle	2 7/8 in. diameter, 24 in. traverse.
Distance from spindle to chucking table	8 ft. 7 in.
Horizontal travel of head along the beam	6 ft. 1 1/2 in.
Diameter of revolving chucking table	6 ft.
Travel of square table	6 ft.
Total width of base under columns	13 ft. 6 in.
Length of shears	10 ft. 4 in.
Weighs about	26,000 lbs.

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6, 5, 4 AND 3 FOOT RADIAL DRILLS.

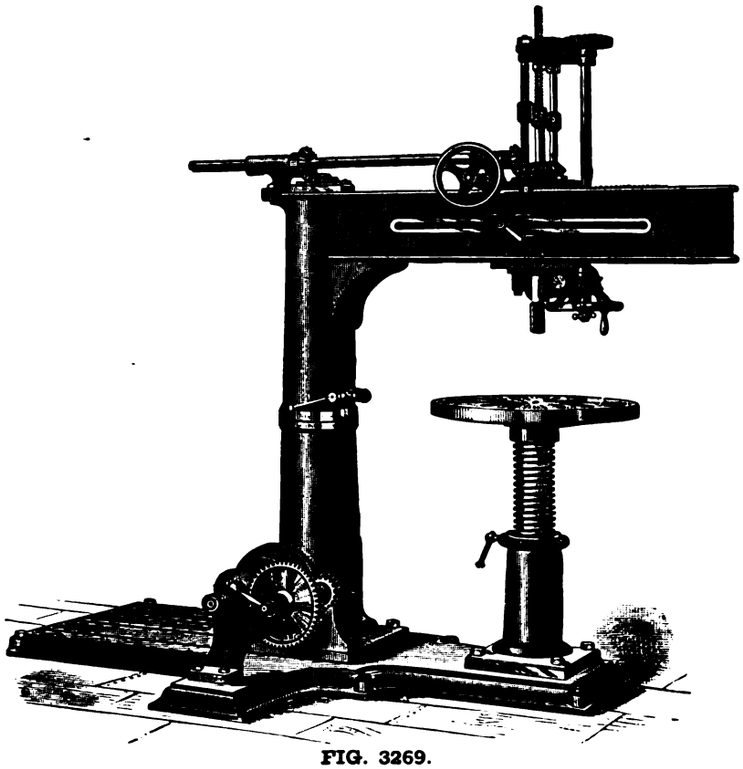


FIG. 3269.

DESCRIPTION, FIG. 3269.

The radiating arm is fitted to the column, and traverses freely in all directions; in this slides the head, carrying the drill, spindle and gearing, which is moved backward and forward by a rack and pinion and hand wheel. The arm is capable of being placed in any position, radiating from the column as a center; hence, the drill can be made to reach any point within the circle, except the part occupied by the belt and driving pulleys.

Size.	Reach from side of column.	Diameter of spindle.	Weight.	Price.
No. 1	36 in.	$1\frac{7}{16}$ in.		$.....
No. 2	48 "	$1\frac{13}{16}$ "		.....
No. 3	60 "	$2\frac{7}{16}$ "		.....
No. 4	72 "	$2\frac{13}{16}$ "		.....

HORIZONTAL DRILL PRESS.

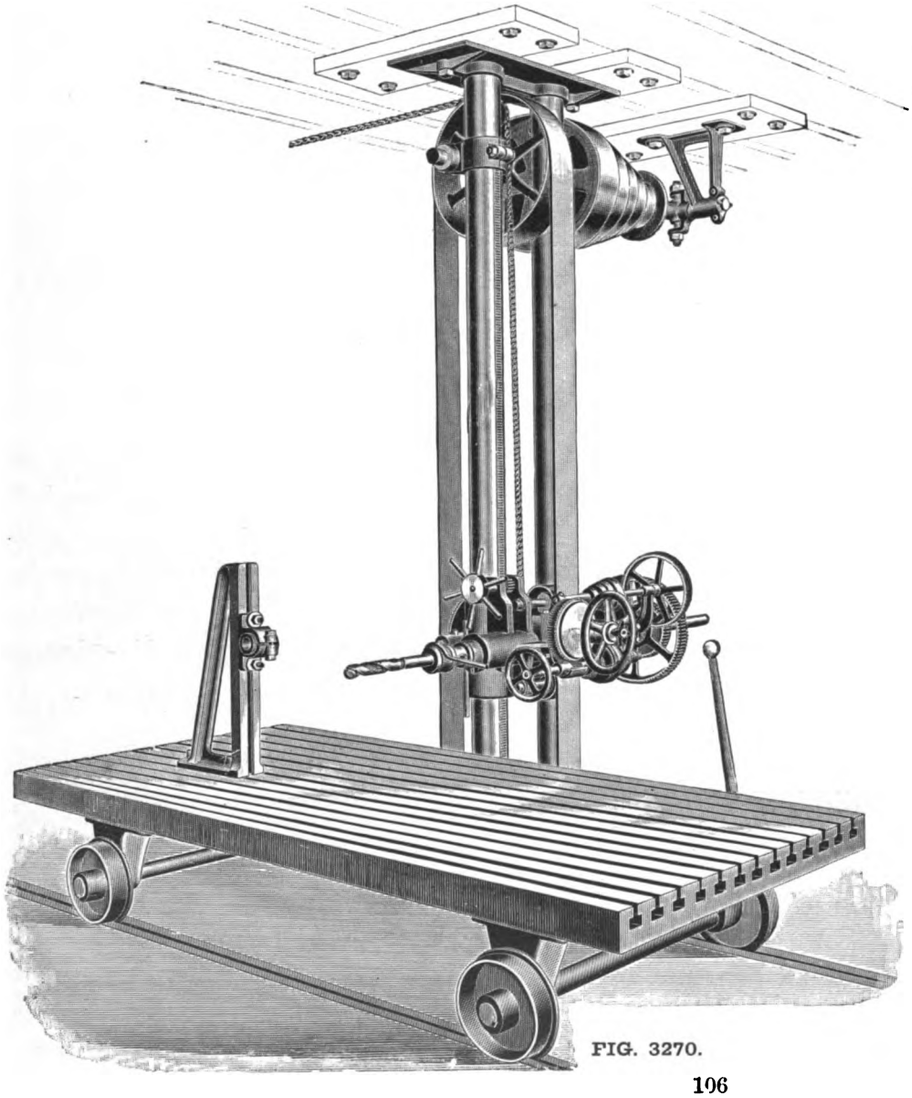


FIG. 3270.

DESCRIPTION, FIG. 3270.

A heavy platen, planed and provided with T slots for securing the work, is mounted on substantial axles and wheels. The wheels are turned and the track planed. The wheels nearest the operator have large hubs with drilled socket holes into which the "starting bar" is fitted. This enables the heaviest piece of work to be moved to any desired position in front of the drill with perfect ease. The platen is 8 ft. long and 4 ft. wide.

The spindle can be raised from a little below the top of platen to 7 feet above it. The weight of spindle frame and parts are counterbalanced to make the movement easy. The spindle has a movement of 20 inches with automatic feed at any point. The cone pulleys have five steps for a 6 inch belt. These, with two pairs of back gears, give ten graduated speeds of the spindle suitable for all holes from ¼ inch to 10 inch.

An outboard support is provided for boring bars, also a cap threaded to end of spindle for securing bars when feeding backward, as in facing and sometimes in boring.

Tight and loose pulleys on countershaft are 20 inch diameter, 6½ inch face, and should run 70 turns per minute.

PRICES.

Including countershaft weight to counterbalance frame and 25 feet chain, 24 feet of wrought iron rails, and posts 15 feet high or shorter.

WEIGHT, 10,000 LBS. PRICE, $.....

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32 INCH DRILL PRESS.

This drill is made from new designs, placing the metal to give greatest resistance to breaking strains. All working parts have large wearing surfaces accurately fitted by hand scraping, straight surfaces being scraped to surface plates.

The drill has a patented device whereby the entire adjustable head, including the spindle, is balanced by one and the same weight that balances the spindle alone, thereby dispensing with rack, pinion, ratchet, pawl and wrench, otherwise necessary to move the adjustable drilling head up or down the face of the column.

This device also admits of keeping the spindle evenly balanced, whether the smallest drill or heaviest boring bar is used; hence the quick return motion by hand works as easily with a very heavy tool as with a light one, and is also very convenient as a hand feed for drilling small holes, and for quick adjustment of cutting tools.

The drill spindle is made from hammered cast steel, is large in diameter, and has hand and three changes of power feed, the latter being connected to it by a simple and positive friction.

The circular table can be revolved around its own axis, and swung around the column, thus allowing the placing of any point on the surface of table under center of spindle. It can be raised or lowered to any position in its traverse on the column.

The base table is accurately planed, having **T** slots for convenience in bolting work.

The cones and gears are unusually large and powerful. No overhead counter required. Tight and loose driving pulleys are each 14 inches diameter by 4 inches face, and should make 220 revolutions per minute.

Weight, 3,000 pounds.

PRICE, COMPLETE, $.....

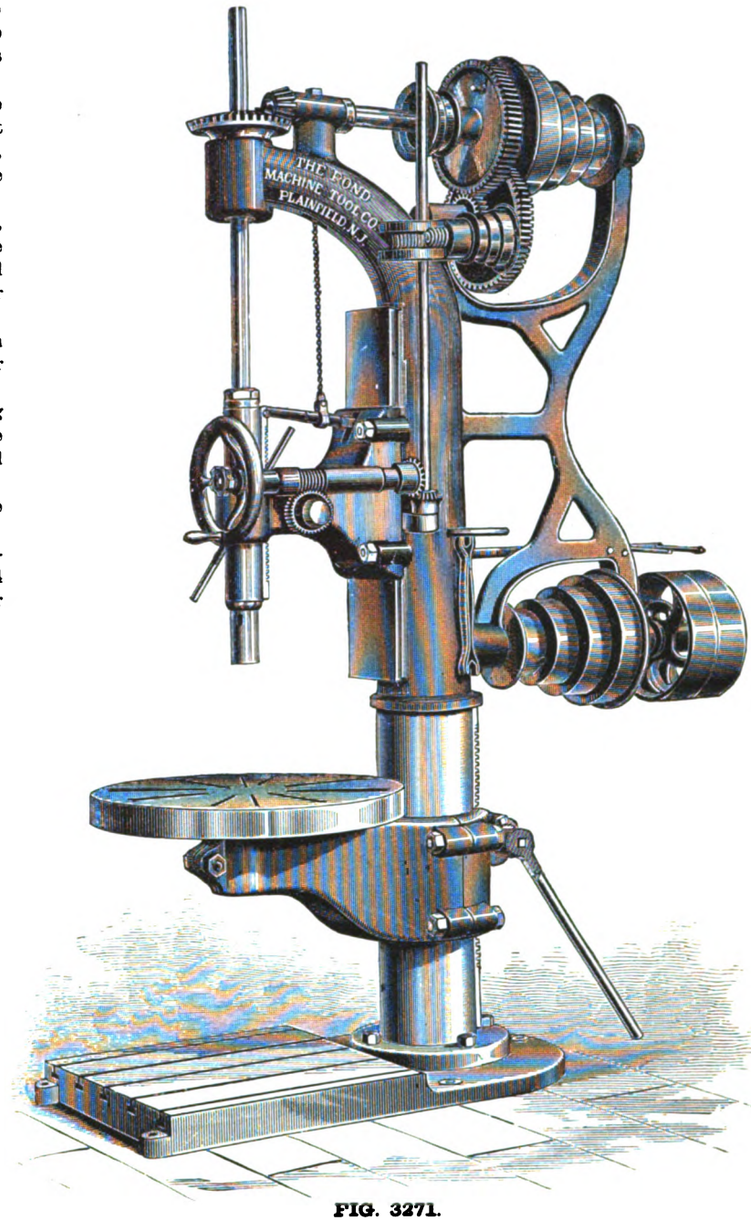


FIG. 3271.

50 INCH DRILL.

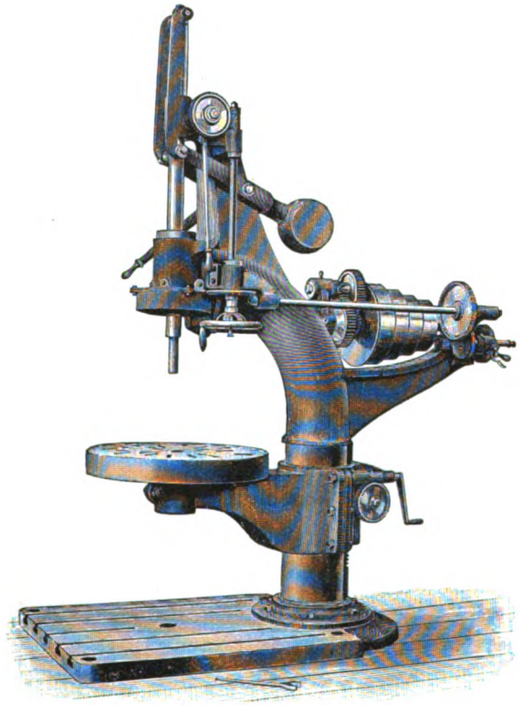


FIG. 3272.

This drill has a balanced steel spindle with 15 inches lift, 26 inches from the side of the column, and a quick return by hand; it is driven by bevel wheels, and is strongly back geared; the cones have four speeds for a 4 inch belt, giving eight changes on the spindle; the table is round, and will revolve in its bearing; has a vertical adjustment and a circular movement around the column; it has a flat foundation plate, with a planed surface for work 45 inch by 45 inch, and a positive self-acting feed with four changes, as well as a hand feed.

Weight, 7,300 pounds.

Speed of countershaft, 170 revolutions per minute.

Fast and loose pulleys, 16 inch by $4\frac{1}{2}$ inch.

40 AND 25 INCH DRILL.

DESCRIPTION, FIG. 3273.

The 40 inch drill has balanced steel spindle 10 inch lift, 21 inches from side of column, and the 25 inch swing drill has 10 inch lift and 21 inches from side column, and a quick return by hand; it is driven by miter wheels, and is strongly back geared; the cones have four speeds for a 3 inch belt, giving eight changes on the spindle; the table is round, and will revolve in its bearing; has a vertical adjustment and a circular movement around the column; it has a flat foundation plate, with a planed surface for work 36 inch by 32 inch, and an adjustable, self-acting feed, driven with a belt, worm, and worm wheel, as well as a hand feed.

Weight of 40 inch, 3,100 lbs.

Countershaft, 14 by $4\frac{1}{4}$ inches, 60 revolutions.

Weight of 25 inch, 1,900 lbs.

Countershaft, 10 by $3\frac{1}{4}$ inches, 150 revolutions.

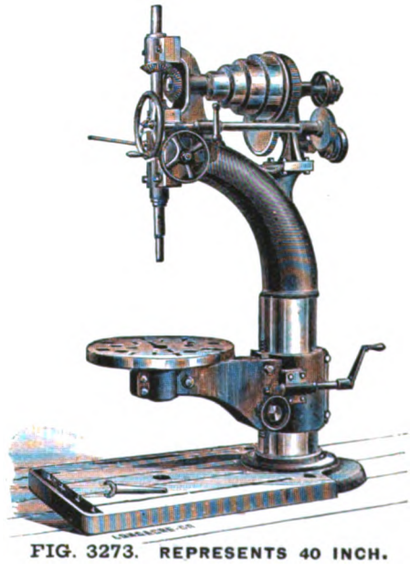


FIG. 3273. REPRESENTS 40 INCH.

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40 INCH DRILL PRESS.

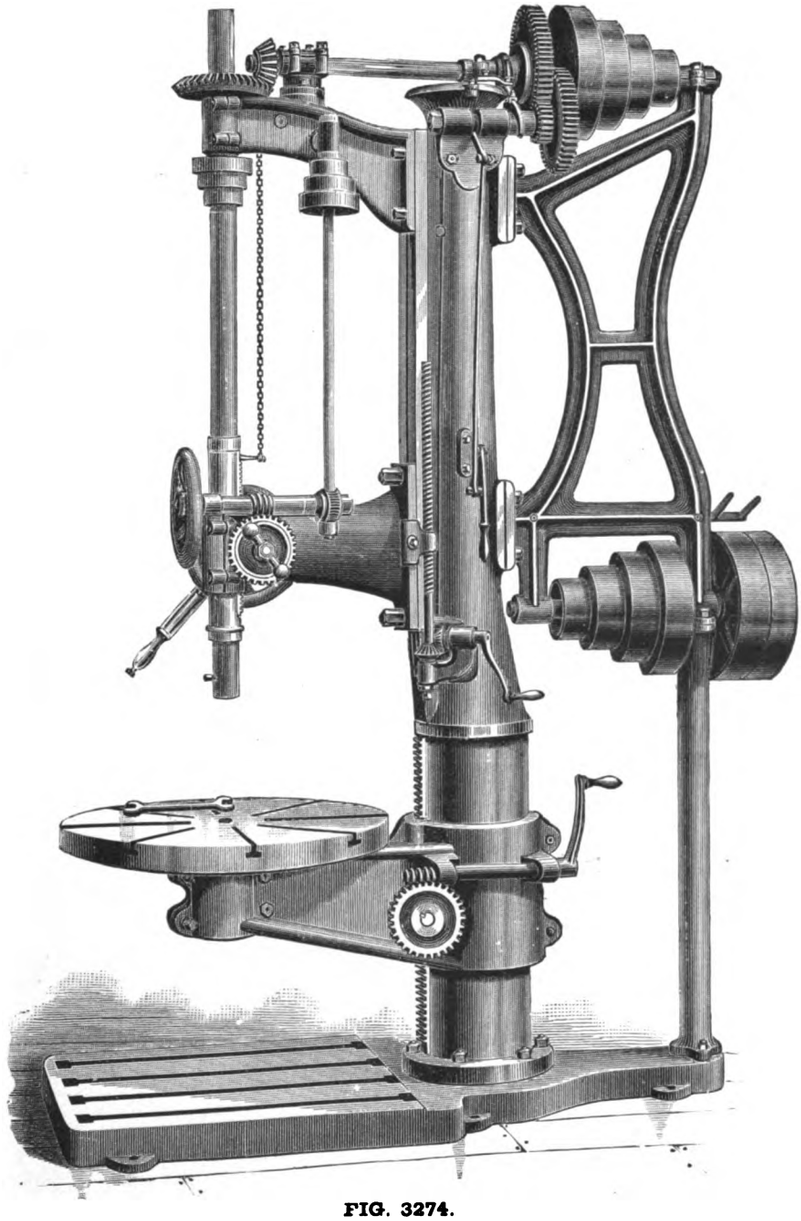


FIG. 3274.

DESCRIPTION, FIG. 3275.

Bores to center of	28	inches.
Traverse of table	18	"
Depth of feed of spindle	9½	"
Greatest distance between table and spindle	32	"
" " " bed plate and spindle	46	"
Diameter of table	26	"
Whole height of machine	7¾	feet.
Weight, about	2,400	lbs.

PRICE, $300.00.

Driving pulleys, 3 inch face, 13 inch diameter. Cone pulleys take 2½ inch belt. Largest section, 11 inch diameter.

Speed of countershaft for ordinary work should be about 280 revolutions per minute.

The back geared drill is the same, except it has not the power feed.

PRICE, $275.00.

Upright drill is similar in style, but is without back gear or power feed, and the cone pulleys are 3 inch face.

PRICE, $250.00.

All the above have the quick return attachment, balanced spindles and heads, and complete countershaft attached to the frame.

Diameter of steel spindles, 2 inches. Holes in spindles will take Morse taper drills, from $1\frac{9}{32}$ to 2 inches, inclusive.

This drill is complete with all latest and most improved attachments for convenience in operating, having both hand and power feeds, quick return movement, also our patented device for throwing the back gearing in and out of gear, and releasing the cone pulley from or connecting it with the shaft by one movement of a lever, and index plate for gauging the depth of holes drilled.

The forged steel spindle is very large, with long bearings, and the hole is reamed with Morse taper reamer No. 4. Since the cut was made, the feeding device has been changed very materially so as to give a very great increase in power.

Bores to center of	40 in.
Traverse of table	15 "
Depth of feed of spindle	12 "
Greatest distance between table and spindle	34 "
" " " bed plate and spindle,	52 "
Diameter of table	36 "
Whole height of machine	9 ft.
Weight, about	4,000 lbs.

PRICE, $465.00.

Driving pulleys, 3¼ inch face, 16 inch diameter. Cone pulleys take 3 inch belt. Largest section, 14 inch diameter.

Speed of countershaft on drill for ordinary work should be about 200 revolutions per minute.

Diameter of spindle is 2½ inches, and the hole in spindle will take Morse taper drills from $1\frac{9}{32}$ to 2 inches, inclusive.

28 INCH DRILL PRESS.

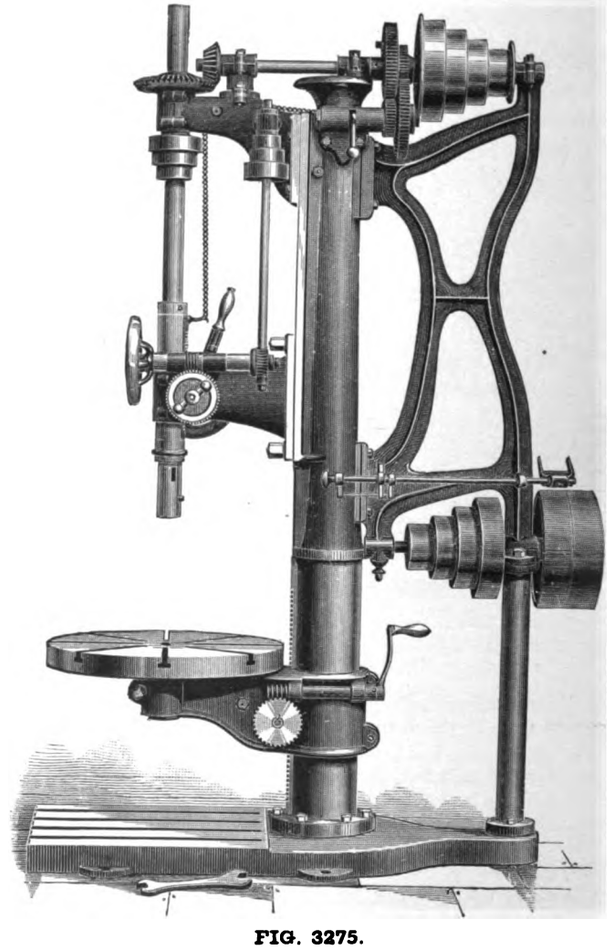


FIG. 3275.

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BACK GEARED SELF FEED DRILL PRESSES.

FIG. 3276 REPRESENTS AN EXTRA HEAVY DRILL PRESS OF SAME GENERAL DESIGN AS FIG. 3277.

Distance from post to center of table, 26 inches. Greatest distance from spindle to base plate, 66 inches. Greatest distance from spindle to table, 45 inches. Vertical traverse of spindle, 15 inches. Diameter of spindle, 2 $\frac{15}{16}$ inches. Hole in spindle fits Morse taper No. 5. Width of belt on cones, 4 inches. Diameter of driving pulleys, 18 inches. Face of driving pulleys, 5 inches. Speed of lower shaft, 125 revolutions per minute. Total height of machine to top of cone, 11 feet. Size of table, 40 x 32 inches. Floor space required, 8 feet 9 inches by 3 feet 4 inches. Weight, 9,500 lbs.

50 INCH TO 30 INCH DRILLS.

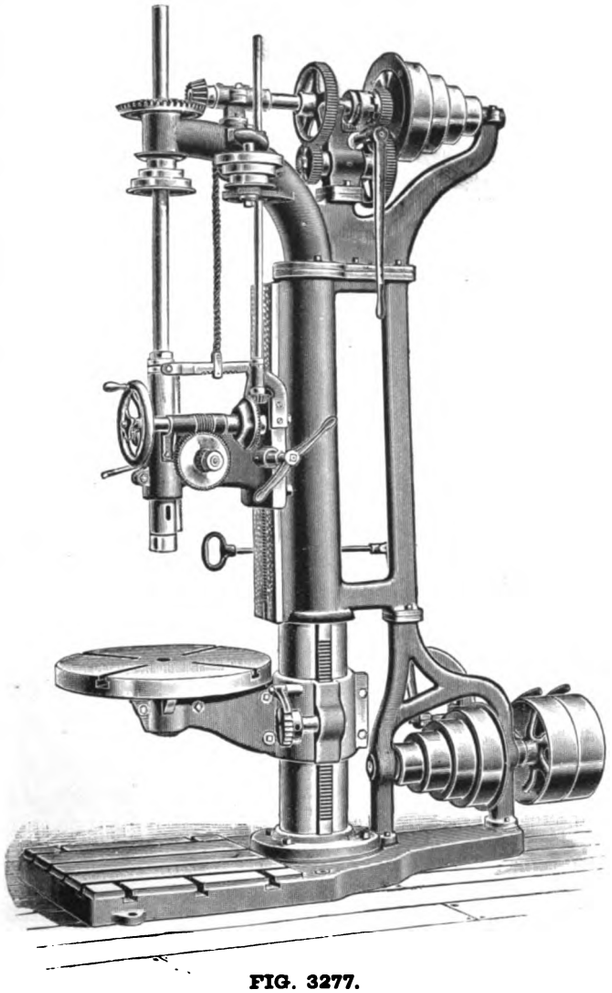


FIG. 3277.

The head is vertically adjustable on the column by means of a rack and pinion. One chain and weight counterbalance both head and spindle, allowing them to be loosened without danger of falling. It has hand and power feed, and quick return movement. By means of an adjustable lever, the spindle can be instantly adjusted to any point within its range. The patented device for throwing the back gears in or out is operated by the lever descending parallel with the column. The holes in spindle conform to Morse taper. We can furnish any of these machines without back gears and without self-feed, if desired.

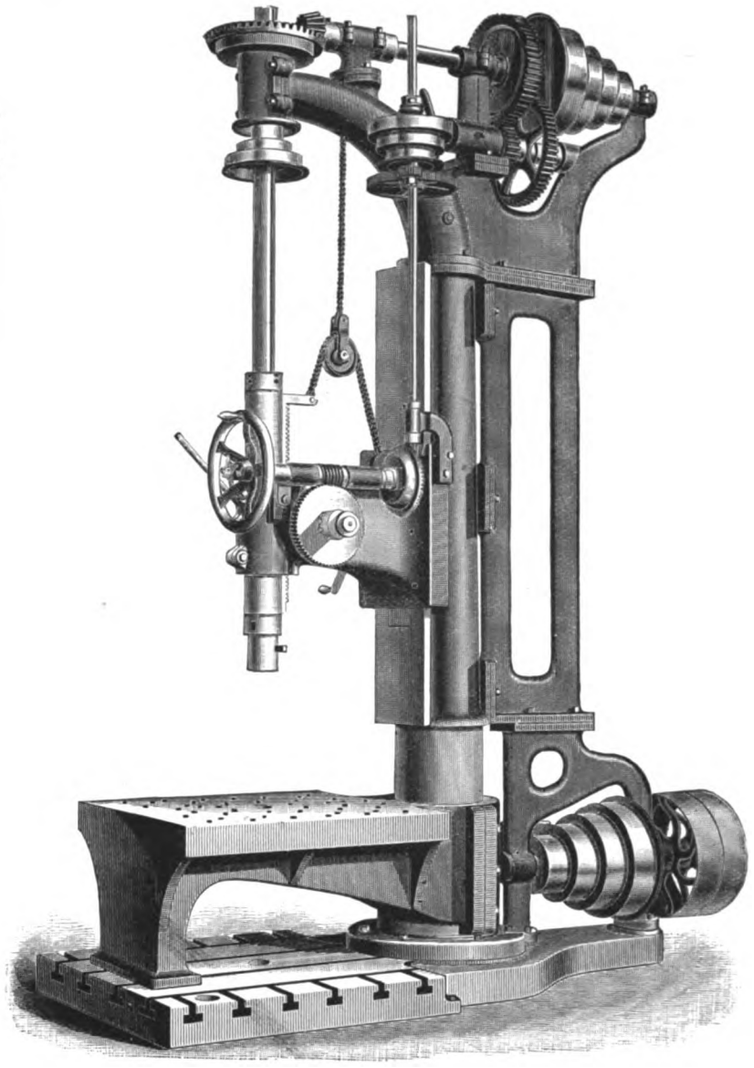


FIG. 3276. MADE IN 50 AND 45 INCH.

DIMENSIONS, FIG. 3277.

SPECIFICATIONS.	30 INCH.	34 INCH.	36 INCH.	42 INCH.	50 INCH.
Distance from post to table	15 in.	17 in.	18 in.	21 in.	25½ in.
Maximum distance from spindle to base plate.	54 in.	54 in.	58½ in.	59 in.	60 in.
Minimum distance from spindle to base plate.	13 in.	15 in.	12 in.	14 in.	14 in.
Maximum distance from spindle to table	38 in.	36 in.	38½ in.	40 in.	39 in.
Vertical traverse of spindle	12½ in.	12½ in.	16 in.	14 in.	15½ in.
Hole in spindle conforms to Morse taper	No. 4	No. 4	No. 4	No. 4	No. 4.
Diameter of spindle	2 in.	2 in.	2¼ in.	2¼ in.	2¼ in.
Ratio of back gearing	4¼ to 1	4¼ to 1	4½ to 1	4½ to 1	4½ to 1
Width of belt on cones	3 in.	3 in.	3½ in.	3½ in.	3½ in.
Diameter of driving pulleys	14 in.	14 in.	16 in.	16 in.	16 in.
Face of driving pulleys.	4 in.	4 in.	5 in.	5 in.	5 in.
Speed of lower shaft	200	200	150	150	150
Total height of machine to top of cone	8 ft. 6 in.	8 ft. 8 in.	9 ft. 6 in.	10 ft.	10 ft. 2 in.
Required floor space	74 × 31 in.	75 × 32 in.	88 × 33 in	96 × 38 in.	96 × 38 in.
Weight	2,800 lbs.	3,000 lbs.	4,000 lbs.	4,800 lbs.	5,600 lbs.

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BACK GEARED SELF-FEED DRILL PRESSES.

26, 24, 22 AND 20 INCH.

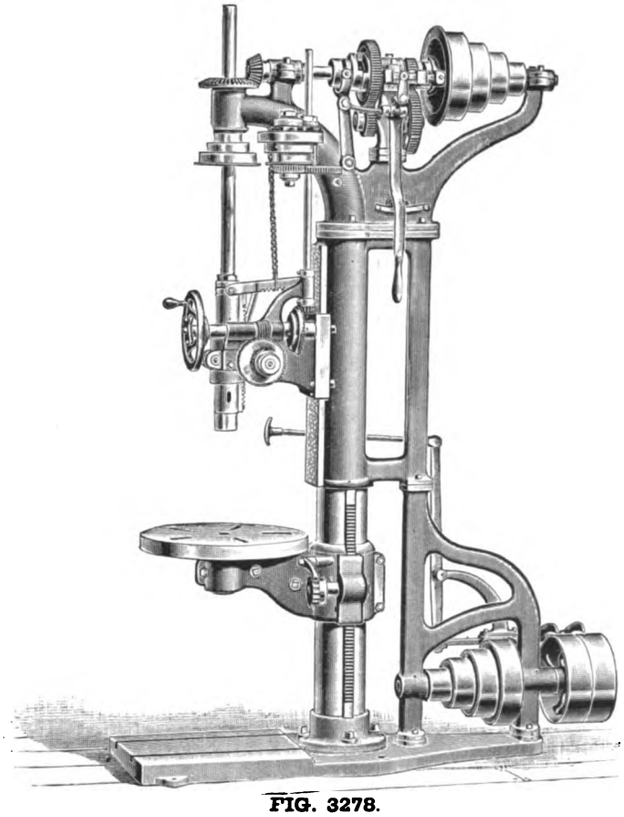


FIG. 3278.

All of these drills are constructed on the same general design, the parts being made proportionately larger as the drill increases in size. The head is vertically adjustable on the column, by means of a rack and pinion. One chain and weight counterbalance both head and spindle, allowing them to be loosened without danger of falling. It has hand and power feed, and quick return movement. By means of an adjustable lever, the spindle can be instantly adjusted to any point within its range. The patented device for throwing the back gears in, or out, is operated by the lever descending parallel with column. The holes in spindle conform to Morse taper. We can furnish any of these machines without back gears, and without self-feed, if desired.

SPECIFICATIONS.	20 INCH.	22 INCH.	24 INCH.	26 INCH.
Distance from post to table	10¼ in.	11 in.	12½ in.	13⅛ in.
Maximum distance from spindle to base plate	43½ in.	47 in.	50 in.	53 in.
Minimum distance from spindle to base plate	17 in.	19 in.	19 in.	14 in.
Maximum distance from spindle to table	31 in.	34¾ in.	37 in.	37 in.
Vertical traverse of spindle	8½ in.	9 in.	10 in.	12 in.
Hole in spindle conforms to Morse taper	No. 3	No. 3	No. 3	No. 4
Diameter of spindle	1½ in.	1⅝ in.	1⅞ in.	1⅞ in.
Ratio of back gearing	4 to 1	4 to 1	4 to 1	4 to 1
Width of belt on cones	2½ in.	2½ in.	2¾ in.	3 in.
Diameter of driving pulleys	10 in.	12 in.	12 in.	14 in.
Face of driving pulleys	3 in.	3 in.	3¼ in.	3½ in.
Speed of lower shaft	240	275	275	210
Total height of machine to top of cone	6 ft. 9 in.	7 ft. 2 in.	7 ft. 8 in.	8 ft. 3 in.
Required floor space	19×56 in.	22×55 in.	24×61 in.	64×25 in.
Weight	1,000 lbs.	1,300 lbs.	1,800 lbs.	2,100 lbs.

32, 28, AND 25 INCH.

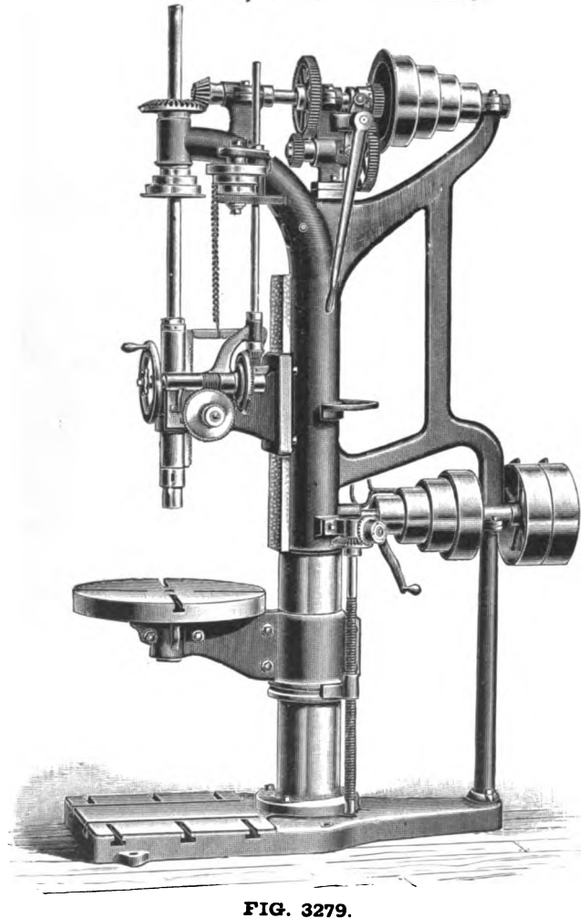


FIG. 3279.

The head is vertically adjustable on the column. One chain and weight counterbalance both head and spindle, allowing them to be loosened without danger of falling. It has hand and power feed, and quick return movement. By means of an adjustable lever, the spindle can be instantly adjusted to any point within its range. The patented device for throwing the back gears in, or out, is operated by the lever descending parallel with column. We can furnish any of these machines without back gears, and without self-feed, if desired.

SPECIFICATIONS.	25 INCH.	28 INCH.	32 INCH.
Distance from post to table	12¾ in.	14½ in.	16½ in.
Maximum distance from spindle to base plate	48 in.	48 in.	54 in.
Minimum distance from spindle to base plate	17 in.	17 in.	15½ in.
Maximum distance from spindle to table	31 in.	31 in.	38 in.
Vertical traverse of spindle	10½ in.	11½ in.	11½ in.
Hole in spindle conforms to Morse taper	No. 3	No. 4	No. 4
Diameter of spindle	1⅞ in.	1⅞ in.	1⅞ in.
Ratio of back gearing	6 to 1	6 to 1	4 to 1
Width of belt on cones	2¾ in.	2¾ in.	3 in.
Diameter of driving pulleys	12 in.	12 in.	14 in.
Face of driving pulleys	3 in.	3 in.	3¼ in.
Speed of lower shaft	275	275	210
Total height of machine to top of cone	90 in.	90 in.	102 in.
Required floor space	60×26 in.	63×27 in.	66×32 in.
Weight	1,600 lbs.	1,850 lbs.	2,300 lbs.

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BACK GEARED AND SELF-FEED DRILL PRESSES.

52, 48 AND 43 INCH SWING.

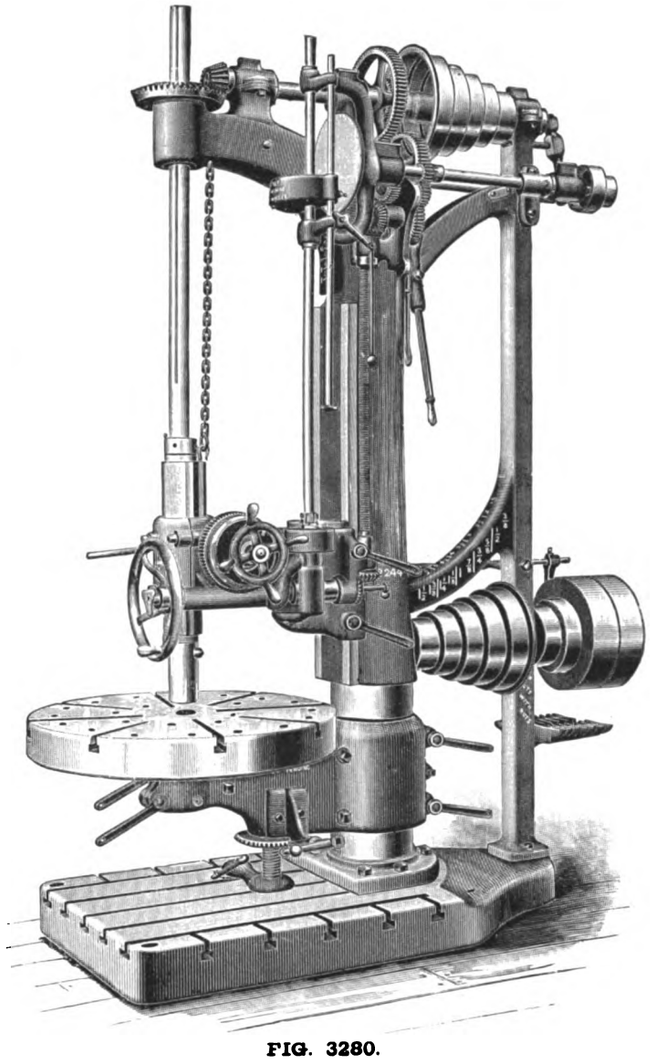


FIG. 3280.

37 AND 32 INCH SWING.

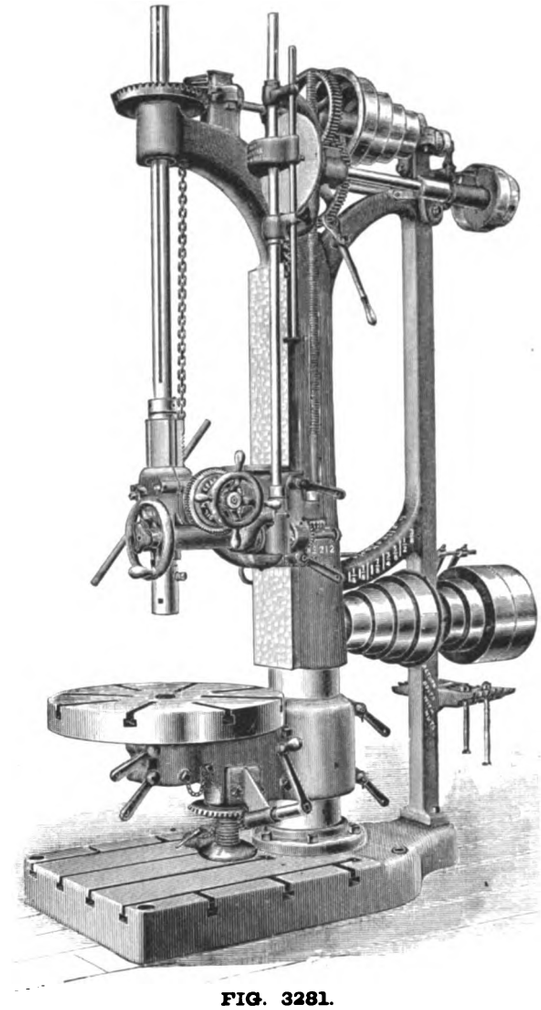


FIG. 3281.

The 25, 22 and 20 inch are similar to above.

TABLE OF DIMENSIONS.

DRILLS TO CENTER OF	52 INCH.	48 INCH.	43 INCH.	37 INCH.	32 INCH.	25 INCH.	22 INCH.	20 INCH.
Height, over all	10 ft. 6 in.		10 ft. 0 in.	9 ft. 3 in.	9 ft. 3 in.	8 ft. 2 in.	7 ft. 10 in.	6 ft. 6 in.
Takes between base and spindle	62 in.		62 in.	60 in.	60 in.	54 in.	47 in.	43 in.
Traverse of spindle	13 in.		13 in.	13 in.	13 in.	12 in.	8 in.	8 in.
Hole in spindle fits Morse taper No.	5		5	4	4	4	3	3
Diameter of spindle	3⅛ & 3½ in.		2½ in.	2 5/16 in.	2 1/16 in.	1 13/16 in.	1 9/16 in.	1 9/16 in.
Diameter of column	12 in.		11 in.	9 in.	9 in.	7 in.	7 in.	6 in.
Diameter of table	46 in.		38 in.	34 in.	28 in.	21 in.	18 in.	18 in.
Diameter of driving pulley	18 in.		16 in.	16 in.	14 in.	12 in.	12 in.	10 in.
Face of driving pulley	5 in.		4½ in.	4 in.	4 in.	3 in.	3 in.	3 in.
Changes of speed, cone driving pulley	5		5	4	4	4	4	4
Revolutions of lower shaft per minute	300		300	300	300	240	220	270
Floor space required, in inches	96 x 45		96 x 38	72 x 34	72 x 29	60 x 22	54 x 22	50 x 21
Weight, about ..... lbs	8,600		5,500	4,000	3,500	2,000	1,600	1,350
Price, back gear, automatic feed	$	$	$	$	$	$	$	$
Price, back gear, hand feed								
Price, automatic feed, no back gear								
Price, hand feed, no back gear								

FOR EXTRAS AND ATTACHMENTS, SEE PAGES 112 AND 113.

PRICES ON APPLICATION.

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SPECIAL TABLES FOR DRILL PRESSES.

COMPOUND TRAVERSE TABLE.

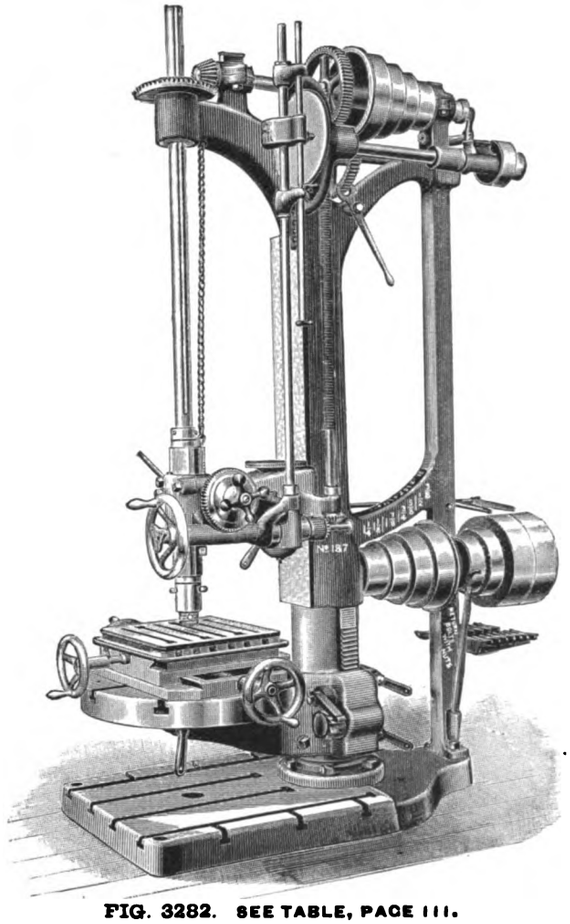


FIG. 3282. SEE TABLE, PAGE 111.

Lower slide has a movement of 18 inches; the upper of 12 inches. Weight, 550 pounds.

PRICE, $.....

ADJUSTABLE SQUARE TABLE.

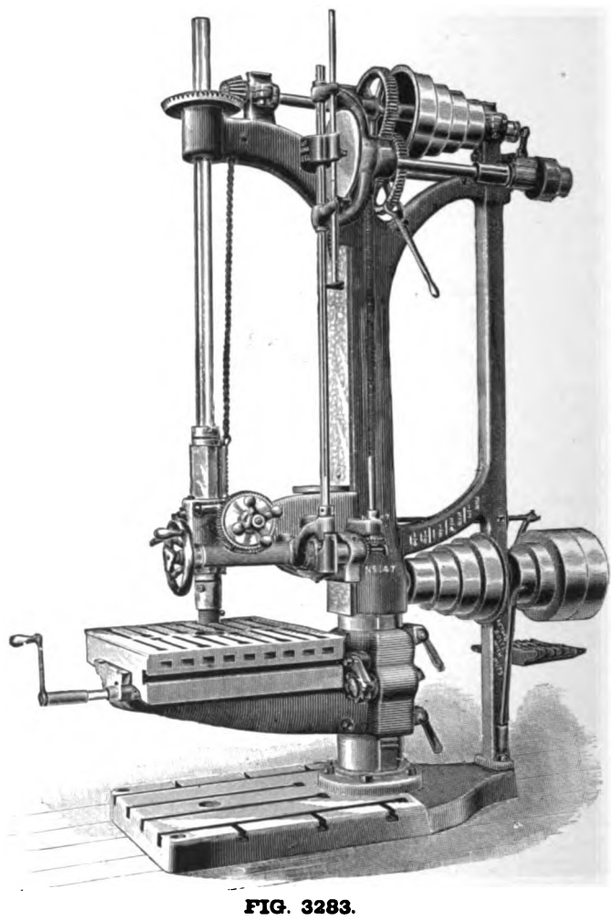


FIG. 3283.

These tables may be applied to drills. See Figs. 3280 and 3281.

PRICES ON APPLICATION.

TAPPING ATTACHMENT FOR DRILL PRESSES.

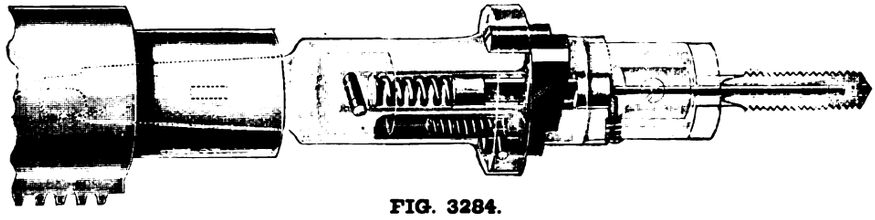


FIG. 3284.

This Tapping Attachment will ordinarily be used in a drill press or similar machine, having been provided with a right and left belt.

TO GO AHEAD.—Lower the upper member until its driving lugs come in contact with projecting drivers of the lower member, press slightly on tap and it will advance toward bottom of hole; as it approaches, the small, projecting tap spindle strikes the bottom, drawing in the drivers of lower member, allowing it to come to rest while the upper member continues in motion. The driving clutch is, of course, disconnected when tap spindle is at bottom of hole.

TO REVERSE.—Draw back cross-head of drill, or other machine, until the pin, passing through shank of lower member, drops to its seat in chamber of upper member, and comes in contact with side-reversing pin; the operating machine having been reversed, the tap is withdrawn from the hole. Any failure of operator to follow up lead of tap in going in and coming out is fully provided for in a safety "trip" for side-reversing pin and clearance between upper and lower members.

They will tap through or bottom holes to any required depth without any adjustment from one size to another.

They will do the work more perfectly than is performed by hand.

They will do the work of five or six men in ordinary machine shop tapping and as many as ten in many kinds of work.

PRICES.

No. 1. Leland Patent Tap Driving Head, with one tap of each of the following sizes: ⅝ in., ¾ in., ⅞ in., 1 in., 1⅛ in. and 1¼ in. ..$50.00

No. 2. Leland Patent Tap Driving Head, with one tap of each of the following sizes: ½ in., ⅝ in., ¾ in..... 35.00

Other sizes made to order.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ATTACHMENTS FOR DRILL PRESSES.

TAPPING ATTACHMENT.

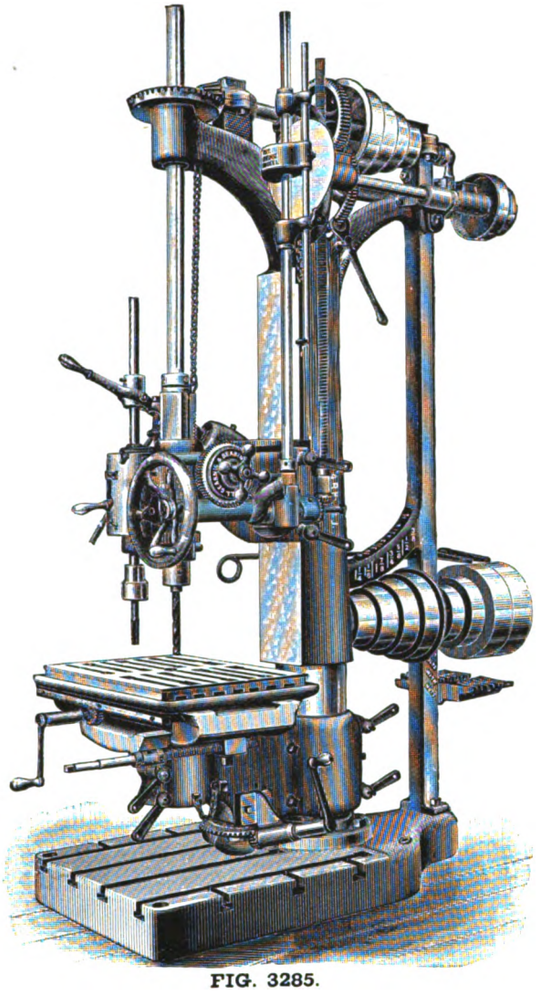


FIG. 3285.

Shows automatic tapping attachment applied to drill press, with compound tapping table allowing of the tapping after boring without removing or loosening work from the table.

DRILL GRINDER AND DRILL CLOSET.

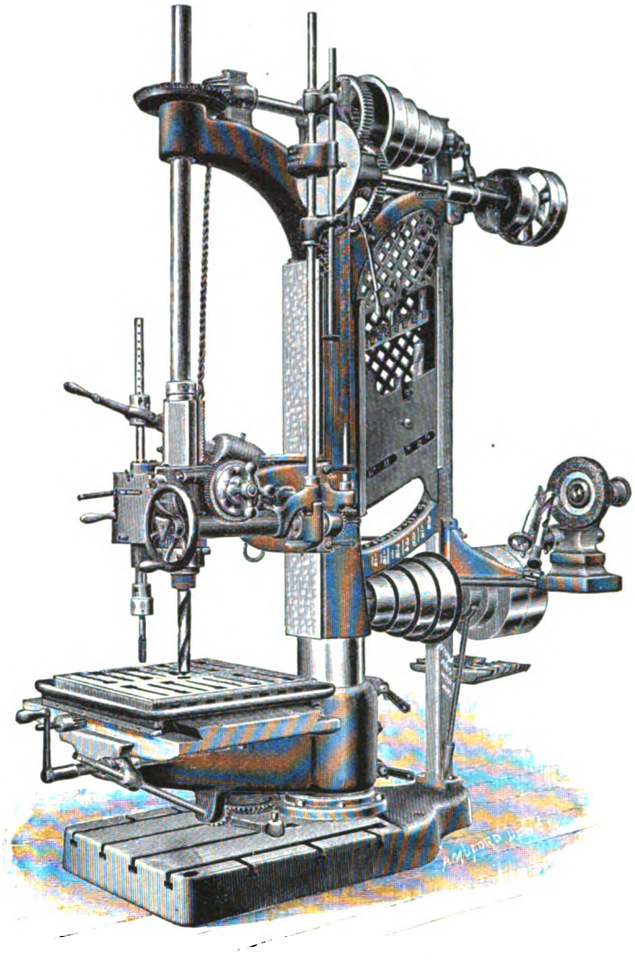


FIG. 3286.

Shows combination of automatic tapping attachment, compound table twist drill grinder and closet where drills are to be kept that may be protected by lock and key.

FRICTION CLUTCH PULLEYS.

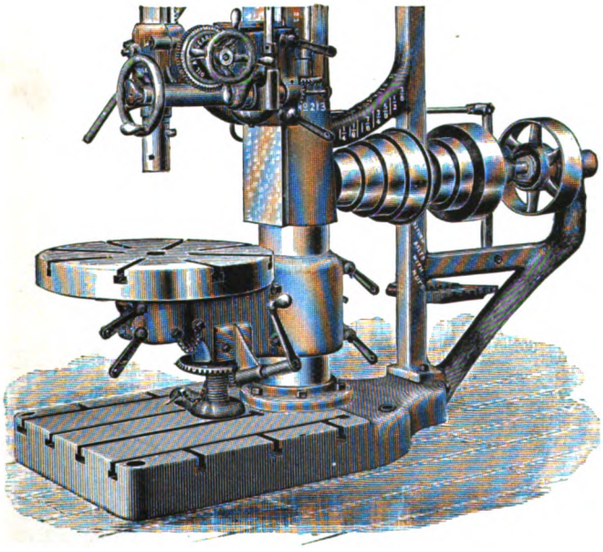


FIG. 3287.

Shows friction clutch pulleys as applied to any drill press for tapping.

Prices on application.

DESCRIPTION, AUTOMATIC TAPPING ATTACHMENT.

The attention of all having holes to tap is called to this important automatic labor-saving device, for tapping holes, either bottoming or through, large or small. After it is set and started it will go the proper depth, reverse and run back, and is ready again for the next hole, without attention. This is done immediately after the hole or holes are drilled, without taking out the drill from spindle, or loosening the work on table.

No reverse belts are needed.

No sliding head has to be raised or lowered.

No delicate mechanism is to be adjusted.

No special taps are required; the parts, etc., are as strong and substantial as the drill press itself.

It reverses about 3½ times quicker than it drives ahead.

PRICES, EXTRA TAPPING ATTACHMENT, FIGS. 3285 AND 3286, AS APPLIED TO DRILLS, FIGS. 3280 AND 3281.

25	inch drill,	drilling up to	¾	inch		$200.00
32	"	"	"	1	"	220.00
37	"	"	"	1¼	"	240.00
43	"	"	"	1¼	"	260.00
48	"	"	"			
52	"	"	"			

PRICES, DRILL GRINDER.

Fig. 3286, 25 in., $80.00. 32 and 37 in., $85.00. 43 in., $95.00.

PRICES, DRILL CLOSET.

Fig. 3286, 25 in., $40.00. 32 and 37 in., $45.00. 43 in., $50.00.

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UPRIGHT DRILLS.

22 INCH SWING.

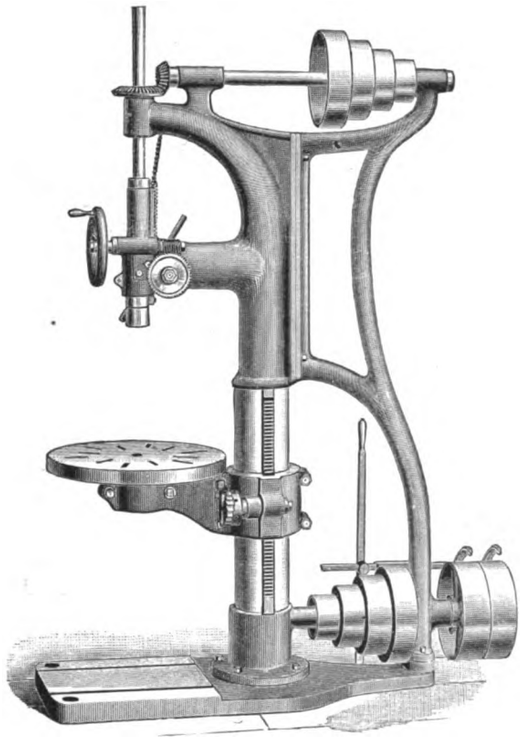


FIG. 3288.

This drill has wheel feed and quick return motion.
It swings 22 inches.
Greatest distance from spindle to table, 25 inches.
Diameter of spindle, 1½ inches.
Vertical movement of spindle, 9 inches.
Hole in spindle conforms to No. 3 Morse taper.
Diameter of table, 20 inches.
Vertical adjustment of table, 18½ inches.
Width of belt on cone pulley, 2¾ inches.
Driving pulleys are 12 inch diameter by 3 inch face, and should make 225 revolutions per minute.
Weight, 1,025 lbs. **PRICE, $** .....

20 INCH SWING.

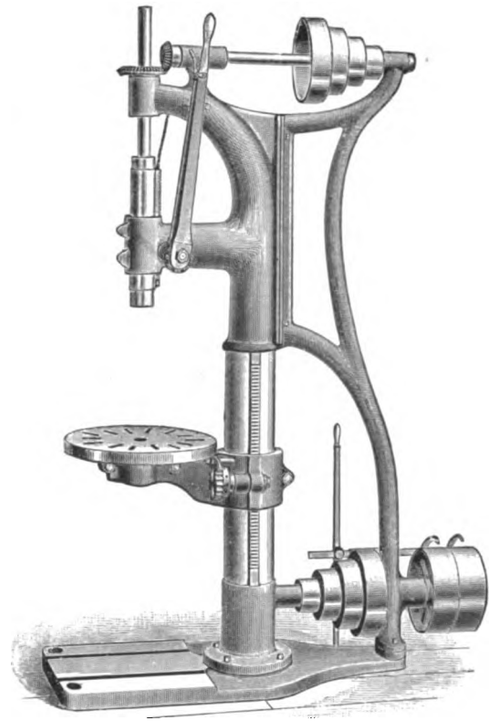


FIG. 3289. BOTH LEVER AND WHEEL FEED.

This drill has lever feed and quick return motion.
It swings 20 inches.
Greatest distance from spindle to table, 25 inches.
Diameter of spindle, 1½ inches.
Vertical movement of spindle, 9½ inches.
Hole in spindle conforms to No. 3 Morse taper.
Diameter of table, 18 inches.
Vertical adjustment of table, 19½ inches.
Width of belt on cone pulley, 2¼ inches.
Driving pulleys are 10 inch diameter by 3 inch face, and should make 260 revolutions per minute.
Weight, 800 lbs. **PRICE, $**.....
This drill can also be furnished with wheel feed and quick return motion. **PRICE, $**.....

17 INCH SWING.

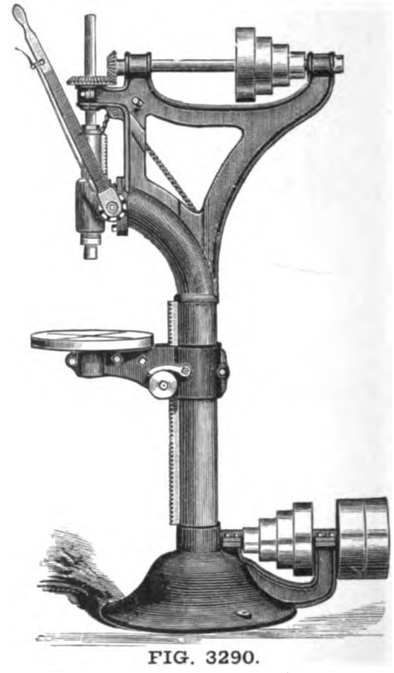


FIG. 3290.

This drill has lever feed and quick return motion.
It swings 17½ inches.
Greatest distance from spindle to table, 24 inches.
Diameter of spindle, 1⅜ inches.
Spindle has a vertical movement of 6½ inches, and is counterbalanced.
Hole in spindle conforms to No. 2 Morse taper.
Diameter of table, 16½ inches.
Vertical adjustment of table, 24 inches.
Width of belt on cone pulley, 1¾ inches.
Driving pulleys are 10 inch diameter by 2½ inch face, and should make 260 revolutions per minute.
Weight, 460 lbs. **PRICE, $**.....

BENCH DRILLS.

13 INCH SWING.

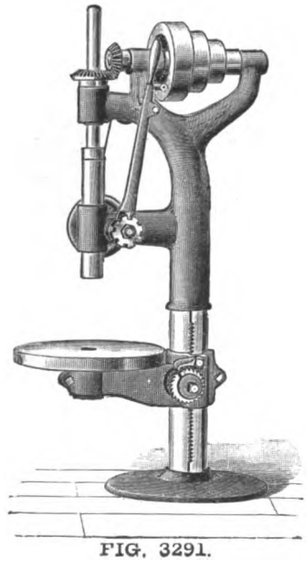


FIG. 3291.

DESCRIPTION, FIG. 3291.

This drill is made to stand upon a bench, and is convenient for sewing machine, gun and lock work, and all other light drilling.
It swings 13 inches.
Greatest distance from spindle to table, 13 inches.
Diameter of spindle, $1\frac{3}{8}$ inches.
Spindle is counterbalanced and has a vertical movement of 5½ inches.
Hole in spindle conforms to No. 2 Morse taper.
Diameter of table, 12 inches.
Vertical adjustment of table, 8½ inches.
Width of belt on cone pulley, 1½ inches.
Countershaft has pulley 6 inch diameter by 2½ inch face, and should make 250 revolutions per minute.
Weight, 210 lbs. **PRICE, $**.....

DESCRIPTION, FIG. 3292.

Distance from post to center of table, 6½ inches.
Greatest distance from spindle to table, 12 inches.
Vertical traverse of spindle, 6¾ inches.
Hole in spindle fits Morse taper No. 2.
Width of belt on cones, 1½ inches.
Diameter of driving pulleys on countershaft, 6 inches; face of driving pulleys, 2 inches.
Speed of countershaft, 250 revolutions per minute.
Bench space required, 24 by 12 inches.
Total height to top of cone, 3 feet 6 inches.
Weight, complete, with countershaft, 225 lbs. **PRICE, $**.....

12 INCH DRILL.

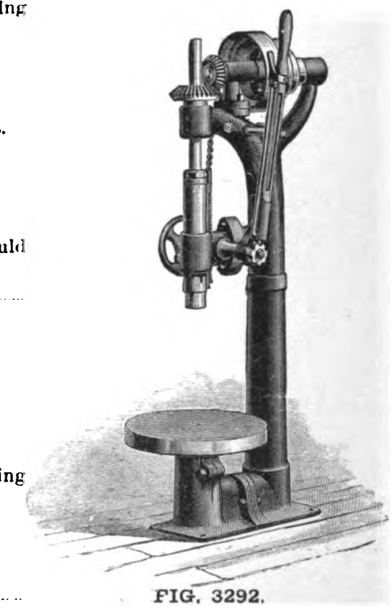


FIG. 3292.

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UPRIGHT DRILLS

21 INCH BACK GEARED DRILL.

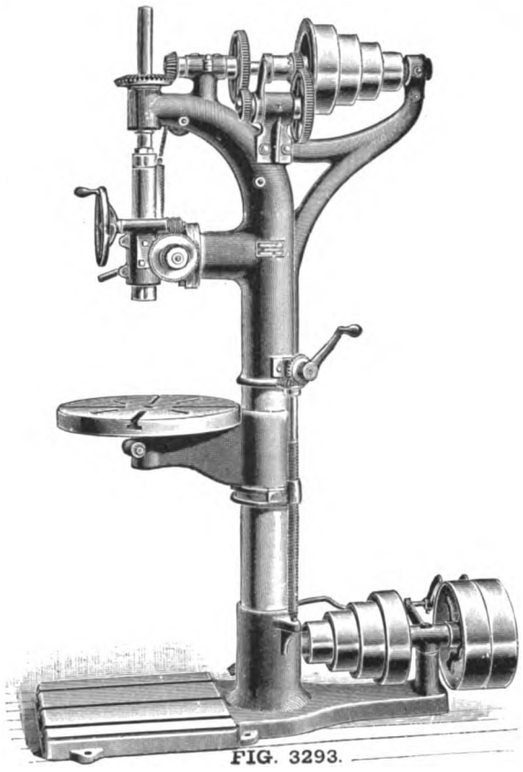


FIG. 3293.

DESCRIPTION, FIG. 3293.

This drill has wheel feed and stationary head. The table is 19 inches in diameter and is arranged to swing around the column. The arm has a vertical traverse on column of 16½ inches, and is operated by means of a rack and pinion. The distance from post to center of spindle is 10½ inches. The spindle has a vertical traverse of 8 inches, and is operated by a steel rack and pinion. Hole in spindle fits Morse taper No. 3. The cone has four changes, carrying a 2½ inch belt, and is driven by tight and loose pulleys, 11½ inches in diameter, 3 inch face, and should make 240 revolutions per minute. The extreme distance from spindle to table is 23 inches. Extreme distance from spindle to base plate is 44 inches. Floor space required, 4 feet 6 inches by 1 foot 10 inches. Extreme height of drill, 6 feet, 6 inches. Weight, 850 pounds.

PRICE, $.....

20 INCH COMBINED WHEEL AND LEVER FEED.

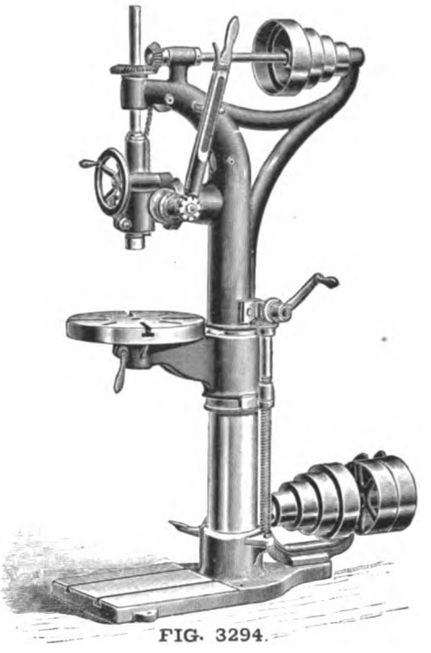


FIG. 3294.

DESCRIPTION, FIG. 3294.

Distance from post to center of table, 10 inches. Greatest distance from spindle to base plate, 41 inches. Greatest distance from spindle to table, 25½ in. Vertical traverse of spindle, 8 inches. Hole in spindle fits Morse taper No. 3. Width of belt on cones, 2¼ inches. Diameter of driving pulleys, 9 inches; face of driving pulleys, 2¾ inches. Speed of lower shaft, 240 revolutions per minute. Floor space required, 44 inches by 15 inches. Total height of machine to top of cone, 5 feet 7 inches.

WEIGHT, 600 LBS. PRICE, $.....

16 INCH BELT DRILL.

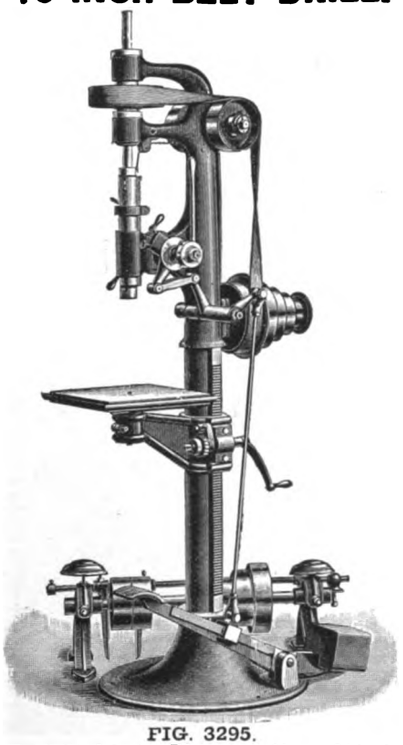


FIG. 3295.

Height, 6 feet. Diameter of base, 24 inches. Diameter of column, 4½ inches. Diameter of spindle, 1⅛ inches. Greatest vertical movement of spindle, 11 inches. Greatest vertical movement of spindle under stop, 7¾ inches. Greatest vertical adjustment of table, 21½ inches. Greatest distance between spindle and table, 29 inches. Hole in spindle to fit No. 2 Morse taper, and will drill holes up to ¾ inch diameter. Weight of drill and countershaft, 700 pounds.

PRICE, $150.00.

Tight and loose pulleys on countershaft are 8 inch diameter, and take 2 inch belt. Countershaft, running 300 revolutions per minute, will give the following speeds: 187, 300, 480, 814.

DESCRIPTION, FIG. 3295.

Either square or round table will be furnished, the former measuring 14 inches, and the latter 15 inches in diameter. Square table has oil channel around the sides, and the hub is chambered and fitted with a plug in the bottom, these serving to keep dirt and oil from the operator's clothes and the floor. The plug may be removed to clean out the hole when necessary.

The table may be removed and a chuck with hollow hub substituted, allowing shafts up to 1⅛ inches in diameter and 34 inches long to be drilled.

When drilling, either the foot lever may be used, or a 14 inch hand lever may be inserted in any of the holes in the hub on the right side of the gear spindle; or, if desired for very fine, light work, the quick return lever on the left side may be used. The spindle may be made to work rigidly up and down, or the full length of its motion, 11 inches, by either of the means named above. A socket is fixed in a convenient place on the side to hold the hand lever when not in use.

10 INCH BELT DRILL.

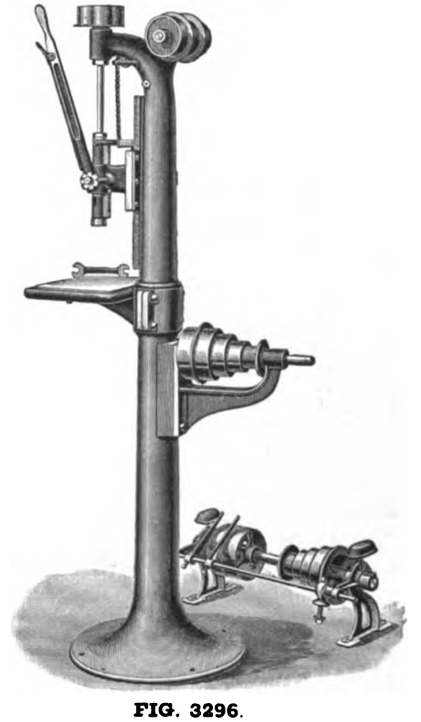


FIG. 3296.

DESCRIPTION, FIG. 3296.

This belt drill has counterbalanced spindle, sliding head and lever feed. It is supplied with an oblong table, 13 inches long by 10 inches wide, made to swing around the column, and which, although not shown in cut, has a vertical traverse on column of 12 inches. The distance from post to center of spindle is 5¼ inches. The spindle has a vertical traverse of 4¾ inches, operated by steel rack and pinion. Hole in spindle fits Morse taper No. 2. The head is fastened by gibs to a planed bearing on the column and scraped to fit accurately. It has a vertical traverse of 12 inches. The machine is driven by a 1¾ inch belt, connected with a four section cone, also carrying a 1¾ inch belt. Countershaft has tight and loose pulleys, 6 inches in diameter, 2 inch face, and should make 250 revolutions per minute.

WEIGHT, 270 LBS. PRICE, $.....

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SENSITIVE DRILLS.

NO. 1, 13 INCH, SWING.

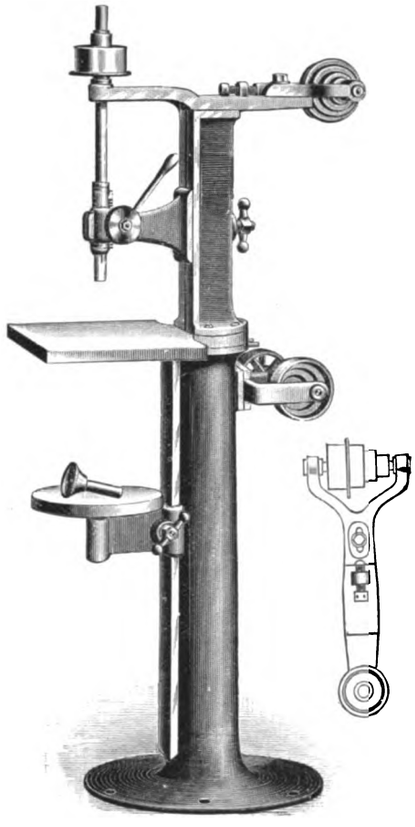


FIG. 3297.

DESCRIPTION, FIG. 3297.

CAPACITY.—The center of spindle is 6½ inches from face of post. On the upper table, work 13 inches, and on lower table 11 inches diameter, can be drilled to center. Extreme height from bottom of spindle to top of upper table is 12 inches; to top of lower table at its lower point, 44 inches. Holes up to ½ inch diameter can be drilled.

SPEED.—The tight and loose pulleys are 4 by 1⅝ inches face, and for ordinary work a speed of 400 revolutions a minute is recommended, which gives, with the three changes of speed on cone, speed of 1,200, 647, 371 on spindle pulley.

WEIGHT, 250 LBS. PRICE, $80.00.

DESCRIPTION, FIG. 3298.

This drill has an adjustable table.

CAPACITY.—The spindle driving pulleys are 4 and 4¾ inches, respectively, in diameter. Pulleys from 2½ to 6 inches diameter fitted, if desired. Three changes of feed are provided by the cone on the back stud. Distance from face of post or front of the slide to center of spindle, 6½ inches. Distance from center to center of spindles, 6 inches. Least distance from bottom of spindle to top of table, 4½ inches; greatest distance between same points, 40 inches. Size of table, 18½ x 13. Throw of spindle by hand lever, 3 inches. Will drill from 0 to ½ inch holes.

We furnish with the drill two depth stops for spindles, an endless belt, a drift key with chain for same, and a countershaft. The tight and loose pulleys on counter are 8 x 2¼ inch face, and for ordinary work should run 250 turns per minute.

WEIGHT, 390 LBS. PRICE, $120.00.

NO. 1, 13 INCH, 2 SPINDLE.

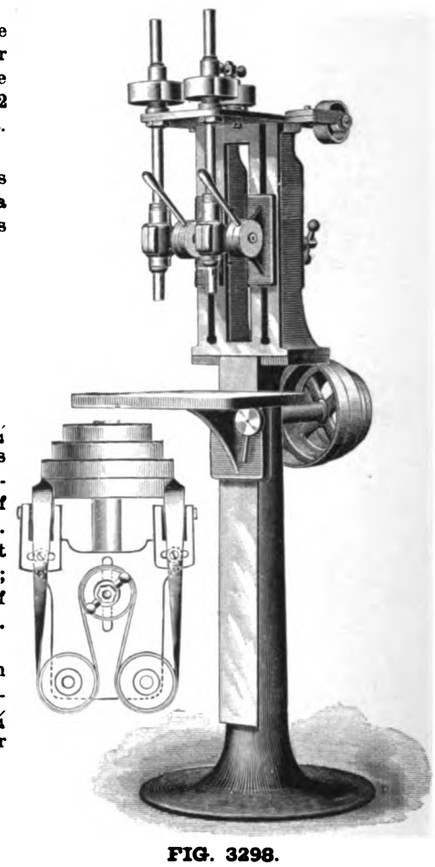


FIG. 3298.

ADJUSTABLE TABLE DRILLS.

NO. 1, 13 INCH, 3 SPINDLE.

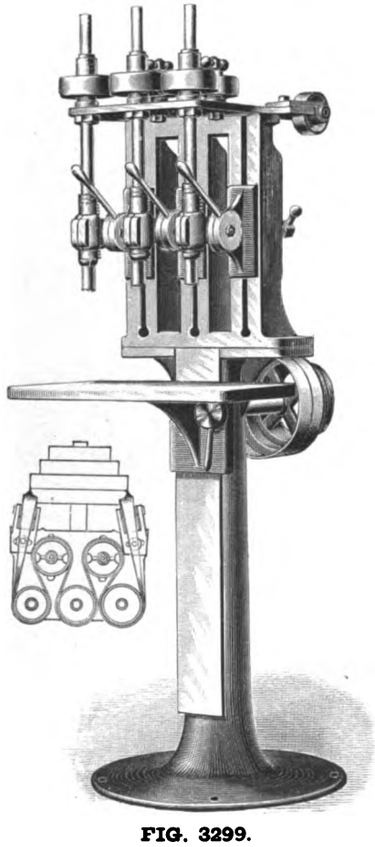


FIG. 3299.

WEIGHT, 525 LBS. PRICE, $160.00.

DESCRIPTION, FIGS. 3299 AND 3300.

CAPACITY.—The distance from face of post, or of slide, to the center of spindle is 6½ inches; from center to center of spindles, 6 inches. Shortest distance from table to bottom of spindle, 4½ inches; greatest distance, 40 inches. Size of table, 13 x 24. Spindles have independent adjustment as to height.

SPEED.—The driving pulleys on the spindles, as regularly furnished, are 4, 4¾ and 5½ inches in diameter. These pulleys can be interchanged from one spindle to the other, or larger or smaller ones used. The idler pulleys are set in adjustable yokes to allow proper lead of belt from them to any diameter pulley on spindle. There are three changes of feed provided on the back cone. On the countershaft are 8 x 2¼ inch face tight and loose pulleys. These, for ordinary work, should run from 250 to 300 turns per minute. Will drill ½ inch hole and under. Depth stops, belt, key drift, etc., furnished.

FOOT ATTACHMENT.

For special work, it is sometimes desirable that the operator shall have both hands free, and in such cases an attachment which can be placed on either No. 1 or No. 2 drill is furnished, consisting of foot lever and adjustable connection with spindle lever. Drill can be operated either by hand or foot power feed. Photograph on application.

PRICE, ATTACHMENT FOR NO. 1 OR NO. 2 DRILL, $8.00 EXTRA.

CENTERING ATTACHMENT.

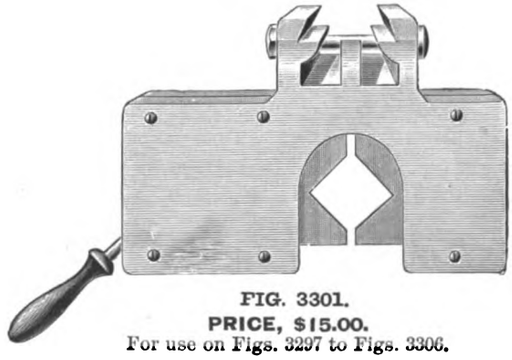


FIG. 3301.
PRICE, $15.00.
For use on Figs. 3297 to Figs. 3306.

NO. 1, 13 INCH, 4 SPINDLE.

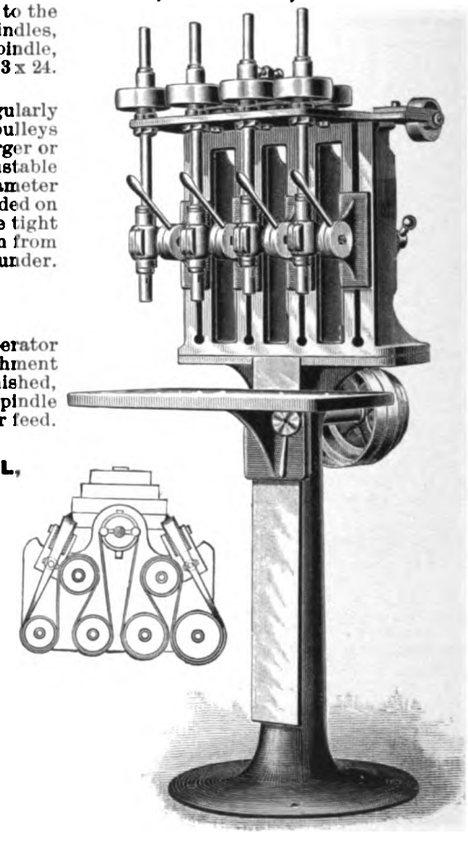


FIG. 3300.

WEIGHT, 610 LBS. PRICE, $200.00.

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SENSITIVE DRILLS.

NO. 1, 10 INCH, SWING.



FIG. 3302.

DESCRIPTION, FIG. 3302.

The spindle is $\frac{3}{4}$ inch diameter, 23½ inches long, made from tool steel, with No. 1 Morse taper hole for chuck shanks. The distance from the face of drill head to center of spindle is 5 inches. The spindle is adjustable to a height of 12 inches from top of table to bottom of spindle. The feed lever will give throw or feed of three inches.

The tight and loose pulleys on lower cone are 4½ by 1⅝ inch face, and for ordinary work a speed of 400 revolutions is recommended.

WEIGHT, 225 LBS. PRICE, $70.00.

DESCRIPTION, FIG. 3303.

This drill differs from the No. 1 style in the manner of driving the spindle pulley, and in the fact that it requires a countershaft independent of the drill frame. The change was made to obviate any objection that might be made to quarter twist driving belt used on the No. 1 drill, and to give more power where the drill was used up to its extreme capacity. This is accomplished by belting from the driving pulley on the back cone up over the two idlers to spindle pulley. This insures a good length of belt.

This 10 inch swing style does not have steel rack in spindle sleeve, but a cast iron cut rack, same as used for several years, into which a steel pinion works.

The countershaft, illustrated, has tight and loose pulleys, 5 by 2¼ inches, and, for ordinary work, should run 350 revolutions per minute, giving, with the three changes on cone, speed of 1130, 640, and 378 turns per minute on the spindle.

The slotted end of detached arm, shown on cut of countershaft, fits loose over a pin on the shipper; the other end is drilled for a ⅞ round rod, by which connection is made to shipping handle on drill within reach of the operator. In consequence of above, these two points should be set about perpendicular. The counter is interchangeable, end for end. The loose pulley and boxes are self-oiling.

As to capacity and sizes we refer to the description of the No. 1, 13 inch swing, and the No. 1, 10 inch swing drills.

PRICES.

13 inch swing and counter, weight 265 lbs.,.....$90 00
10 " " " " 235 " 80.00

PRICE LIST OF 19 INCH SWING DRILLS, WITH ADJUSTABLE TABLE.

We make a line of two, three and four spindle drills that will drill to the center of 19 inches. They are the same as the regular 13-inch swing style, with the exception of swing.

PRICES.

Two spindle, 19 inch swing.....$145.00
Three spindle, 19 inch swing..... 190.00
Four spindle, 19 inch swing..... 240.00

NO. 2, 10 AND 13 INCH, SWING.

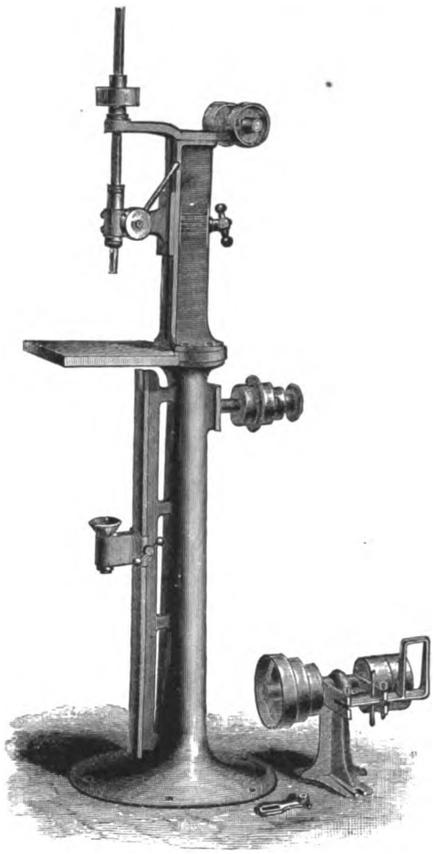


FIG. 3303.

NO. 2, 10 IN., 2 SPINDLE.

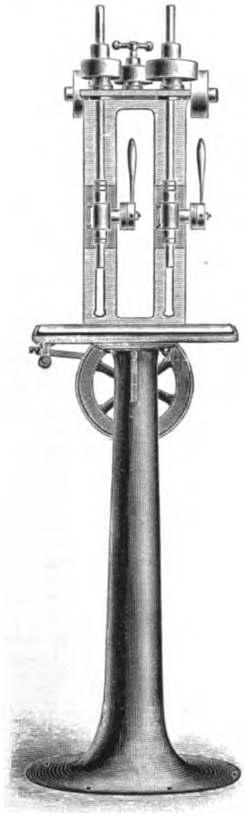


FIG. 3304.
SEE NEXT PAGE FOR PRICES.

NO. 2, 10 IN., 3 SPINDLE.

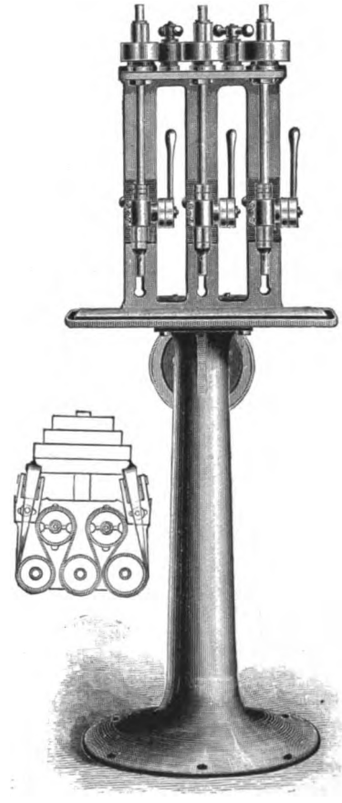


FIG. 3305.
SEE NEXT PAGE FOR PRICES.

NO. 2, 10 IN., 4 SPINDLE.

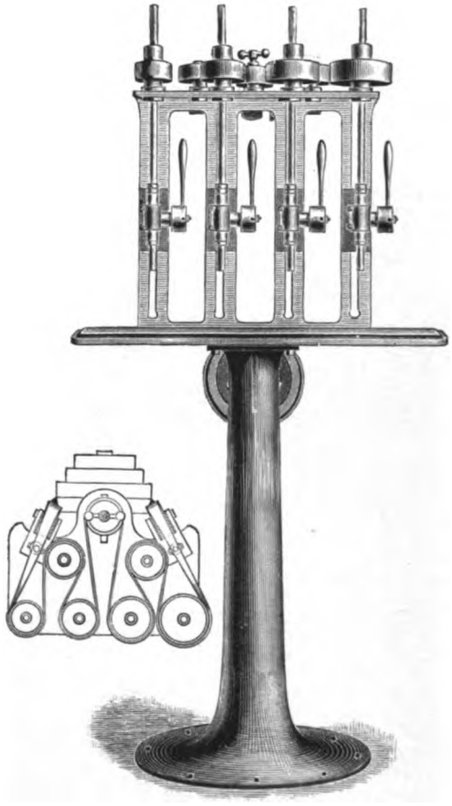


FIG. 3306.
SEE NEXT PAGE FOR PRICES.

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PRICES, FIGS. 3304, 3305 AND 3306.

EXTRA SWING.

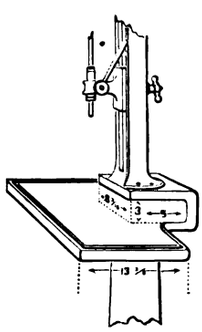


FIG. 3307.

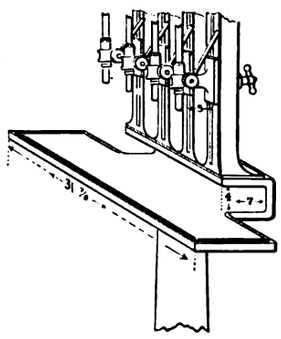


FIG. 3308.

AS APPLIED TO THE 10 INCH SWING DRILLS.

Fig. 3307 shows a 10 inch swing post and special table, mounted on the column usually used under the two spindle drill. This design of table, gives a swing of 21 inches for four inches clear above table. The two, three, and four spindle drills of this swing not having tables adjustable on the columns, a table, as shown in Fig. 3308, is used, which gives a swing to center of 19 inches, four inches above table.

PRICE OF 10 INCH DRILLS, EXTRA SWING.

	Drill to center of	Price.
Fig. 3307, one spindle	21 inches.	$7.00
Two spindle	19 "	8.00
Three spindle	19 "	10.00
Four spindle	19 "	12.00

AS APPLIED TO 13 INCH SWING DRILLS.

The two, three, and four spindles of this style have an adjustable table on the slide in front of column that at all times provides for 13 inch swing. We put a simple] piece under the post, and do not interfere with the sliding table. Fig. 3307 is mounted on the same post as shown above.

PRICE OF 13 IN. SWING DRILLS, EXTRA SWING.

	Drill to center of	Price.
Single spindle	24 inches.	$8.00
Two spindle	22 "	9.00
Three spindle	22 "	11.00
Four spindle	22 "	13.00

10 INCH SWING, TWO, THREE, AND FOUR SPINDLE DRILLS.

FIGS. 3302 TO 3306.

These tools are of uniform capacity as to the taking in of work. The swing is to the center of 10 inches Distance from center to center of spindles is 6 inches; distance from top of table to bottom of spindle, at greatest elevation, 12 inches. Spindles are of tool steel, 23½ inches long, ¾ inch diameter. The spindles are all driven by the endless belt, tightening pulleys being provided, as described, on the 13 inch swing drills of same number of spindles.

The following pulleys are put on the respective drills to drive spindles, unless otherwise ordered.

On the two spindle, 4 and 4¾ inches diameter, 1⅝ inch face; on the three spindle, 4 inch, 4¾ and 5½ inches diameter, and 1⅝ inch face; on the four spindle, 3½, 4, 4¾ and 5½ inches diameter, and 1⅝ inch face. These are driven from a driving pulley on the cone on back stud, 10 inches diameter. The spindle pulleys can be interchanged on the drills, as the idlers run in adjustable yoke bearings, so that the proper lead of belt from the idler to the spindle pulley can be secured. For special work any pulleys from 2½ to 5½ inches diameter can be used. On the cone three changes of speed are provided for. A countershaft, with corresponding cone, is furnished, and the tight and loose pulleys on same are 8 inches diameter, 2¼ inch face, and for ordinary work, these should run from 250 to 300 turns per minute.

The capacity of these drills is for holes ½ inch diameter and less. With each drill is furnished an endless belt to drive same, depths, stops, and drift-key, and chain.

The tables have oil groove around same. Size of tables, inside oil groove, as follows: Two spindle, 11 x 16 inches; three spindle, 11 x 22 inches; four spindle, 11 x 30 inches.

PRICES.

Two spindle drill, 10 inch swing, including counter; weight 325 lbs	$108.00
Three spindle drill, 10 inch swing, including counter; weight, 475 lbs.	145.00
Four spindle drill, 10 inch swing, including counter; weight, 550 lbs.	180.00

10 AND 13 INCH BENCH DRILLS.

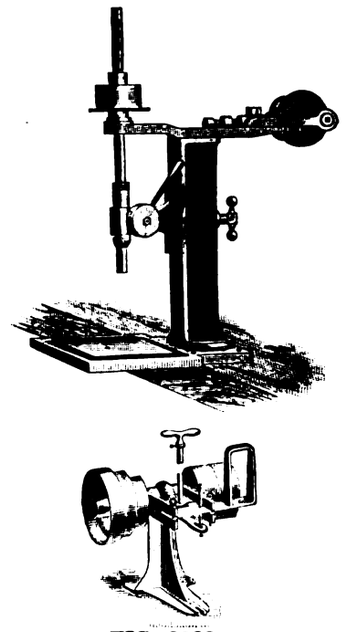


FIG. 3309.

The post, top and drill head is that of either the 13 inch swing or 10 inch swing drill, mounted on a substantial table which is provided with groove for oil drip. This table is designed to bolt to the bench as shown in the cut. With this drill is furnished an endless belt to drive the spindle, and a special countershaft, with cone pulley. The tight and loose pulleys on counter are 5 inches diameter, 2¼ inch face, and for ordinary work should run 350 turns per minute, giving, with the three speeds on cone, speed of 1,130, 640 or 378 turns per minute on spindle. The countershaft is interchangeable, end for end; a ⅞ round rod is used to connect shipper. The loose pulley and box of counter are self-oiling. Size of table 10 inch swing drill, 9½ x 11; table 13 inch swing drill, 11 x 11 inches.

PRICES.

13 inch swing bench drill and counter	$60.00
10 inch swing bench drill and counter	54.00

NO. 00 DRILL.

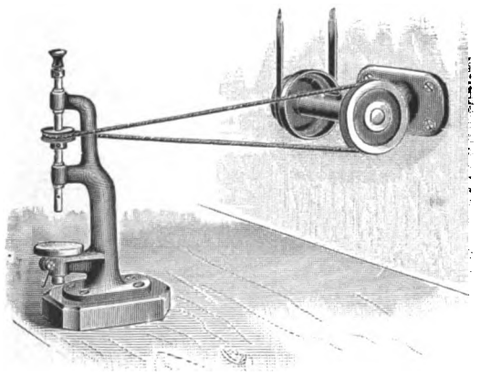


FIG. 3310.

The above drill is adaped to very light work. Drills No. 40 and smaller can be used. It can be set on bench, and run from a wall counter, as shown, or if a number are required a light shaft with a number of driving pulleys can be used.

By setting the top of driving pulley on the wall counter slightly higher than the center of the driving pulley on spindle, the tension of the belt will lift the spindle, and keep it at the point of its highest throw, and at the same time not in any way interfere with the down feed. The spindle is .4 Stubbs drill rod. It runs in brass bushings, which can easily be renewed in case of wear. The button runs loose on shank let in to top end of spindle; the lower end has taper hole for chuck shank. Table, 3 inches in diameter, swing to center of 4½ inches. Pulley on spindle, 1½ inches diameter grooved for ⅜ round belt.

Wall counter has 4 inch diameter grooved pulley, and three step cone. We make an overhead counter with corresponding cone and pair of tight and loose pulleys, 4 inches in diameter, 1¼ inch face, which, for ordinary work, should make 200 revolutions per minute, this giving a range of spindle speed from 1,100 turns for slow to 1,800 for fast speed.

PRICES.

Drill	$12.00	Overhead counter	$6.00
Wall counter	4.00	Complete	22.00

POST OR BENCH DRILL.

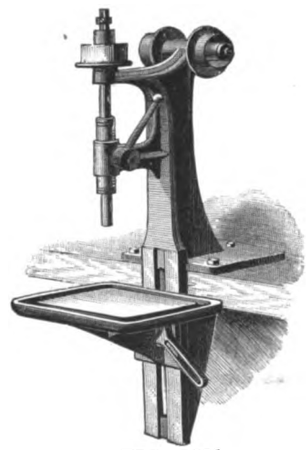


FIG. 3311.

This drill is intended for electrical and mathematical instrument work and general light manufacturing. The machine, it will be seen, takes up but little space. Photograph will be sent showing the grouping of these drills on all sides of a bench, all driven from one countershaft with friction clutch pulleys. The driving is done through one long belt passing over idler pulleys, and the spindle pulley runs on a hollow stud, which takes the pull of the belt instead of the spindle. The spindle has an adjustable stop on the upper end to regulate the depth of hole. The table is light, has oil groove, and is quickly adjusted and bound by the fixed wrench shown. We make another style of column for the same drill, which is adapted to fastening to the wall or a post.

Capacity	0 to ⅜ in.
Diameter of spindle	11/16 "
Travel of spindle	3½ "
Vertical adjustment of table	16½ "
Tight and loose pulleys	4½ x 2 "
Speed of countershaft	320 rev.
Largest drill used	⅜ in.
Weight, with countershaft	150 lbs.
PRICE, including small chuck and countershaft	$50.00

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SENSITIVE DRILLS.

1 SPINDLE.

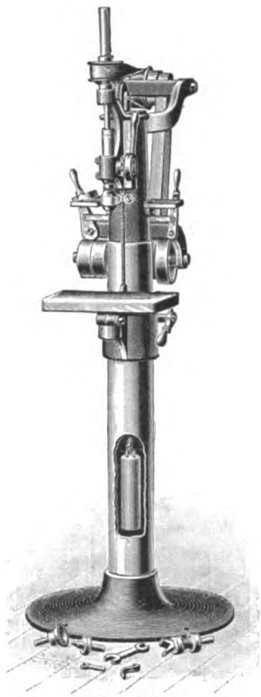


FIG. 3312.

Circular work, as pulleys or gears, can be admitted on this drill of a diameter of 12 inches, the spindle projecting more than 6 inches from the face of the column.

Diameter of tight and loose pulleys is 4 inches, the recommended speed being 450 revolutions, and shipping levers will be found on either side of machine.

PRICE OF DRILL, $90.00.

APPENDAGES:

⅝ Almond drill chuck, fitted	Price,	$5.50
V with extension	"	1.25
Dead center	"	1.50
Bell center	"	1.75

WEIGHT, 310 LBS.

2 SPINDLE.

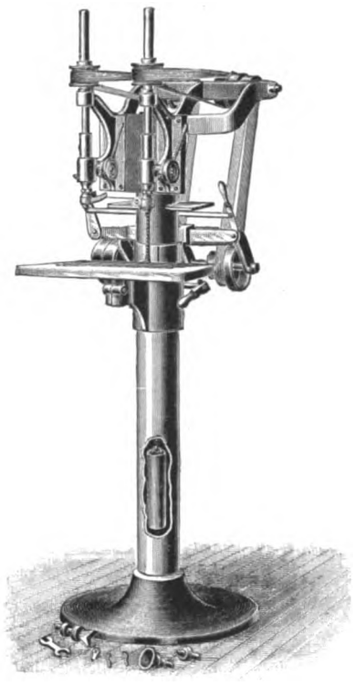


FIG. 3313.

This machine, besides carrying two spindles, has a somewhat greater capacity than the single spindle drill, as it admits work of a diameter of 13½ inches on the table.

Diameter of tight and loose pulleys is 5 inches, the recommended speed being 450 revolutions, and shipping levers will be found on either side of machine.

PRICE OF DRILL, $135.00.

APPENDAGES:

⅝ Almond drill chuck, fitted	Price,	$5.50
V with extension	"	1.25
Dead center	"	1.50
Bell center	"	1.75

WEIGHT, 425 LBS.

3 SPINDLE.

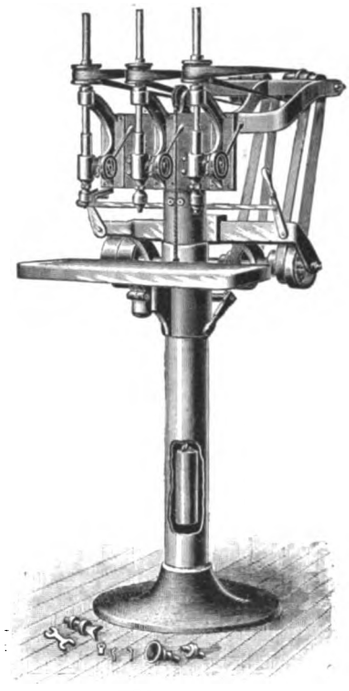


FIG. 3314.

Center spindle admits work of a diameter of 12 inches.

Outer spindles admit work of a diameter of 17 inches.

Diameter of tight and loose pulleys is 6 inches, the recommended speed being 450 revolutions, and shipping levers will be found on either side of machine.

PRICE OF DRILL, $175.00.

APPENDAGES:

⅜ Skinner chuck, fitted	Price,	$8.50
⅝ Almond drill chuck, fitted	"	5.50
V with block	"	1.25
Dead center	"	1.50
Bell center	"	1.75

WEIGHT, 550 LBS.

The downward throw of the drill, without re-adjustment of the table, is 2¼ inches.

The table has a vertical range of 30 inches, and shafts can be centered to the length of 38 inches. The table is also counterbalanced by weight inside of column, and can be turned to right or left as required.

On the stud of the lever pinion is a clamp stop, that is instantly adjustable to determine the depth of hole to be drilled to the limit of the traverse of the spindle.

On the side of the column is a planed line, and on the table bracket a corresponding mark, which, when coincident, insure the exact agreement of the center of hole in table and of the spindle.

The spindle is fitted to No. 1 Morse drill taper, and has three changes of speed.

The spindle and its appurtenances are counterbalanced by an open coiled spring concealed in a cylindrical case above the spindle pulley.

KNEE DRILLS.

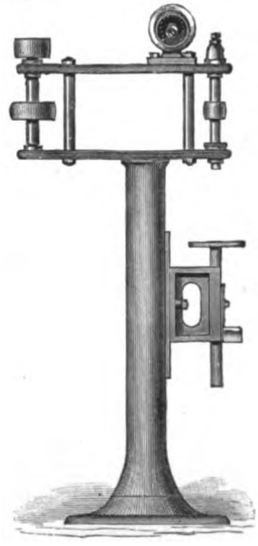
DESCRIPTION, FIG. 3315.

This machine is designed for light drilling up to ⅜ inch, and is very sensitive. It is operated by knee pressure, leaving the hands free to handle the work to be drilled, which can be done very rapidly. It is especially adapted for skate work, gun work, electrical work, and light hardware generally. The drill can be run at a high rate of speed for small drills. The boxes are of bronze, and are adjustable to take up any wear.

DIMENSIONS.

Size of table	6 x 12 in.
Diameter of spindle	1 1/8 "
Hole in spindle to fit No. 2 Morse taper.	
Size of pulley on spindle	2½ "
Distance from center of spindle to center of upright shaft	20 "
Length of spindle	12¾ "
Size of belts	2 "
Weight of machine and counter	400 lbs.

PRICE, $65.00.



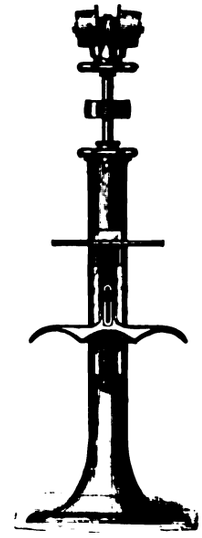


FIG. 3315.

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LIGHT DRILL PRESSES.

No. 1.—1 OR 2 SPINDLES.

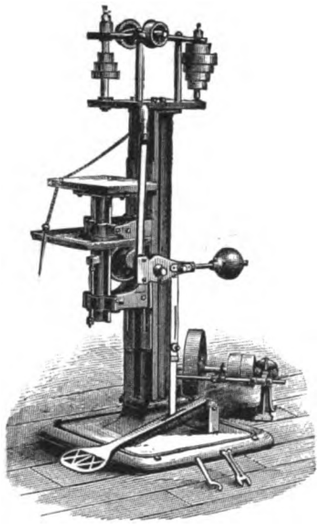


FIG. 3316.

This machine is designed more for jobbing than for manufacturing, and is fitted up with one or two spindles. Those with two spindles have a cone pulley, allowing two speeds for each spindle. Those fitted up with one spindle have a cone pulley for three speeds. The back shaft has a cone pulley for four speeds. With the above mentioned alterations the press is the same as No. 2 in every particular.

The 2 spindle press will drill holes from ..... 1/16 to 3/8 in. diam.
The 1 spindle press will drill holes from ..... 1/16 to 1/2 in. diam.
Size of pulleys on 2 spindle ..... 1½, 2½, 2 and 3 x 1 in. face.
Size of pulleys on 1 spindle ..... 2½, 3½, and 4½ x 1 in. face.
Size of pulleys on countershaft, tight and loose ..... 6 x ½ in.
Number of revolutions per minute 180
Weight of machine and countershaft ..... 650 lbs.
PRICE of 2 spindle press **$160.00**
" " 1 " " as shown in cut, **150.00**

No. 2.—3 OR 4 SPINDLES.

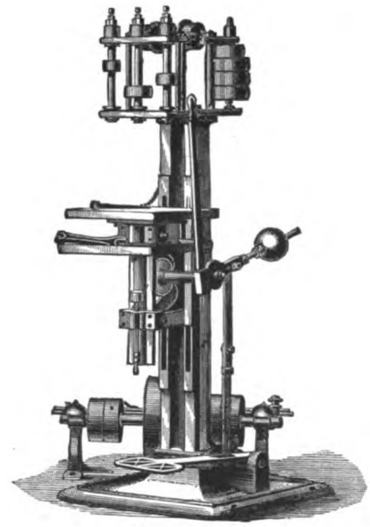


FIG. 3317.

The spindles are made of steel, 1 1/8 inch diameter, hardened and ground, and 12 inches long, with taper holes for tool shanks, ½ inch diameter and 2½ inches deep, with drift key way to remove the tool from the spindles. The arrangement for the spindles, and the adjustment on the column and table are the same as described in press No. 4. The arrangement for communicating power to the drum is unlike the other machines; it is more simple, and high speed and little power is required on this press for drilling holes 1/16 to 3/8 inch diameter. The base has a raised rim around its edge for catching oil, etc.

Greatest distance from lower end of spindle to table ..... 19 in.
Shortest distance from lower end of spindle to table ..... 4 "
Length of table ..... 18 "
Width " ..... 12 "
Distance, center to center of spindles ..... 4¾ "
Tight and loose pulleys on countershaft ..... 6 and 8 x 2½ in. face.
Speed of countershaft for fast motion ..... 220 rev.
" " " slow " ..... 165 "
Weight, complete ..... 700 lbs.
PRICE, as shown in cut **$175.00**
" with four spindles **190.00**

No. 3.—4 OR 6 SPINDLES.

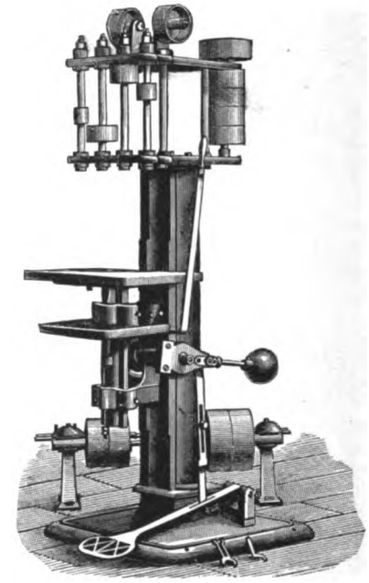


FIG. 3318.

This press is designed to drill holes from 1/16 to ½ inch diameter. The spindles are 1 1/16 inch diameter, and hardened and ground, as are also the idler pulley studs. There is a tapered hole in the spindle for receiving the shank of tool, which is ½ inch diameter at large end, and 2⅞ inches deep, with a mortise for drift key to remove the tools from the spindle. The upright shaft, which carries the drum, runs in hardened steel bearings, making this a perfect running press in every particular.

When so ordered, we are prepared to furnish an individual lever movement for the spindles in place of the regular table movement. In this case the table is mounted on a plain knee bolted to the face of the column, but adjustable up and down.

Greatest distance from lower end of spindle to table ..... 18 in.
Shortest distance from lower end of spindle to table ..... 4 "
Length of table ..... 22 "
Width " ..... 14 "
Distance, center to center of spindles ..... 4⅝ "
Pulleys on countershaft, tight and loose ..... 8 and 10 x 3 in. face.
Countershaft should run on the 8 in. pulley ..... 120 rev.
Countershaft should run on the 10 in. pulley ..... 90 rev.
Weight of press and countershaft ..... 850 lbs.
PRICE, as shown in cut **$250.00**
" with six spindles **290.00**

No. 4.—4 OR 6 SPINDLES.

This machine is very heavy, and designed for drilling holes ranging from ¼ to ⅞ inch diameter; also for counterboring, reaming or face milling. The spindles are made of steel, 1 5/16 inch diameter and 20 inches long, and are held down by adjustable hardened steel steps at top of frame. The lower end has a taper hole to receive the shank of tools, ¾ inch diameter and 4 inches deep, with mortise for drift key to remove the tools from the spindle. The spindles run in composition metal boxes fitted up in a very substantial manner, with ample means of adjustment for wear. The table on which the work is placed has hand and foot levers connected by a milled rack and gear to elevate and lower the table, in connection with adjustable stops to limit the exact motion required. The table guide frame is planed to fit the front of the column by tongue and groove guides, so that the whole table and frame, with all the attachments, can be raised or lowered up or down the column by means of a wire cable with a worm and gear, and can be held in a true position at all points.

Greatest distance from lower end of spindle to the table ..... 20 in.
Shortest distance from lower end of spindle to the table ..... 6 "
Length of table ..... 26 "
Width " ..... 16 "
Length of spindle ..... 20 "
Diameter " ..... 1 5/16 "
Distance between spindles ..... 5 "
Pulleys on countershaft, tight and loose, 12x3½ in. face.
Revolutions of countershaft per minute 140
Weight of press, with countershaft, about ..... 1,200 lbs.
PRICE, with countershaft, as shown in cut. **$350.00**
" with six spindles **400.00**

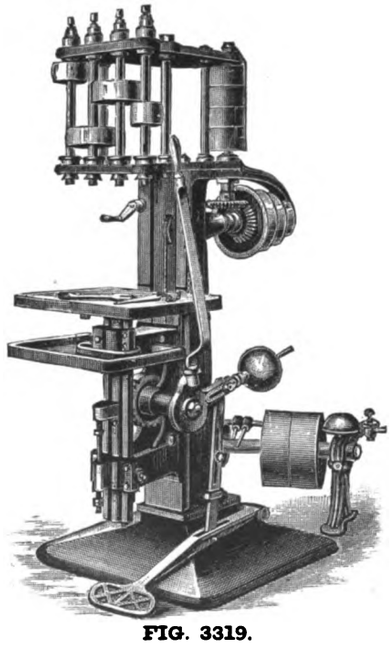


FIG. 3319.

PRICES AND DIMENSIONS.

	No. 1.	No. 2.	No. 3.	No. 4.
Capacity	1/16 to ½	1/16 to 3/8	1/16 to ½	¼ to ⅞
Greatest dist. bet. spindle and table	18½	19	18	20
Least distance bet. spindle and table	4	4	4	6
Length of feed	4	4	3½	4
Diam. of spindle	1 1/8	1	1¼	1 5/16
Length of table	15	18	22	26
Width "	10	12	14	16
Distance bet. centers of spindles.	4¾	4¾	4⅝	5
Countershaft pulleys	6x2½	6& 8x2½	8 & 10x3	12x3½
Speed of countershaft (fast)	180	220	120	140
Speed of countershaft (slow)	.....	165	90	
Weight, complete	650	700	850	1,200
PRICES.				
As shown	$150	$175	$250	$350
With 2 spindles	$160			
" 4 "	.....	$190		
" 6 "	.....	.....	$290	$400

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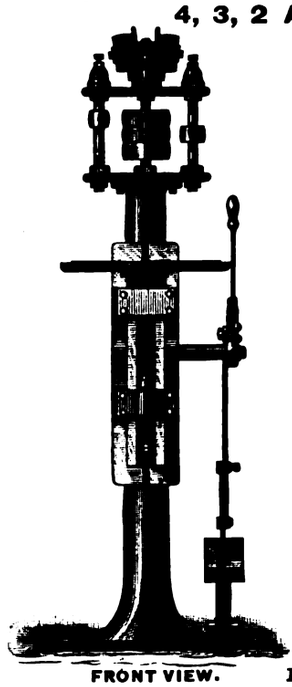
GANG DRILLS.

4, 3, 2 AND 1 SPINDLE.

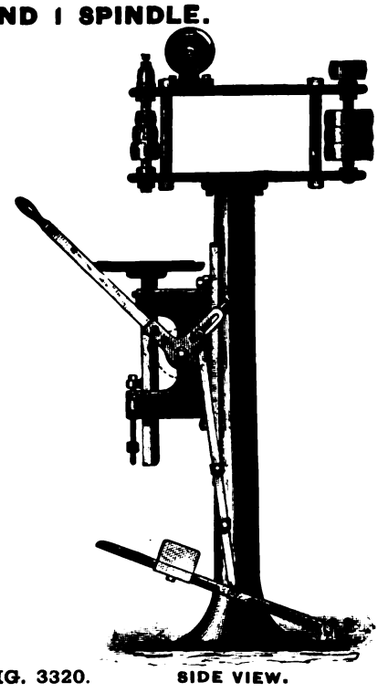
DESCRIPTION, FIG. 3320.

Distance from end of spindles to table	4 to 16 in.
Size of table	12 x 18 "
Distance from center to center of spindle	5 "
Diameter of spindles	1⅛ "
Hole in spindle to fit No. 2 Morse taper.	
Size of pulleys on spindles	2, 2½ and 3 in. x 1¾ in. face.
Distance from center of spindles to center of upright shaft	22 in.
Length of spindles	12 "
Size of belt from countershaft to machine	2 "
Size of tight and loose pulleys on countershaft	6 and 8 in. x 2½ "
Speed of counter to obtain 1,000 revolutions on spindle with 3 in. pulley	138

1 spindle drill	550 lbs.	**PRICE,** $120.00
2 spindle drill	600 "	" 135.00
3 spindle drill	650 "	" 150.00
4 spindle drill	700 "	" 165.00



FRONT VIEW.



SIDE VIEW.

FIG. 3320.

3 SPINDLE.

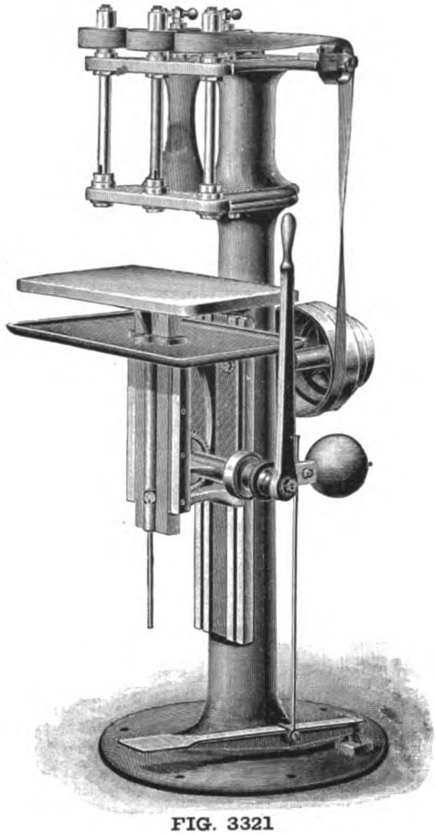


FIG. 3321

The spindle in lower bearing is 1⅛ inches in diameter. It runs in a gun-metal box with nuts for take-up. It will drill holes from ⅝ inch to 0.

Prices on application for 4 and 5 spindle drills.

Greatest distance from lower end of spindle to table	19 in.
Shortest distance from lower end of spindle to table	3 "
Length of table	21 "
Width of table	13 "
Distance center to center spindle	6½ "
Distance face of column to center spindle	8 "
Size of spindle	1 "
Taper hole in spindle	Morse, No. 2
Size pulley on spindles	3¾, 4¾, 5¾ in. diam.
Face	1½ in.
Size cone driver	10 "
Tight and loose on counter	8 x 1¾ "
Speed of counter	220
Weight drill and counter	700 lbs.

PRICE, INCLUDING COUNTERSHAFT, $225.00.

SPECIAL 7 SPINDLE DRILL.

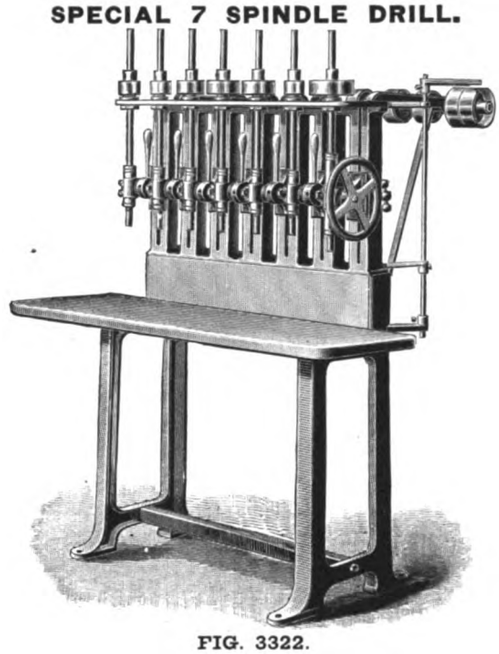


FIG. 3322.

The above cut of 7 spindle drill represents a tool made for one of the large typewriter manufacturing companies. A pair of side frames, once placed in the drill jig, had some 80 operations performed under the spindles. The number of spindles corresponded to the number of different sized drills and counterbores required to complete the work in this line.

The above drill had a clearance of 18 inches from bottom of spindle to top of table. Prices on other sizes quoted on application.

PRICE, WITH COUNTERSHAFT, $350.00.

4 SPINDLE AUTOMATIC CAM FEED DRILL.

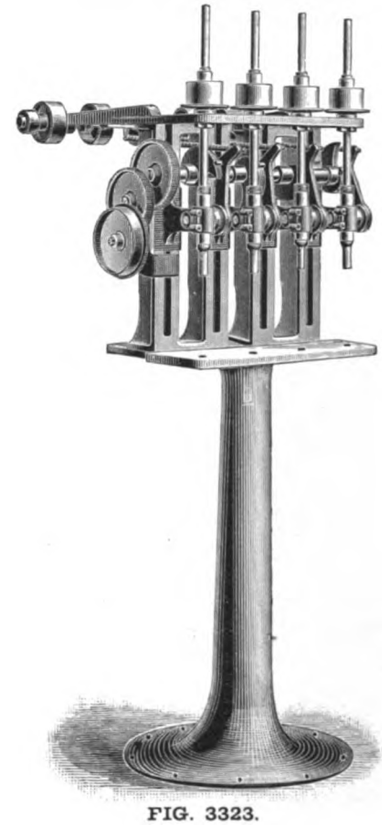


FIG. 3323.

DESCRIPTION, FIG. 3323.

This cut shows an adaptation of our drills which is made for special work. The spindles are driven with a quarter twist belt from shaft supported by top frame. On this shaft are tight and loose pulleys, and a feed pulley, which drives the geared feed shaft, on which are located cams set quartering. These cams, working against pins on the feed levers, feed the spindles down, and at completion of throw springs attached to the same levers raise the drills.

A suitable work-holder or jig should be provided. This we will make as an extra, if desired.

The feed and time of cam motion should be adapted to do the work intended to the best advantage. From 2 to 12 spindles can be set up on suitable frame, the profitable limit being all that an operator can get work out of and into.

On one of the 4 spindle style recently made, 24 holes per minute are drilled and countersunk, each spindle drilling 6 per minute, and giving the operator 2½ seconds to get piece out and in.

We would suggest that parties send sample of work they desire to do, with order or inquiry.

WEIGHT, 550 LBS. PRICE, WITH COUNTER, $250.00.

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6, 4 AND 3 SPINDLE AUTOMATIC FEED DRILLS.

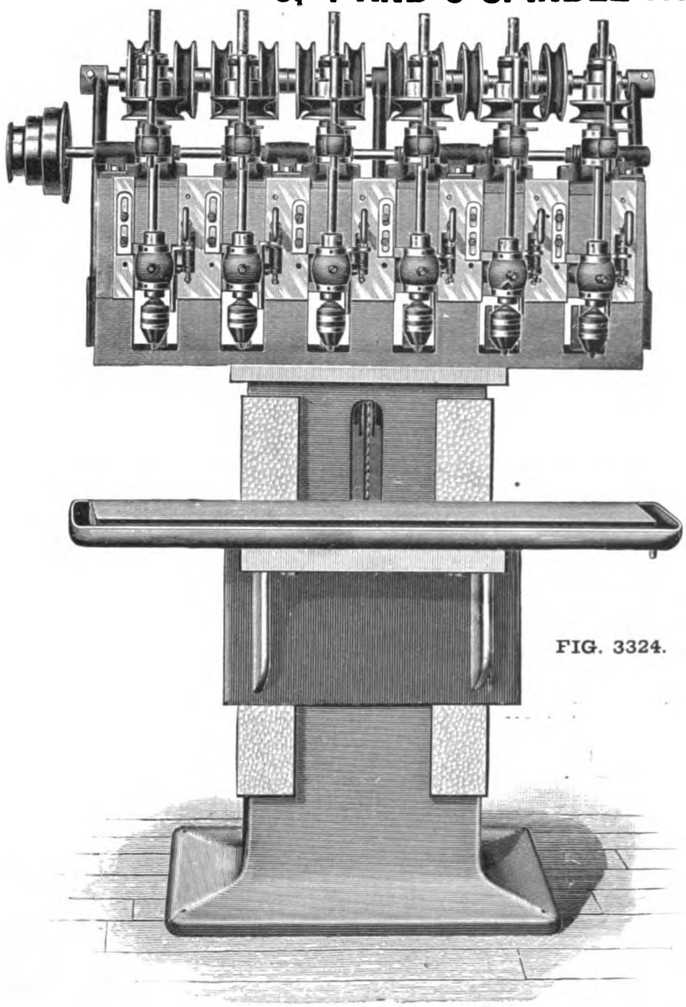


FIG. 3324.

It will drill holes to ⅜ inch diameter, and spindle has down feed of 2½ inches. Each spindle is entirely independent of the others.

The feed is automatic, and can be set to feed any depth of hole up to its capacity, and when through its work the feed is released and the drill returns to place.

The spindles are run by round belts in V grooved pulleys, and are so arranged that there is no strain of belts whatever on the spindles.

The row of grooved pulleys back of spindles are simply idlers to carry the belts to countershaft on ceiling, which can be set in any position.

The machine is provided with two countershafts, having a four step cone each for change of speed for various sizes of drills. The speed of countershaft given will give a range of speed on the spindles of 250 revolutions per minute on slow speed, and 1,270 on fast speed. The table can be lowered on column to take in 18 inches. Speed of first counter from main line, 190 revolutions per minute. Weight, 1,000 lbs.

PRICES.

6 spindle automatic drill press	$400.00
4 " " " "	350.00
3 " " " "	300.00

MULTIPLE SPINDLE DRILL.

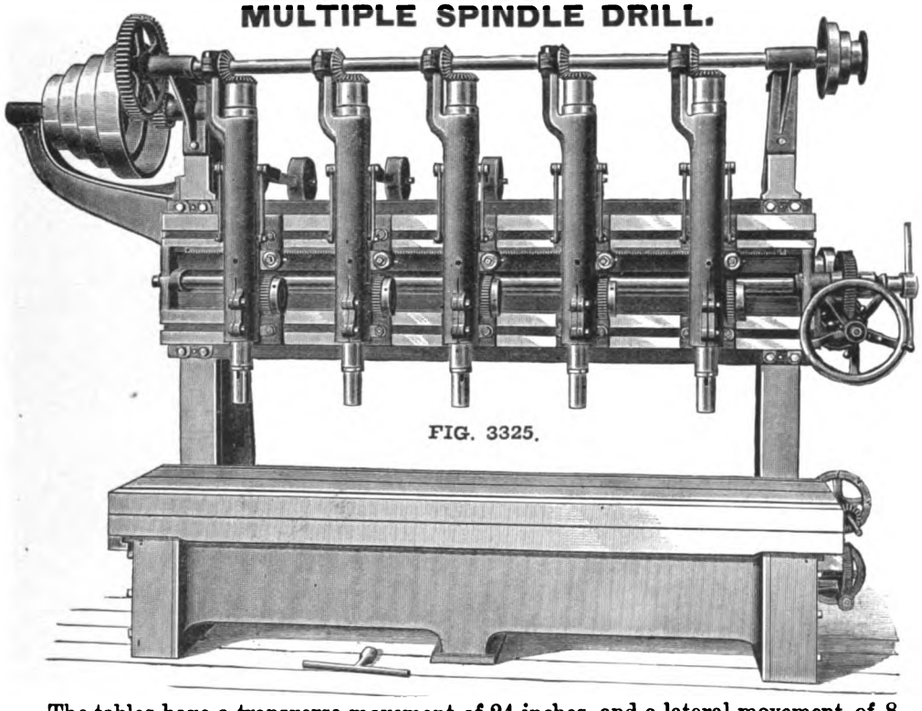


FIG. 3325.

The tables have a transverse movement of 24 inches, and a lateral movement of 8 inches, is capable of drilling five 1½ inch holes through 6 inches of wrought iron or steel plates, at one time. Greatest distance from spindles to table, 18 inches. Vertical traverse of spindles, 12 inches. Minimum distance between centers of spindles, 8 inches. Width of belt on cones, 4¼ inches. Weight, 9,500 lbs.

We can furnish this machine with any length of frame, and with any number of spindles. Countershaft and wrenches accompany each machine.

4 AND 3 SPINDLE AUTOMATIC FEED DRILLS.

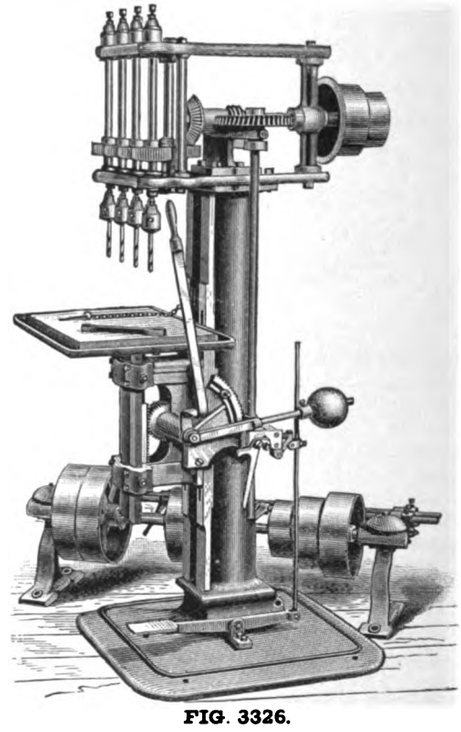


FIG. 3326.

These drills have gearing to the spindles, and an automatic vertical feed to the tables. There is an automatic trip for feed, adjustable to any point, and can be readily disengaged by hand. The lever feed can be employed, when desired, without any change of parts.

PRICES ON APPLICATION.

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FRAME DRILLS.

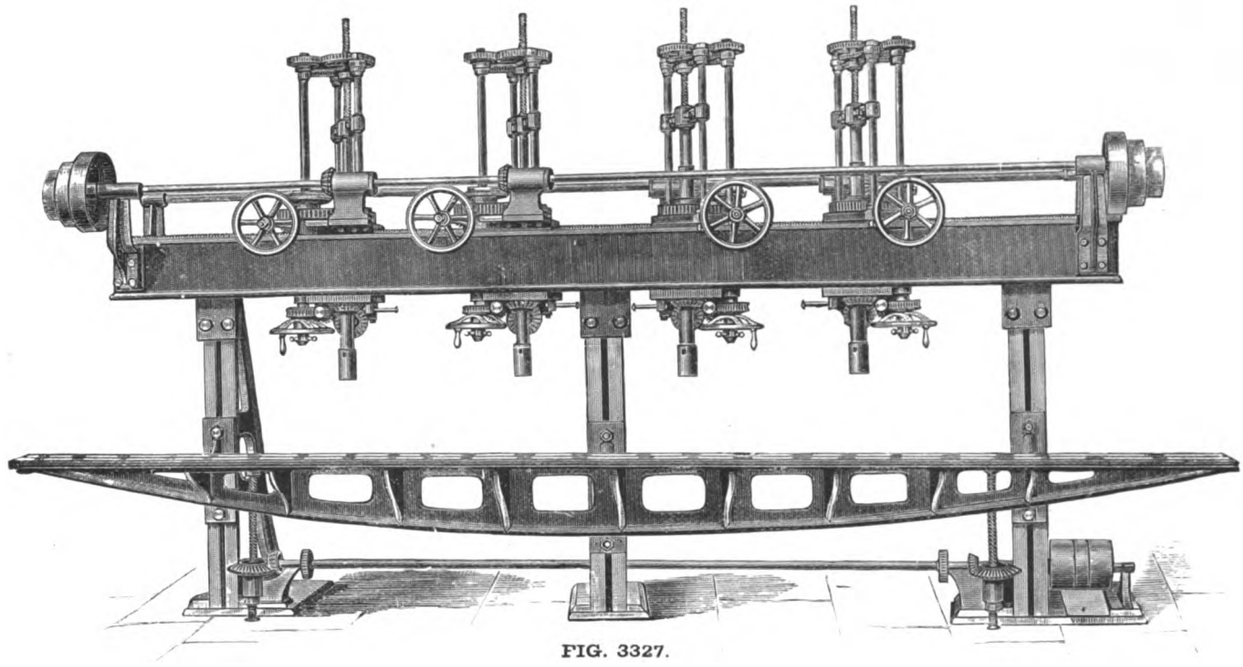


FIG. 3327.

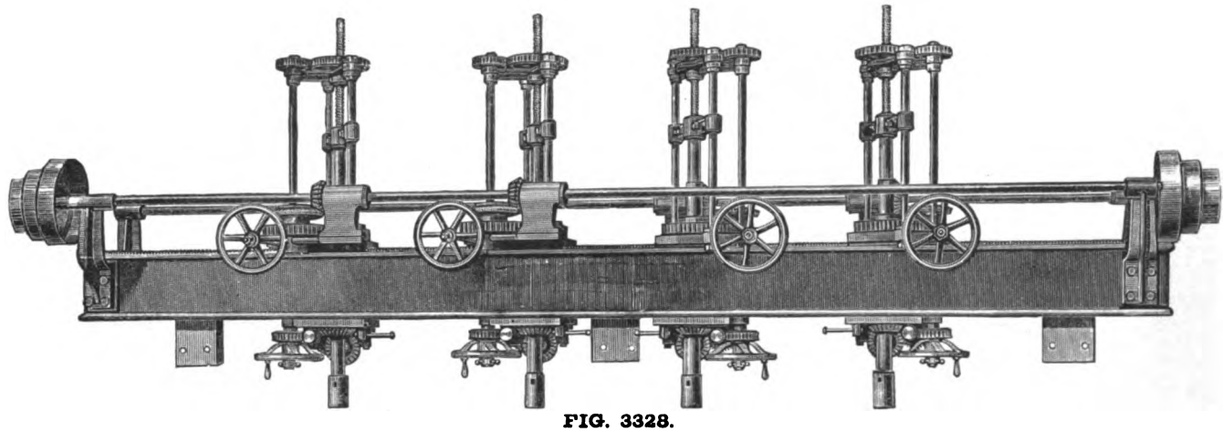


FIG. 3328.

The four spindle drill is not only a locomotive frame drill, but equal to four complete drill presses for locomotive work; in fact, it is adapted to any such work where one man can run one or more spindles to advantage.

The table is raised and lowered quickly by gearing, so that when a frame has to be turned over to drill the other side, the table is brought into position again quickly. We furnish two spindle drills, same design.

The four spindle drill, without uprights and table, is made in this way so it can be bolted to columns in the shop, or to brackets on the wall, and so the purchaser can make a suitable arrangement of table for the class of work to be done. Some of the locomotive builders find it a great saving of labor on such work as boring tube sheets, drilling rivet holes in the bottom ring around a locomotive boiler furnace, etc. We can furnish two spindle drills of same design.

Spindles are $2\frac{7}{16}$ inches diameter, and have a vertical movement $13\frac{1}{2}$ inches, with automatic feed.

Countershaft furnished for both ends of each drill.

PRICES.

Fig. 3327, with 4 spindles and table, taking 11 feet 6 inches between spindles. Weight, lbs. Price, $.....

" 3327, " 2 " " " " 8 " 6 " " " " " " $.....

" 3328, " 4 " no table, " 11 " 6 " " " " " " $.....

" 3328, " 2 " " " " 8 " 6 " " " " " " $.....

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10, 8 OR 6 SPINDLE ARCH BAR DRILLS.

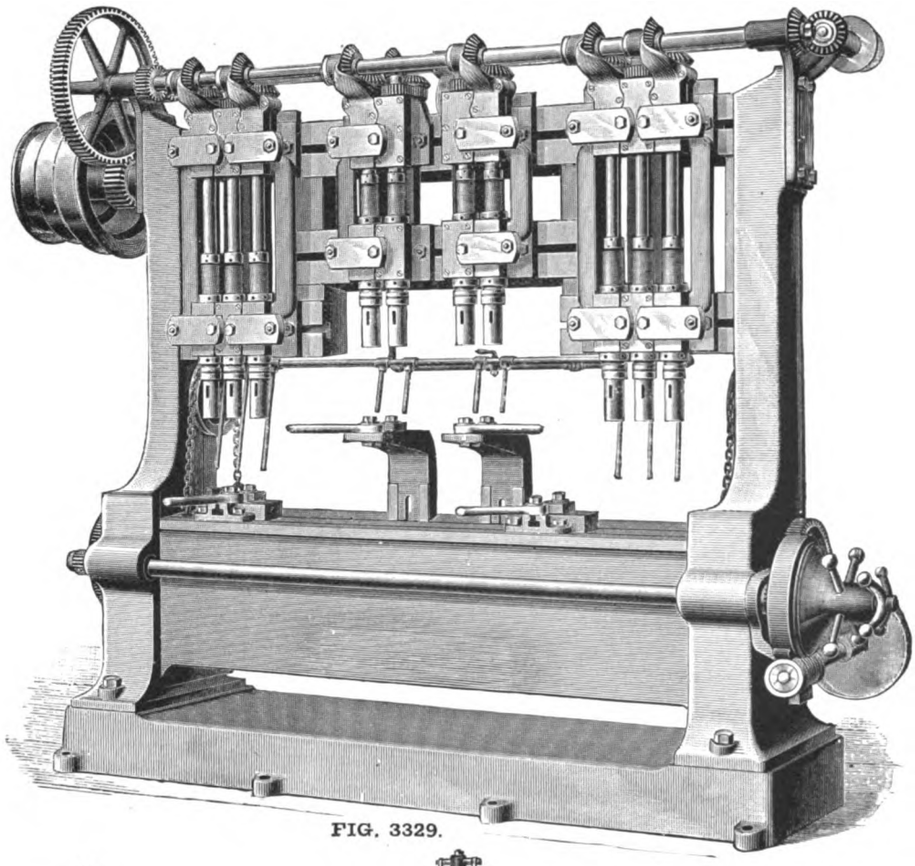


FIG. 3329.

Fig. 3329 shows a 10-spindle machine, but it can be furnished with six or eight spindles. All spindles are driven simultaneously by a three step cone, carrying a 4 inch belt; the driving shaft is strongly geared. All spindles have a lateral adjustment without disturbing driving gears, and all spindles run in one direction, and can be closed up to drill to centers of 4 inches; the spindle sleeves are threaded outside and are adjustable vertically 4 inches, by means of lock nuts, to compensate for differences in lengths of drills. The work table feeds upward by means of racks and pinions, belt driven, and has a quick return movement by hand, and is also counterbalanced. The feed table is provided with two saddle blocks, adjustable horizontally, and also two supports, for the arch of car truck frames, and the latter are adjustable vertically to suit different heights; these saddles and supports have steel-faced back stops or jaws—the same being adjustable to suit different widths of arch bars—and the clamping is done by the four levers shown. The cooling solution is piped to each spindle from one reservoir.

WEIGHT, 11,000 LBS.

PRICES, WITH ANY NUMBER OF SPINDLES, ON APPLICATION.

DUPLEX LOCOMOTIVE ROD BORER.

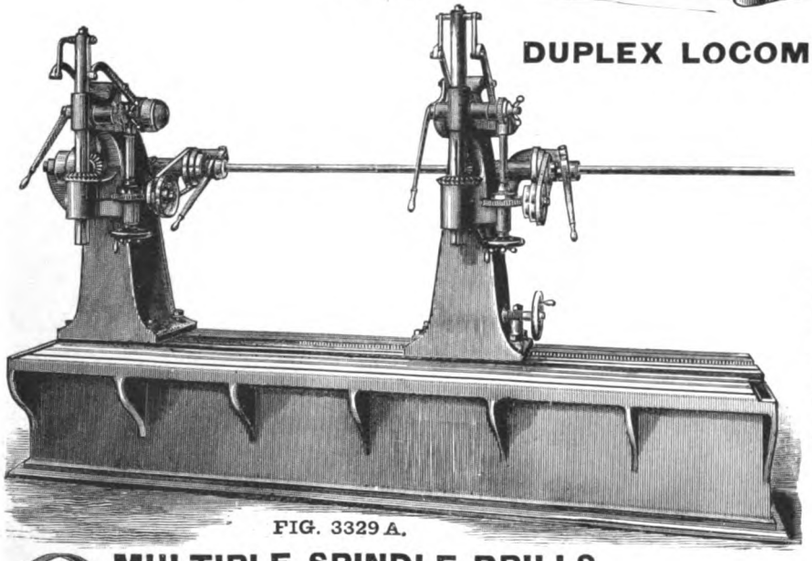


FIG. 3329 A.

DESCRIPTION, FIG. 3329 A.

This machine is designed for boring locomotive side-rods that are made with bushed bearings, or may be used where strapped braces are required, boring both holes exactly parallel at one operation. The tool may be used as a double drill or boring machine when not being used for boring rods, one man operating both spindles. One head is stationary, the other can be adjusted to suit the length of rod by a tangent screw, and exact centers can thus be obtained. The spindles are 3½ in. diameter, are strongly back-geared, have automatic feed and quick return. Two holes, 4 in. deep, 8½ in. diameter, have been bored on this machine in forty minutes.

WEIGHT, 15,000 LBS.

PRICES ON APPLICATION.

MULTIPLE SPINDLE DRILLS.

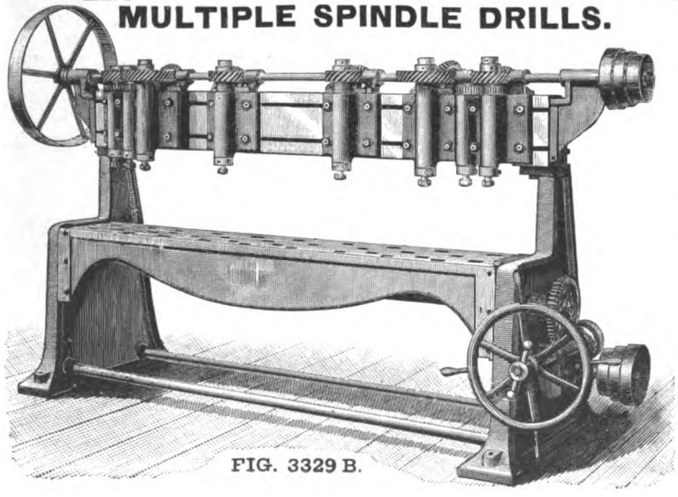


FIG. 3329 B.

DESCRIPTION, FIG. 3329 B.

The cut shows an 8-spindle drill and has four adjustable saddles carrying single spindles and the two outer saddles, which each carry two spindles 4 in. between centers. The saddles can be adjusted and placed in any position on rail, the extreme distance between the outer spindles being 6 ft. 8¾ in. The center spindles can be moved within 10 in. from one spindle to another. Each spindle has a sliding socket to suit the various lengths of drills; the carriage, or table, feeds up to the drills automatically and has three changes of feed and quick return by hand. The spindles are driven by helical gearing, making a comparatively noiseless running machine.

The machine is used for drilling the eight holes in freight car-truck channel bars, but can be adapted to many other classes of work.

We build multiple drilling machines with any number of spindles desired, with fixed or adjustable centers, with independent hand or automatic feed, and with hand and automatic feed to table. Drawings and specifications furnished upon application, showing any number of spindles.

WEIGHT, 8 SPINDLE, 3,800 LBS.

PRICES ON APPLICATION.

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6 SPINDLE ARCH BAR DRILL.

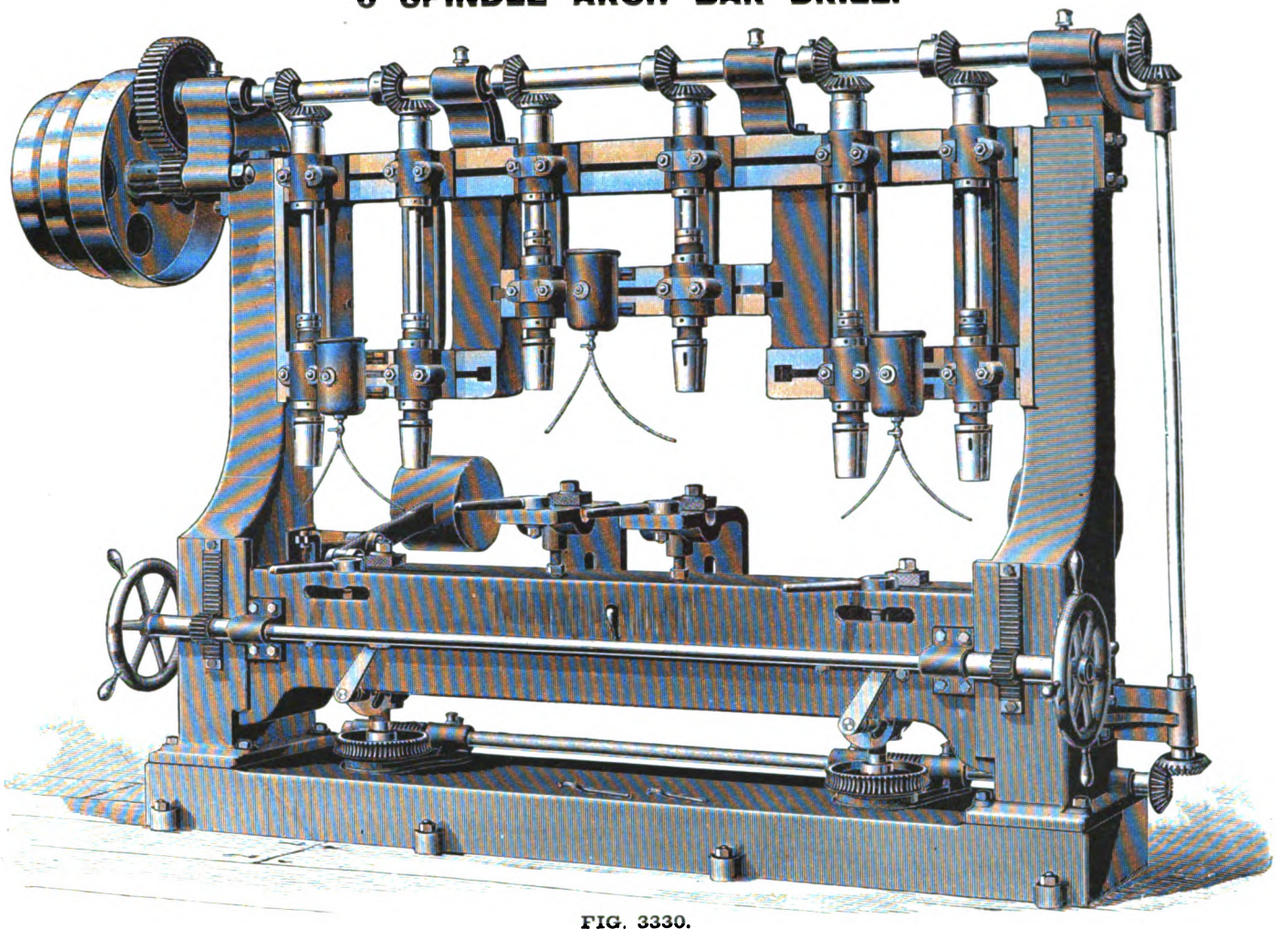


FIG. 3330.

Designed for drilling car truck frames.

Driven by cone with three steps for a belt 4 inches wide, and very strongly geared. The spindles are all operated by one heavy shaft, and drill the six or eight holes at one operation.

Each spindle has a socket adjustable vertically, allowing the drills to be used at different levels. The spindles have a lateral adjustment for change of centers. The center spindles have an adjustment from 6¾ inches to 22 inches between centers, and the outside spindles an adjustment from 7½ inches to 18 inches between centers.

The table has automatic feed. The feed is operated by worm gearing and screws at either end of the table; hence the work is brought squarely up to the drills.

The table may also be raised or lowered by hand.

The table is furnished with supports for the arch bar, and the necessary clamping devices.

The countershaft has two pulleys, 24 inches diameter, 4¾ inches face. Speed of countershaft, 210 revolutions per minute.

8 SPINDLE DRILL.

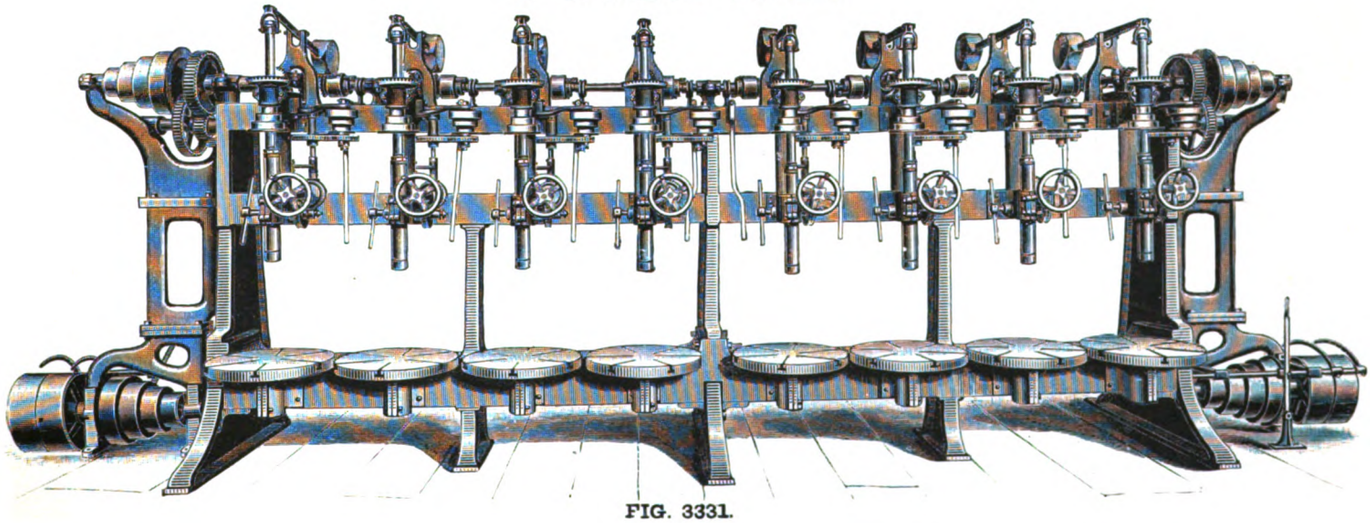


FIG. 3331.

These machines are recommended for work on which several successive operations, such as drilling, boring, reaming and tapping have to be performed, the work being passed from one spindle to another, thus saving time lost in changing tools and carrying work about the shop, as well as making it possible to accomplish a given amount of work in less time and with less labor. For tapping, the spindle is provided with two friction clutches, imparting opposite motion to the spindle.

PRICES ON APPLICATION.

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8 TO 2 SPINDLE DRILL.

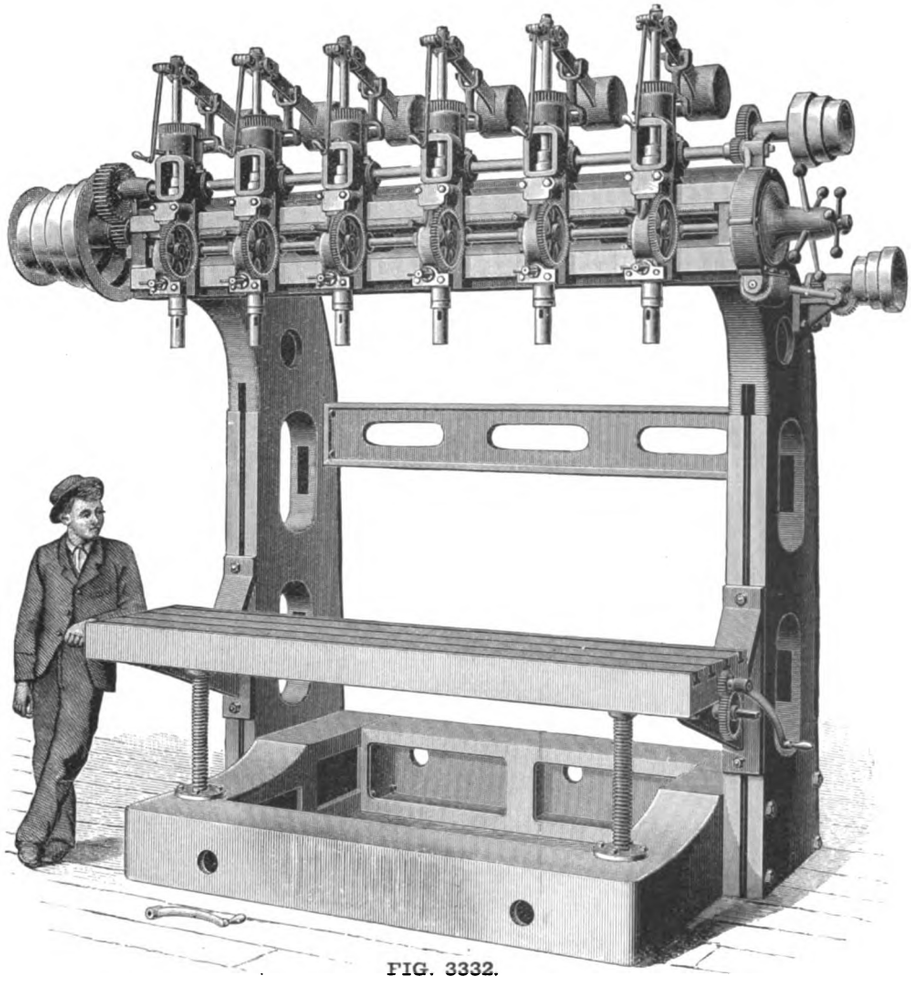


FIG. 3332.

This 6 spindle machine is designed for drilling large core bars for cast iron pipe, coal breaker rolls, girders, etc. Is capable of drilling six holes at once 1⅛ diameter. Can be made with two to eight spindles. Driving cone of 4 steps, for 4 inch belt. Feed cone of 3 steps. Each spindle has automatic feed of 10 inches, and the feed can be thrown out for any spindle independently; all spindles are driven by one shaft, but, if necessary, any number of spindles may be thrown out of gear, and the balance left running.

The machine will drill to the center of cylindrical work 52 inches in diameter.

Extreme distance spindles to table, 5 feet 8 inches.

Vertical adjustment of table, 3 feet 9 inches.

Distance from spindles to face of housings, 26 inches.

Extreme centers of end spindles, 8 feet.

Closest centers of spindles, 6 inches.

Distance between housings, 7 feet 5 inches.

Table for holding work is 2 feet wide and 8 feet 9 inches long.

Machines can be furnished with greater or less number of spindles.

Countershaft, wrenches, etc., furnished.

WEIGHT, ABOUT 14,000 POUNDS.

PRICE, ...

GANG DRILL.

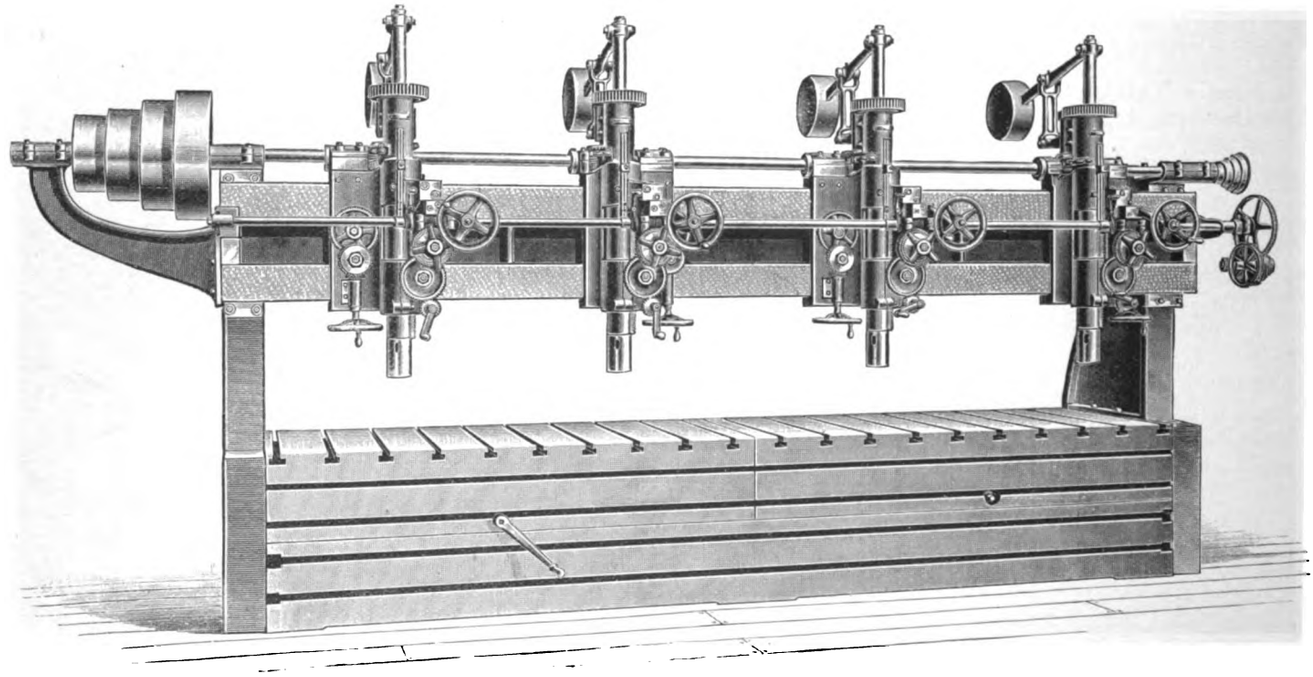


FIG. 3333.

Minimum distance between spindles, 10 inches. Maximum distance between two outside spindles, 12 feet. Vertical traverse of spindle, 12 inches. Greatest distance from spindle to table, 12 inches. Distance from floor to top of lower table, 15 inches. Distance from floor to top of upper table, 30 inches. Distance between frames, 14 feet 5 inches. Floor space required, 15 feet 6 inches by 4 feet 6 inches. Driving cone and arm overhang, 3 feet. Feed cone and feed gear overhang, 1 foot.

PRICES AND VARYING DETAILS ON APPLICATION

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GANG DRILL.

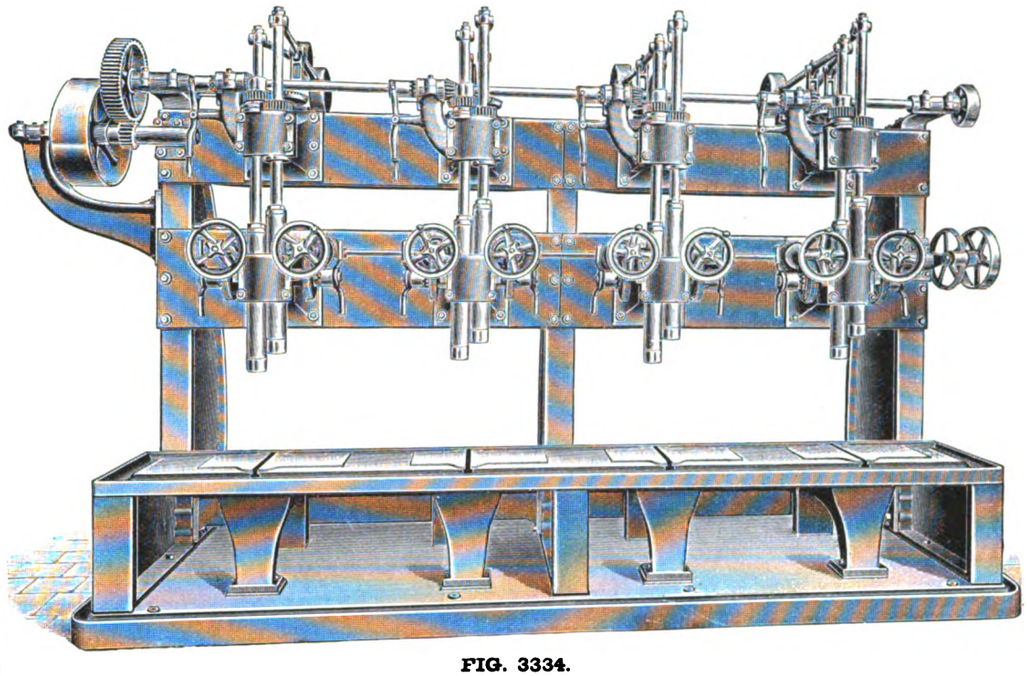


FIG. 3334.

This cut represents a Gang or Multiple Drill, with fixed heads and tables, with spindles arranged in pairs for the purpose of drilling two holes at a fixed and close distance from each other. These spindles rotate and feed simultaneously, and each pair of spindles is independent of the others, at the will of the operator. The action of each pair of spindles, in this regard, is controlled by a lever at the left of each head, actuating the gearing connecting the top shaft to the spindles. Each spindle is counterbalanced, has hand and power feed, and quick return motion, common to our drills, and independent vertical adjustment. Varying lengths of drills can be used. The table is designed for the attachment of jigs, chucks, or special vises for holding work. This machine can be furnished with any number of heads, with single spindles or spindles in pairs, and with heads any distance apart; also with automatic trip for determining the depth of drilled holes. Countershaft accompanies this machine. The heads are placed on girts, 36 inches apart. Distance from center to center of spindles in each head, 3½ inches. Vertical traverse of spindle, 16 inches. Distance from floor to top of table, 26 inches. Greatest distance from spindle to table, 27 inches. Floor space required, 13 feet 9 inches by 5 feet 4 inches. Driving pulley and arm overhang, 28 inches.

SPECIAL TABLE DRILL.

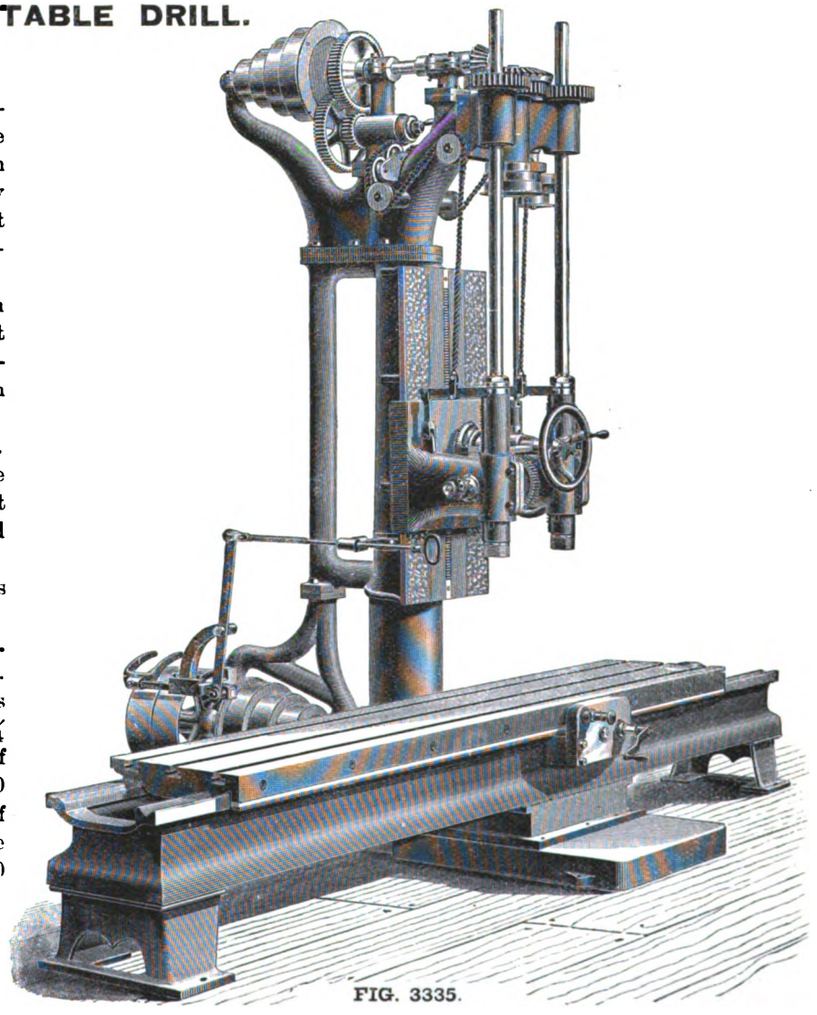


FIG. 3335.

This cut represents a 30 inch 2 spindle drill, designed especially for work where a number of holes are to be drilled in a straight line. It has a bed 16 feet in length, provided with a table 12 feet long, moved by means of a rack and pinion nearly its entire length. It is supplied with an automatic stop for the accurate spacing of work.

The spindles rotate and feed simultaneously. Each spindle has independent vertical adjustment, so that drills of different lengths may be used without inconvenience to the operator. The machine is provided with hand and power feed and quick return motion.

Either spindle can be used independent of the other. The spindles and heads are counterbalanced by one chain and weight, the leverage being so applied that each spindle is accurately balanced and the sliding head can be loosened without danger of falling.

We can furnish this machine with one or two spindles and with any desired length of bed.

Distance from post to center of table, 15½ inches. Greatest distance from spindles to table, 45 inches. Vertical traverse of spindles, 12 inches. Holes in spindles fit Morse taper No. 4. Width of belt on cones, 3¼ inches. Diameter of driving pulleys, 14 inches; face of driving pulleys, 4 inches. Speed of lower shaft, 200 revolutions per minute. Height of machine to top of cone, 9 feet 6 inches. Floor space for machine here represented, 16 feet by 7 feet. Weight, about 5,200 pounds.

PRICE, $.....

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30 INCH 2 SPINDLE COMPOUND TABLE DRILL.

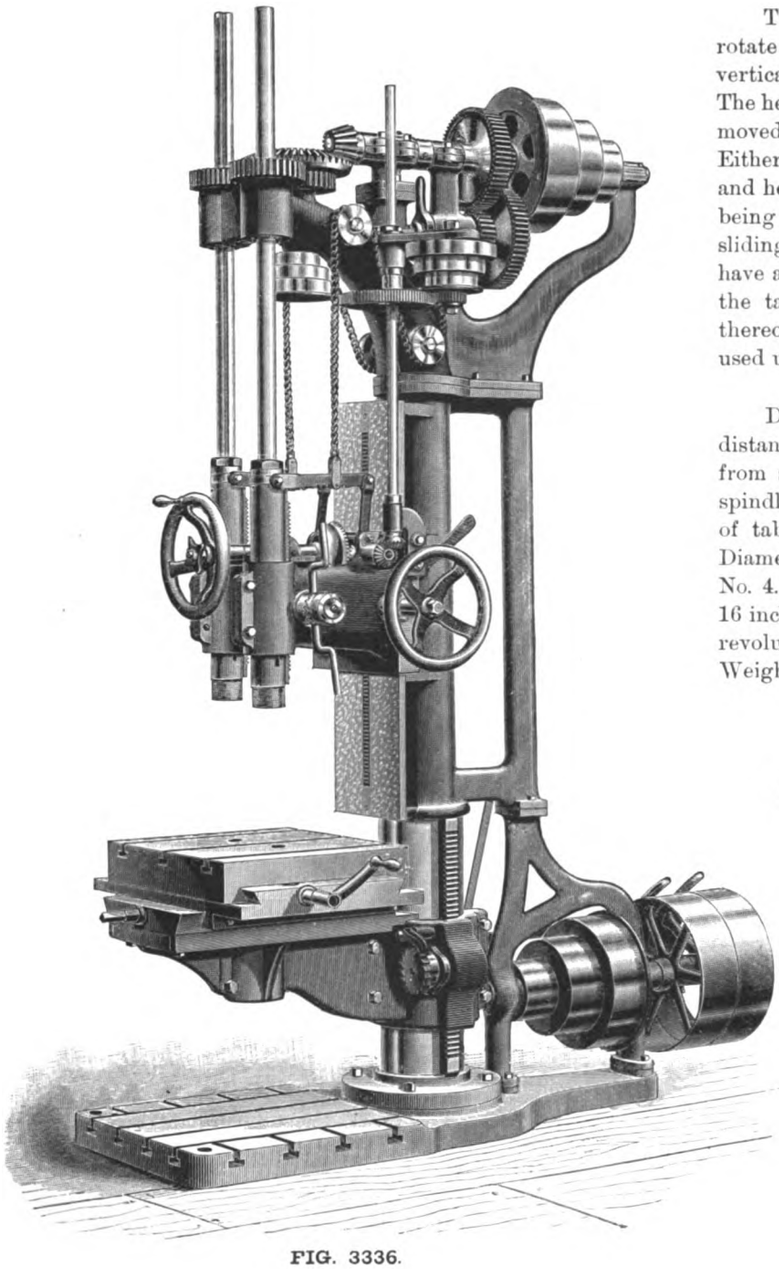


FIG. 3336.

This cut represents a 30 inch swing 2 spindle drill. The spindles rotate and feed simultaneously. Each spindle has an independent vertical adjustment, so that different lengths of drills may be used. The head is vertically adjustable on the column, and can be instantly moved to any position thereon by means of a rack and pinion. Either spindle can be used independent of the other. The spindles and head are counterbalanced by one chain and weight, the leverage being so applied that each spindle is accurately balanced, and the sliding head can be loosened without danger of falling. The tables have a movement at right angles to each other. The arm carrying the tables swings around the column and is vertically adjustable thereon. We furnish with this machine a jack screw which can be used under the table in line with the spindles, to take the strain.

SPECIFICATIONS.

Distance from base to center of table, 15½ inches. Maximum distance from spindles to base plate, 65 inches. Minimum distance from spindles to base plate, 14 inches. Maximum distance from spindles to table, 43 inches. Maximum distance from floor to top of table, 39½ inches. Vertical adjustment of table, 15 inches. Diameter of spindles, 2 inches. Holes in spindles fit Morse taper No. 4. Width of belt on cones, 4 inches. Tight and loose pulleys, 16 inches diameter and 4¾ inches face. Speed of lower shaft, 150 revolutions per minute. Height of machine to top of cone, 10 feet. Weight, 4,200 lbs.

PRICE, $

COMPOUND TABLE AND SUPPORT.

DESCRIPTION, FIG. 3337.

Distance from post to center of table, 15½ inches. Greatest distance from spindle to base plate, 54 inches. Greatest distance from spindle to table, 33 inches. Vertical traverse of spindle, 12 inches. Diameter of spindle, 2 inches. Hole in spindle fits Morse taper No. 4. Distance from floor to top of table, 25 inches. Distance from base plate to top of table, 21½ inches. Compound table, 24 x 32 inches. Compound table has a lateral movement of 15½ inches, and a transverse movement of 20 inches. Width of belt on cones, 3½ inches. Driving pulleys, 14 inches diameter by 4 inch face. Speed of lower shaft, 200 revolutions per minute. Total height of machine to top of cone, 8 feet 5 inches. Floor space required, 84 x 26 inches. Weight, 3,720 pounds.

Any size of drills can be furnished with a compound table. Complete description and specifications of any size will be furnished upon application.

PRICE ON APPLICATION.

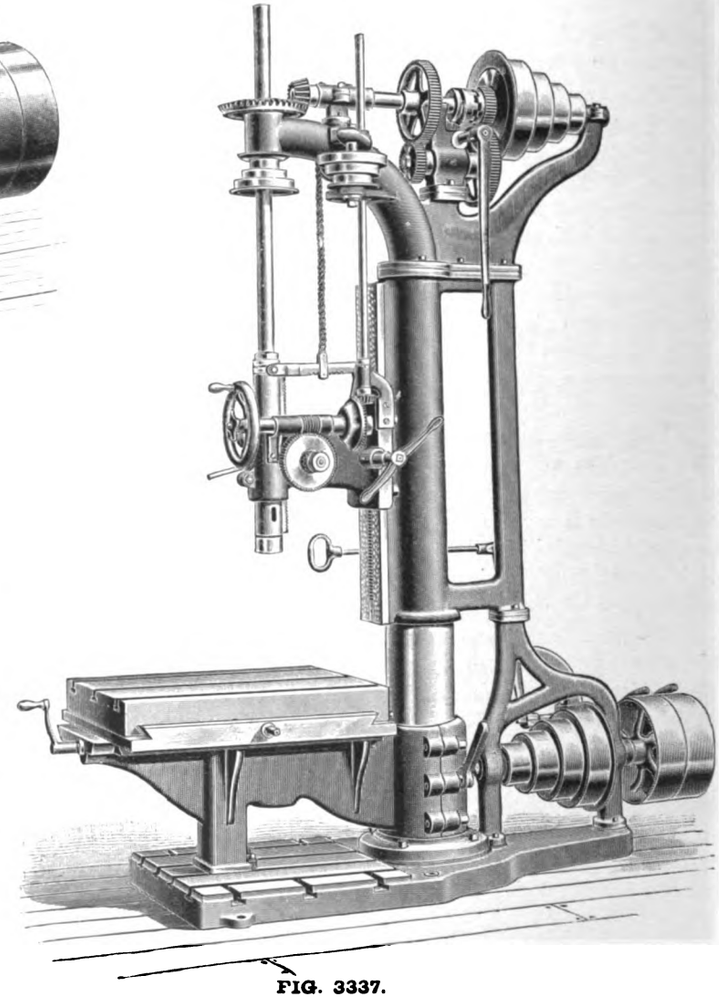


FIG. 3337.

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BRIDGE DRILL.

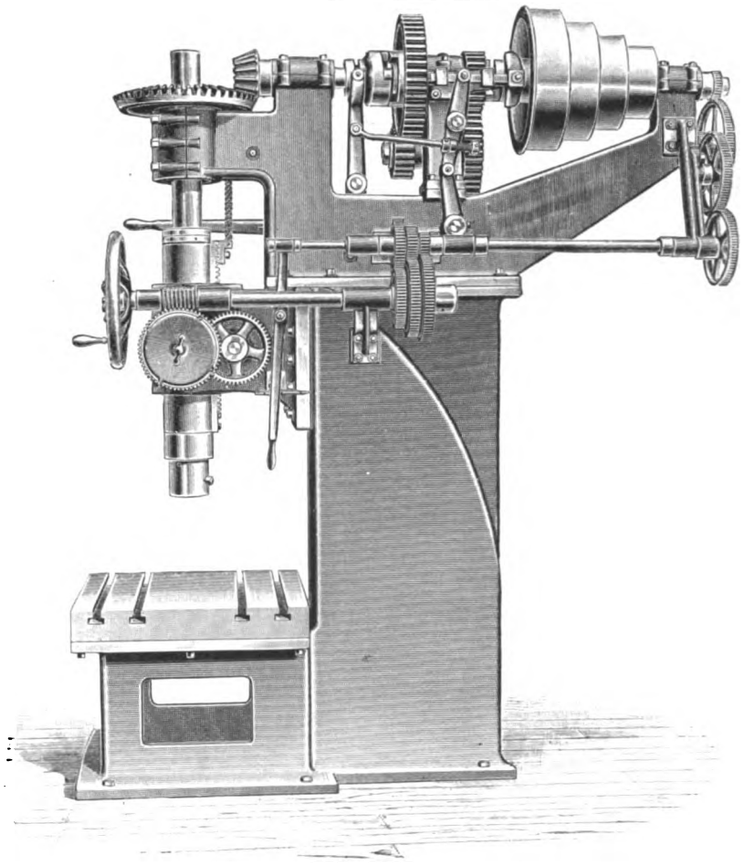


FIG. 3338.

Distance from post to center of spindle, 16 inches. Greatest distance from spindle to table, 18 inches. Diameter of spindle, 4 inches. Vertical traverse of spindle, 15 inches. Distance from floor to top of table, 24 inches. Distance from floor to top of machine, 8 feet 4 inches. Width of cone belt, 4 inches. Pulleys on countershaft, 20 x 6 inches. Weight, 5,800 lbs.

SUSPENSION DRILL.

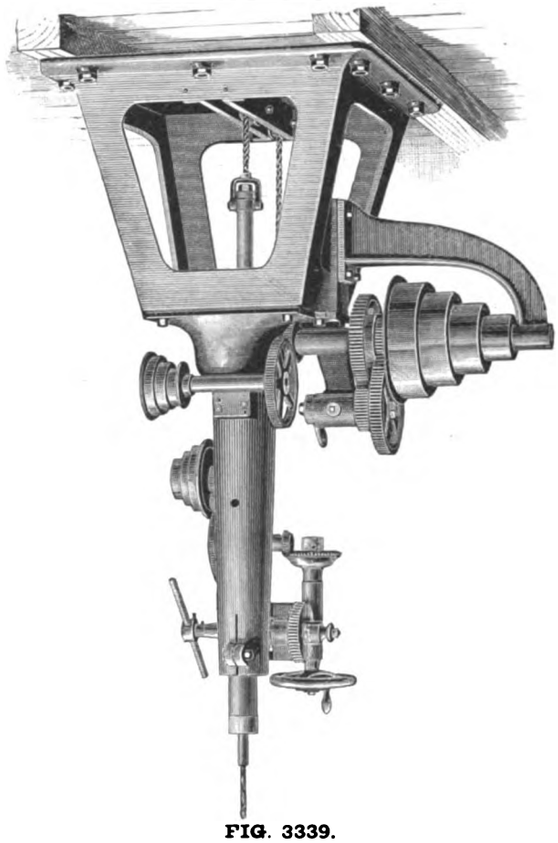


FIG. 3339.

Will drill up to 2 inch holes. Vertical traverse of spindle, 19 inches. Distance from ceiling to lower end of spindle, when spindle is at its greatest height, 68 inches. Diameter of spindle, 2 inches. Hole in spindle fits Morse taper No. 4. Ceiling space required to fasten frame, 36 inches square. Tight and loose pulleys on countershaft, 14 inches diameter by 4 inch face. Speed of countershaft, 200 revolutions per minute. Weight, 1,600 lbs.

PORTABLE ROPE DRIVEN RADIAL DRILL.

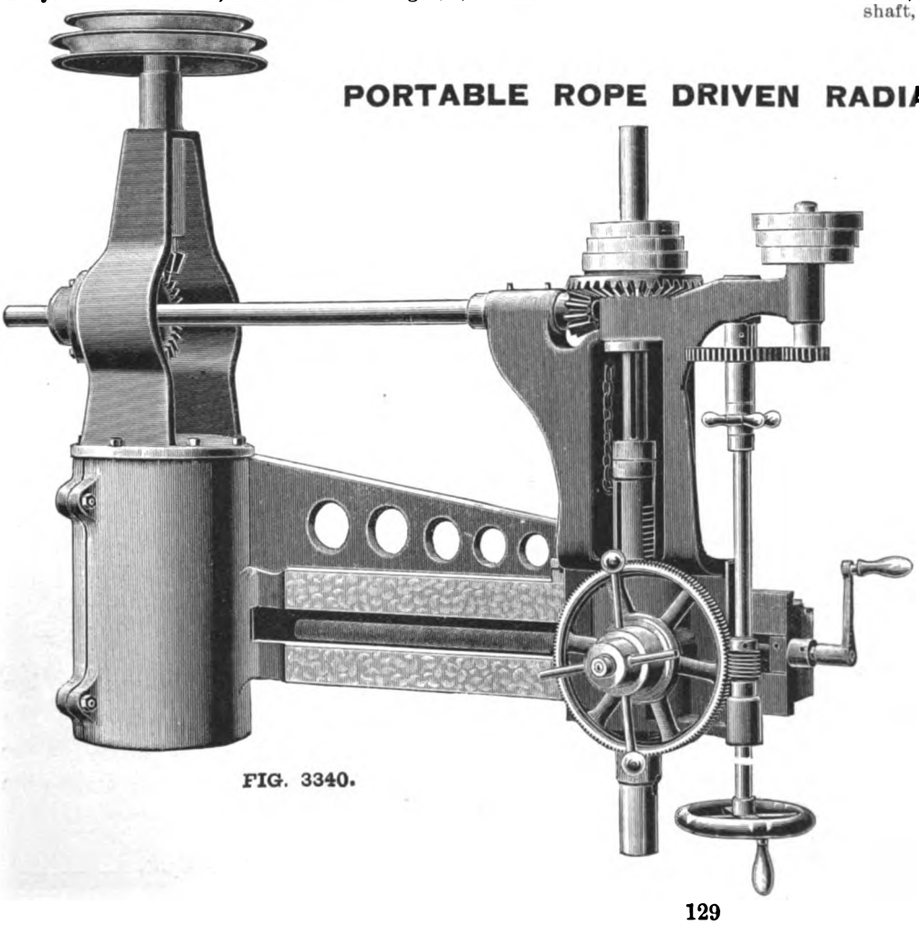


FIG. 3340.

DESCRIPTION, FIG. 3340.

This machine is designed to do drilling on work that would be inconvenient to get under a stationary machine, or for drilling centers or hubs of built up, or segment, fly wheels, pulleys, or any large work; with this arrangement the power can be carried to any convenient distance. The arm and sleeve fits over a 10 inch stump with flanged or cross-armed base that can be bolted or clamped to the work.

Least radius to center of spindle.....13 in.
Greatest radius to center of spindle. .....43 "
Traverse of spindle..... .....15 "

Has hand and power feed, quick return and balanced spindle. Will drill 2 inch hole from solid. Made of greater capacity, if desired. Special two grooved pulley countershaft furnished.

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FIG. 3341 REPRESENTS NO. 1.

It has back gears and power geared feed, hand feed, quick return and balanced spindle.

Drop from ceiling, about ..... 5 ft.
Diameter of spindle ..... 2¼ in.
Traverse of spindle ..... 20 in.
Cones for four inch belt .....
Countershaft with cone and T. and L. pulleys .....

WEIGHT, ... LBS. PRICE, $.....

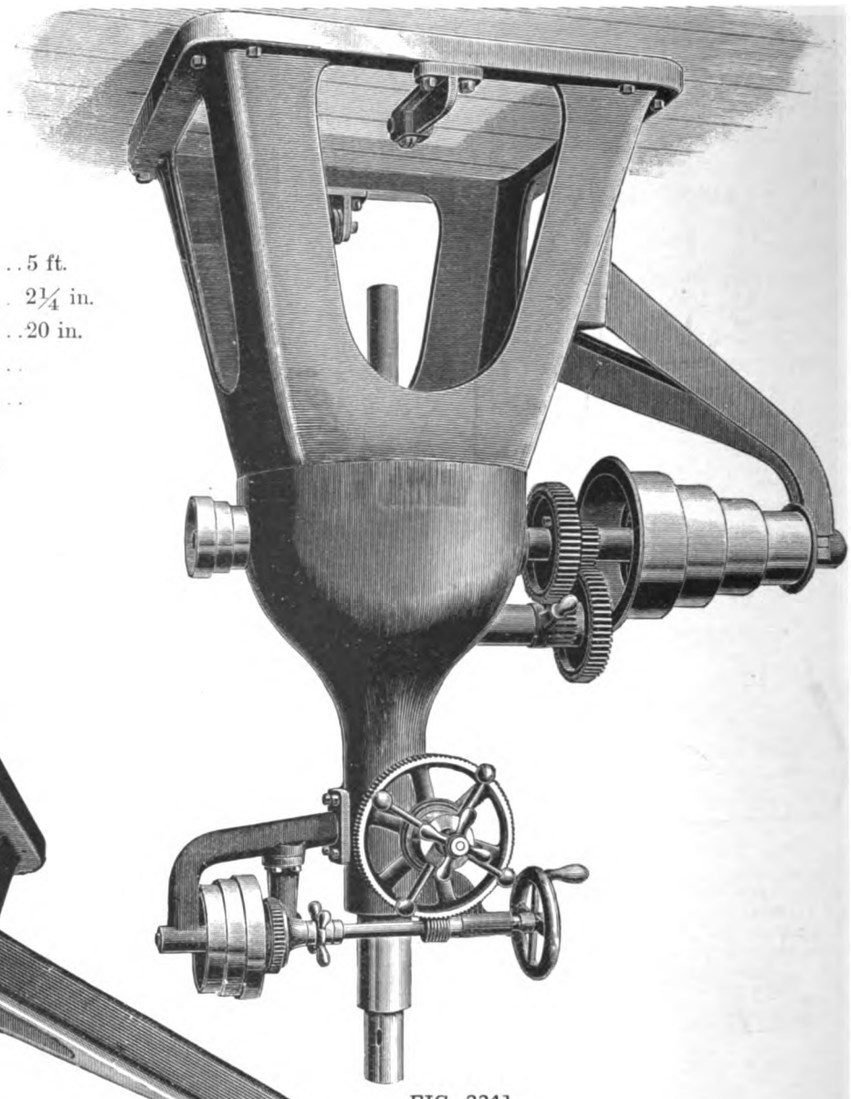


FIG. 3341.

NO. 2 SUSPENSION.

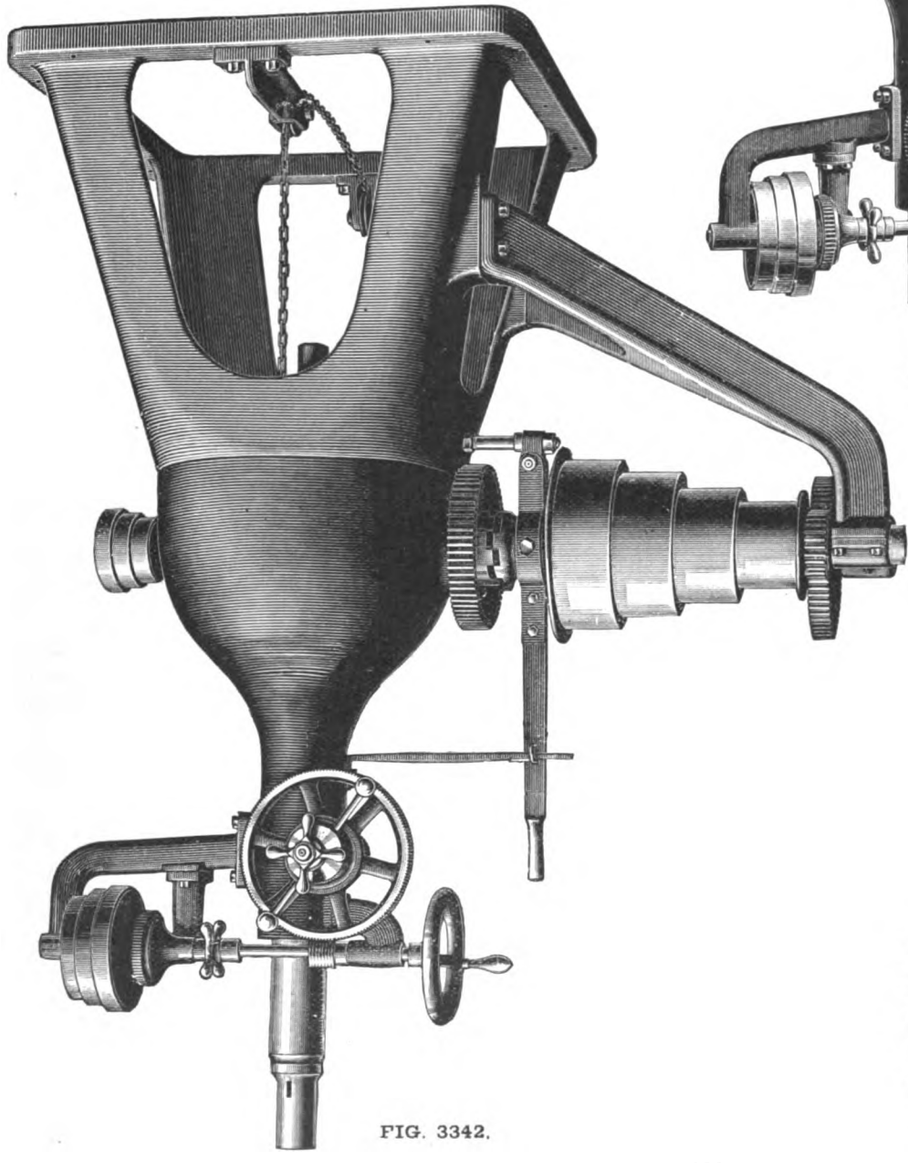


FIG. 3342.

FIG. 3342 REPRESENTS NO. 2.

Which is the same as No. 1 above; also has Martin's patent speed changing device. The change from backgear to cone speed, or the reverse, is made by shifting the lever while the drill is running.

WEIGHT, ... LBS. PRICE, $.....

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36 INCH SUSPENSION RADIAL DRILL.

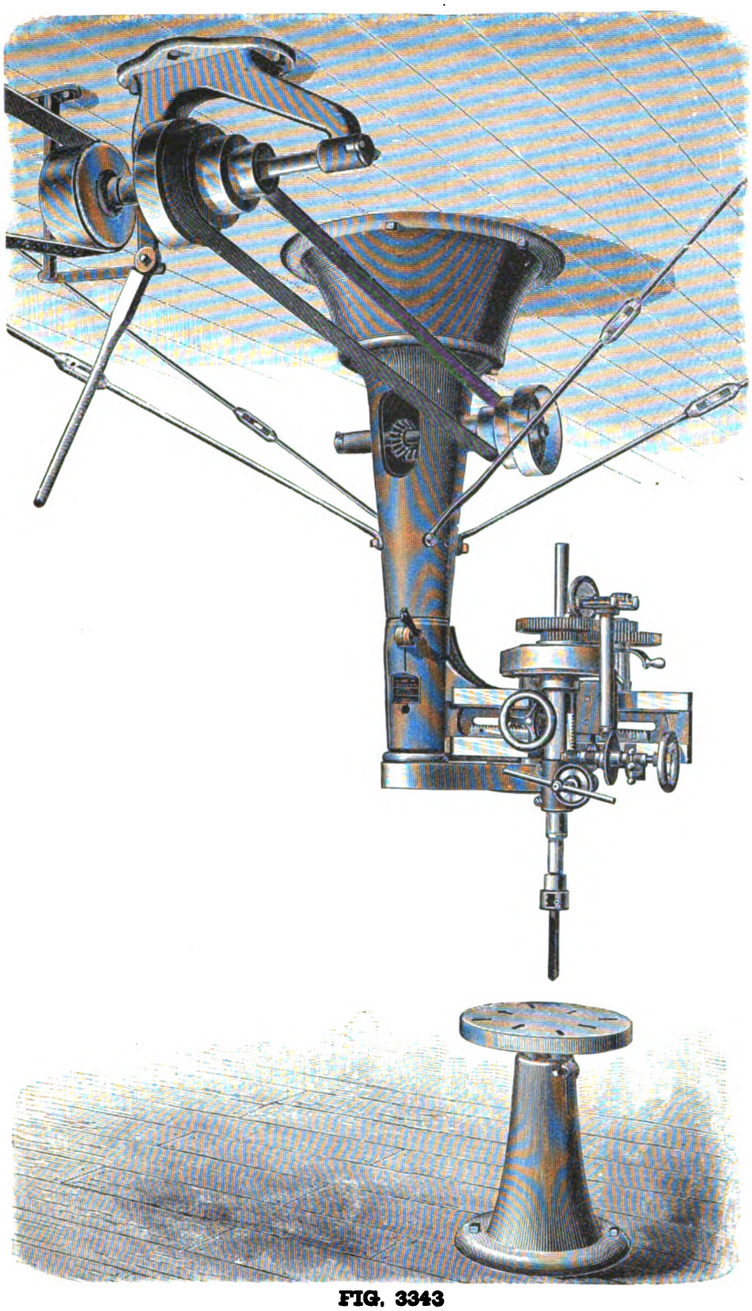


FIG. 3343

Distance from base to lower end of spindle when raised to its highest point is 6 feet. The distance from center of column to center of spindle when head is out, 29 inches. The spindle has a vertical movement of 10 inch, quick return. Spindle counterbalanced by spring back gears direct on spindle; has automatic feeds. Being suspended from above gives unlimited floor space and room to bring work under the tool that could not be put under ordinary tools.

WEIGHT, 1,500 LBS.

PRICE, $400.00.

POST RADIAL DRILL.

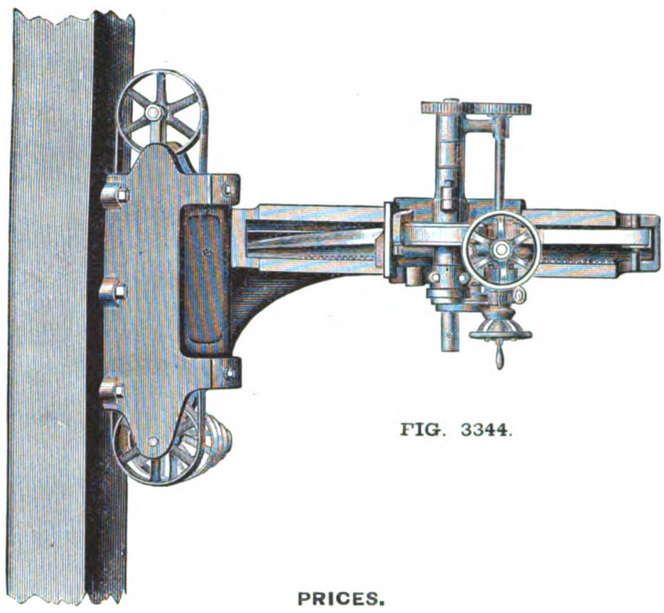


FIG. 3344.

PRICES.

	44 inch.	60 inch.
With back gears	$375.00	$475.00
Without back gears	350.00	440.00
Weight	2,600 lbs.	3,500 lbs.

36 INCH WALL RADIAL.

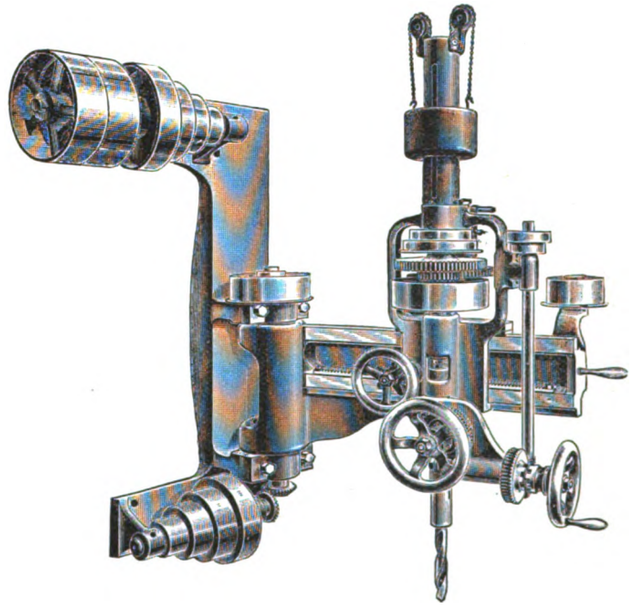


FIG. 3345.

Height of machine, 4 feet 6 inches; width of frame, 2 feet; width of frame, supporting column, 9 inches; length of column, 23 inches; bearings on column, 4 inches diam.; distance from center of column to end of arm, 36 inches; greatest distance from column to spindle, 30 inches; arm radiates about half circle; spindle of tool steel, $1\frac{1}{8}$; traverse of spindle, 10 inch, quick return; width of belt on spindle pulley, $3\frac{1}{2}$ inches. Back gears are located on spindle.

Countershaft pulleys, x 3, 170 revs.

WEIGHT, 1,500 LBS. PRICE, $300.00.
EXTRA FOR TABLE, $25.00.

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4 FOOT WALL RADIAL DRILLS.

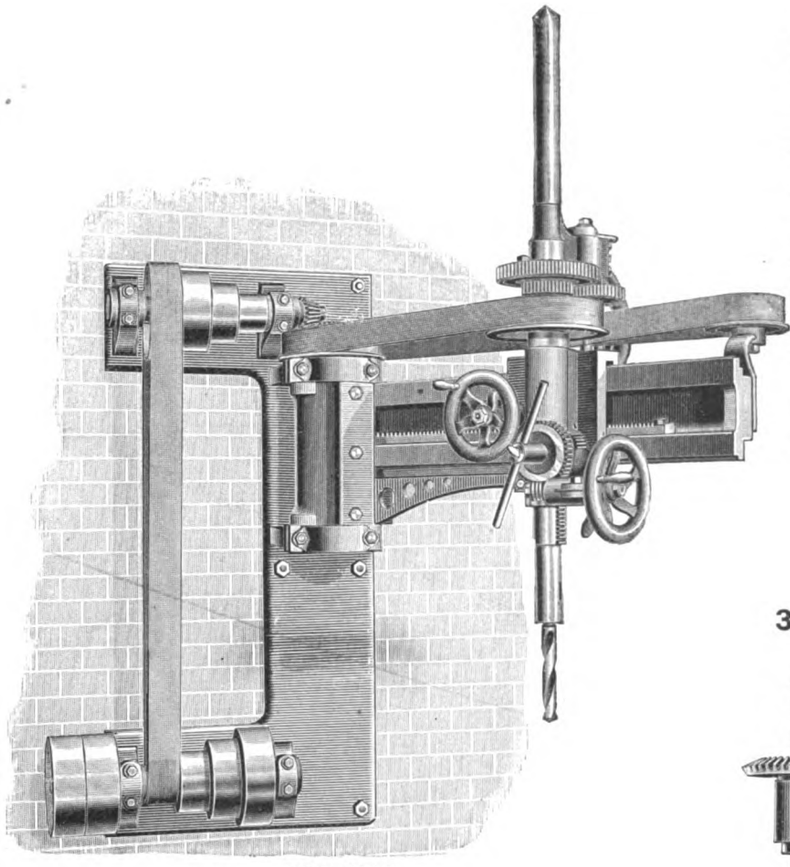


FIG. 3346.

Figs. 3346 and 3347 represent the same tool, but in the former the arm is at top of frame and fast and loose pulleys below, and in the latter these features are reversed.

Height of frame, 5 feet 8 inches. Width of frame, 2 feet 6 inches. Width of frame supporting column, 12 inches. Length of column, 24 inches. Bearings on column, 5 inches in diameter. Distance from center of column to end of arm, 48 inches. Greatest distance from center of column to center of spindle, 44 inches. Arm rotates about half circle. Spindle is of tool steel, $1\frac{3}{16}$ diameter, with hole for Morse taper No. 4. Traverse of spindle, 12 inches; has quick return. Width of belt on spindle pulley, $3\frac{1}{2}$ inches.

All shafts, studs, pinions, racks, etc., made of steel. Back gears are located directly on spindle. Countershaft pulleys, by 4 inches. 160 revolutions. Weight, 2,500 lbs.

PRICE	**$375.00**
Extra, for self feed	25.00
" " table	25.00

36 AND 30 POST OR WALL DRILL.

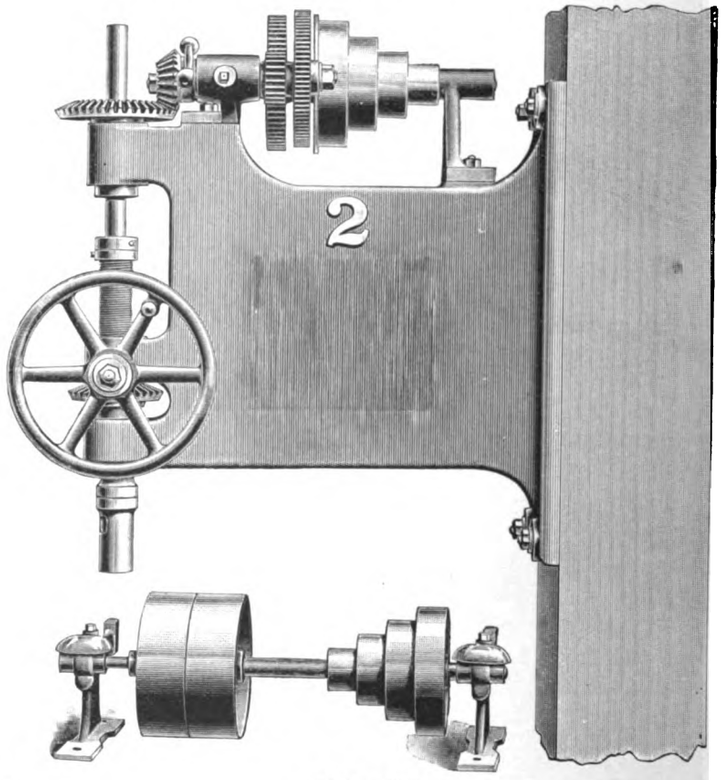


FIG. 3348.

The spindle has a vertical movement of 8 inches, and is 2 inches in diameter, made of steel. The feed is by hand, not automatic.

PRICES.

	With back gears.	Without back gears.
30 inches from post to spindle, weight, lbs.....	$.....	$.....
36 inches from post to spindle, weight, lbs.....	$.....	$.....

4 FOOT WALL RADIAL.

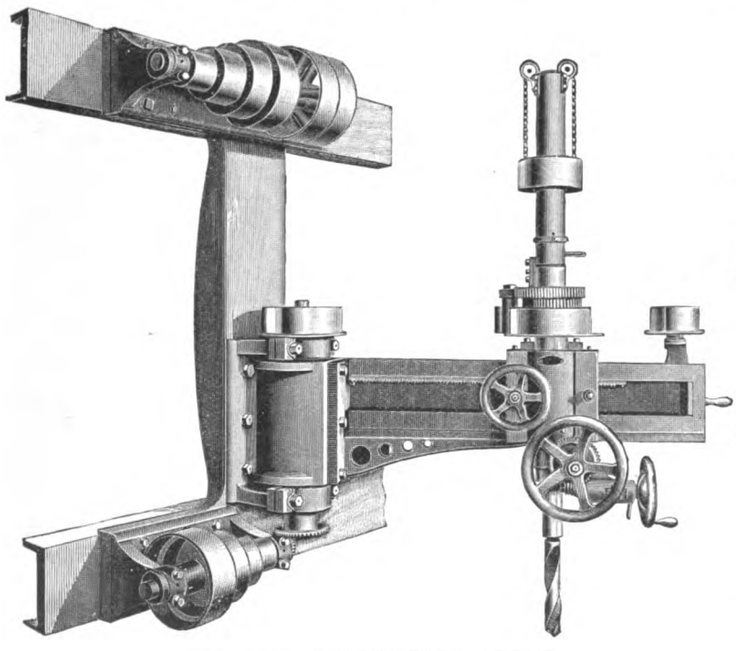


FIG. 3347. DESCRIPTION ABOVE.

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POST OR WALL DRILLS OR COUNTERSINKERS.

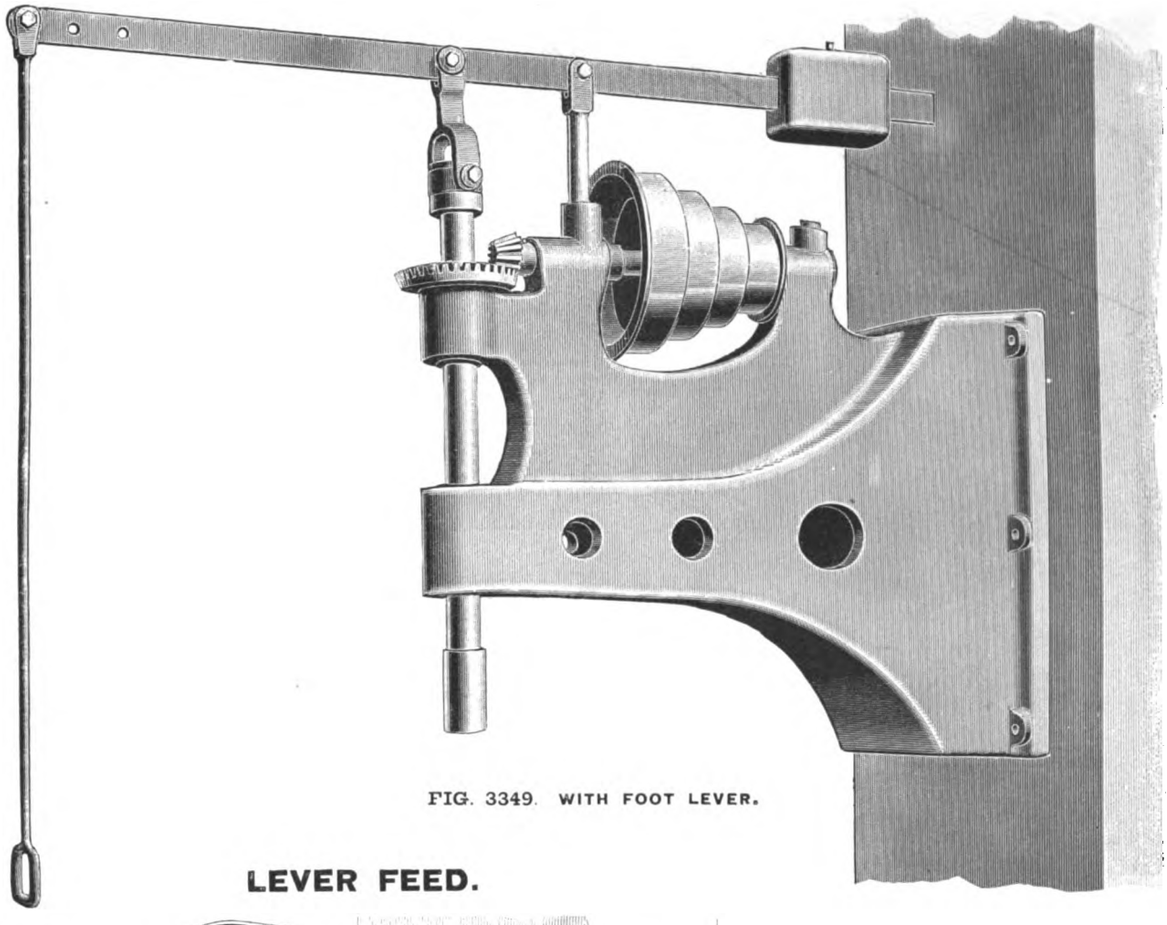


FIG. 3349. WITH FOOT LEVER.

LEVER FEED.

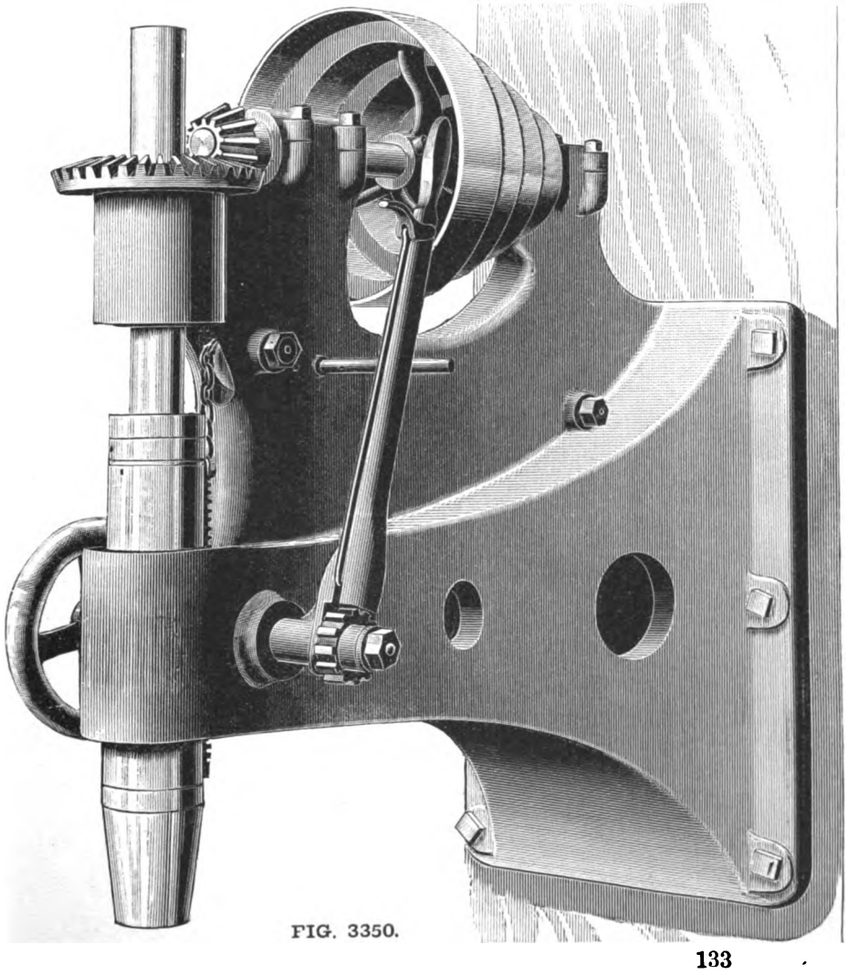


FIG. 3350.

DESCRIPTION, FIGS. 3349 AND 3350.

These drills are made in two sizes, 36 and 42 inches from back to center of spindle, working respectively to centers of 72 and 84 inches.

The tools are adapted for reaming and countersinking in plates and girders, tank work and general shop work.

A proper countershaft is furnished with each tool.

Spindle is $2\frac{7}{16}$ inch diameter, and has 7 inch traverse.

Weight, about 1,000 lbs.

PRICE, EITHER STYLE.

36 inch.....$.....

42 inch.....$.....

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POST DRILL OR COUNTERSINKER.

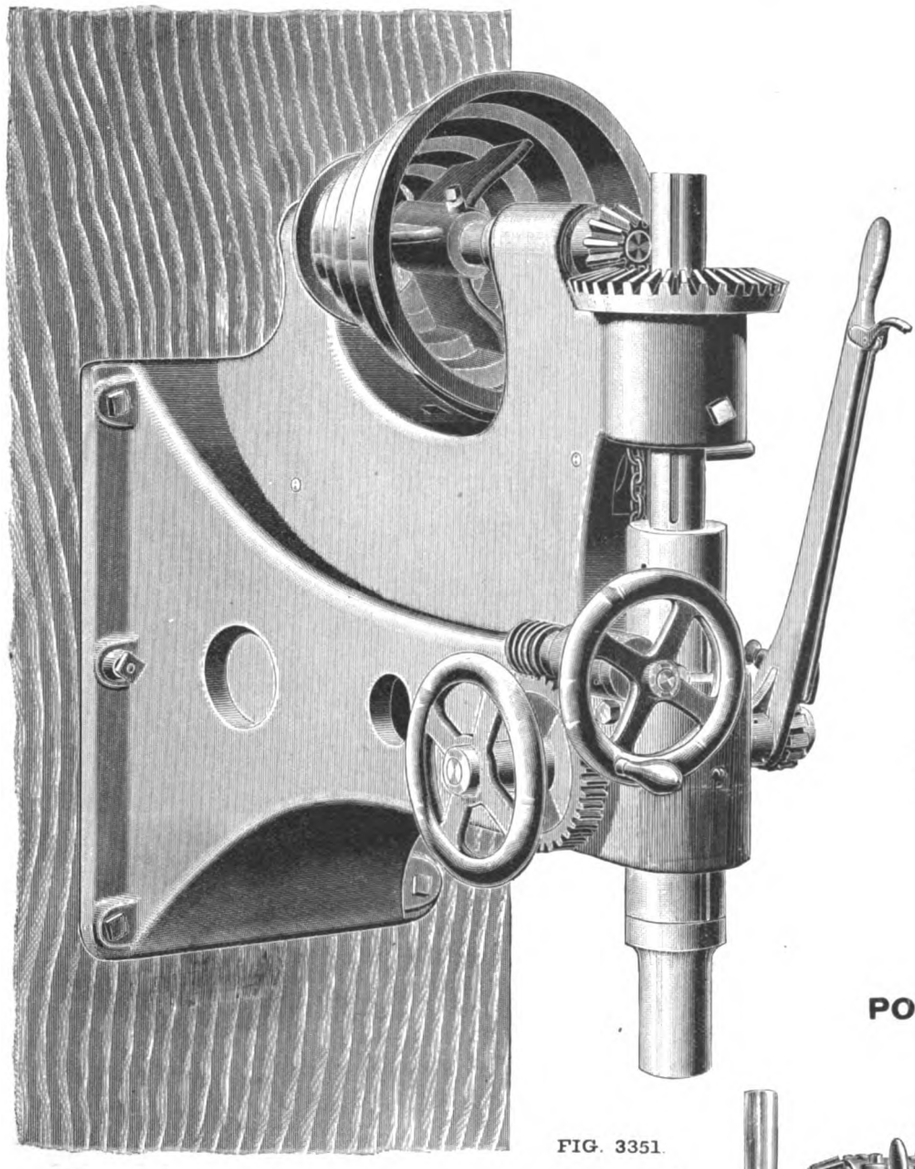


FIG. 3351.

COMBINED WORM AND WHEEL, AND HAND LEVER FEEDS.

We make this design in two sizes, viz. : 36 and 42 inches from back to spindle, working respectively to centers of 72 and 84 inches. Well adapted for reaming and countersinking in plates, girder and tank work. Countershaft furnished with each machine. Spindle travel, 7 inches, and diameter, $2\frac{7}{16}$ inches.

PRICES.

36 inches, ... $.....

42 " . . . . . $.....

POST OR WALL DRILL.

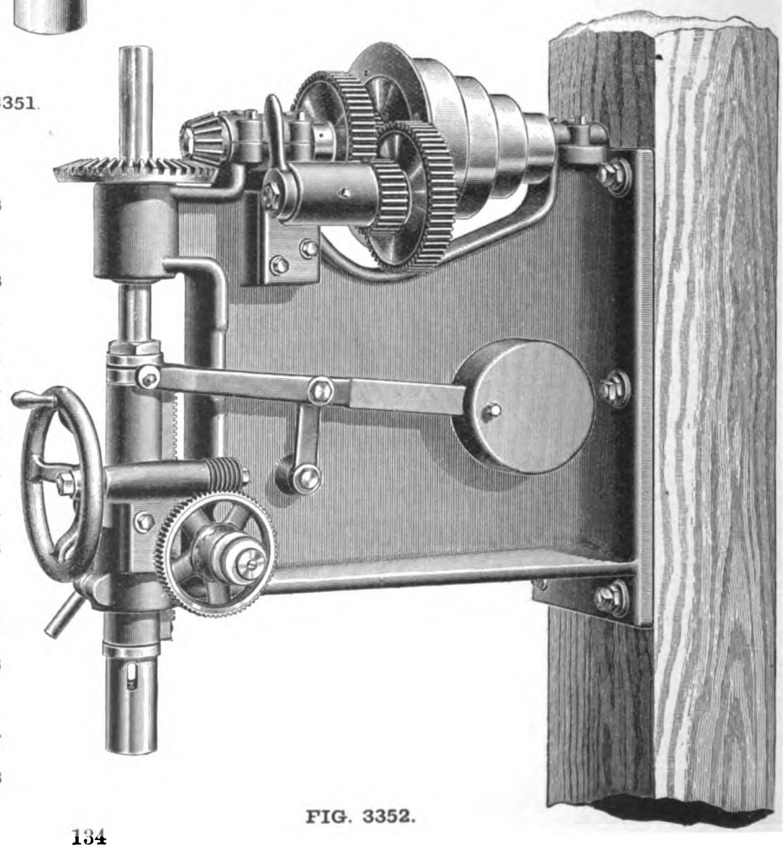


FIG. 3352.

DESCRIPTION, FIG. 3352.

The pinion wheel, which engages the rack on quill, is not driven on or keyed to its shaft, but is, with its shaft, made of one solid piece of steel. This construction gives great strength to the teeth of pinion to resist heavy strains. The worm is of hardened steel. It runs in a bronze worm gear of coarse pitch. The rack on quill is steel and strongly bolted to it. It has a counterbalanced spindle and quick return motion. The feed is by hand wheel and worm gearing. This machine will drill up to $2\frac{1}{2}$ inch holes in wrought metal. We furnish countershaft with this machine.

Distance from post to center of spindle, 36 inches. Vertical traverse of spindle, 10 inches. Hole in spindle fits Morse taper No. 5. Width of belt on cones, $3\frac{1}{4}$ inches. Diameter of driving pulleys, 14 inches. Face of driving pulleys, 4 inches. Speed of countershaft, 200 revolutions per minute. Weight, 1,350 lbs.

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22 INCH POST DRILL.

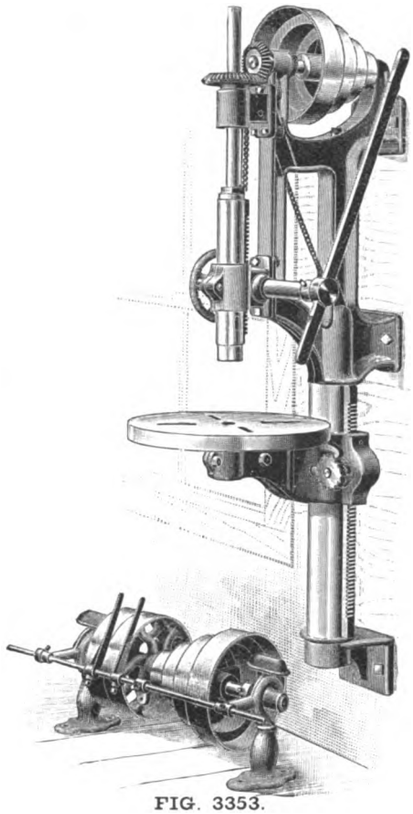


FIG. 3353.

35 INCH DRILL, NO. 3.

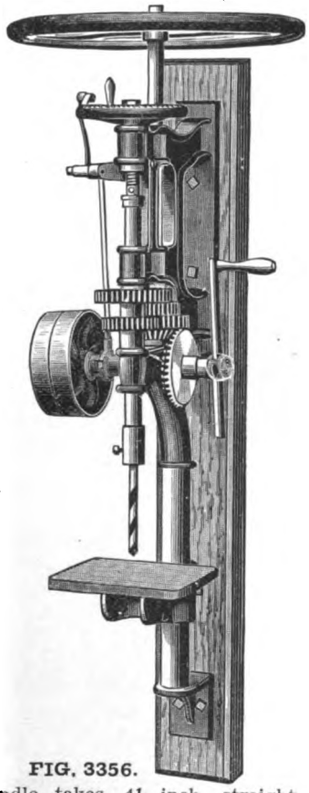


FIG. 3356.

Spindle takes $\frac{11}{16}$ inch straight shank drills. Drills 0 to $1\frac{1}{2}$ inch hole, and to center of $19\frac{1}{2}$ inch circle. Weight, 250 pounds.

PRICES.

With tight and loose pulleys, 10 inch diameter, $2\frac{1}{2}$ inch face..... $79.00
Without pulleys..... 75.00
With cone pulley, see Fig. 3355, and countershaft to match..... 105.00

LIGHT DRILLS.

22 INCH DRILL.

When placed on a wall, the distance from wall to spindle is 19 inches. When placed on a cross beam or hanging post, work of any dimension can be brought under drill.

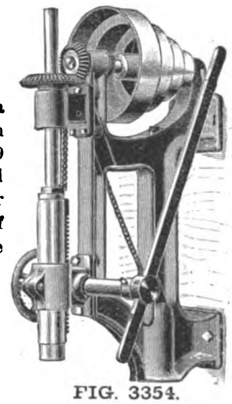


FIG. 3354.

PRICE, FIG. 3354.

With countershaft and lever feed..... $95.00
" " " screw " 100.00
" " lever and screw feed combined..... 105.00

DESCRIPTION, FIGS. 3353 AND 3354.

HOLE IN SPINDLE BORED TO MORSE TAPER NO. 3.

Distance from post to center of table, 11 inches. Diameter of table, 19 inches. Greatest distance between table and spindle, $23\frac{1}{2}$ inches. Vertical traverse of table, 18 inches. Vertical traverse of spindle, 10 inches. Diameter of tight and loose pulleys, 10 inches for 3 inch belt. Revolutions per minute, 230. Weight, 500 lbs.

PRICE, FIG. 3353.

With countershaft and lever feed..... $125.00
" " " screw " 130.00
" " lever and screw feed combined..... 135.00

NO. 2 AND 1 1-2 DRILLS.

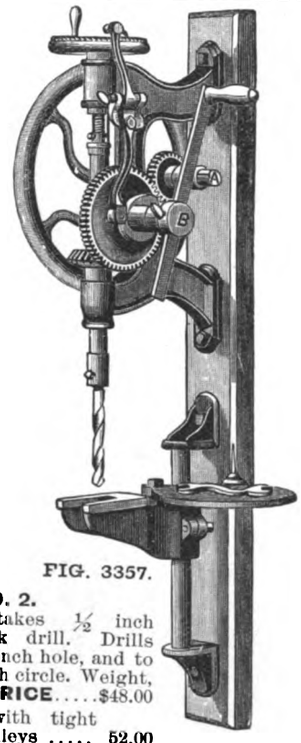


FIG. 3357.

NO. 2.

Spindle takes $\frac{1}{2}$ inch straight shank drill. Drills from 0 to $1\frac{1}{2}$ inch hole, and to center of 15 inch circle. Weight, 160 pounds. **PRICE**.....$48.00

For power, with tight and loose pulleys 52.00
For power, with three step cone and countershaft..... $73.00

NO. 1 1-2.

Drills from 0 to $1\frac{1}{4}$ inch hole, and to center of 11 inch circle. Spindle takes $\frac{1}{2}$ inch straight shank drills. Weight, 120 lbs. **PRICE,** $34.00

PRICES.

For power, with tight and loose pulleys. $37.00
With three step cone and countershaft.. 59.00

35 INCH DRILL, NO. 4.

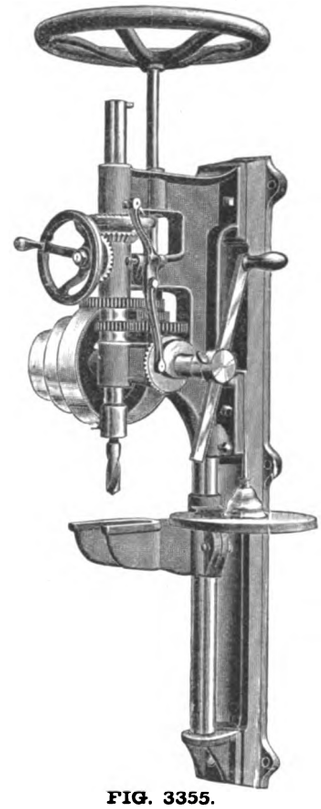


FIG. 3355.

Drills to $1\frac{1}{2}$ inch. Weight, 250 pounds. Spindle for $\frac{11}{16}$ straight shank drill. Size of driving pulley, 10 x $2\frac{1}{2}$ inches.

PRICE, for hand only..... $70.00
" with tight and loose pulleys, see Fig. 3356..... 74.00
PRICE, with cone and countershaft to match..... 100.00

NO. 1 AND 0 DRILL.

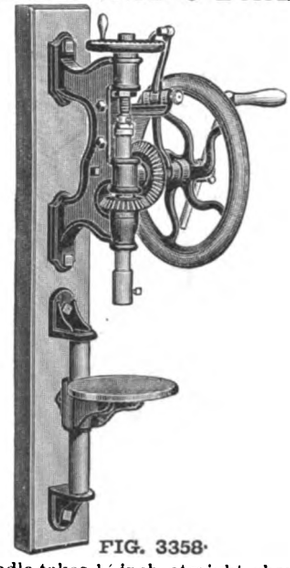


FIG. 3358.

Spindle takes $\frac{1}{2}$ inch straight shank drills; has three changes of automatic self-feed, instantly adjusted from fine to coarse. Furnished with pulleys for power, when so ordered. Drills from 0 to 1 inch hole. Weight, 100 pounds.

PRICE, for hand..... $28.00
" with pulleys..... 31.00

NO. 0.

Spindle bored to receive $\frac{1}{4}$ inch straight shank drills, and turned tapering on end to receive small chuck for wire drills; has three grades of feed. Drills from 0 to $\frac{3}{8}$ inch hole. Length, 26 inches. Weight, 30 lbs.

PRICE, $20.00.

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UPRIGHT BLACKSMITHS' DRILLS.

LEVER FEED.

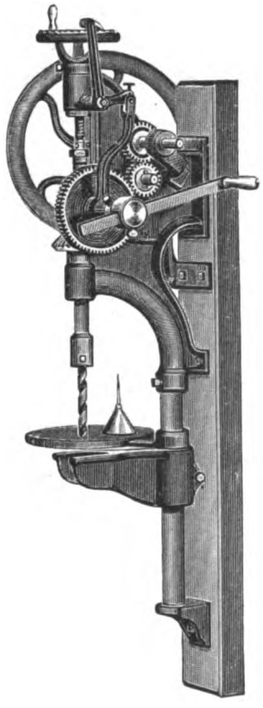


FIG. 3358 A.

No. 3 will drill from ⅛ to 1½ in. hole. Diameter of spindle, $1\frac{5}{16}$ in. Length, 15 in. Will drill hole to center of 16 in. circle, 4½ in. deep. Greatest distance from spindle to table, 22 in. The drill socket screws on to spindle, and takes drills with $\frac{11}{64}$ inch round shank. It has automatic feed, a swing table, 11 in. diameter, and grinding attachment. The crank can be changed to balance wheel shaft, giving more power for heavy drilling. Length, 66 in. Weight, 200 lbs.

PRICE, complete.....$48.00
" without grinder..... 45.00

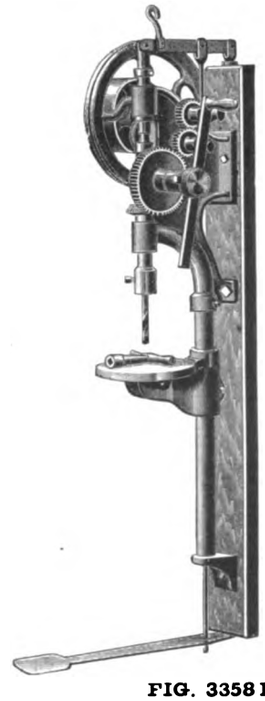


FIG. 3358 B.

By means of a stop collar fitted on the spindle an equal depth in every hole is certain.

The spindle is held up from the work by a counter weight or spring, not shown.

PRICE, with grinder.....$38.00
" without grinder..... 35.00
" with tight and loose pulley and grinder..... 43.00
" with tight and loose pulley, without grinder..... 40.00
" with countershaft and grinder... 55.00
" with countershaft, without grinder, 52.00

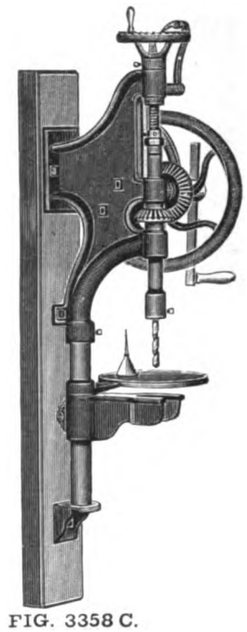


FIG. 3358 C.

Diameter of spindle, 1⅛ inches.

Length, 12 inches.

Will drill hole to center of 11 inch circle, 2½ inches deep and up to one inch holes.

Greatest distance from spindle to table, 12 in.

The drill socket screws on to the spindle, and takes drill with ½ inch round shank.

This drill has a positive automatic feed, which can be adjusted to four rates of speed. It has swing table 8 inches diameter, also a grinding attachment, with rest for grinding bit correctly. Length, 47 inches. Weight, 115 lbs.

PRICE, complete.....$28.00.
" without grinder..... 25.00.

NO. 2 DRILL.

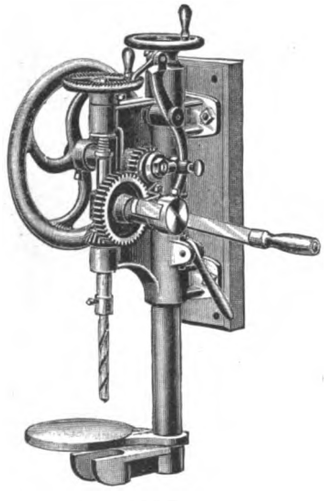


FIG. 3358 D.

The spindle of this drill is made to receive ½ inch straight shank drill bits, unless otherwise ordered. This machine will drill from 0 to ¾ inch hole, and to the center of a 10 inch circle. The spindle will travel 3 inches.

PRICE.....$16.00

NO. 4 DRILL.

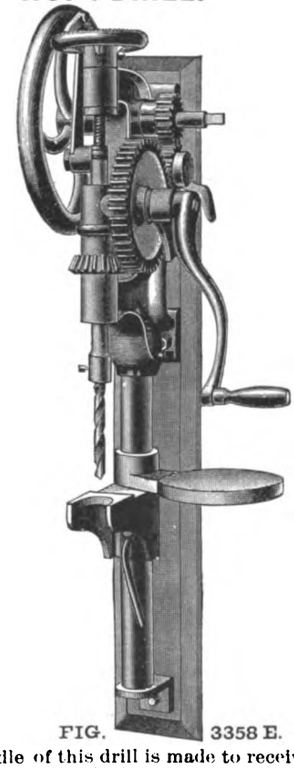


FIG. 3358 E.

The spindle of this drill is made to receive ½ inch straight shank drill bits, unless otherwise ordered.

This machine will drill from 0 to 1 inch hole, and to the center of a 10 inch circle.

The spindle will travel $3\frac{1}{2}$ inches.

PRICE.....$24.00

NO. 3 DRILL.

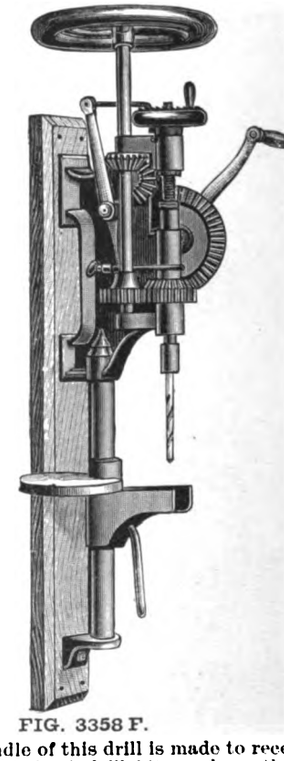


FIG. 3358 F.

The spindle of this drill is made to receive ½ inch straight shank drill bits, unless otherwise ordered.

This machine will drill from 0 to 1 inch hole, and to the center of a 10 inch circle.

The spindle will travel $3\frac{1}{2}$ inches.

PRICE.....$22.00

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UPRIGHT BLACKSMITHS' DRILLS.

Weight of these machines, 150 lbs.
Drills from $\frac{1}{8}$ to $1\frac{1}{4}$ inch hole.
Drills to center of 14 inch circle.
Table is removable for drilling tire, and instantly adjustable to height.
Spindle is steel, with steel set screw hardened and tempered.
The feed has a run of four inches.
The table has an adjustment of 16 inches.
On power machines pulleys will not interfere with use of hand crank.
Spindles are made to receive $\frac{1}{2}$ inch, or $\frac{11}{64}$ shanked drills, as ordered.
Unless ordered otherwise, $\frac{1}{2}$ inch holes will be sent.

PRICES, FIG. 3358 G.
Drills to $1\frac{1}{4}$ inch diameter hole.
Price, with straight table.....$18.00 Price, with swinging table..$20.00

PRICES, FIG. 3358 H.
Drills to $\frac{3}{4}$ inch diameter hole.
Price, with straight table.....$21.00 With swinging table.....$23.00

HAND.

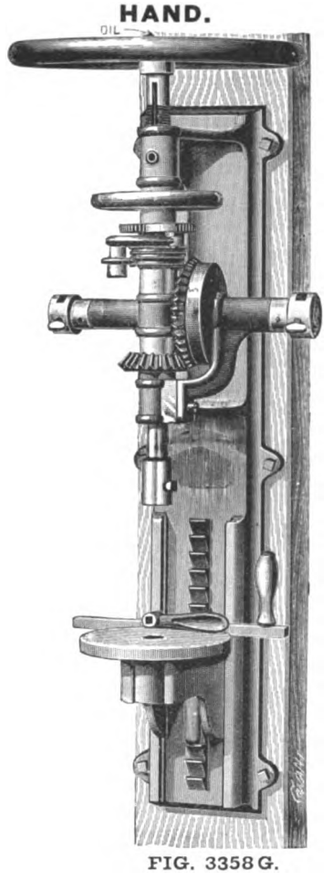


FIG. 3358 G.

HAND OR POWER.

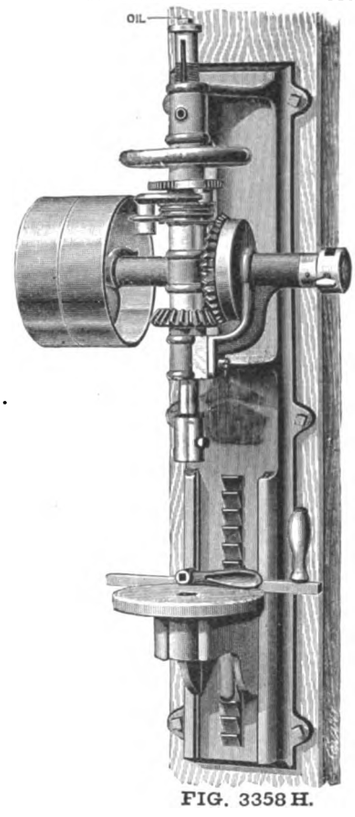


FIG. 3358 H.

NO. 1 DOUBLE GEARED DRILL PRESS.

DESCRIPTION, FIG. 3358 K.

It will drill a hole one inch in diameter with perfect safety. It is so constructed that power and speed are combined in one machine. By using the side crank, speed is obtained for drilling small holes. By using the fly wheel crank gives power, and one inch holes can be drilled with same strength as one-half inch holes can be drilled with side crank.

Weight.....125 lbs.
Swings.....18 inches
Price..... $37.50
Extra for vise..... 2.50

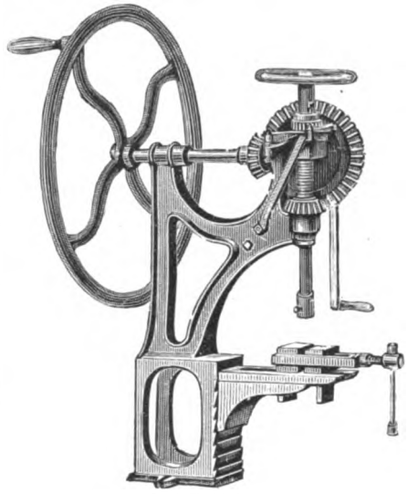


FIG. 3358 K.

NO. 2 SELF-FEED DRILL PRESS.

DESCRIPTION, FIG. 3358 L.

The No. 2 machine is capable of drilling a hole from $\frac{1}{8}$ to 1 inch in diameter. Both cranks can be used in drilling large holes. To increase the speed of feed, turn set screw on back of large gear.

Has a vertical motion of ..... 4 inches
Swings.....22 "
Weight, over.....200 lbs.
Price.....$50.00
Price, with cone pulleys, countershaft, hangers and shipper, complete 80.00

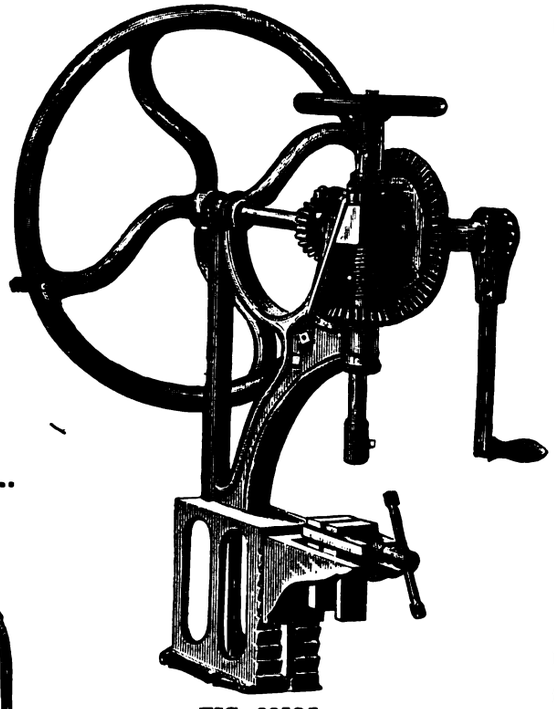


FIG. 3358 L.

NO. 0 BENCH DRILL.

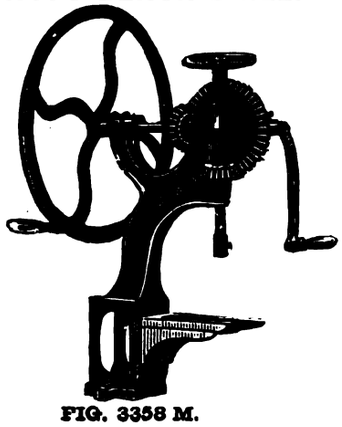


FIG. 3358 M.

DESCRIPTION, FIG. 3358 M.

The No. 0 is suitable for carriage and blacksmith work, and ordinary drilling. It is not a self-feeding machine.

Swings.....14 inches
Weight.....80 lbs.
Price.....$25.00
Vise, extra 2.50

STRAIGHT TABLE DRILL.

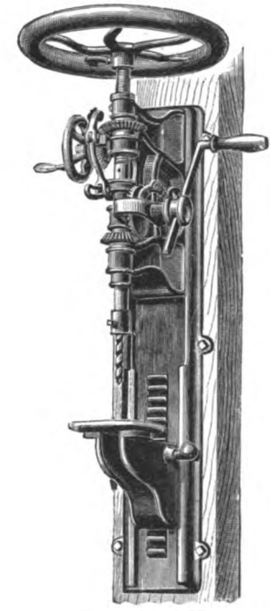


FIG. 3358 N.

This machine will drill as large as 1 inch.
Drill bits should have $\frac{1}{2}$ inch shank. Diameter of balance-wheel, 19 inches. Drills to center of 15 inch circle.

Price, with regular straight table.....$28.00
Price, with swinging table..... 30.00
Fitted with pulley for belt, extra 5.00
Countershaft, extra ... 12.00
Vise, with right and left screw, extra,.... 10.00

SWING TABLE DRILL.

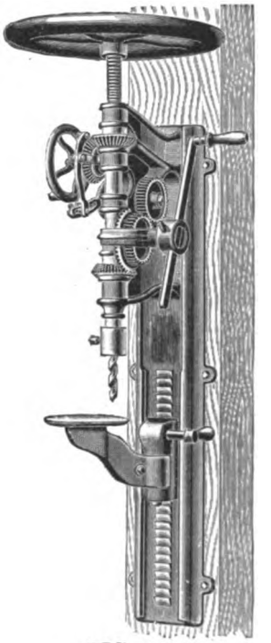


FIG. 3358 P.

Will drill as large as 1 inch. Drill bits should have $\frac{11}{64}$ inch shanks. Diameter of balance-wheel, 22 inches. Drills to center of 20 inch circle.

WEIGHT, 200 LBS.

Price, complete, regular straight table....$43.00
Price, with swinging table..... 45.25
Fitted with pulley for belt, extra..... 5.00
Countershaft, extra.... 12.00
Vise, with right and left screw, extra..... 10.00

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PORTABLE DRILLS.

SHOWS COUNTER AND IDLER.

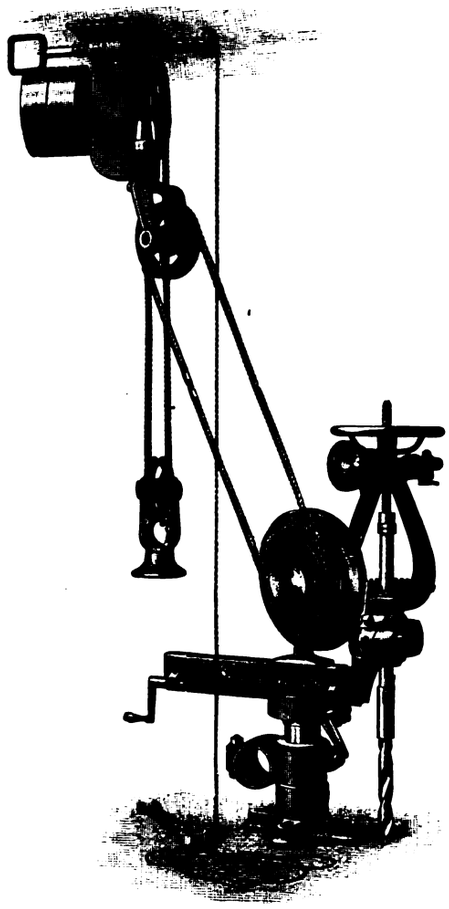


FIG. 3359.

GENERAL DESCRIPTION OF PORTABLE DRILLS 3360 TO 3367.

These machines can be placed as easily as a ratchet brace, and will drill at any angle, in any position, at any distance, and in any direction from the power. Are especially adapted to drilling all pieces which are inconvenient to move, or which cannot be readily adjusted under stationary drilling machines.

Fig. 3359 represents a No. 3 drill, with countershaft, showing the manner in which the power is applied to these machines.

The countershaft being bolted to the ceiling, or other convenient place, receives power from the "line shaft" by a flat belt on the fast and loose pulleys. The frame carrying the "idlers" rotates on a hollow stud, through which the round belt passes to the grooved driving pulley. The rotation of this frame permits the belt to be led to the drilling machine in any direction, radially, from the countershaft, while the rise and fall of the weighted "idler" permits it to be led to any point within the scope of this rise and fall—say ten to fifteen feet or more. By inserting sections of belt by means of the hook couplings, any distance can be reached.

The base of the drilling machine is intended to be bolted or clamped to the piece to be drilled. The height of the post can be adjusted to suit the different lengths of drills and chucks used in the spindle.

The radial arm is adjustable in direction of its length, and can be rotated about the post, thus any point within the circle having the arm for its radius can be reached without moving the machine.

FOR GENERAL TABLE PRICES, SEE PAGE 139.

NO. A DRILL.

DESCRIPTION, FIG. 3360.

This size will drill holes up to ¾ inch in diameter, being intended for very light work.

The arm has a reach of 12 inches; drilling, at one setting, anywhere over a surface of 24 inches, outside diameter, and 9 inches, inside diameter.

The spindle has 4 inch traverse, and contains a No. 2 Morse taper socket. It is held in a vertical position by a squaring collar, which is splined to the arm and bolted to the post; by loosening this collar it can be set at any angle.

The post has 5 inch vertical adjustment, to allow for the use of different lengths of drills and reducing sockets.

The base, post and arm are made of steel castings, giving strength and stiffness with the least weight.

By use of bottom clamp and stud of the base, the drill can be fastened to the flange of a casting, etc., or, with the clamp and stud removed, it can be bolted to any flat surface.

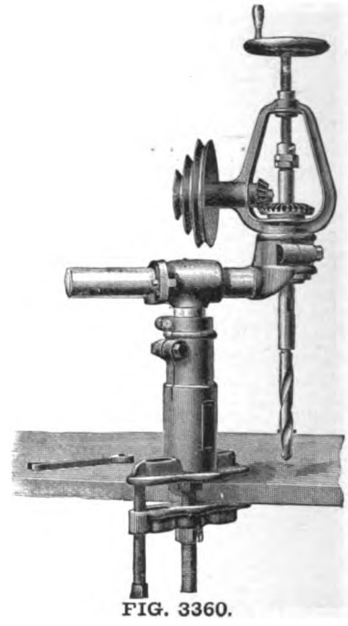


FIG. 3360.

NO. B DRILL.

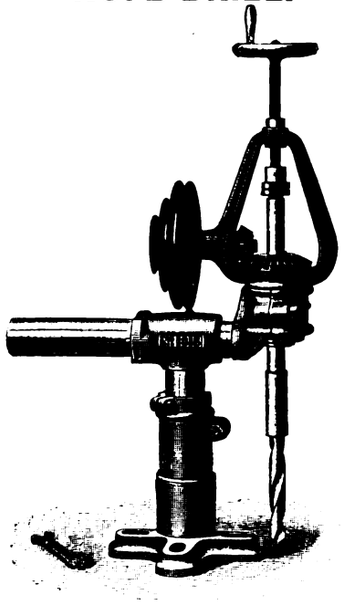


FIG. 3361.

The tight and loose pulleys on the No. 1 countershaft (this being the size furnished with this machine) are 9 inches in diameter for 2½ inch belt, and should make 200 revolutions per minute.

Weight of machine is 75 lbs.

Weight, complete, with countershaft, boxed for shipment, is 225 lbs.

FOR PRICES, SEE PAGE 139.

DESCRIPTION, FIG. 3361.

Will drill holes up to 1 inch in diameter.

The arm has a reach of 16½ inches; drilling, at one setting, anywhere over a surface of 33 inches, outside diameter, and 11 inches, inside diameter.

The spindle has 5½ inch traverse, and contains a No. 3 Morse taper socket. It is held in a vertical position by a squaring collar, which is splined to the arm and bolted to the post; by loosening this collar it can be set at any angle.

The post has 5 inch vertical adjustment to allow for the use of different lengths of drills and reducing sockets.

The base, post and arm are made of steel castings, giving strength and stiffness with the least weight.

The tight and loose pulleys on the No. 1 countershaft (this being the size furnished with this machine) are 9 inches in diameter for 2½ inch belt, and should make 200 revolutions per minute.

Weight of the machine is 110 lbs.

Weight, complete, with countershaft, boxed for shipment, is 250 lbs.

FOR PRICES, SEE PAGE 139.

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PORTABLE DRILLS.

NO. 1 DRILL.

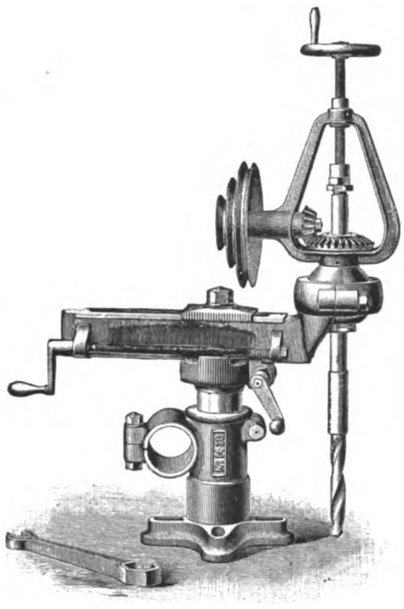


FIG. 3362.

DESCRIPTION, FIG. 3362.

This size will drill holes up to 1 inch in diameter, having the same range and power as the No. B drill ; in this design, however, a much quicker and more delicate means of setting drill is obtained by use of the side screw, worm and tangent wheel.

The arm has a reach of 16½ inches ; drilling, at one setting, anywhere over a surface of 33 inches, outside diameter, and 11 inches, inside diameter. The arm is moved in and out by a screw, and rotated around the post by a worm and tangent wheel.

The spindle has 5½ inches traverse and contains a No. 3 Morse taper socket. It is held in a vertical position by a squaring collar fitted to the under side of the ball on the frame ; on removing this collar, the spindle, by means of the ball and socket joint, can be set at any angle up to 30 degrees.

The post has 5 inches vertical adjustment to allow for the use of different lengths of drills and reducing sockets. It can be held in the split bearing on side of base for drilling horizontally. The tight and loose pulleys on the No. 2 countershaft, this being the size furnished with this machine, are 10 inches in diameter for 3 inch belt, and should make 200 revolutions per minute. Weight of machine is 130 pounds.

Weight, complete, with countershaft, boxed for shipment, is 300 pounds.

FOR PRICES, SEE PAGE 139.

NO. 2 DRILL.

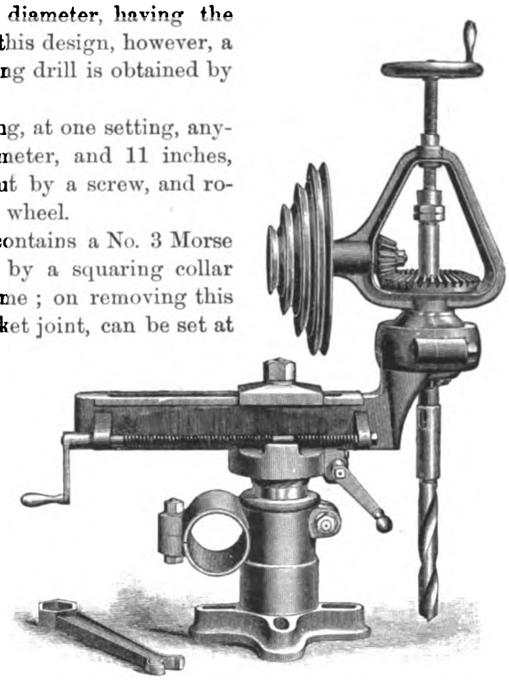


FIG. 3363.

DESCRIPTION, FIG. 3363.

This size closely resembles the No. 1 drill, but has more power and has larger range, drilling holes up to 1½ inches diameter.

The arm has a reach of 21½ inches ; drilling, at one setting, anywhere over a surface of 43 inches, outside diameter, and 13 inches, inside diameter. The arm is moved in and out by a screw, and rotated around the post by a worm and tangent wheel.

The spindle has 5½ inches traverse and contains a No. 4 Morse taper socket. It is held in a vertical position by a squaring collar fitted to the under side of the ball on the frame ; on removing this collar the spindle, by means of the ball and socket joint, can be set at any angle up to 30 degrees.

The post has 6 inches vertical adjustment to allow for the different lengths of drills and reducing sockets. It can be held in the split bearing on the side of the base for drilling horizontally.

The tight and loose pulleys on the No. 2 countershaft, this being the size furnished with this machine, are 10 inches in diameter for 3 inch belt, and should make 200 revolutions per minute. Weight of the machine is 240 pounds.

Weight, complete, with countershaft, boxed for shipment, is 500 pounds.

FOR PRICES, SEE PAGE 139.

NO. 3 DRILL.

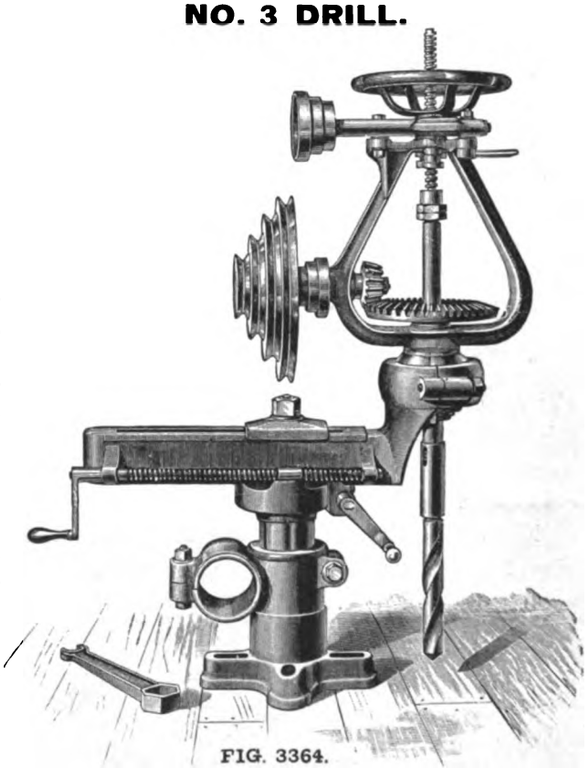


FIG. 3364.

DESCRIPTION, FIG. 3364.

This size has the same range as the No. 2 drill, but is more powerful, drilling holes up to 2 inches diameter, and is also furnished with an automatic feed.

The arm has a reach of 21½ inches ; drilling, at one setting, anywhere over a surface of 43 inches, outside diameter, and 13 inches, inside diameter. The arm is moved in and out by a screw, and rotated around the post by a worm and tangent wheel. The spindle has 8 inches traverse, contains a No. 4 Morse taper socket, and is furnished with an automatic feed arrangement giving, per revolution of the spindle, .005, .007 or .013 of an inch advance. The spindle is held in a vertical position by a squaring collar fitted to the under side of the ball on the frame ; on removing this collar the spindle, by means of the ball and socket joint, can be set at any angle up to 30 degrees. The post has 6 inches vertical adjustment to allow for the use of different lengths of drills and reducing sockets. It can be held in the split bearing on the side of the base for drilling horizontally.

The tight and loose pulleys on the No. 2 countershaft, this being the size furnished with this machine, are 10 inches in diameter for 3 inch belt, and should make 200 revolutions per minute. Weight of the machine is 240 pounds.

Weight, complete, with countershaft, boxed for shipment, is 550 pounds.

FOR PRICES, SEE PAGE 139.

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NO. 4 DRILL.

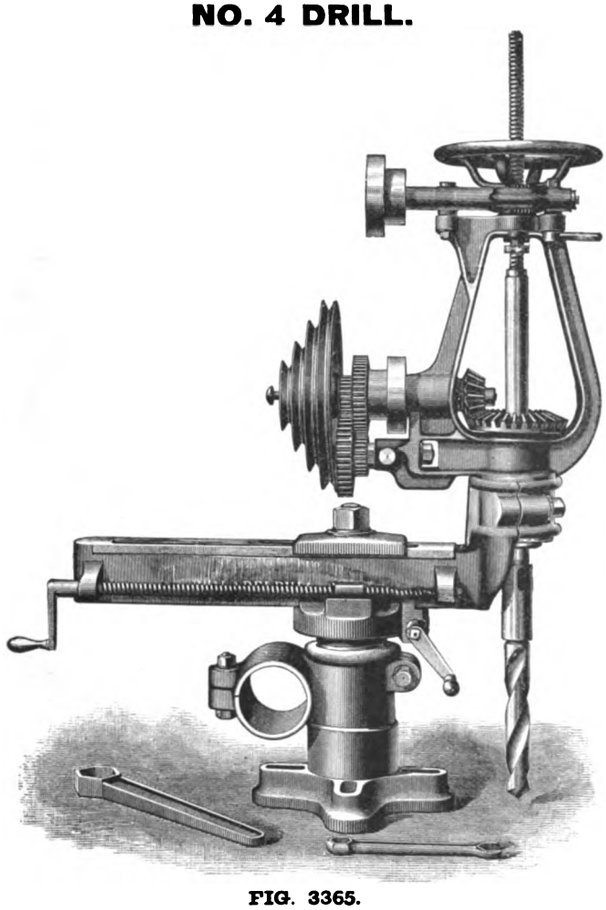


FIG. 3365.

DESCRIPTION, FIG. 3365.

This machine is larger and much more powerful than the No. 3 drill, and is intended for heavy work. It is found very useful in large engine and shipbuilding establishments. It will drill any hole and bore up to 8 inch diameter with bar and cutter.

The arm has a reach of 28 inches; drilling, at one setting, anywhere over a surface of 56 inches, outside diameter, and 16 inches, inside diameter. The arm is moved in and out by a screw, and rotated around the post by a worm and tangent wheel.

The spindle has 13 inch traverse, contains a No. 4 Morse taper socket, and is furnished with an automatic feed arrangement giving, per revolution of the spindle, .006 or .013 of an inch advance. As the cone, back gears, etc., in this size are so heavy and overhung, it has not been thought advisable to put the ball and socket joint on this machine; the frame is held in a straight bearing, which keeps the spindle vertical.

The post has 6 inch vertical adjustment to allow for the use of different lengths of drills and reducing sockets. It can be held in the split bearing on the side of the base for drilling horizontally.

The tight and loose pulleys on the No. 2 countershaft, this being the size furnished with this machine, are 10 inches in diameter for 3 inch belt, and should make 200 revolutions per minute.

Weight of the machine is 400 lbs.

Weight, complete, with countershaft, boxed for shipment, is 700 lbs.

FOR PRICES, SEE NEXT PAGE.

DESCRIPTION, FIG. 3366.

This machine is similar in design to the No. 4 drill, but of nearly double its range, power and weight.

It is designed for the heaviest kind of boring, having five steps on the driving cone, and being powerfully back geared.

The arm has a reach of 36 inches; drilling, at one setting, anywhere over a surface of 72 inches, outside diameter, and 22½ inches, inside diameter. The arm is moved in and out by a screw, and rotated around the post by a worm and tangent wheel.

The spindle has 22 inch traverse, contains a No. 5 Morse taper socket, and is furnished with an automatic feed arrangement giving, per revolution of the spindle, any advance from .005 of an inch to .125 of an inch. As in the No. 4 drill, the frame is held in a straight bearing, which keeps the spindle vertical.

The post has 8 inch vertical adjustment to allow for the use of different lengths of drills and reducing sockets. It can be held in the split bearing on the side of the base when drilling horizontally.

The tight and loose pulleys on the No. 3 countershaft, this being the size furnished with this machine, are 16 inches in diameter for 3½ inch belt, and should make 150 revolutions per minute.

Weight of the machine is 900 lbs.

Weight, complete, with countershaft, boxed for shipment, is 1,400 lbs.

FOR PRICES, SEE NEXT PAGE.

NO. 5 DRILL.

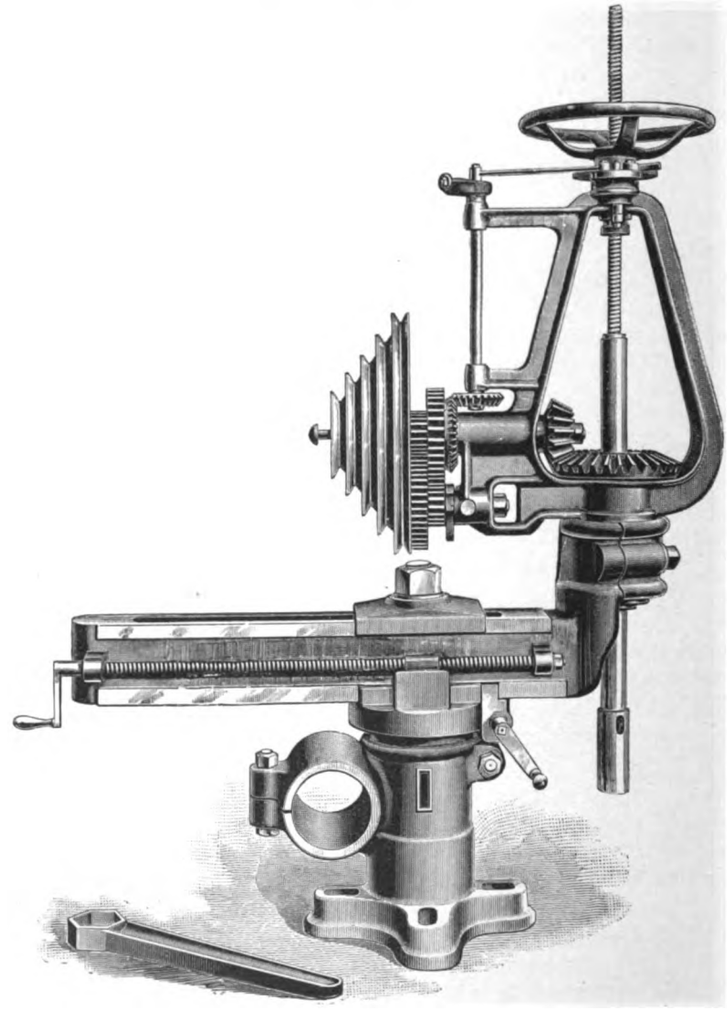


FIG. 3366.

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TABLE FOR PORTABLE DRILLS.

DESCRIPTION, FIG. 3367.

FOR USE WITH FIGS. 3359 TO 3366.

This cut shows a table and base plate designed to use in connection with the portable drill when the latter is not in use on the floor.

The top and front of the table contain T slots, so that the work or drill can be readily bolted to either of these sides, giving the advantages of a vertical or horizontal machine.

The base plate also contains T slots, so that large work or supports for work fastened to the front of the table can be readily bolted to it.

The table contains a door in the back, making a convenient closet.

DIMENSIONS:—Size of top of table, 24 inches by 20 inches.

Size of front of table is 20 inches by 15 inches.

Height of table from top to base plate is 30 inches.

Size of slotted part of base plate is 21 inches by 18 inches.

Weight of table and base plate, complete, is 1,000 lbs.

PRICE, $85.00.

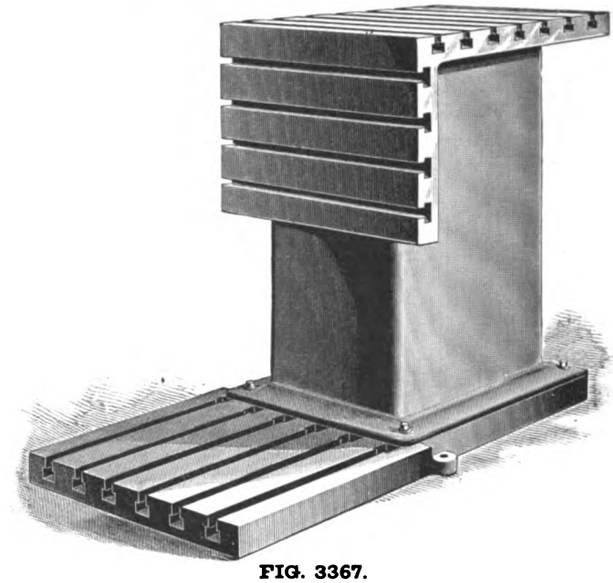


FIG. 3367.

GENERAL DIMENSIONS AND PRICES, PAGES 136 TO 139.

	Will drill up to a diameter of	Greatest distance from spindle to center of post.	Vertical adjustment of post.	Spindle traverse.	Morse taper socket in spindle.	Speed of countershaft.	Diameter of tight and loose pulleys.	Width of belt.	Weight of machine.	Weight, complete, boxed.
No. A.	¾ in.	12 in.	5 in.	4 in.	No. 2.	200 rev.	9 in.	2½ in.	75 lbs.	225 lbs.
" B.	1 "	16½ "	5 "	5½ "	" 3.	200 "	9 "	2½ "	110 "	250 "
" 1.	1 "	16½ "	5 "	5½ "	" 3.	200 "	10 "	3 "	130 "	300 "
" 2.	1½ "	21½ "	6 "	5½ "	" 4.	200 "	10 "	3 "	240 "	500 "
" 3.	2 "	21½ "	6 "	8 "	" 4.	200 "	10 "	3 "	280 "	550 "
" 4.	3 "	28 "	6 "	13 "	" 4.	200 "	10 "	3 "	400 "	700 "
" 5.		36 "	8 "	22 "	" 5.	150 "	16 "	3½ "	900 "	1,400 "

PRICES.

	Machine.	Counter hanger.	Complete, with 100 ft. hemp or cotton rope and 3 pairs couplings.	Complete, with 100 ft. raw hide rope and 3 pairs couplings.	Hemp or cotton rope, per foot.	Raw hide rope, per foot.	Steel couplings, per pair.	Size of suitable rope and couplings.
Fig. 3360. No. A.	$60.00	$30.00	$95.00	$115.00	5 cts.	25 cts.	50 cts.	½ in. diam.
" 3361. " B.	85.00	30.00	120.00	140.00	5 "	25 "	50 "	½ " "
" 3362. " 1.	130.00	35.00	170.00	190.00	5 "	25 "	50 "	½ " "
" 3363. " 2.	165.00	35.00	207.00	230.00	7 "	30 "	60 "	⅝ " "
" 3364. " 3.	195.00	35.00	237.00	260.00	7 "	30 "	60 "	⅝ " "
" 3365. " 4.	265.00	35.00	307.00	330.00	7 "	30 "	60 "	⅝ " "
" 3366. " 5.	450.00	55.00	514.00	543.00	9 "	38 "	90 "	¾ " "

We advise use of raw hide rope in preference to hemp or cotton.

PORTABLE HORIZONTAL OR RADIAL DRILL.

This machine is designed to work on or from a drill press. It is mounted on the frame, and is driven direct from the drill press spindle. It is useful in drilling the ends and diagonal parts of frames; it can also be mounted on the work and driven by a sliding shaft and universal joints. Drilling in all directions can be done, with the two 2 taper shanks and the horizontal and vertical movements, by loosening the nuts shown. This machine does away with the expensive ratchet worked by hand, and it is capable of drilling with as great speed as though drilled direct. The spindle is drilled for Morse taper socket.

PRICE, $300.00.

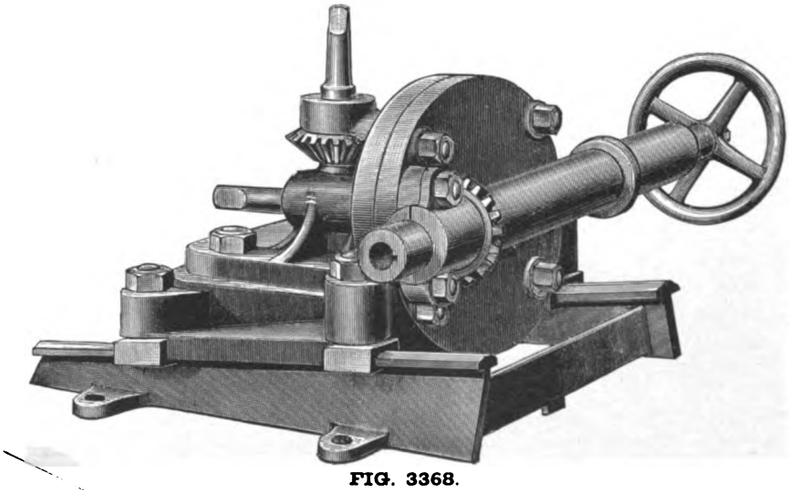


FIG. 3368.

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AUTOMATIC FEED PORTABLE DRILLS.

COUNTERSHAFT.

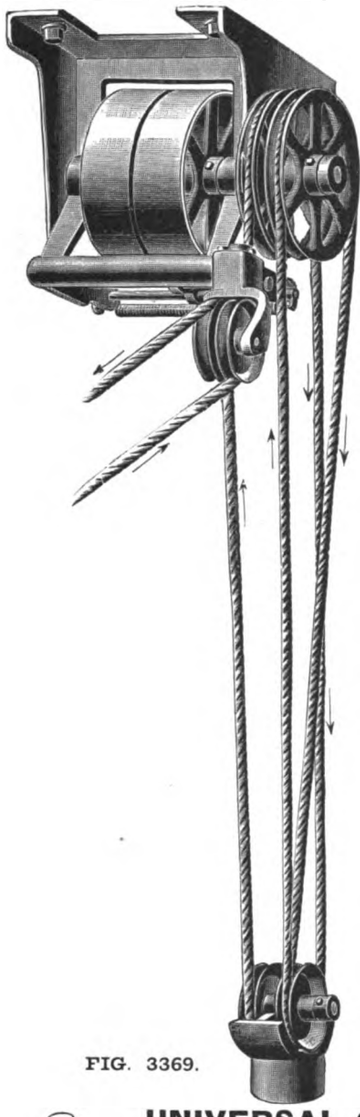


FIG. 3369.

DRILL PRESS.

It can be placed more readily than the ratchet, and will drill in any position, at any angle, and at any direction from the power.

It is very powerful, and has a strong automatic feed, equal to the greatest strain a twist drill can be subjected to.

The accompanying illustrations show the drill as applied to places where it is common to use a ratchet, portable or stationary drill.

At the base of machine is a hollow stud, with a coarse thread, for the purpose of securing almost instantly machine to the brace or jig, after the brace or jig is properly adjusted for the hole to be drilled. In order to secure great accuracy of work, a hardened thimble can be placed in this hollow stud to guide the drill. There are some locations where the ordinary brace is not suitable, and in such cases it pays to make a brace suitable for its peculiar position.

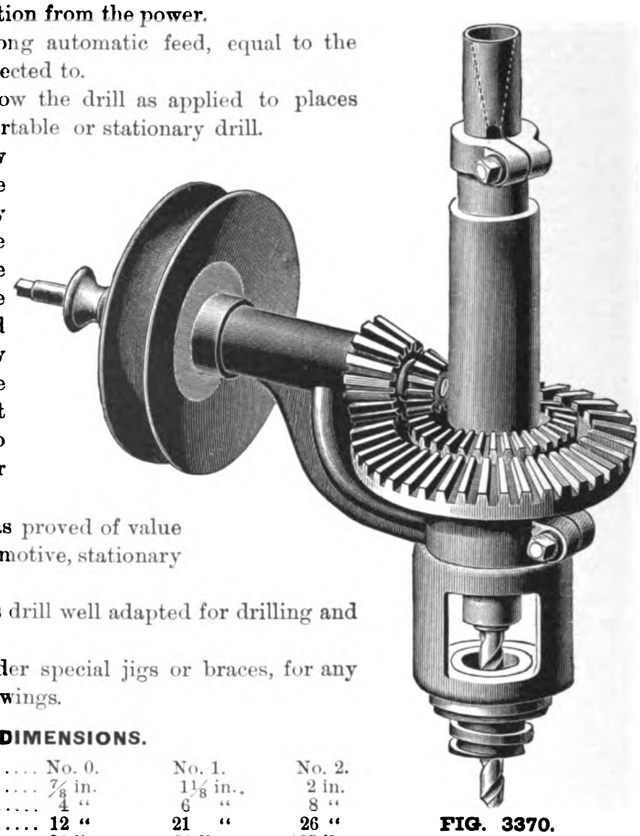


FIG. 3370.

In the boiler shop this machine has proved of value for a great variety of drilling about locomotive, stationary and portable boilers.

For bridge work we have found this drill well adapted for drilling and reaming.

We are prepared to furnish to order special jigs or braces, for any peculiar shaped work, on receipt of drawings.

CAPACITY AND DIMENSIONS.

Sizes	No. 0.	No. 1.	No. 2.
Drills up to	⅞ in.	1⅛ in.	2 in.
Length of feed	4 "	6 "	8 "
Extreme height of machine	12 "	21 "	26 "
Weight of machine	20 lbs.	50 lbs.	125 lbs.
T. and L. pulleys on counter hanger	13 in.	13 in.	13 in.
Width of belt	4 "	4 "	4 "
Speed of pulleys	300	300	300
Weight of counter hanger	250 lbs.	250 lbs.	250 lbs.
PRICES	$	**$150.00.**	**$235.00.**

NO. 2 DRILL IS MADE WITH BACK GEARS.

We furnish countershaft and 100 feet of rope and one cast steel brace with each complete machine.

UNIVERSAL CAST STEEL BRACE.

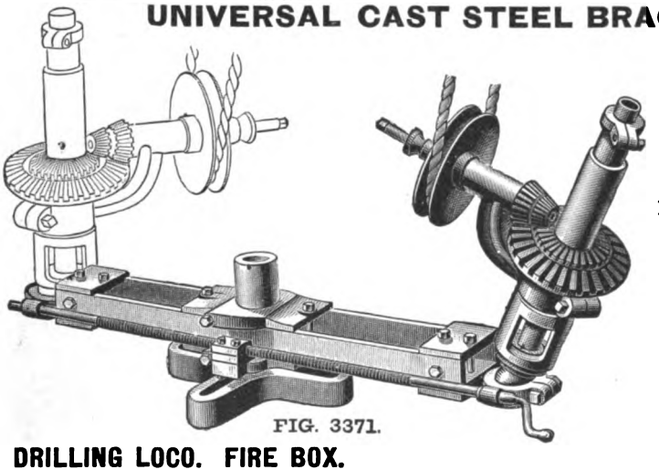


FIG. 3371.

PRICES, FIG. 3371.

No. 1. 5 ft. circle, $ ....

" 2. 8 " " .....

DRILLING ENGINE FRAME.

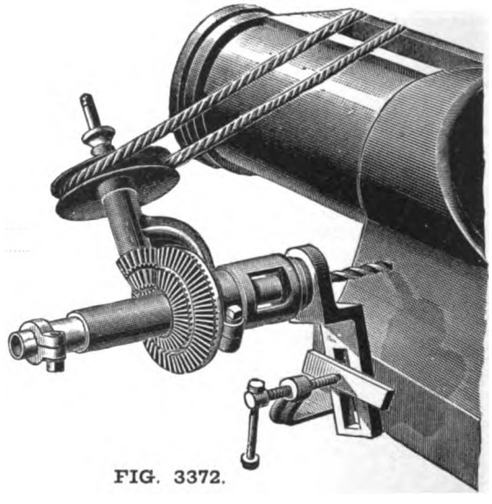


FIG. 3372.

DRILLING LOCO. FIRE BOX.

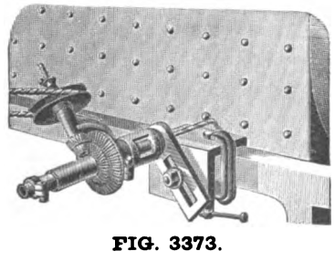


FIG. 3373.

DRILLING AT AN ANGLE.



FIG. 3374.

CHAIN CLAMP.



FIG. 3375.

IN SMOKE BOX BY JIG.

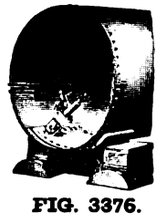


FIG. 3376.

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STOW FLEXIBLE SHAFTS AND DRILLS.

They are made up of a series of coils of steel wire, wound hard upon each other, each alternate layer running in an opposite direction, and the number of wires in different layers varying according to the work the shaft is adapted to; on being brought to size, about one inch at each end of the shaft is brazed solid, and to these solid ends the fittings are attached, the one to receive the tools to be operated, the other to receive the power from the pulley enclosing it, which in turn receives its power from a belt. Next a case is prepared consisting of a single coil of special square steel wire, its internal diameter being a loose fit for the outside of shaft; this is covered with some flexible material, leather preferably, over which at either end a ferrule is fastened; into this ferrule at one end is screwed the hand piece; at the opposite end the frame, which carries the pulley. A glance at the cuts following will show these details of construction, and make the explanation clear.

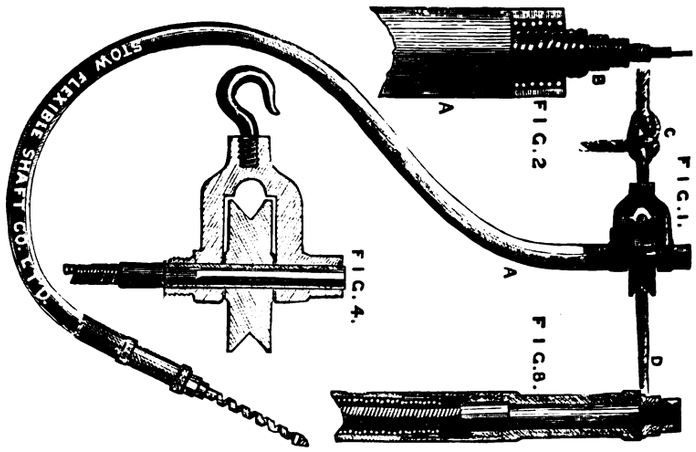


Fig. 1 shows complete shaft with auger screwed into end. Fig. 2 shows manner of "laying up" the shaft, and the construction of case, to which are attached the tools to be used. Fig. 4, section at pulley end. Fig. 3, section showing hand piece, shaft case, and end nut, Letter references: A A, shaft case; B, section of shaft and case; C, cord to draw pulley to any desired direction; D, driving belt.

This mode of construction insures stability, durability, and great torsional strength, and at the same time entire flexibility at right angles to the axis.

The term flexible shaft means the shaft only as shown in this cut, including case, core, pulley head, flat end, screw end, hand piece, and hexagonal nut.

FLEXIBLE SHAFTS.

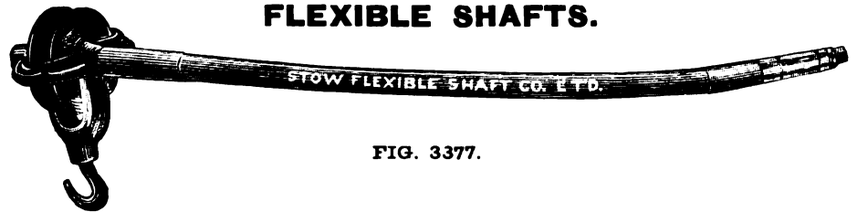


FIG. 3377.

PRICES.

Selling number	0	1	2	3	4	5	6	8	9
Diameter of core, in inches	1/4	5/16	3/8	1/2	5/8	7/8	1	1 1/4	1 3/8
Standard length, in feet	3	3 1/2	4	5	6	7	8	8	8
Price, complete, as per cut	$16.00	18.00	25.00	30.00	40.00	50.00	60.00	80.00	100.00
" per foot, extra	1.80	2.40	2.70	3.00	3.75	4.50	5.25	8.25	12.00

Shafts of special length made to order only.

SCREW FEED DRILL PRESS.

They have the spindles made to take the Morse twist drills, as follows:

Nos. 3 and 4 have Morse taper socket No. 1, taking drills from 1/4 inch to 1 3/32 inch, inclusive. With No. 3 shaft, it will drill to 3/8 inch; with No. 4 shaft, will drill to 5/8 inch.

PRICE, $20.00.

No. 5 has Morse taper sockets Nos. 1 and 2, taking drills from 1/4 inch to 2 3/32 inch, inclusive.

PRICE, $25.00.

No. 6 has Morse taper sockets Nos. 2 and 3, taking drills from 5/8 inch to 1 1/4 inches, inclusive.

PRICE, $25.00.

Nos. 8 and 9 have Morse taper sockets Nos. 3 and 4, taking drills from 1 5/16 inch to 2 inches. No. 8 press drills to 1 5/8 inches. No. 9 press drills to 2 inches.

PRICE, $30.00.

The drill presses are numbered to correspond with numbers of shafts with which they are used—thus the No. 6 drill press is used with the No. 6 shaft.

For very light work in wood or metal, we make a series of three hand drills, used with Nos. 0, 1 and 2 shafts, costing respectively **$2.00, $2.50** and **$3.00.**



FIG. 3378.

Made in four sizes. They are well proportioned, accurately and carefully made, with steel spindles, feed screws and gear pinions, cut gears, hardened steel thrust bearings, and feed screw points, and have the gear pinion covered. All these drill presses are provided with stopping and starting clutch.

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FLEXIBLE SHAFTS AND PARTS.

BREAST DRILL.

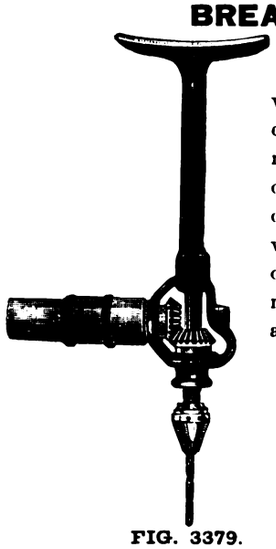


FIG. 3379.

This tool is made of malleable iron, with steel spindles and thrust bearing, cut gears, now enclosed, and a clutch arrangement by which it may be thrown in or out of gear at will. Used with No. 3 or 4 shaft, it drills all holes possible where feed power is limited to weight of operator. Say, $\frac{1}{4}$ inch and under. We make it with different clutch ends, adapted to fit the various sizes of shafts.

PRICES.

No. 3	$12.00
" 4	13.00
" 5 or 6	14.00
" 8 or 9	15.00

COUNTERSHAFT.

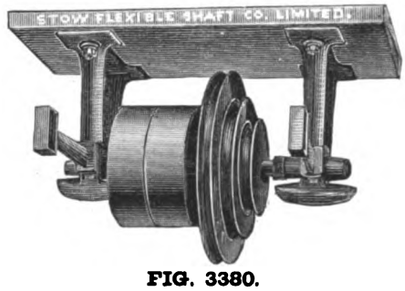


FIG. 3380.

ROUNDABOUT, ETC.

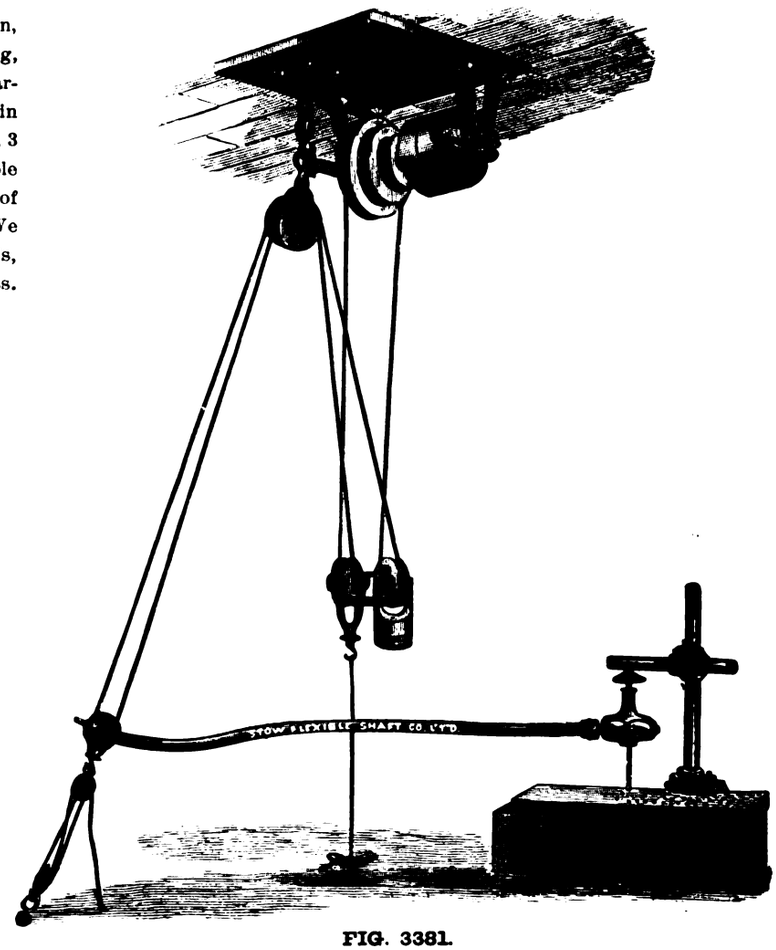


FIG. 3381.

ROUNDABOUT TRANSFER.

This arrangement is shown in Fig. 3381, in connection with countershaft, flexible shaft, drill press, etc. The lower pulley takes up the slack of the driving rope, and the swiveled pulleys at the top allow the shaft to be carried in any direction. A peculiar feature of this device, distinguishing it from all others of its class, is the fact that the rise of the lower pulleys is only one half the extension of the driving rope, a matter of great importance in low studded rooms. With the roundabout, work may be performed at varying distances from the fixed countershaft, and in any desired direction.

DRIVING BELT. For driving belt, any of the varieties of round belting may be used. We keep in stock, and furnish at market rates, a round belt made of rawhide lacings, twisted and woven into a rope, which has proven the best round belt for the purpose. Also a soft braided cotton rope, in lengths of 50 and 25 feet each.

TRANSFER PULLEYS.



FIG. 3382.

Where the great range of the roundabout is not required, the transfer pulley may be used. With it the driving belt may be carried at any desired angle, but at a constant distance only, unless the length of the rope itself be varied.

PRICES.

No. 2 transfer pulley	$2.00
" 4 " "	2.50
" 6 " "	3.00
" 8 " "	3.50

PRICES, COMPLETE, WITH COTTON BRAIDED ROPE.

	Flexible shaft. Fig. 3377.	Drill press. Fig. 3378.	Breast drill. Fig. 3379.	Countershaft. Fig. 3380.	Roundabout. Fig. 3381.	100 feet cotton braided rope.	Three pairs couplings.	Drill rest and support. Fig. 3387.	Total.	Capacity.
No. 3	$30.00		$12.00	$10.00	$10.00	$5.00	$1.50		$68.50	Drills to $\frac{1}{4}$ in.
" 3	30.00	$20.00		10.00	10.00	5.00	1.50		76.50	" $\frac{1}{2}$ "
" 4	40.00	20.00		20.00	17.00	7.00	1.50		105.50	" $\frac{5}{8}$ "
" 5	50.00	25.00		20.00	20.00	10.00	2.25	$16.00	143.25	" $\frac{13}{16}$ "
" 6	60.00	25.00		20.00	20.00	10.00	2.25	16.00	153.25	" $1\frac{1}{4}$ "
" 8	80.00	30.00		20.00	20.00	12.00	3.00	18.00	183.00	" $1\frac{5}{8}$ "
" 9	100.00	30.00		22.00	20.00	12.00	3.00	18.00	205.00	" 2 "
" 8	80.00		55.00	20.00	20.00	12.00	3.00	18.00	208.00	" $2\frac{1}{2}$ "
" 9	100.00		55.00	22.00	20.00	12.00	3.00	18.00	240.00	" 3 "

Pedestal drill. Fig. 3385.

PRICES, COMPLETE, WITH RAWHIDE BELT.

	Flexible shaft. Fig. 3377.	Drill press. Fig. 3378.	Breast drill. Fig. 3379.	Countershaft. Fig. 3380.	Roundabout. Fig. 3381.	100 feet rawhide belt.	Three pairs couplings.	Drill rest and support. Fig. 3387.	Total.	Capacity.
No. 3	$30.00		$12.00	$10.00	$10.00	$20.00	$0.75		$82.75	Drills to $\frac{1}{4}$ in.
" 3	30.00	$20.00		10.00	10.00	20.00	0.75		90.75	" $\frac{1}{2}$ "
" 4	40.00	20.00		20.00	17.00	25.00	1.00		123.00	" $\frac{5}{8}$ "
" 5	50.00	25.00		20.00	20.00	30.00	1.50	$16.00	162.50	" $\frac{13}{16}$ "
" 6	60.00	25.00		20.00	20.00	30.00	1.50	16.00	172.50	" $1\frac{1}{4}$ "
" 8	80.00	30.00		20.00	20.00	38.00	2.25	18.00	208.25	" $1\frac{5}{8}$ "
" 9	100.00	30.00		22.00	20.00	45.00	3.00	18.00	238.00	" 2 "
" 8	80.00		55.00	20.00	20.00	38.00	2.25	18.00	233.25	" $2\frac{1}{2}$ "
" 9	100.00		55.00	22.00	20.00	45.00	3.00	18.00	263.00	" 3 "

Pedestal drill. Fig. 3386.

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FLEXIBLE SHAFT EXTRAS.

TAPPER AND REAMER.

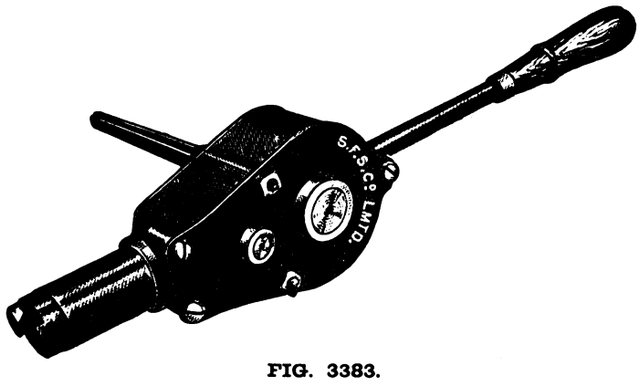


FIG. 3383.

Is used with Nos. 6, 8 and 9 shafts, and is interchangeable with the drill presses of the same numbers.

PRICE, $25.00.

Sometimes it becomes necessary to back out a tap or reamer, for which we arrange by putting the hole in both ends of the spindle. After the tool has been driven as far as necessary the machine is withdrawn, turned over in the hands, and put on the other end, when the tool is backed out by the same power that drove it in.

PRICE, WITH HOLE IN BOTH ENDS OF SPINDLE, $30.00.

HEAVY REAMER.

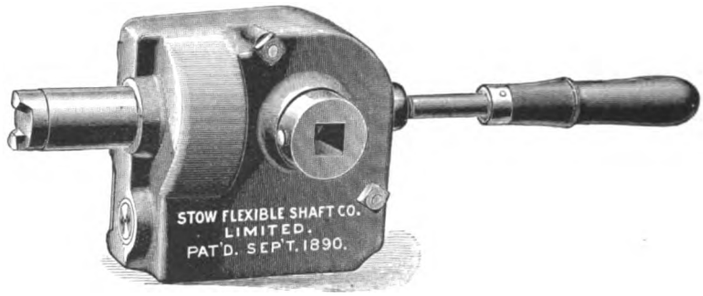


FIG. 3384.

This machine contains a worm and gear, besides a pair of spur gears, all of which are enclosed in a tight case. All hard working parts are of steel or phosphor bronze, and gears are all accurately cut.

This is built for the Nos. 8 and 9 shaft, provided with the usual clutches for starting and stopping; has hole in both ends of spindle, and is provided with easily detachable sockets, which can be made in a series of sizes and arranged to take taps or reamers with shanks of any size or shape.

PRICE, $45.00.

PEDESTAL DRILL.

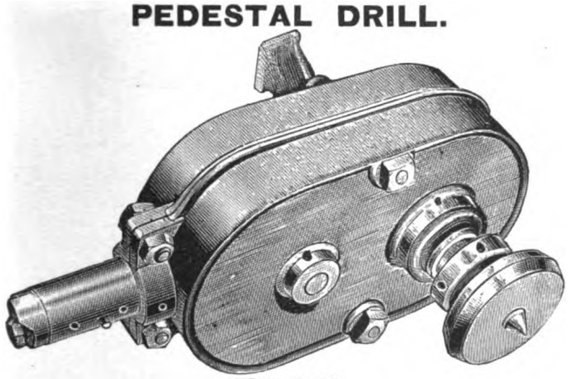


FIG. 3385.

It is double geared in the ratio of seven revolutions of the shaft to one of the drill, occupies a space of 7½ x 7½ x 12 inches, and is fitted with a square socket. Used either with Nos. 8 or 9 shaft, according to character of the work.

PRICE, $55.00.

FLUE CUTTER.

This cut shows the improved tool for cutting off boiler flues in place. The mandrel and tool carrier *A* is inserted in the flue to be cut off, and held in position by the clamps *BB*. The shaft is attached by means of the hand piece *F*, which is also the means of starting and stopping the cutter when in use. The cutters *D* are forced out against and through the flue as it is cut, by means of the feed screw *E*. In this way we are enabled to cut out flues much more rapidly than by the ordinary process, and quite as effectually—with the decided advantage of destroying a much less length of flue than is necessary by the old methods.

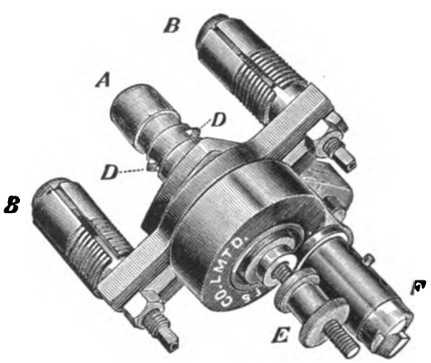


FIG. 3386.

PRICE, WITH ONE SET OF CUTTERS, $45.00.

DRILL REST AND SUPPORT.

DESCRIPTION, FIG. 3387.

We have recently designed a new drill rest especially adapted to use with the flexible shaft, because there is a piece on the arm which supports the drill press and prevents it from feeding itself too fast at the end of the hole, or from dropping when the hole is bored. This supporting piece has a hole which just fits over the end of the feed screw of the drill press. We have extended the feed screw slightly above the feed wheel, and made a depression around it. This depression comes opposite a pair of holes in the support, and a bent wire is inserted, which fills the space and holds up the drill press. This device entirely prevents the old trouble of the drill press falling through the hole and being broken.

We make this in two sizes:

FOR NOS. 5 AND 6 DRILL PRESSES, $16.00.
FOR NOS. 8 AND 9 DRILL PRESSES, $18.00.

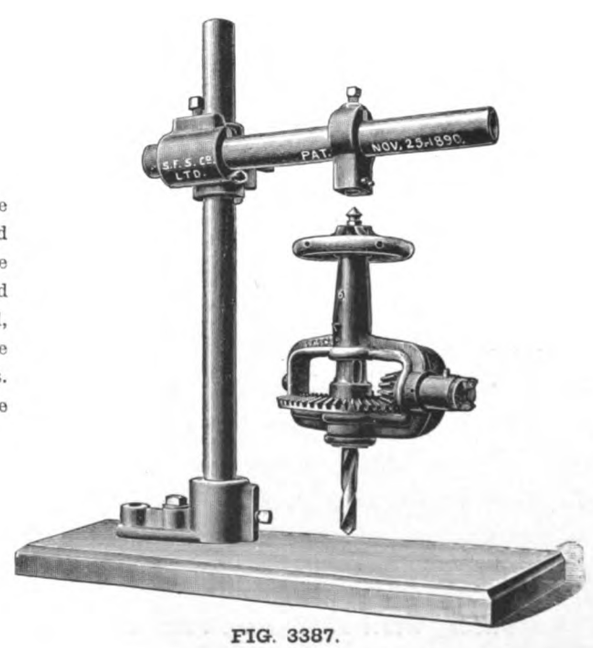


FIG. 3387.

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DEAD LIGHT OR AIR PORT CUTTER.

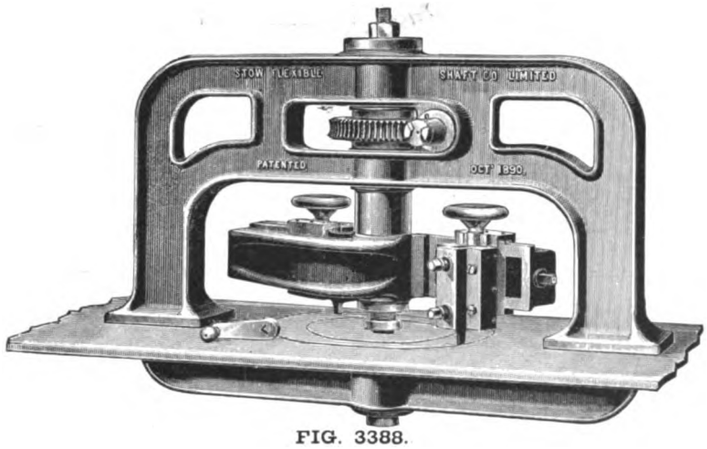


FIG. 3388.

This machine is operated by the No. 9 flexible shaft, through the usual clutches. The power is carried through a worm and gear to the spindle. This has an arm revolving with it, carrying two cutting tools that may be cutting in the same place, or different places, at the same time. These tools are fed down by feed screws and hand wheels, until the hole or ring is cut out.

Cuts holes from 6 to 18 inches in diameter.

PRICE, $250.00.

CORNER DRILL PRESS.



FIG. 3389.

Is made for the No. 6 shaft, and adapted to ship or tank work, where it is necessary to drill lines of rivet holes near a corner. Is arranged to drill holes within 1⅜ inches from the corner. It is built with spur and bevel gears, all accurately cut, and is provided with the regular stopping and starting clutch. The gears are all covered. The spindle has No. 2 Morse taper hole. The feed motion is operated by a ratchet and handle, which can be turned either way.

The tool is useful in confined spaces, where it is not convenient to set up an "Old Man," or inside a boiler or tank 3 or 4 feet in diameter. For this purpose we take off the ratchet feed and put on an extension feed screw with ordinary hand wheel, which can be fed against the opposite side of the boiler shell as a thrust bearing.

PRICE, WITH EXTENSION FEED SCREW, $52.00.

PULLEY HUB DRILL AND TAPPER.

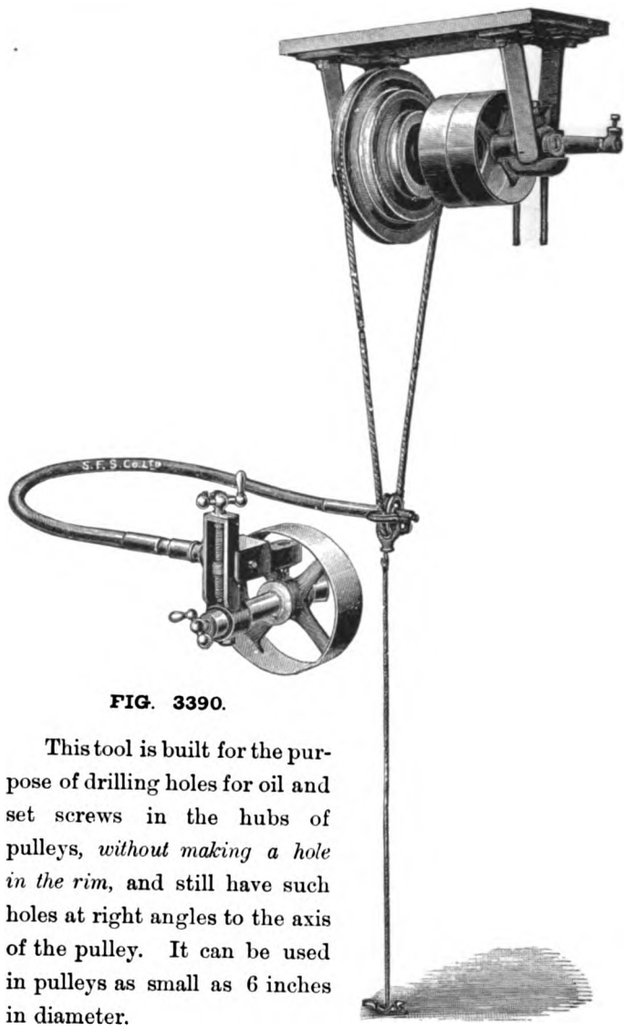


FIG. 3390.

This tool is built for the purpose of drilling holes for oil and set screws in the hubs of pulleys, *without making a hole in the rim*, and still have such holes at right angles to the axis of the pulley. It can be used in pulleys as small as 6 inches in diameter.

This is provided with feed screws in two directions, so as to feed parallel with, or at right angles to, the axis of pulley.

The gears are all enclosed in covered case, and the spindle has No. 1 Morse taper hole.

The tool is operated by the No. 4 shaft, and is interchangeable with all other tools of the same number.

PRICE, $40.00.

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FLEXIBLE SHAFT GRINDING ATTACHMENTS.

"D" GRINDING MACHINE.

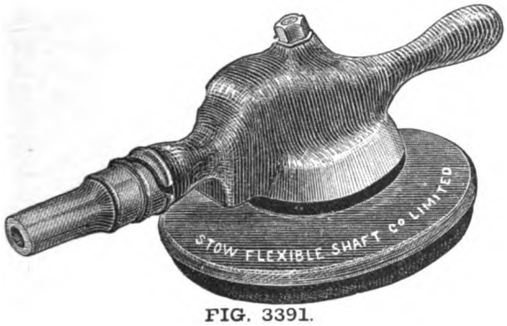


FIG. 3391.

This machine is attached to the shaft by means of the clutch box F, being the same arrangement as that used on drill presses. The emery, sand or other grinding wheels are inserted in a turned recessed plate, and held firmly in this position, as shown. The mode of use is to carry the machine over the work to be done, and in this way large surfaces can be quickly and accurately finished or polished, with a very small outlay for labor. We furnish them with plates to receive 4, 5 and 6 inches diameter of wheels.

Used with shafts Nos. 4, 5 or 6 only.

PRICES.

With one plate, No. 4	$12.00
" " " " 6	15.00
Extra plates, each	.50

In ordering, state what material is to be cut or polished, that a correct wheel may be sent.

DESCRIPTION, FIG. 3392.

In all shops there is a great deal of time and labor spent in cleaning and filling castings before painting. This work is reduced to a minimum, by using a flexible shaft in connection with the "D" grinding machine, for wheels on the flat surface, and a half stop clutch and clamp spindle, for wheels on edge.

The cut shows the general method of work. A complete outfit consists of

PRICES.

1 No. 4 flexible shaft	$40.00
1 No. 4 "D" machine	12.00
1 No. 4 half stop clutch	2.50
1 No. 4 clamp spindle	1.50
1 No. 4 countershaft	20.00

Driving rope and couplings to suit.

STONE WORKING TOOLS.

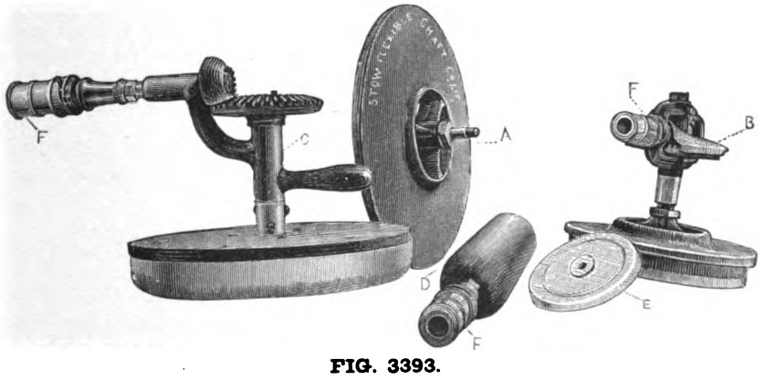


FIG. 3393.

A, standing disk; B, the "B angle gear," for emery wheels; C, the "C angle gear," for buffing wheels; D, fluting roll; E, disk, for cutting medallions. The angle gears B and C are used with the No. 6 shaft, except in cases of very heavy work, when No. 8 is substituted.

PRICES.

"B angle gear," without disks	$16.00
"C " " " "	16.00
Plane sanding disks, 12 in. diam., $1.25. Spelter rings	2.75
" " " 16 " " 2.50. " "	5.00
Turned emery wheel disks, 12 inches diameter	2.50

Rosette disks, 5, 6, 7 and 8 inches diameter, @ 35 cts. per inch, of any desired moulding.

Fluting rolls, 18 inches long, 3½ inches diameter, with hand piece	$6.50
Tutty wheels of various diameters, from	$2.50 to $4.00 each.

These disks, rings and wheels, are varied to match different classes of work; hence, the prices are only given to enable parties ordering, to judge of the cost of an outfit, when of this the usual class. Almost every stone worker will find new uses for the flexible shaft, and for such we can furnish any desired outfit.

CASTING GRINDER.

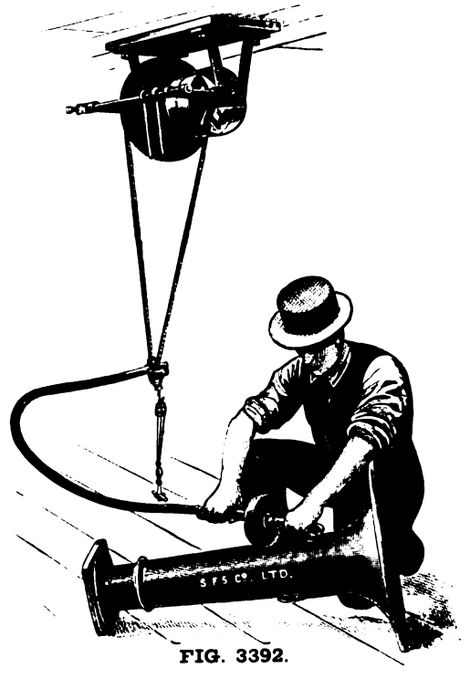


FIG. 3392.

CLAMP SPINDLE.

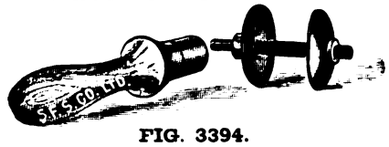


FIG. 3394.

For holding all varieties of emery, buffing and polishing wheels to be used on edge, we make a simple clamp spindle or mandrel, with tight and loose washer and nut. This tool is made for Nos. 2, 3, 4, 5 and 6 shafts.

PRICE, $1.50.

STOP CLUTCH.

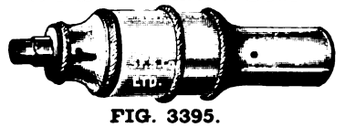


FIG. 3395.

This attachment permits the working tool to be stopped and started at will, without stopping the motion of the shaft itself. Made for Nos. 3, 4, 5, 6, 8 and 9 shafts.

PRICES.

No. 3	$4.50
" 4	5.00
" 5 and 6	6.00
" 8 and 9	7.00

THUMB CLUTCH.



FIG. 3396.

Similar to above, but in one piece and not separable. It is operated by the thumb.

PRICES.

Nos. 0 and 1	$4.00
" 2	5.00
" 3 and 4	6.00

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POND FLOOR DRILL.

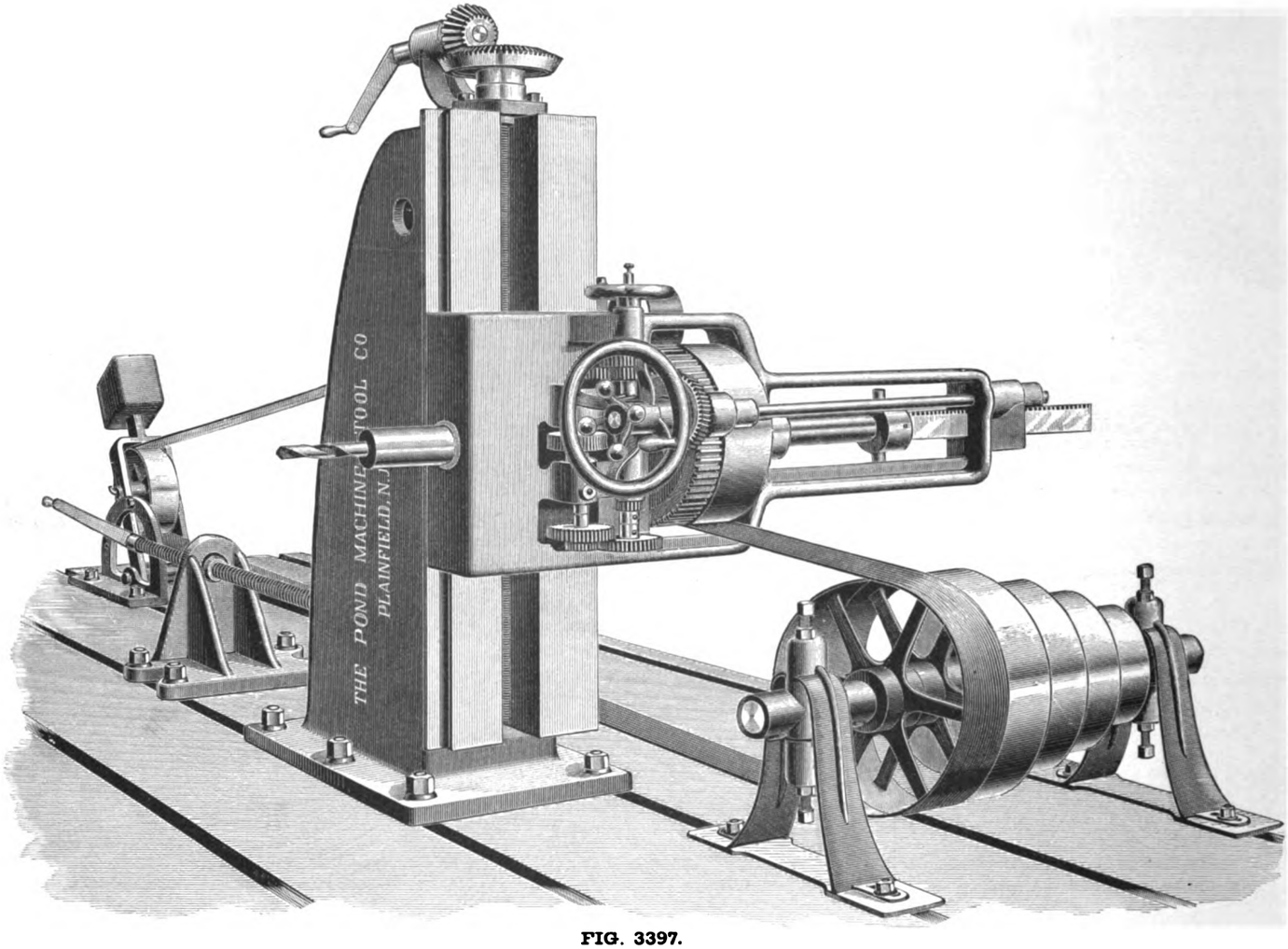


FIG. 3397.

A simple and inexpensive machine, mounted on a floor plate of any size that the work can be most conveniently placed upon. The spindle has a horizontal rapid hand traverse of 18 inches, by means of a rack and pinion, also a wide range of automatic friction feeds, a vertical traverse of from 14 inches above the floor plate to 44 inches high, and a transverse motion limited only by the size of the floor plate. Uprights having a vertical travel greater than 44 inches can be furnished, if desired.

Holes small as ¼ of an inch in diameter can be drilled as conveniently and cheaply as on any small drilling machine, and boring up to 6 inches diameter by 12 inches long may be done with spindle supported from one end only, and for bores of any length within range of the floor plate, bearings can be bolted to same to support the outer end of the boring bars.

It will be readily seen that a large percentage of the work can be done on this machine that is usually done on a large, heavy and expensive boring and drilling machine, and that it can be done much more conveniently, and consequently cheaper.

Countershaft and necessary wrenches furnished complete.

WEIGHT, WITHOUT FLOOR PLATE,.....LBS. PRICE, $.....

PRICE, WITH FLOOR PLATE, ACCORDING TO SIZE.

HORIZONTAL SPINDLE DRILLING AND BORING MACHINE.

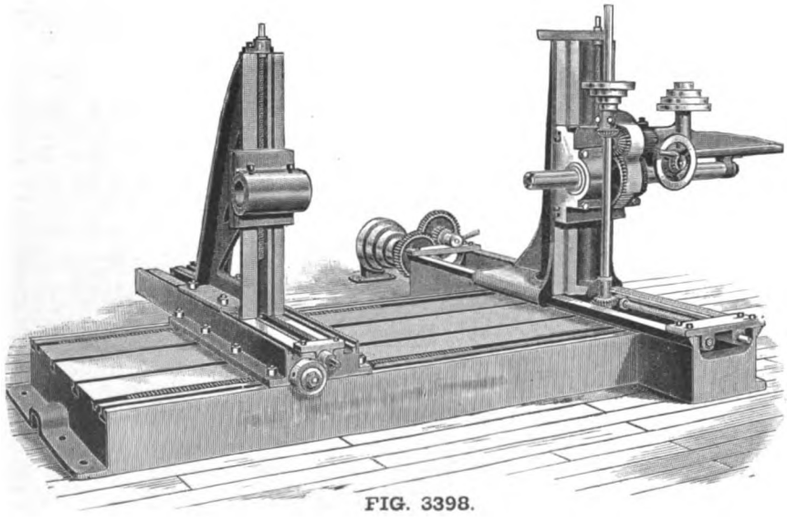


FIG. 3398.

This machine is intended for drilling or boring work which can be securely fastened to the bed and tools brought to the desired position without the necessity of moving work, which is much more convenient and accurate than moving work, particularly when it is heavy.

The platen is 8 inches high, 40 inches wide, 84 inches long, is heavy and well ribbed, has seven T slots ⅞ inch wide, and to it is securely fastened the bed which supports the upright with spindle.

Spindle is 3 inches diameter, has taper hole for tools, bars or sockets, also driving slot across the end, has 24 inch movement, by hand or power, is driven by a 2½ inch belt, on a 5 section cone, geared 3 to 1, and back geared 24 to 1, which gives 10 speeds from 3 to 150 revolutions per minute. The spindle quill has large conical ends running in taper boxes of hard bronze, with take up for wear.

Automatic feeds are 120, 80, 40 and 13⅓ revolutions of spindle to 1 inch of feed.

Capacity. The greatest distance from top of platen to center of spindle is 40 inches; the least, 10 inches. The spindle can be moved vertically 30 inches; horizontally 40 inches, and the outer bearing moved to correspond. Accuracy of adjustment is secured by four graduated steel rules, suitably placed with pointer.

Carriage on platen has a quick adjustment by racks and pinions from outer end of platen nearly to spindle, and can be rigidly fastened. The greatest distance from spindle head to outer bearing is 70 inches.

Countershaft has tight and loose pulleys 14 inches diameter for 2½ inch belt, and should run 130 revolutions per minute.

WEIGHT, 6,500 LBS. PRICE, $1,250.00.

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HORIZONTAL SPINDLE DRILLING AND BORING MACHINE.

This machine is especially valuable for heavy work, though convenient for general shop use. By its use holes may be bored parallel to each other without resetting the work or traveling same during the process of boring.

The table is moved to bring the work in position by a rack and pinion driven by power.

The spindle carrying boring bar is of steel, 3½ inches in diameter, and has a longitudinal feed of 30 inches. It is carried by a head with 60 inches vertical adjustment upon a strong upright securely attached to the bed, and the cutter end of bar is supported through a bush carried by the tail block upon a similar upright on the left side of machine.

The head and tail blocks are raised and lowered together by means of screws shown, which are driven by power. To compensate for any possible variation in the two vertical adjusting screws, a slight independent adjustment is provided in the tail block, so as to bring the boring bar perfectly true with the bed.

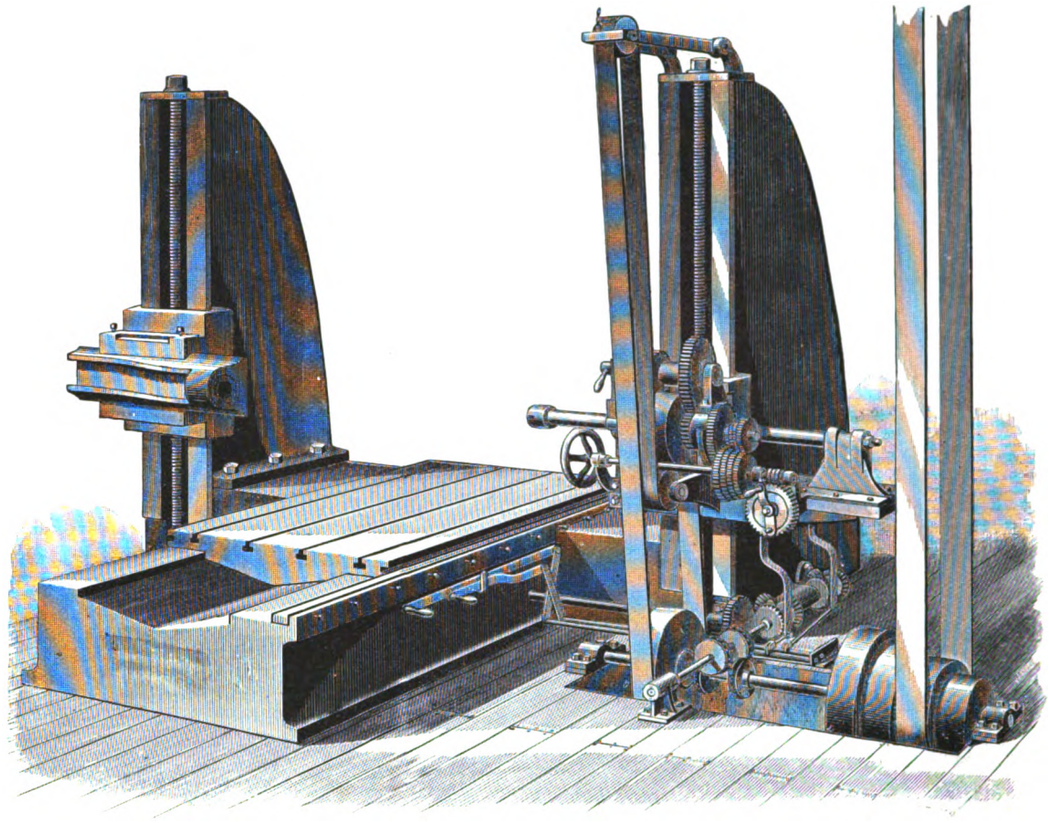


FIG. 3399.

The driving cone pulley has four steps, and a heavy back gear is attached to the spindle, giving eight speeds for the bar. The spindle is fed forward by a rack and pinion having four changes of speed, is driven by a worm gear, and may be run back quickly by hand.

The main spindle is driven directly by a belt from the floor shaft, and the head may be raised or lowered without changing the length of the belt.

PRICE, INCLUDING COUNTERSHAFT, $2,500.00.

Weight, complete	26,000 lbs.	Vertical adjustment of heads	5 ft.
Length of table	7 ft.	Cone lifts, 15, 18, 21 and 24 in. diam. by 5 in. wide	
Width of table	3 ft.	Floor space, front and back by right and left	10 x 15 ft.
Extreme width in clear between head and tail blocks	7 ft.	Total height	9 ft.

12 INCH TRAVERSE DRILL PRESS.

This machine is a very useful tool for a great variety of drilling and boring, and can be used to excellent advantage for milling. It is especially valuable where a number of holes are to be drilled parallel with a base.

The spindle has a movement of 14 inches in a horizontal direction, and is provided with power and hand feed and quick return. The head is back geared, and has six changes of speed.

The knee slides along the top of the bed, and is mounted with a table, having a cross movement of 19 inches. At the lowest position the distance from the center of spindle to top of table is 9 inches.

It is furnished with countershaft, having pulleys 12 x 3½ inches. 165 revolutions per minute. Weight, 2,700 lbs.

PRICE, $.....

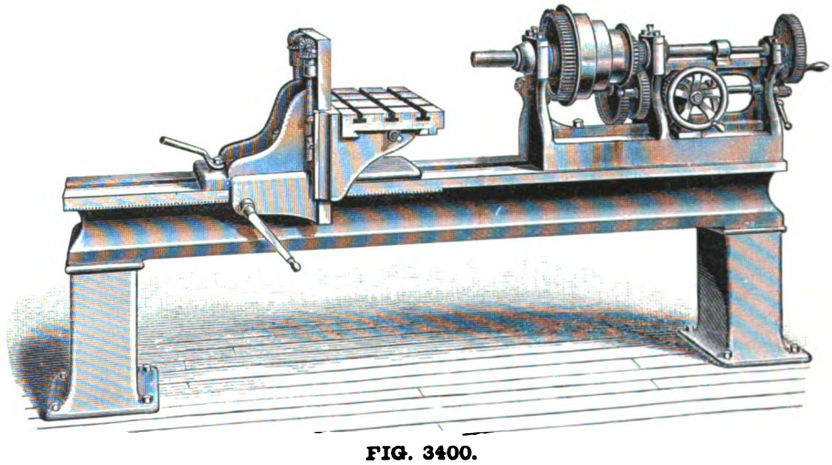


FIG. 3400.

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HORIZONTAL FLOOR BORER.

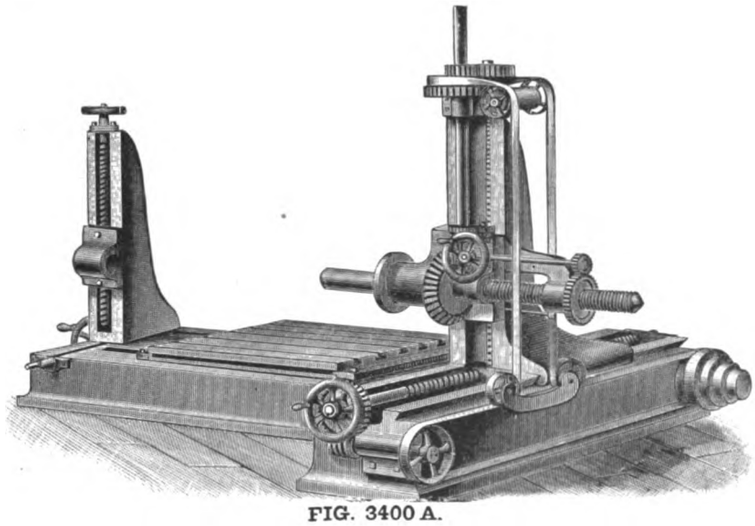


FIG. 3400 A.

Will bore and face work to center of 80 inches. Is driven by a four-step cone pulley, powerfully back geared, giving eight changes of speed. The saddle which carries the spindle is gibbed to the upright and has a vertical automatic feed in either direction. The upright is gibbed to the base and has an automatic feed, used for facing. The boring-bar has automatic feed. The end support for boring-bar is adjustable across the floor-plate. The carriage can be moved longitudinally and can be turned around, being pivoted in the center. Scales are inserted in both of the uprights and also in the floor-plate below; this facilitates setting the boring-bar support in line with center of boring-bar.

We build this machine with two or more uprights for boring duplex steam pumps.

WEIGHT, 20,000 LBS. PRICES ON APPLICATION.

NOS. 1 AND 2 HORIZONTAL BORING AND DRILLING MACHINES.

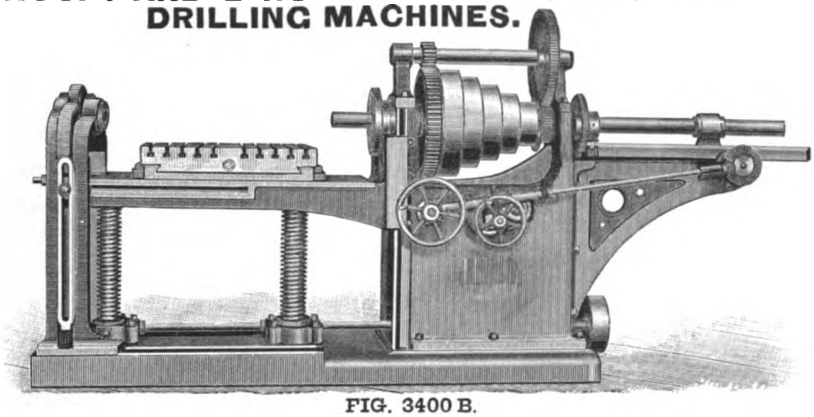


FIG. 3400 B.

DESCRIPTION, FIG. 3400 B.

No. 1 will drill and bore to the center of a circle 50 inches diameter. Spindle has an automatic feed of 20 inches, and can be furnished with spindle of extra length, having 40 inch traverse, with two movements. Machine is driven by a four-step cone pulley, with back gears giving eight changes of speed. Has variable automatic feed. Table or knee is 4 feet long. May be made 6 feet long if desired.

WEIGHT, 6,000 LBS.

No. 2 will drill and bore to the center of a circle 62 inches diameter. Spindle has an automatic feed of 25 inches, and can be furnished with spindle of extra length, having 50 inch traverse, with two movements. Machine is driven by five-step cone pulley, with back gears giving ten changes of speed. Has variable automatic feed. Table or knee is 6 feet long; weight, 9,800 lbs. Can be made 9 feet long if desired; weight, 11,500 lbs.

PRICES ON APPLICATION.

NO. 3 HORIZONTAL BORING AND DRILLING MACHINE.

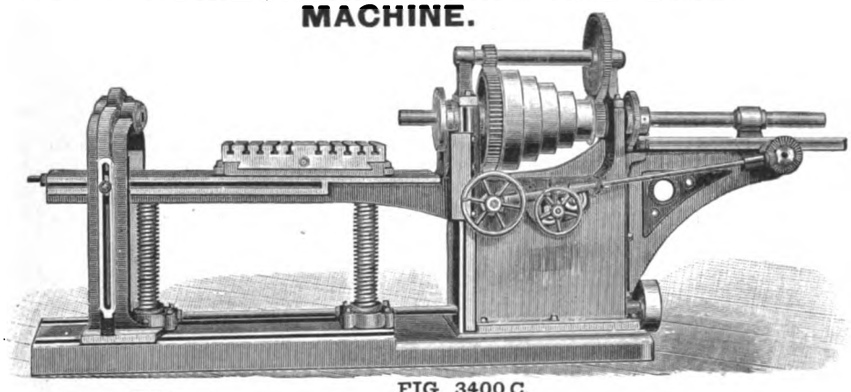


FIG. 3400 C.

DESCRIPTION, FIG. 3400 C.

No. 3 will drill and bore to the center of a circle 65 inches diameter. Spindle has an automatic feed of 30 inches, and can be furnished with spindle of extra length, having 60 inch traverse, with two movements. Machine is driven by five-step cone pulley, with back gears giving ten changes of speed. Has variable automatic feed, arranged from slowest feed for roughing to fastest feed for finishing. The slow hand feed and quick return can be operated from the front of the machine. The revolving sleeve which surrounds the spindle has a face-plate on the end, to which a facing tool can be attached. The main table, which is 9 feet long, is raised and lowered by power, and supports a saddle carrying the carriage.

WEIGHT, 19,000 LBS.
PRICES ON APPLICATION.

NO. 1 HORIZONTAL DOUBLE-SPINDLE BORING MACHINE.

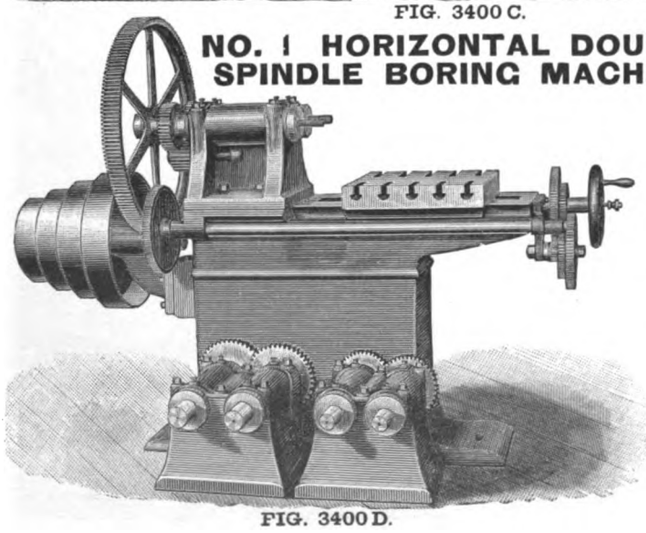


FIG. 3400 D.

DESCRIPTION, FIG. 3400 D.

For boring duplex steam pumps or other work with parallel chambers required to be bored. Machine, as illustrated, is provided with three heads, the centers for spindles in each head corresponding with three sizes of duplex pumps. Machine can be furnished with one or more heads as desired, or can be made with expansion heads where the variation of centers of work would require too many heads. The machine is strongly back-geared; has compound feed gears arranged to take $\frac{1}{20}$ inch roughing cut and $\frac{1}{4}$ inch finishing cut.

WEIGHT, 3,600 LBS. PRICES ON APPLICATION.

NEW YORK, CHICAGO & ST. LOUIS, PHILADELPHIA, BOSTON, CINCINNATI, MILWAUKEE, ATLANTA, LONDON, ENGLAND.

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NO. 2 DOUBLE-SPINDLE HORIZONTAL BORERS.

For boring duplex steam pumps with cylinders up to 12 inches in diameter, and can be made with adjustable spindles; or, if with fixed spindles, centers are made to suit the customer. The machine is strongly back-geared, has compound feed gears arranged to take $\frac{1}{16}$ inch roughing cut and $\frac{1}{4}$ inch finishing cut.

WEIGHT, 3,900 LBS. PRICES ON APPLICATION.

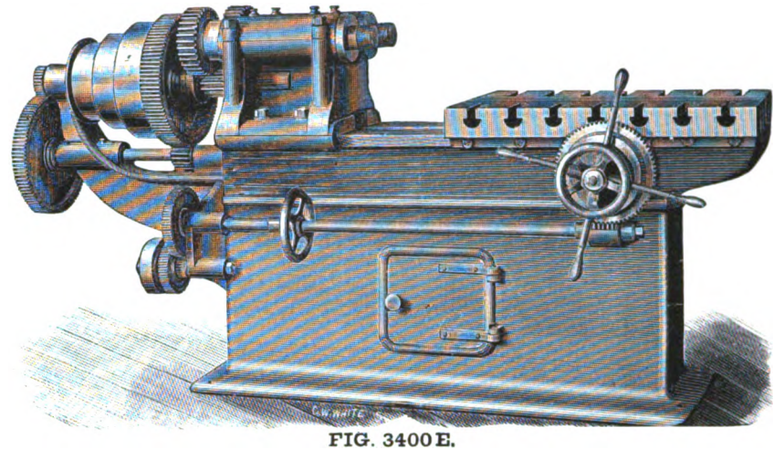


FIG. 3400 E.

SINGLE-SPINDLE BORING MACHINE.

This machine can be made with a single spindle if desired. We also build these tools with any number of heads, so that different centers may be obtained.

PRICES ON APPLICATION.

THREE-SPINDLE HORIZONTAL BORING MACHINE.

For boring the three holes in electric street car motor frames. It is very desirable to have the bearings in street car motors bored with great accuracy; to do this is a very slow and expensive process bored on the ordinary boring machine with one spindle. Machine as arranged has three spindles with fixed centers, which can be made to suit any motor frame. With the machine arranged in this manner the holes in frame will come exactly in the same position and the work can be bored in much less time than with the single-spindle machine. In designing the machine great care was taken to have the feed works on three sides of the machine, as facing and short boring is mostly done by hand feed. Machine has an automatic feed with three changes and quick return by hand on three sides of the machine. The illustration shows machine without any out-board bearings for boring bars or attachments for boring out frame.

WEIGHT, 11,000 LBS. PRICES ON APPLICATION.

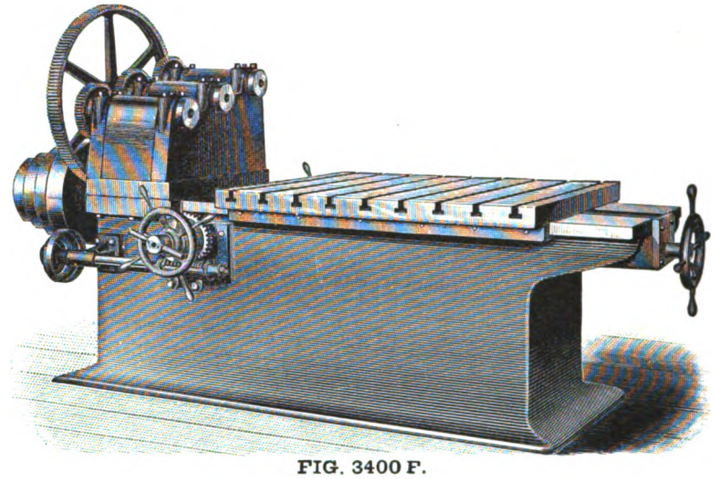


FIG. 3400 F.

FOUR-SPINDLE BORING MACHINE, ADJUSTABLE HEADS.

The entire operation of boring the four cylinders of a duplex steam pump, including roughing and finishing cuts, facing, drilling, reaming and tapping for stuffing-box, can be done in 25 minutes. Each head has an independent automatic and hand feed, with quick return. **WEIGHT, 8,000 LBS.**

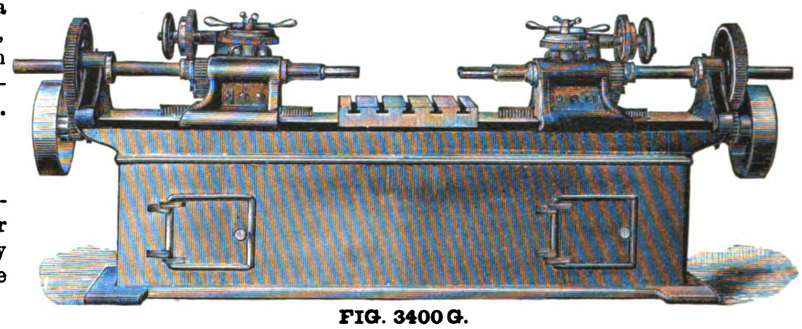


FIG. 3400 G.

SPECIAL HORIZONTAL BORING MACHINES.

We design and build these machines with single or multiple spindles, with the spindles parallel, at right angles or at any angle to adapt it to the work, with either stationary or adjustable centers. The illustration shows a four-spindle machine designed for small duplex steam pumps.

PRICES ON APPLICATION.

FOUR-SPINDLE HORIZONTAL BORING MACHINE, WITH ADJUSTABLE SPINDLES.

For boring the four cylinders of duplex steam pumps or other work of like nature. The spindles are driven by worm wheels, which allows the spindles to be adjusted from 5 inches to 14 inches, from center to center. Spindles have five changes of speed; each head is driven independent, has two changes of feed, $\frac{1}{16}$ inch for roughing cut and $\frac{1}{4}$ inch for finishing cut, with hand feed and quick return. The carriage of this machine is made in three sections, so that narrow or broad work can be strapped to table, using one or more sections as required for the length of pump or work to be bored.

The adjustment of centers of this machine can be made wider than 14 inches to adapt it to other work.

We build a smaller size machine than this for small pumps which have centers closer than 5 inches.

Will design and build larger size four-spindle boring machines with adjustable centers for any size or range of work.

WEIGHT, 1,500 LBS.

PRICES ON APPLICATION.

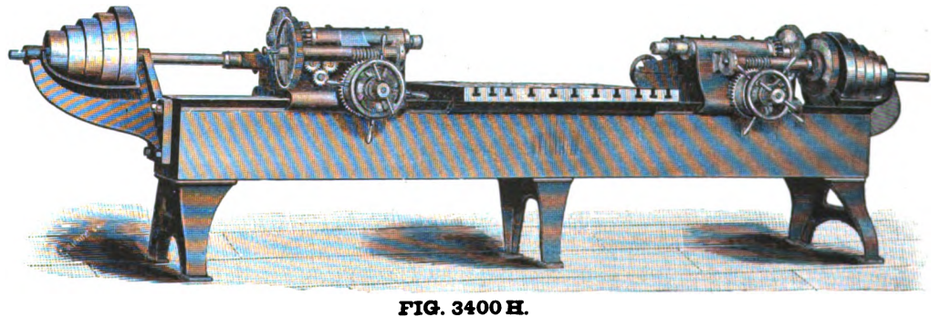


FIG. 3400 H.

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HORIZONTAL BORING AND DRILLING MACHINES.

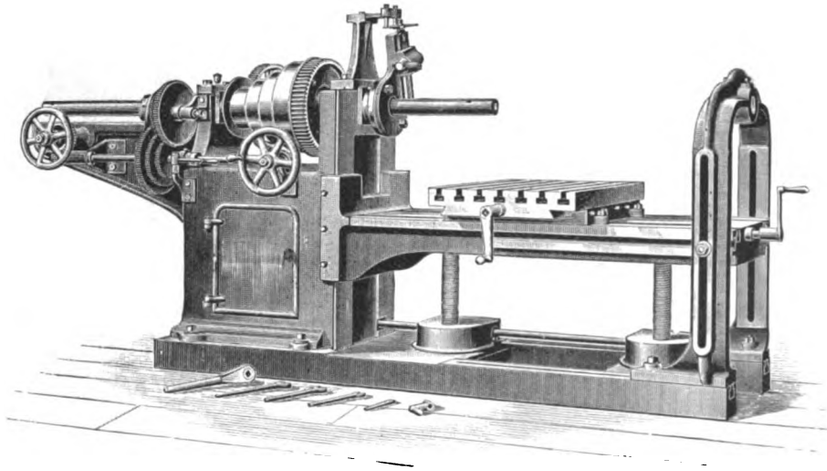


FIG. 3401 REPRESENTS NO. 1.

On the No. 1 the cone pulleys have four speeds for 3½ inch belt; it is strongly back geared, giving eight changes on the spindle, which is of cast steel, 3 inches in diameter, and has 24 inch movement through the cone, with provision for 48 inch traverse when required. The steel spindle can be driven in either direction; has a full bearing through the cast iron spindle at all times, does not lose any of its bearing surface as it is run out, and has a quick movement by hand through a rack and pinion; it has six changes of automatic feed by cut cone gearing; it has a table for work 5 feet 6 inches long, elevated by two screws, worm wheels and worms, which are driven by power. The table carries a saddle which has a movement parallel with the main spindle; on this saddle is a cross table 24 inches by 34 inches, which can be lowered until its top is 25½ inches from the center of the spindle, and which has a horizontal movement at right angles to it; this saddle and cross table are 5¼ inches thick, and can be removed to increase the capacity of the machine when necessary; it is 30¾ inches from center of spindle to the top of the long table when at its lowest point. It is also provided with a facing tool and a steady rest for the outer end of the boring bar; but no boring bars are furnished. Pulleys, 16 x 4¼. 120 revolutions. Weight 8,600 pounds.

NO. 2 MACHINE.

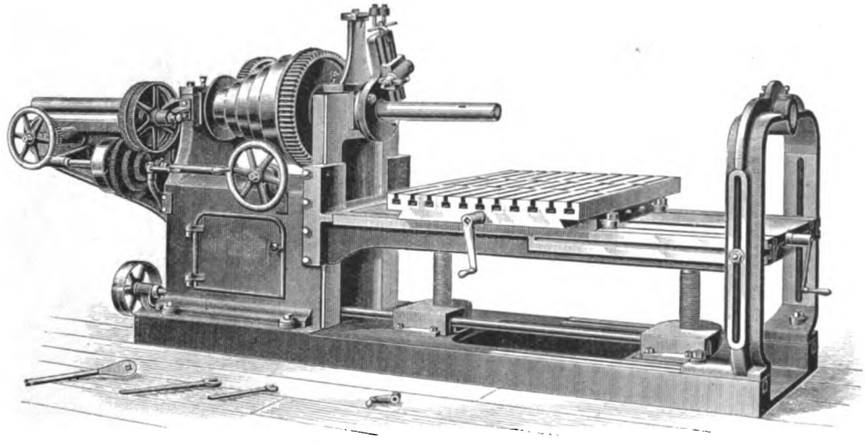


FIG. 3402 REPRESENTS NOS. 2 AND 3.

The cone pulleys on this machine have five speeds for 4 inch belt; it is strongly back geared, giving 10 changes on the spindle, which is of cast steel, 4 inches in diameter, and has 30 inch movement through the cone, with provision for 60 inch traverse when required. The steel spindle can be driven in either direction; has a full bearing through the cast iron spindle at all times, and does not lose any of its bearing surface as it is run out, and has a quick movement by hand through a rack and pinion; it has six changes of automatic feed by cut cone gearing; it has a table for work 7 feet long, elevated by two screws, worm wheels and worms, which are driven by power; said table carries a saddle which has a movement parallel with the main spindle; on this saddle is a cross table 36 inches by 48 inches, which can be lowered until its top is 26½ inches from the center of the spindle, and which has a horizontal movement at right angles to it. This saddle and cross table are 5¼ inches thick, and can be removed to increase the capacity of the machine when necessary; it is 31¾ inches from center of spindle to the top of the long table when at its lowest point. It is also provided with a facing tool and a steady rest for the outer end of the boring bar; but no boring bars are furnished. Pulleys, 24 x 5½. 120 revolutions. Weight, 13,750 pounds.

NO. 3 MACHINE.

The cone pulleys on this machine have five speeds for 4 inch belt; it is double back geared, giving 15 changes on the spindle, which is of cast steel, 5 inches in diameter, and has 30 inches movement through the cone, with provision for increasing to 60 inches with one movement of spindle in the feed rack. The steel spindle can be driven in either direction; has a full bearing through the cast iron spindle at all times, and does not lose any of its bearing surface as it is run out, and has a quick movement by hand through a rack and pinion; it is provided with automatic feeds varying from $\frac{1}{100}$ to $\frac{37}{100}$ of an inch, with every graduation between these points. The table for work is 10 feet long, elevated by two screws, worm wheels and worms, which are driven by power; said table carries a saddle which has a movement parallel with the main spindle, and on this saddle is a cross table 36 inches by 60 inches for securing work. The tables can be lowered until the top of the long table is 32 inches from the center of spindle. Rapid movement of spindle, and releasing or engaging of automatic feeds, can be operated from either side of machine by means of hand wheels and levers, which are all within easy reach from the front of machine. This feature of operating from both sides results in a great saving of time on a large machine. It is also provided with a facing tool and a steady rest for the outer end of boring bar; but no boring bars are furnished. Pulleys, 24 x 5½. 100 revolutions. Weight, 24,000 pounds.

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10, 8, 7 AND 6 FOOT POND BORING AND TURNING MILLS.

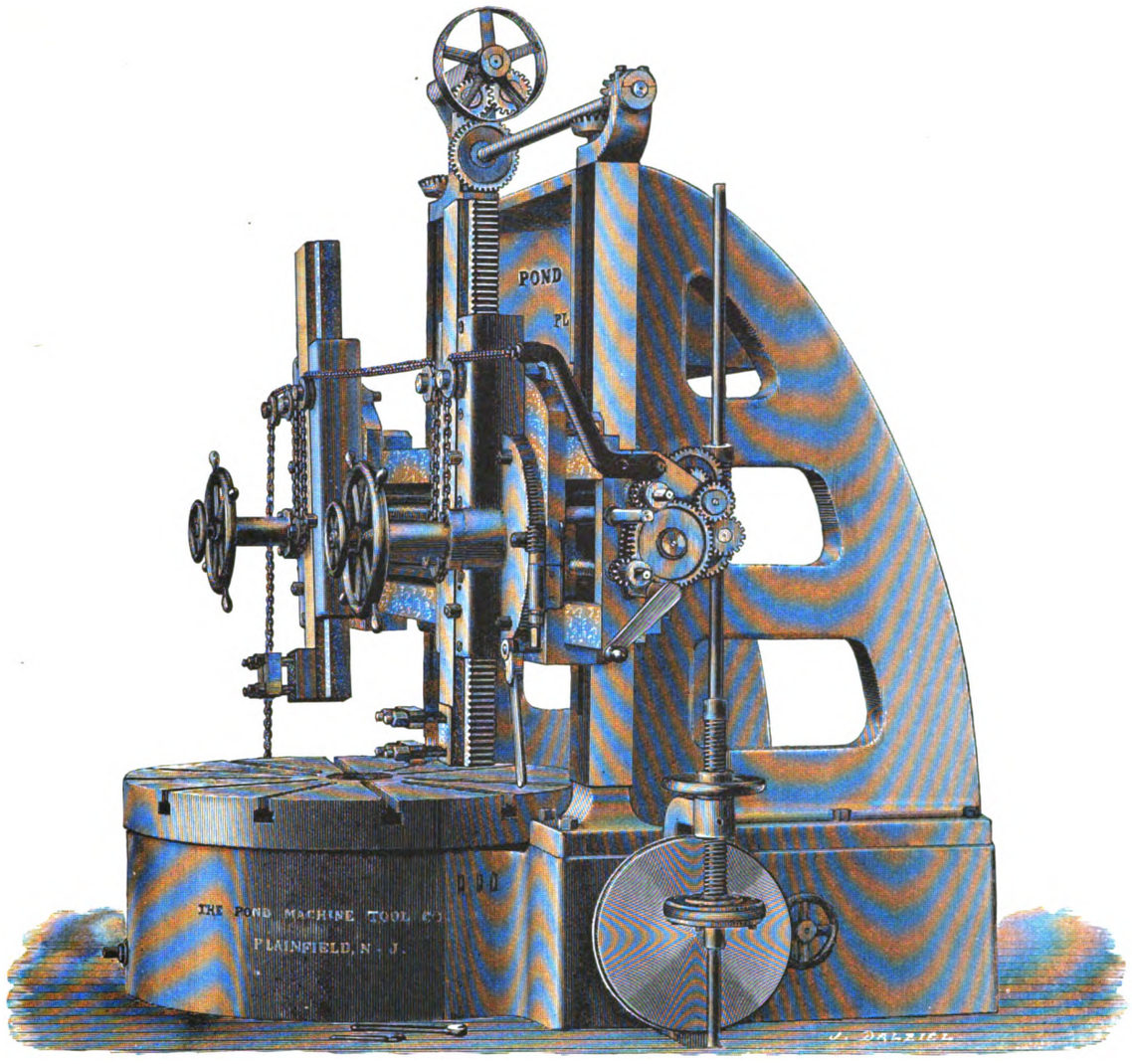


FIG. 3409.

GENERAL DESCRIPTION OF VERTICAL BORING AND TURNING MILLS.

These mills are designed for boring and turning pulleys, and for all work that can be done on a facing lathe, but have the advantage over the latter of horizontal face plates for convenience in centering and securing the work.

The cones are of large diameter with wide belt steps, are back geared and geared into an internal gear on the face plates.

The face plates have wide annular bearings on the beds nearly equal in diameter to the diameter of the plates; they are mounted on spindles having large bearings with adjustment for wear, and of sufficient length to prevent plates from tipping when tools are cutting at the highest position.

The lower bearings are fitted in steps resting on wedges that can be adjusted from above the floor, thus lifting the plates off the annular bearings when required to revolve at high speeds for small work, or by hand in setting and fastening work.

The cross-rails, which are of box form with deep arched backs, are elevated by power and have large flat wearing surfaces.

The saddles are fitted with taper packings for adjustment and are attached to the steel feed screws by nuts which can be opened, and a rapid movement obtained by a ratchet and pinion engaging a steel rack on the cross-rails.

The tool slides are of rectangular section and have large flat wearing surfaces the entire length of the swivels, making the strongest possible support; they are counterbalanced, easily adjusted by hand, and are fitted with tool holders, consisting of four bolts and two straps, that allow the use of the ordinary lathe or planer tools.

A worm and ratchet are provided to set swivels at any angle.

The feeds are operated by a disk driving a friction wheel, and the amount of these feeds can be instantly varied from 0 to the maximum by moving the friction-wheel across the disk. They are self-acting across, down at any angle and in either direction. A specially valuable feature consists in the feeds of the two slides being entirely independent of each other, permitting one tool to be fed in any desired direction, without reference to the feed of the other.

For turning pulleys on an arbor an equalizing driver plate, a saddle on the cross-rail with a spindle, as in the tailstock of a lathe, and a center fitted to the face plate can be furnished.

Mills of 10 feet and larger swing have sufficient power and weight to permit the extension of the beds, so that the uprights with cross-rails may be moved back by power and work of large diameters turned successfully, while the conveniences of a mill of the size best suited to the majority of purposes are retained, and the cost is much less than for a large mill.

SPECIAL DESCRIPTIONS AND PHOTOGRAPHS ON APPLICATION.

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BORING AND TURNING MILLS.

5 FOOT MILL.

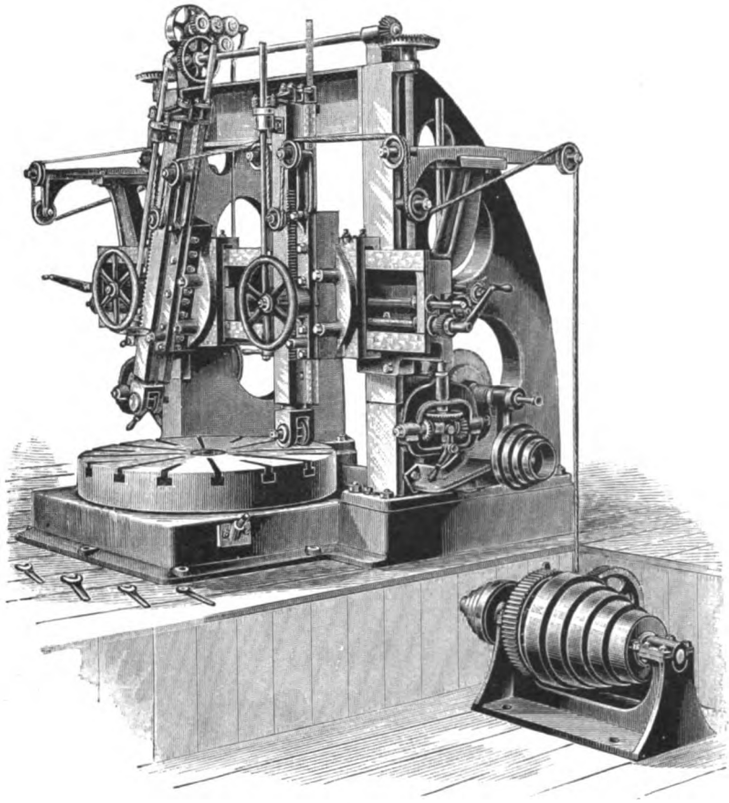


FIG. 3410.

5 FOOT MILL, FIG. 3410.

Turns 5 feet 5 inches diameter. Takes work 3 feet 6 inches high. Vertical spindles have 24 inch movement. Twenty changes of speed on the table. Ratio of gearing, 1 to 103. Weight, 20,000 lbs. Countershaft, 180 and 280 revolutions. Fast and loose pulleys, 16 and 12 by 5¼ inches.

6 FOOT MILL.

Turns 6 feet 5 inches diameter. Takes work 4 feet high. Vertical spindles have 25½ inch movement. Twenty changes of speed on the table. Ratio of gearing, 1 to 129. Weight, 26,000 lbs. Countershaft, 150 and 300 revolutions. Fast and loose pulleys, 22 and 16 by 6¼ inches.

7 FOOT MILL.

Turns 7 feet 5 inches diameter. Takes work 4 feet 9 inches high. Vertical spindles have 27 inch movement. Forty changes of speed on the table. Ratio of gearing, 1 to 176. Weight, 30,000 lbs. Countershaft, 110 and 125 revolutions. Fast and loose pulleys, 26 and 16 by 6¼ inches.

7-10 FOOT MILL, FIG. 3411.

With uprights set back, will turn or bore 10 feet diameter. Takes work 4 feet 9 inches high. Vertical spindles have 27 inch movement. Forty changes of speed on the table. Ratio of gearing, 1 to 176. Weight, 35,500 lbs. Countershaft, 110 and 125 revolutions. Fast and loose pulleys, 26 and 16 by 6¼ inches.

8 FOOT MILL.

Turns 8 feet 4 inches diameter. Takes work 4 feet 9 inches high. Vertical spindles have 27 inch movement. Forty changes of speed on the table. Ratio of gearing, 1 to 176. Weight, 35,900 lbs. Countershaft, 110 and 125 revolutions. Fast and loose pulleys, 26 and 16 by 6¼ inches.

9 FOOT MILL.

Turns 9 feet 4 inches diameter. Takes work 4 feet 9 inches high. Vertical spindles have 27 inch movement. Forty changes of speed on the table. Ratio of gearing, 1 to 176. Weight, 37,900 lbs. Countershaft, 110 and 125 revolutions. Fast and loose pulleys, 26 and 16 by 6¼ inches.

10 FOOT MILL.

Turns 10 feet 4 inches diameter. Takes work 4 feet 9 inches high. Vertical spindles have 27 inch movement. Forty changes of speed on the table. Ratio of gearing, 1 to 176. Weight, 40,300 lbs. Countershaft, 110 and 125 revolutions. Fast and loose pulleys, 26 and 16 by 6¼ inches.

10 FOOT MILL, EXTRA HEAVY.

Turns 10 feet 4 inches diameter. Takes work 6 feet high. Vertical spindles have 30 inch movement. Sixty changes of speed on the table. Ratio of gearing, 1 to 225. Weight, 60,100 lbs. Countershaft, 100 and 150 revolutions. Fast and loose pulleys, 26 and 18 by 6¼ inches.

7-10 FOOT MILL.

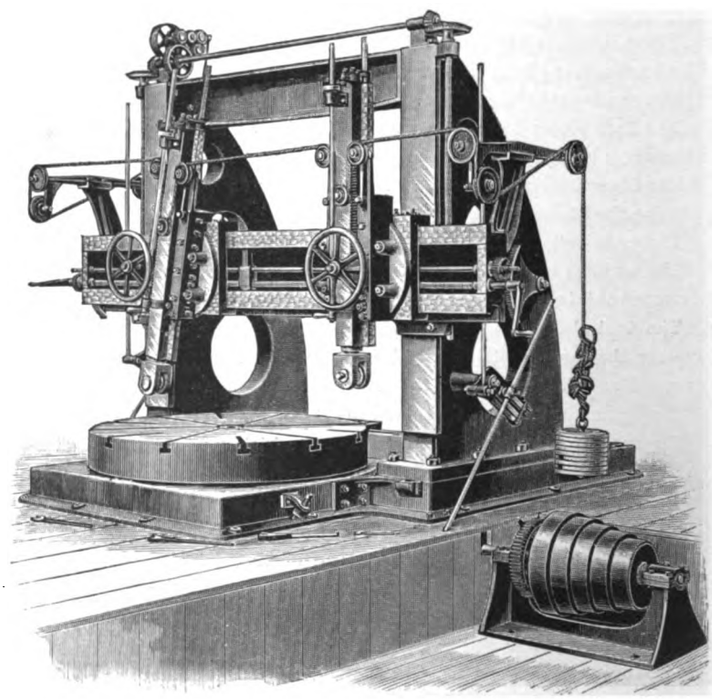


FIG. 3411.

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BORING AND TURNING MILLS.

10-16 FOOT MILL, FIG. 3412.

With uprights set back will turn or bore 16 foot diameter. Takes work 6 feet high. Vertical spindles have 30 inch movement. 60 changes of speed on the table. Ratio of gearing, 1 to 225. Weight, 63,100 lbs.

Speed of countershaft, 100 and 150 revolutions.

Fast and loose pulleys, 26 and 18 x 6¼ inches.

12 FOOT MILL.

Turns 12 feet 4 inches diameter. Takes work 6 feet high. Vertical spindles have 30 inch movement. 60 changes of speed on the table. Ratio of gearing, 1 to 225. Weight, 63,100 lbs.

Speed of countershaft, 100 and 150 revolutions.

Fast and loose pulleys, 26 and 18 x 6¼ inches.

14 FOOT MILL.

Turns 14 feet 5 inches diameter. Takes work 6 feet high. Vertical spindles have 30 inch movement. 60 changes of speed on the table. Ratio of gearing, 1 to 225. Weight, 67,100 lbs.

Speed of countershaft, 100 and 150 revolutions.

Fast and loose pulleys, 26 and 18 x 6¼ inches.

14 FOOT MILL—EXTRA HEAVY.

Turns 14 feet 5 inches diameter. Takes work 10 feet high. Vertical spindles have 48 inch movement. 60 changes of speed on the table. Ratio of gearing, 1 to 232. Weight, 112,700 lbs.

Speed of countershaft, 100 and 120 revolutions.

Fast and loose pulleys, 26 and 22 x 6¼ inches.

14-20 FOOT MILL.

With upright set back will turn or bore 20 feet diameter. Takes work 10 feet high. Vertical spindles have 48 inch movement. 60 changes of speed on the table. Ratio of gearing, 1 to 232. Weight, 125,000 lbs.

Speed of countershaft, 100 and 120 revolutions.

Fast and loose pulleys, 26 and 22 x 6¼ inches.

10-16 FOOT MILL.

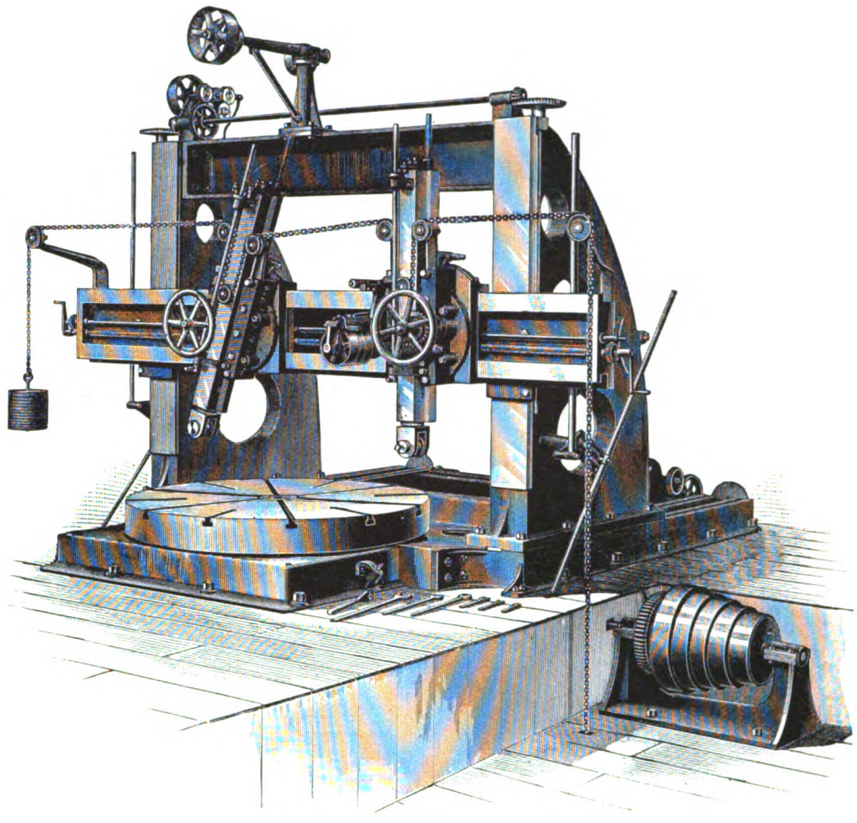


FIG. 3412.

4, 5 AND 6 FOOT MILL.

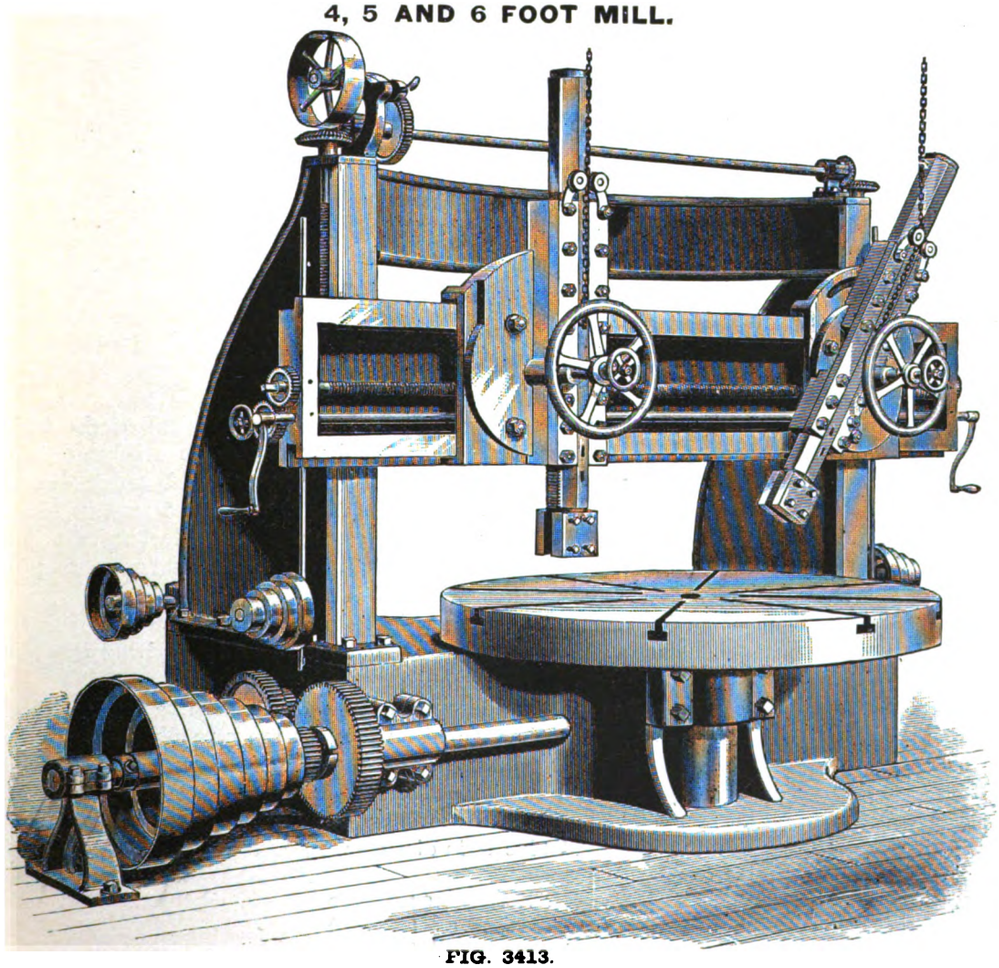


FIG. 3413.

With single or double heads. The tool spindle is 6 inches in diameter, octagon shape, bearing on alternate sides. The spindle is operated at any angle, has quick hand adjustment, and powerful automatic feed in all directions. The heads are right and left, so as to work close together, and will feed in same or opposite directions, the feed being entirely independent. The right spindle runs over the center for boring, and the spindles have direct counterbalance in any position. 4 foot takes 30 inches under cross rail, 5 and 6 foot take 36 inches.

The 4 foot mill has a table 48 inches; 5 foot, 54 inches; 6 foot, 62 inches in diameter. The table spindles are 4 feet long. Upper journals 8 inches diameter, lower journals 6 inches diameter, and runs in a heavy drop hanger and on a tempered step; hanger is bolted rigid to bottom of base and requires a pit 2½ x 2½ feet. Driving gears under the table are large internal spur gear and steel pinion.

Tight and loose pulleys for 4 foot mill are 20 inches diameter, and should run 120 revolutions; 5 foot, 24 inches diameter, and should run 110 revolutions; 6 foot, 24 inches diameter, and should run 100 revolutions per minute. The cross rail is adjusted by power from the driving countershaft, no extra countershaft required. Weight of 4 foot, 13,000; 5 foot, 16,000; 6 foot, 20,000 lbs.

PRICES.

4 foot, single head	$1,650.00
4 foot, double head	2,000.00
5 foot, single head	2,050.00
5 foot, double head	2,300.00
6 foot, single head	2,500.00
6 foot, double head	2,750.00

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4 AND 6 FOOT BORING AND TURNING MILLS.

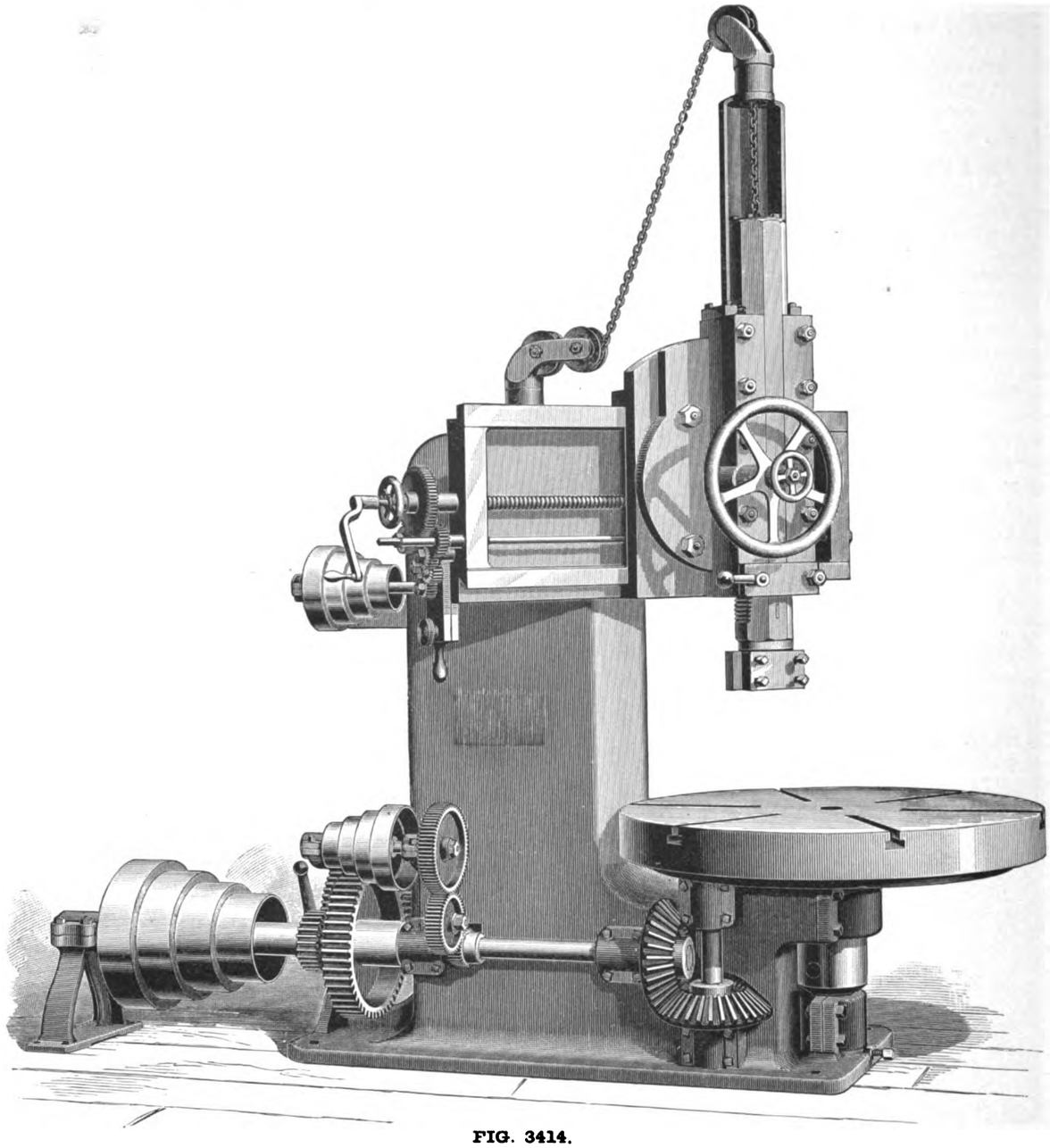


FIG. 3414.

The single column boring and turning mill is a very useful tool in every machine shop. The work can be chucked on the table much easier than in a lathe. It can readily be placed on the table, and resting thereon, can be wedged up and set in a shorter time. The center of the tool spindle can be brought to the center of hole in table; then, by the use of boring bars, fly-wheels, truck wheels, pulleys, etc., can be bored same as on a special boring machine. By substituting tool holder in place of bar, any object may be faced, bored or turned as large in diameter as swing in machine, and as high as distance between table and cross rail. The tool spindle is 6 inches in diameter, octagon shape, with bearing on alternate sides, giving the best possible bearing with little friction, and excellent provisions for taking up wear.

The spindle can be operated at any angle, has quick hand adjustment, and powerful automatic feed in all directions. The column is so designed that when doing heavy work of large diameter the spindle is brought directly opposite the column, thus giving the best possible support.

The gearing under the table is spur gearing, giving a smooth and steady motion, free from all the lifting, chattering tendencies of bevel geared machines. All gears are cut from the solid. The cross rail, saddles, spindles and all journals are carefully scraped to a perfect bearing. The shafts are of steel. The table is extra heavy, running in large journals, and resting on a tempered step adjusted by taper key, operated by screw in front of base. Cone pulleys are large, four grades for four foot mill, five grades for six foot mill, all for 4½ inch belt. The machine is heavy, strong and made with great care. The 48 inch mill will work any object 24 inches high and 48 inches in diameter. The 72 inch mill will work any object 28 inches high and 72 inches in diameter.

PRICES.

48	INCH	MILL,	WEIGHT,	8,500	LBS.	$1,350.00
60	"	"	"	11,000	"	1,600.00
72	"	"	"	14,000	"	1,825.00

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DRILL CHUCKS.

KEY DRILL CHUCK.

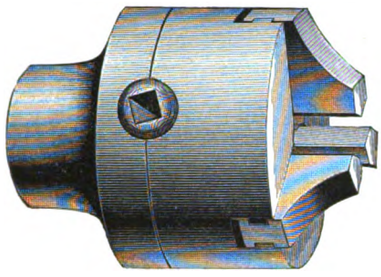


FIG. 3415.

We furnish these chucks with all the three kinds of jaws, as shown on page 46, or with two sets of jaws (No. 1 and No. 2). Unless otherwise specified will send chucks with No. 3 jaws, as shown in cut.

PRICES.

No.	Capacity. Inches.	With one set of jaws.	With two sets of jaws.
1	0 to 1/2	$6.50	$8.00
2	1/4 to 5/8	8.00	9.50

THE HARTFORD.

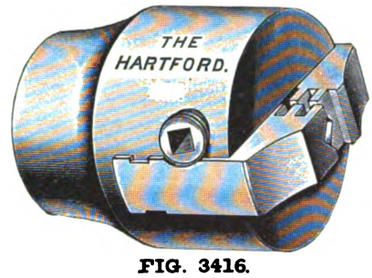


FIG. 3416.

No.	Diameter. Inches.	Length. Inches.	Weight. Lbs.	Capacity. Inches.	PRICE.
0	1 3/4	2 1/2	1 1/4	0 to 1/4	$6.00
1	2 1/8	2 3/4	2 1/4	0 to 1/2	7.00
2	2 7/8	3 1/4	4 1/2	0 to 3/4	8.00

THE ACME CHUCK.

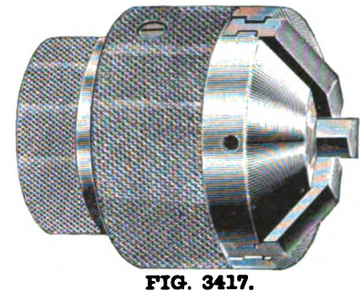


FIG. 3417.

It is made of steel in the most thorough manner, and holds from 0 to 1/2 inch true and firm. It is a self-tightening chuck, and needs no spanner wrench to make it hold.

PRICE, $4.00.

THE VICTOR DRILL CHUCK.

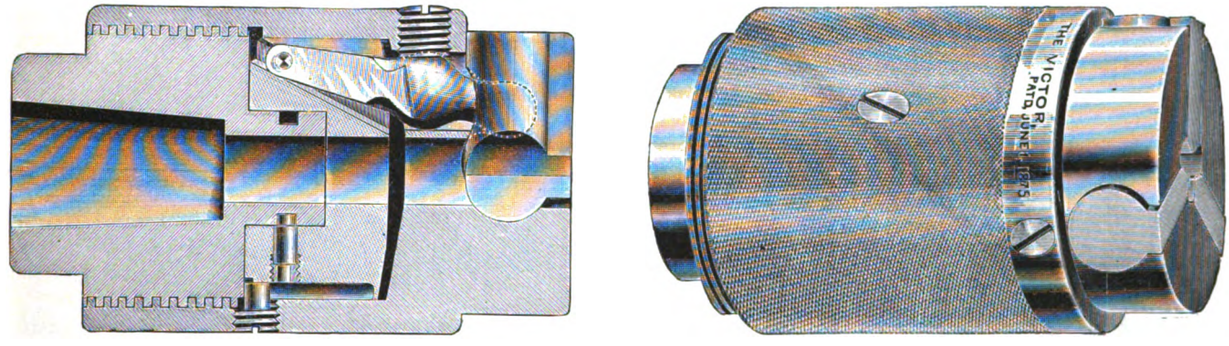


FIG. 3418.

PRICES.

No. 1 holds from 0 to 3/8, $8.50
No. 2 " " 0 " 5/8, 12.00

THE ALMOND DRILL CHUCK.

FIG. NO. 1.

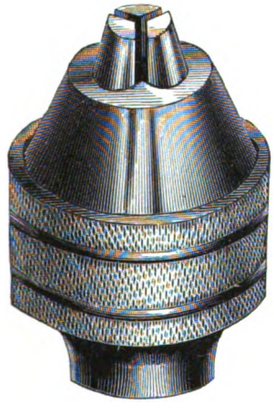


FIG. 3419.

FIG. NO. 2.

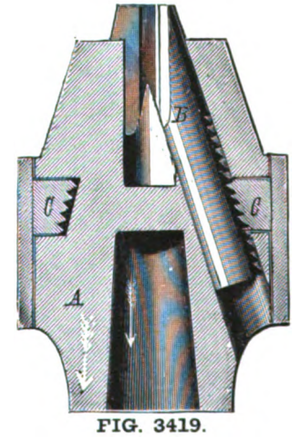


FIG. 3419.

The Almond Drill Chuck has now been in use nine years, and has been received with favor in this and all other countries where drill chucks are used. In this chuck are embodied almost all the features of an ideal tool, which, to be satisfactory, should be simple in construction, perfect in its action, strong, durable, true and cheap.

That it is possible to produce such an article cheaply is apparent upon a close inspection of the cut, Fig. 2, where it will be seen that all the parts are cylindrical, and, as is generally known, such forms are the cheapest to produce– the sizes can be maintained and the fits made better than is possible by any other means.

The body of the chuck *A* is one continuous piece of machinery steel, and is provided with three converging guideways into which the jaws *B* are fitted. There is also a recess around the center of the body for the nut *C*. The front ends of the jaws are made to match each other, as shown, their back ends being provided with teeth which fit the screw thread of the nut. The shape of the jaw teeth is such as to present a square surface to the thread of the nut when under pressure, so that no power is lost by the threads riding upon each other. The nut *C*, after being hardened, is broken in two across its diameter, for the purpose of allowing it to be placed in the recess, and the outside ring or ferrule, which is slightly tapering, is driven over the two halves of the nut in the direction of the arrow, the largest diameter of the ferrule being toward the back end of the chuck. In this way the nut assumes its original form, before broken, and being securely held by the ferrule will, upon being turned, cause the jaws to open or close. It should be mentioned that the jaws are made of Stubs' steel, and their gripping edges are left as hard as possible, the rear ends or threaded portion being drawn to a blue temper. No damage is done to this chuck by drilling a full sized hole through the center.

PRICES.

No. 1, 3/16 in. to 0, $5.50 each. No. 2, 5/16 in. to 0, $5.50 each. No. 3, 1/2 in. to 0, $9.00 each.

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LITTLE GIANT DRILL CHUCKS.

REGULAR LITTLE GIANT CHUCK.

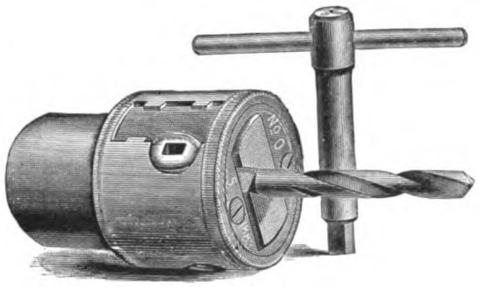


FIG. 3420.

This chuck has no projections. The jaws and screws are all within the body. The jaws are of the best tool steel, carefully hardened.

A guard ring prevents the jaws from being opened so as to take in larger work than is designed for the chuck. It is very powerful, and is guaranteed to hold true and not to injure or shear the finest drill. It holds round or square work, and there is no chuck equal to it for holding wood-boring tools. The hole in the hub is made to fit the Morse taper, but can be bored out and threaded to suit the customer's templet at small cost.

The jaws are guided by three strong gibs, which prevent their canting when taking a short bite.

STRAIGHT BODY CHUCKS.

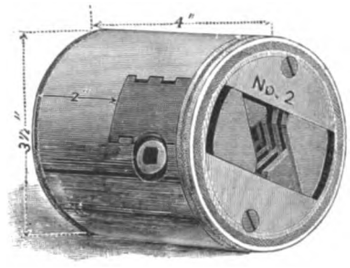


FIG. 3421.

Straight body chucks are especially adapted for hollow spindle lathes, for holding rods, round or square, which are to be turned or cut off.

If you wish to cut a thread in the hub of the little giant chuck for lathe spindle, by no means hold the chuck in another chuck, but screw the jaws down upon a perfectly true live center.

PRICES, EITHER FIG. 3420 OR 3421.

No.	Diameter.	Holding drills.	Price.
00	1¼ inch.	0 to ¼ inch.	$7.00
0	2¼ "	0 to ½ "	8.00
1	2¾ "	0 to ¾ "	9.00
2	3½ "	0 to 1 "	10.00
2½	4 "	0 to 1 in., ex. strong	11.00
3	6 "	0 to 1½ inch.	18.00
4	6½ "	0 to 2 "	20.00

NOS. 3 & 4 STYLE.

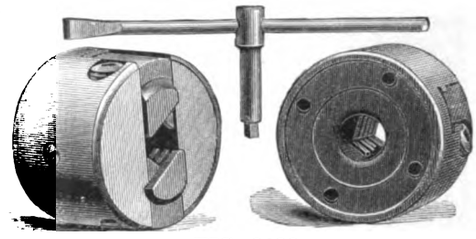


FIG. 3422.

FRONT AND REAR VIEW.

PRICES.

No.	Diameter.	Holding.	Price.
3	6 inch.	0 to 1½ inch.	$18.00
4	6½ "	0 to 2 "	20.00

These chucks are designed for hollow spindle lathes, screw machines, and turret head lathes, taking the place of the more costly lathe chucks which have been used for cutting off chucks.

These chucks have also the Westcott patent side screws, D, an auxiliary help to hold work where the strain is unusually heavy. After closing the jaws B down upon the work E, then, if doing heavy work, set up the independent screws D. This gives double holding power. In the Nos. 2 and 2½ the screws reach to ⅝ inch, in the No. 3 to ¾ inch, and in the No. 4 to 1 inch drills. When using smaller drills the screws D must be drawn back out of the way to let the jaws pass.

SHOWING SIDE SCREWS.

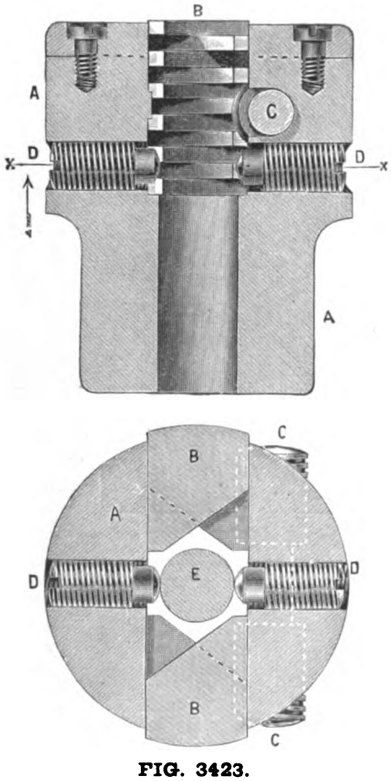


FIG. 3423.

Illustration of manner of using the side screws as applied to the Nos. 2, 2½, 3 and 4.

SEE DESCRIPTION, FIG. 3422.

DOUBLE GRIP LITTLE GIANT DRILL CHUCK.

DIAGONAL TONGUED JAWS.

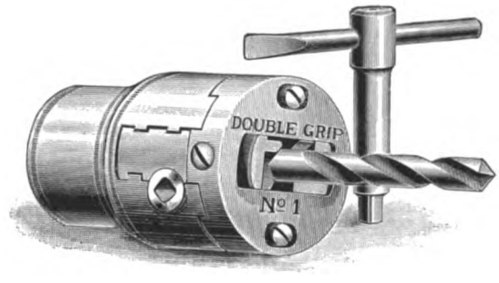


FIG. 3424.

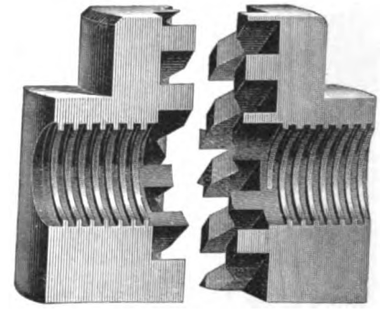


FIG. 3424A.

Many machinists demand a drill chuck with the grip so strong that a drill will break before it will slip. Other machinists prefer the drill to slip before breaking. The above differing demands have been satisfied in the new "double grip" chuck, by putting on a drop forged steel tie plate, that acts not only as a clamp, but, having flanges, makes of it a tie plate, thus rendering it an impossibility to spread or spring the chuck body, as in other chucks of the same construction.

This tie plate, or extra stay, applied to the back of the jaws is independent of their other adjustment. This is accomplished by said plate having lateral motion across the face of chuck body, thereby doing away with the liability of throwing drills or work out of true. This chuck will be found by far the best and most powerful chuck made for use on bolt cutting machines and on screw machines for holding iron to be threaded with a die, or for any work where a chuck of extra strength is needed, as well as for the many uses required of a drill chuck.

The "double grip" chuck can be used in the ordinary way without using the tie plate, but when it is used for extra heavy work, center the chuck in the usual manner, then, by setting up the set screws in the tie plate, it will have many times the holding power of any chuck manufactured.

The set screws in the tie plate are made for screw-driver, and not to project, but can be made with a square head and to project, if so ordered.

By the use of this tie plate, the heaviest of work can be done without injury to the chuck, *i. e.*, without straining the screw that operates the jaws.

We make the "double grip" chuck with diagonal jaws, as shown in Fig. 3424, or with regular straight jaws as shown in Fig. 3423.

Taps can be held by the round part of the shanks, for tapping in tapping machines and in turret head machines.

PRICES, FIG. 3424.

No.	Diameter.	Holding drills.	Price.
0	2¼ inch.	0 to ½ inch.	$8.00
1	2¾ "	0 to ¾ "	9.00
2	3½ "	0 to 1 "	10.00
2½	4 "	0 to 1 in., ex. strong	11.00
3	6 "	0 to 1½ inch.	18.00
4	6½ "	0 to 2 "	20.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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LITTLE GIANT DRILL CHUCK EXTRAS.

CENTER ARBORS FOR ATTACHING DRILL CHUCKS TO LATHES, DRILL PRESSES, ETC.

1-2, 5-8 AND 41-64 INCH SHANK FOR BLACKSMITHS' DRILL PRESSES.



FIG. 3425.

PRICE, 50 CENTS.

BLANK SHANK.



FIG. 3426.
4 1-2 IN. LONG, 1 INCH DIAMETER.
PRICE, 50 CENTS.

ARBOR, WITH NUT.

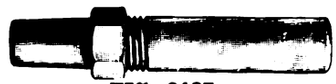


FIG. 3427.

PRICE, $1.25.

TAPERED ARBORS.

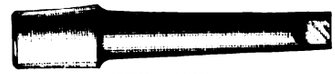


FIG. 3428.

PRICE, $.....

BEACH DRILL CHUCK.

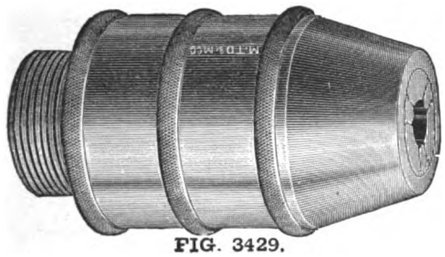


FIG. 3429.

NO. 0 CHUCK.

FULL SIZE.



FIG. 3430.

BEACH STETSON DRILL CHUCK.

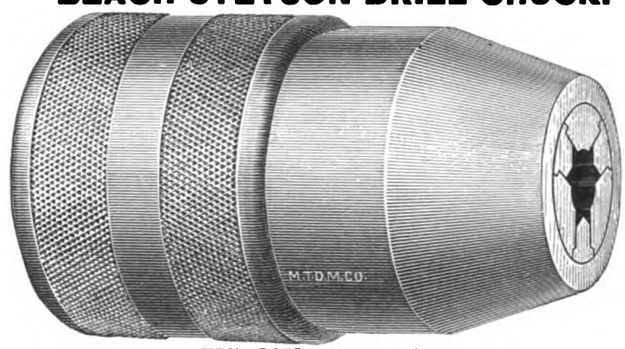


FIG. 3431. FULL SIZE.

This construction has advantages over the old style, in that the jaws are much stronger, and move in that part of the chuck which is attached to the driving spindle. Great firmness and accuracy are gained to the chuck by this arrangement.

The threaded and working parts of the chuck are covered, and thereby secured from injury or dirt. But one size is made.

No. 2, holding from 0 to $\frac{3}{8}$ inch. **PRICE, $8.50.**

PRICES.

Fig. 3430.	No. 0, holding from 0 to $\frac{1}{8}$ inch diameter.	$8.00
" 3429.	No. 1, holding from 0 to $\frac{1}{4}$ inch diameter	8.00
" 3431.	No. 2, holding from 0 to $\frac{3}{8}$ inch diameter	8.50
" 3429.	No. 3, holding from $\frac{1}{16}$ to $\frac{1}{2}$ inch diameter	10.00
" 3429.	No. 4, holding from $\frac{3}{16}$ to $\frac{5}{8}$ inch diameter	11.00

ARBOR FOR BEACH DRILL CHUCKS.

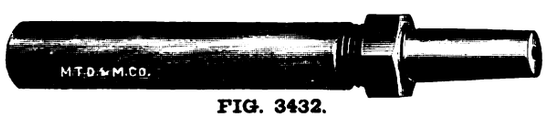


FIG. 3432.

PRICES.

Arbor for Beach drill chuck No. 1	$1.00
Arbor for Beach and Stetson drill chucks No. 2	1.00
Arbor for Beach drill chuck Nos. 3 and 4	1.20

THE ARBORS ABOVE HAVE ONE END BLANK TO BE FITTED TO THE LATHE SPINDLE.

Arbor with No. 1 Morse taper shank, fitting chuck No. 1	$1.30
Arbor with No. 2 Morse taper shank, fitting chuck No. 2	1.40

CENTER DRILL CHUCK.

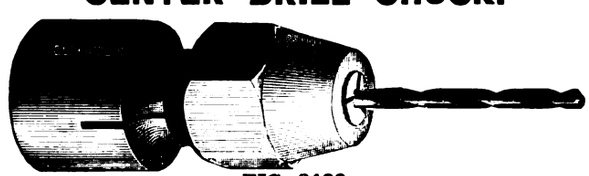


FIG. 3433.

This chuck is made of steel, has hardened jaws, and will hold one size drill only, in sizes from $\frac{1}{16}$ to $\frac{5}{16}$ in. diameter.

PRICE, EACH CHUCK, $2.50.

GEARED DRILL CHUCK.

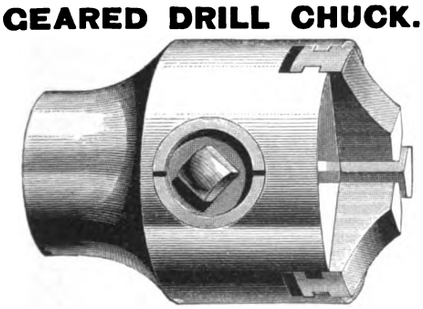


FIG. 3434.

Jaws of the form shown in the cut will be furnished unless others are ordered. Chucks having step jaws of either style, and with both sets are kept in stock.

With No. 1 jaws it will hold work to two inches in diameter, and when so fitted is a very desirable amateur's geared chuck.

Diameter.	Capacity.	PRICE, 1 set jaws.	PRICE, 2 sets jaws.
2 inches.	0–$\frac{1}{2}$ inch.	$6.50	$8.00

1883 DRILL CHUCK.

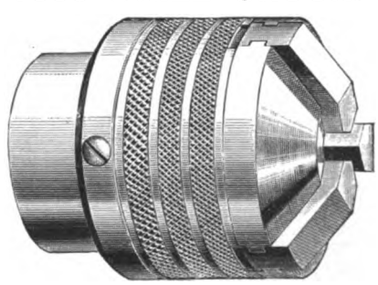


FIG. 3435.

All the parts are of steel and it is thoroughly well made. It is easily attached to any drill or lathe by a taper mandrel, and will hold drills firmly and true.

PRICES.

No. 1, 2 inch, holds from 0–$\frac{5}{16}$ ..... Price, $4 00
No. 2, 2$\frac{1}{2}$ inch, holds from $\frac{1}{64}$–$\frac{3}{4}$ .... " 5.00

A spanner wrench is furnished with each chuck.

THE PEQUOT DRILL CHUCK.

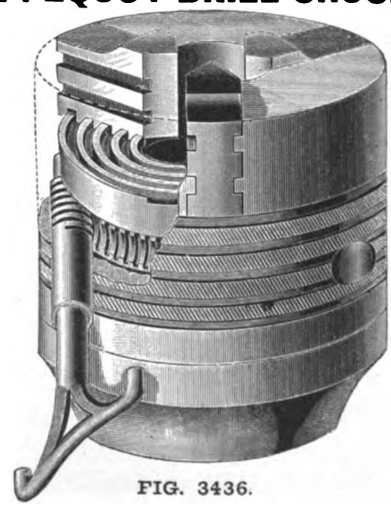


FIG. 3436.

3$\frac{1}{4}$ inch diameter.

PRICES.

Diameter.	Capacity.	PRICES.
2 inches.	0 – $\frac{5}{8}$ inch.	$7.50
2$\frac{1}{2}$ "	0 – $\frac{3}{4}$ "	9.00
3$\frac{1}{4}$ "	0 – 1$\frac{1}{4}$ "	11.00

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CYLINDER BORING AND FACING MACHINE.

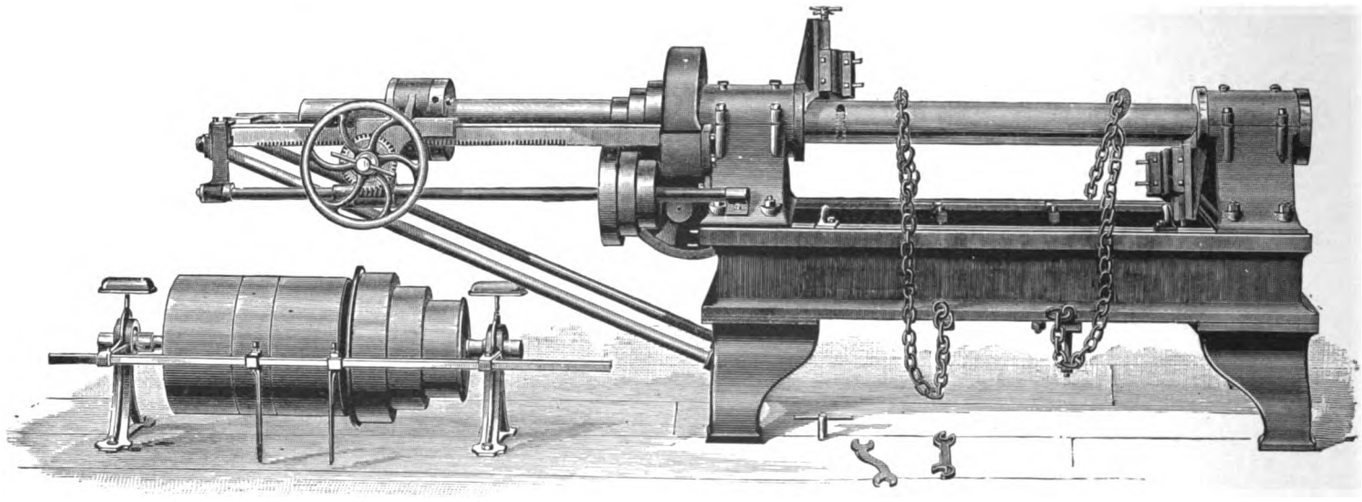


FIG. 3444. DESCRIBES NO. 1.

It is made to bore and face engine cylinders, boring guides, piston rod hole and stuffing box and facing ends of frames, in fact, all places where a true and smooth bore and face is required. The bar fits in sleeves which revolve in the boxes and bar slides through sleeves. Attached to the sleeves are facing blocks, which are moved by a star feed that can be set to feed in or out. Length between facing blocks, 3 feet, and will face 28 inches outside diameter. There is a chuck for holding cylinder, and if wanting to face head or bore stuffing box and guides the outside box can be removed. The bar is of hammered steel 5 inches in diameter.

PRICES.

No. 1 will bore cylinder 5 to 22 ins. diam., has steel bar 4 ins. diam., will cut 3 feet between facing blocks, weight, 4,600 lbs.... $750.00
No. 2 " " " 6 to 33 " " " 5 " " 4 " " " " 5,500 " 850.00
No. 3 " " " 6 to 38 " " " " " 4 " " " " 7,000 " 1,000.00

CYLINDER BORING AND FACING MACHINE.

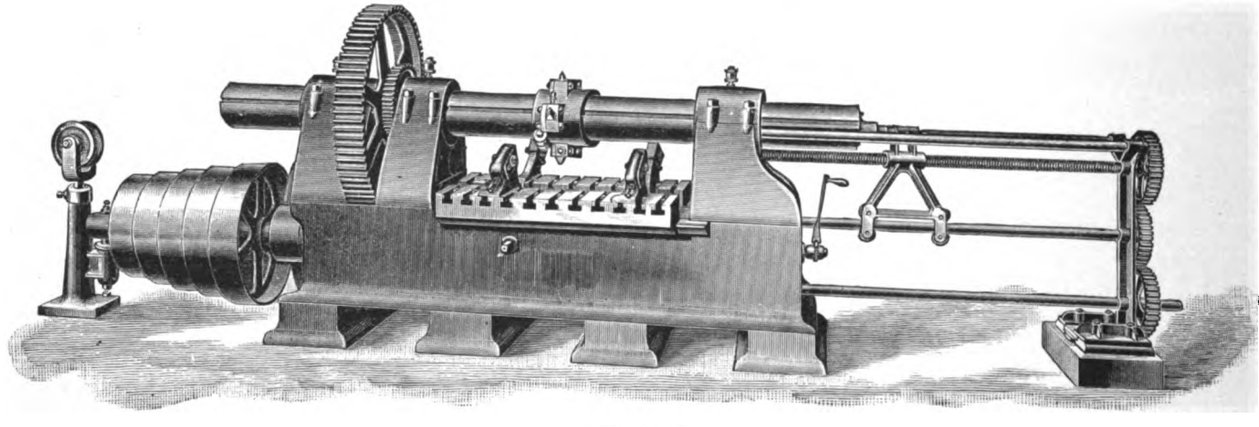


FIG. 3445.

This machine will rapidly and accurately bore and face locomotive cylinders. The bed, housings and platen are very heavy, and an 8-inch bar is used, same being driven by powerful gears, 4½ inch and 5 inch face, back geared 36 to 1, and driven by a 5 inch belt on cones, the largest of which is 30 inches in diameter, and smallest 18 inches in diameter, with five changes. The feed is changeable by placing change gears similar to lathes for cutting screws. Distance between bearings for bar to revolve in is 4 feet 6 inches, but can be made to meet any requirements.

Table or platen is 36 inches long, with suitable T slots for securing the work. From top of platen to center of bar is 17½ inches. At the end of the machine, forming a part of cone shaft support, is a sheave to take the weight of bar when drawn out to place cylinder on platen. The table or platen has a sufficient amount of adjustment, and is operated by a screw, 2¼ inches in diameter, by a crank from either front or rear end of the machine. We furnish, when desired, four adjustable saddles to receive cylinders, which have movable parts, operated by screws and wrench to facilitate placing cylinders in position for boring. When once set, machine is all right for other cylinders of same size.

It is not necessary to use facing arms, but place a side tool in regular cutter head and face off with that.

WEIGHT,.....LBS. PRICE, $1,900.00

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CYLINDER BORER AND FACER.

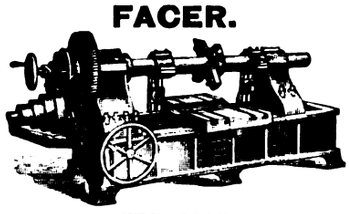


FIG. 3446.

This machine is built very heavy and is powerfully geared; it will bore cylinder and face off the ends at the same time; it has variable feed that feeds either way. No. 1 machine will bore cylinders 6 to 16 inches diameter. No. 2 machine will bore cylinders 10 to 25 inches diameter.

PRICES.

No. 1 machine with one facing arm.....$900.00
No. 2 machine with two facing arms....1,500.00

LOCOMOTIVE CYLINDER BORERS.

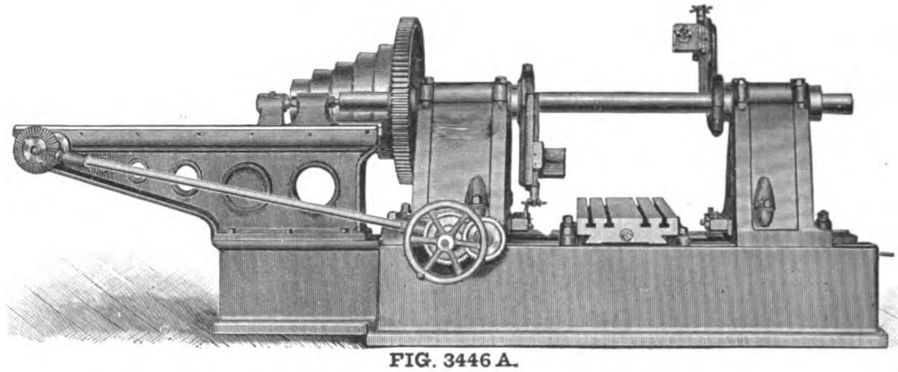


FIG. 3446 A.

These tools will bore and face both ends of cylinders at one time. The boring bar can be rapidly drawn through one head across the intervening space for the convenience of placing or removing the cylinder. The tools are set; either the feed or quick return can be operated from one point; that is, the operator does not have to move from his position to operate the machine.

No. 1 locomotive cylinder boring machine will face and bore cylinders 16 inches diameter and 24 inches long. Has five changes of speed; six changes of automatic feed; three slow feeds for roughing and three fast feeds for finishing. **WEIGHT, 10,000 LBS.**

No. 2 locomotive cylinder boring machine will bore and face cylinders 36 inches long and up to 24 inches in diameter. Has five changes of speed; six changes of automatic feed to boring bar; arranged to have three slow feeds for roughing and three fast feeds for finishing. **WEIGHT, 15,000 LBS.**

No. 3 locomotive cylinder boring machine will bore and face cylinders 42 inches long and up to 36 inches diameter. Has five changes of speed; boring bar has six changes of automatic feed; arranged to have three slow feeds for roughing and three fast feeds for finishing. **WEIGHT, 19,000 LBS.**

Can alter machine to suit customer.

PRICES ON APPLICATION.

16 INCH SWING HORIZONTAL BORING MACHINE.

A very strong and powerfully geared single-spindle horizontal boring machine for special work, especially adapted to boring air-brake cylinders, steam pump cylinders, etc. It is driven with a three-step cone pulley, largest diameter 20 inches, face 4 inches, spindle is powerfully geared. Carriage has an automatic feed of 29 inches, with three changes, slow feed for roughing, fast feed for finishing, and an intermediate feed; has slow hand feed and quick return. Boring bars are screwed on end of spindle; the outer end is supported in a yoke with adjustable taper bushing. When carriage is run back, until end of bar is out of the bushing, the yoke, which is pivoted on one side, can be swung out of the way and the work removed.

This machine can be built with any desired distance between center of spindle and carriage, or any desired length of feed to carriage can be made.

This machine was designed for air-brake companies, and is used by many steam engine and steam pump manufacturers.

WEIGHT, 3,900 LBS.

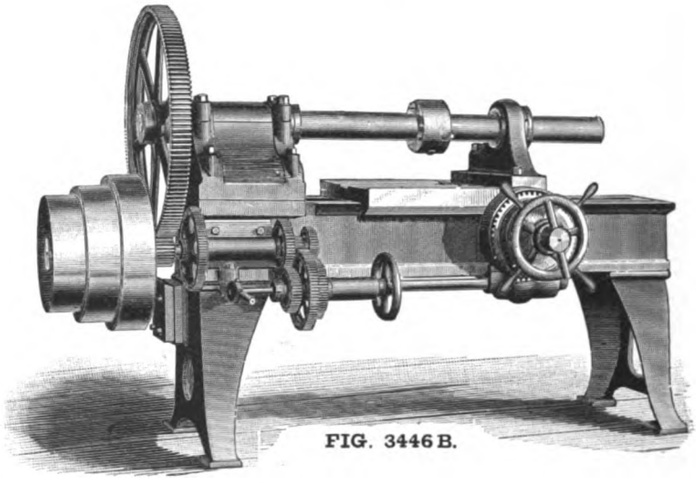


FIG. 3446 B.

PORTABLE CYLINDER BORING MACHINE.

This machine is designed for re-boring, in present positions, all makes and sizes of steam engine cylinders, pumps, steam hammers, blowing engines, air compressors, mining and hoisting engines, Corliss valves, hydraulic and steam hoists, heavy housings, large wheels, etc. It will bore with one or both cylinder heads off, either vertical, horizontal, or inclined on the engine bed, or lying on the ground. It is so constructed that the piece being bored serves as the bed or support of the bar. It is only necessary to take off the cylinder head and remove piston, when the cylinder can rapidly and accurately be bored out. This saves breaking the steam joints, bolts, etc., and often cylinder can be re-bored in less time than it would take to remove cylinder from its bed.

The cutter heads are fed by a screw in one side of bar, and are operated by the feed casing on the end that contains the gearing, by changing position of which two changes can be made, slow feed for roughing out, and fast for finishing cuts. The feed is automatic and constant, and at the pleasure of the operator. The bar is driven by a train of powerful cut gears, either with a crank or belt for power. We furnish with this bar a self-centering chuck that fits in the stuffing box supporting the bar perfectly central at that end. We also furnish two cross heads and bearings to support the bar when both cylinder heads are off. In many instances this tool is particularly valuable, requiring to be only the length of the cylinder, and the bearings for it, bar and screw are made of cast steel, and are fitted for doing very rapid and exact work.

When ordering, give length and diameter of cylinders and size of stuffing boxes, that the expanding chuck and cutter heads may be furnished to suit.

One set of tools, wrenches and full directions are furnished with each machine.

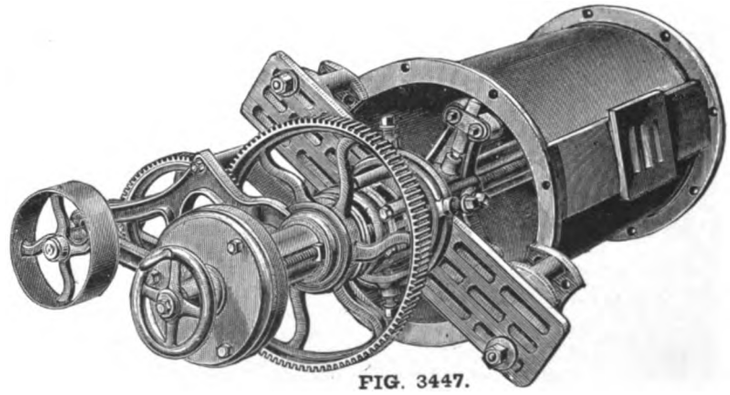


FIG. 3447.

PRICES.

2½	in. steel bar, to bore from	4	to	12	in. diam.,	30	in. stroke					$250.00
3	"	"	"	6	"	16	"	"	36	"	"	300.00
3¼	"	"	"	8	"	22	"	"	42	"	"	350.00
4	"	"	"	10	"	24	"	"	60	"	"	475.00
4½	"	"	"	12	"	30	"	"	60	"	"	525.00
8	"	"	"	20	"	60	"	"	72	"	"	bar 8 ft. long.. 750.00
8	"	"	"	20	"	60	"	"	170	"	"	" 17 " " 1,100.00

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PORTABLE LOCOMOTIVE CYLINDER BORING MACHINES.

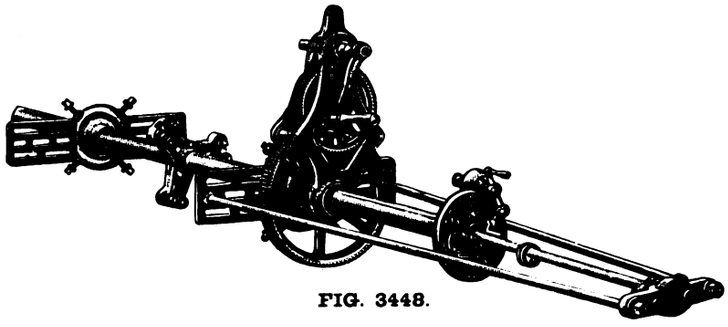


FIG. 3448.

This machine is especially adapted to boring out locomotive cylinders in their places, by removing only one or both heads and piston. The back head, cross head or slides need not be removed, unless so desired. On removing the piston and leaving the front head and stuffing box, a small cone takes the place of the stuffing box at once, and with proper adjustment at the front head, the machine is ready for work; it is fed with a constant feed of cut gears. The clamps or cross heads are so arranged that they may be used conveniently on locomotive cylinders of all sizes. The same bolts or studs that fasten the cylinder head on are used to bolt the bar supports also. Two rods are fastened to the ends of the cross head that supports the bar in cylinder, and to an adjustable swivel cross head on end of screw; these take the whole of the thrust and torsion strain of the bar. It makes no difference which position the bar is in, the end thrust is always in exact line with it, causing it to cut steady, smooth and absolutely true.

PRICES.

Bar 2½	inches	diameter,	bores	from	8 to 16	inches..... $375.00
" 3	"	"	"	"	10 to 20	" 400.00
" 3¼	"	"	"	"	10 to 24	" 450.00

The feed nut is in halves, held together by a round nut, so that when the cut is through cylinder, unscrew the round nut, open the half nuts, loosen the tools so that they will not mark cylinder in moving back, push in the end of bar until the cutter head is in its place and it is ready for another cut.

The feed can be thrown out of gear at any time, by simply screwing up the round milled nut, and by loosening the nut the machine will feed automatically.

The larger sizes of this machine are made with convenient change of feed, so that after the roughing or truing cut has been taken it can be instantly changed to a coarse feed, finishing quickly and accurately.

An attachment is made with the driving power for holding it in position rigid and firm, one end being fastened at the extreme end of the driving power, the other at the cross head. By placing the cross head vertical, the driving power can stand horizontal.

These bars are accurately ground, bearings are scraped out to fit, and they will stand a great amount of wear before loss of motion occurs.

Cutter heads are furnished for boring driving boxes.

We furnish a crank or pulley with each machine.

LOCOMOTIVE CYLINDER BORING MACHINE.

This boring bar is intended for boring locomotive cylinders before or after they are placed in position, and only needs a trial to be appreciated. The bar is of cast iron, and hollow, with a sliding head which is fed by feed screw *D*; the yokes *A* are provided with sleeves or boxes that are centered by set screw *H*, and held in position with nut and studs inserted in lugs *F* on the yokes *A*, thereby preventing any bind on the bar, which would be sure to occur if said sleeves or boxes were held in position only by set screw *H*. By the use of said nuts and studs you are enabled to hold said sleeves or boxes firmly in place. There are three grades of feed, 40, 20 and 10, and simple and sure in operation. The dust and chips do not affect the working of this bar, as the bar *B* and its feed screw *D* should be oiled only at their end of bearings, allowing the head and nut to run dry, thus preventing dust sticking to them. The feed pins *E E* are adjusted by means of split pins, and are sure to stay in position. The different members of this bar are easily taken apart and as easily put together, therefore having but one piece to handle at a time.

PRICE, $350.00.

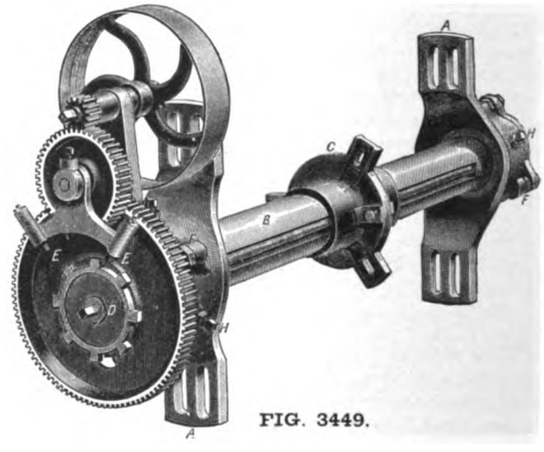


FIG. 3449.

LOCOMOTIVE CYLINDER OR DOME FACING MACHINE.

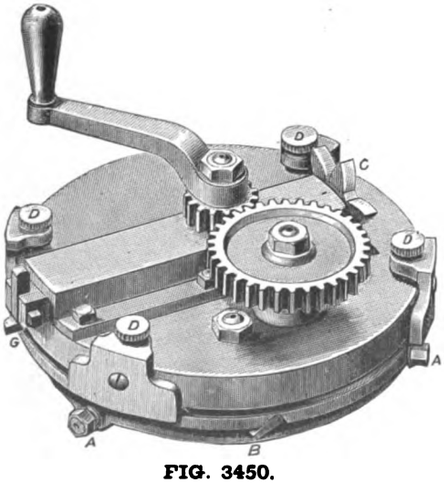


FIG. 3450.

With this machine you can make the joint in the time it takes to get ready to do it in any other way, and it makes the joint perfectly tight without grinding, which is a great saving of time and labor over the old way of scraping and grinding them tight. There is no necessity of removing the piston or studs to work this machine, thereby avoiding the liability of breaking the studs, which very often occurs in removing them. This machine is in use in more than 100 railroad shops in this country, and is considered one of the greatest labor-saving machines in use.

PRICES.

No. 1	machine,	facing	cylinder	from	13½	to 20 inches..... $125.00
" 2	"	"	"	"	15	to 22 " 150.00
" 3	"	"	"	"	18	to 28 " 175.00

Set a pair of dividers half the diameter of the cylinder, and place one point in the back center of the crank pin, then run out screws *A A A*, all at an equal distance, to fit the cylinder. Set the machine in the cylinder, with the groove about even with the joint you wish to make, screw out screws *A A A* hard enough to hold the machine for work. Turn the crank, and true up the machine by driving back the screws *A A A* until the tool runs true with the joint. To connect the feed, turn arm *B* a quarter turn, which connects it with the feed wheel *C*, and causes it to feed at each revolution of the tool *G*. If the machine runs too slack, tighten gib screw *D*.

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TRAVELING HEAD BORING BAR.

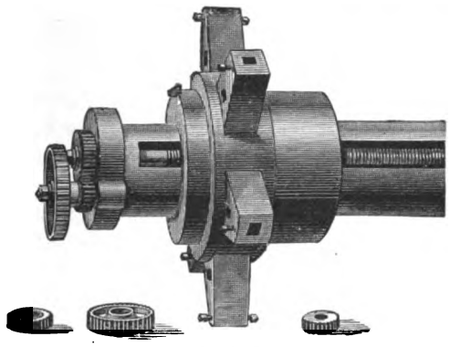


FIG. 3451.

PRICES.

With 6¼	in. diam.,	8	ft. long,	weight	1,225	lbs.,	$170.00
" 8	"	10	"	"	2,225	"	255.00
" 10	"	12	"	"	4,075	"	380.00
" 12	"	14	"	"	6,900	"	550.00
" 14	"	14	"	"	9,700	"	610.00

The skeleton head or spider is only made upon special order, as parties generally prefer to make their own to suit their particular work; in naming prices, therefore, it is not included unless specially named.

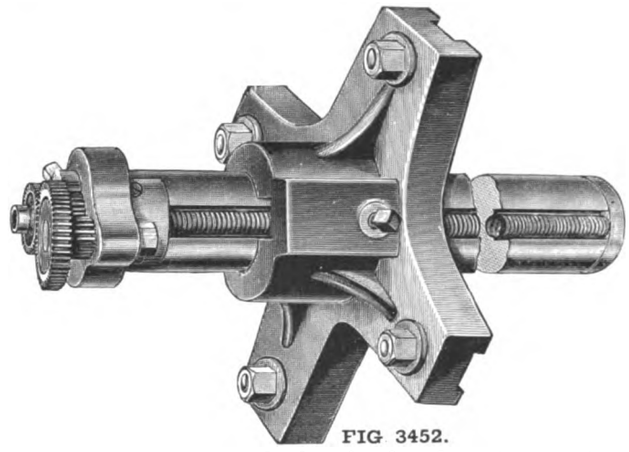


FIG 3452.

Built any size required; has hardened centers; automatic constant feed of cut gears; with steel feed screw, being carefully fitted up with a bronze thrust bearing, keeping out all lateral motion. We furnish suitable cutter heads with our adjustable tool holder. All bars accurately ground to gauge, and are first-class in every particular.

PRICES.

4 in.	steel bar,	6 ft.	long,	with two	cutter heads,	$200.00
4½	"	7 ft.	"	"	"	275.00
5	"	7 ft.	"	"	"	325.00
6	"	7 ft.	"	"	"	400.00
	Bar,	10 ft.	"	"	"	550.00

CYLINDER HEAD FACING ATTACHMENT.

This attachment is used in connection with either kind of our cylinder boring machines, and will face any size cylinder joint. It consists of an arm, bolted and keyed to the bar, on which works a slide holding the tool, operated by a star wheel and crank. It can be readily attached to the machine, and is so arranged that it may be used on both ends of the cylinder by simply removing the cap and transferring to the other end. An adjustable bearing is furnished to support the bar so the whole end can be faced off. With the cylinder boring machine and this attachment, cylinders can be very quickly bored and flanges faced—the facing is exactly square with center line of cylinder.

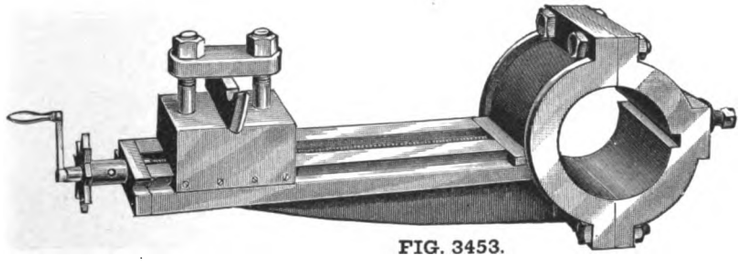


FIG. 3453.

In ordering, give the bores of the smallest and largest diameters of cylinder.

PRICE, $50.00.

STEAM CHEST SEAT MILLING MACHINE.

This machine is also adapted to the drilling either of new holes for studs or the drilling out of old studs when broken off. It is also used for milling out the ports on new work, and for repairing the same when eaten away.

It is supported and adjusted to the surface to be grooved or milled by four studs, running through two hollow arms, which in turn support the V's or slide. This slide carries a head containing a spindle, similar to a drill press, and this head receives a transverse movement by means of the screw, as shown, the milling spindle being driven by bevelled gears and a transverse shaft.

The cutting or grooving is performed by a face, milling cutter inverted in the end of the spindle, and is fed up and down by means of a screw and small wheel, and when the proper depth for a cut is reached, the horizontal movement of the spindle is prevented by means of a check nut on the small screw. The sliding or tool head is fed in either direction by means of change feed gears at the end of the screw, and in case of drilling a hole or milling down to the desired depth of a groove the head can, in a moment, be made independent of the transverse feed screw, while the spindle is rotated by the driving shaft.

It will be seen that the best possible advantage has been taken of the limited space afforded for this work in the construction of the machine, and that the strain on the tool head slide and supporting arms has been reduced to a minimum by bringing the bearing for the spindle within half an inch of the face of the work, thus practically lowering the entire machine as far as possible. But two settings or adjustments of the machine are required for all four sides of the steam-chest seat, because when the groove is finished on the outer side of the valve face, all that is required is to loosen the top nuts on the studs supporting and passing through the arms, lift up the machine and replace it, facing the boiler, when, having been secured, work can be resumed. The same applies to the other sides, the forward and back ends; having set it for one and finished the cut, turn the machine about and replace it on the same studs.

But one size of the machine is built, as provision for very large steam chests is made by supplying extension feet or plates fitted with a T-slot and hole for the ordinary stud.

PRICE $200.00.

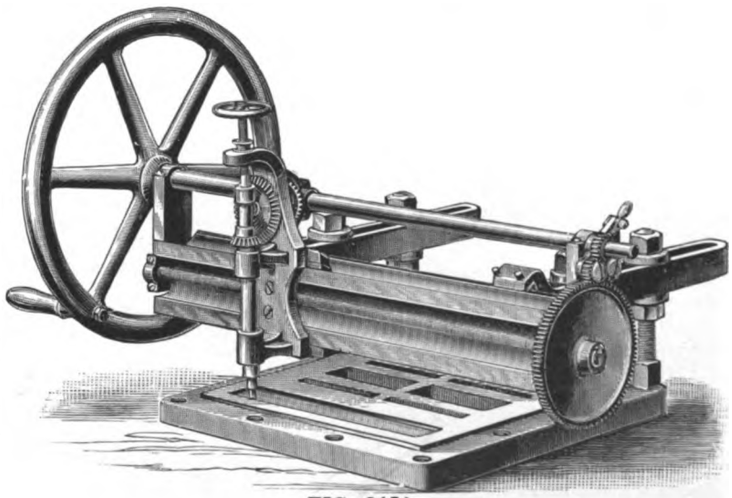


FIG. 3454.

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LOCOMOTIVE CYLINDER PORT MILLER.

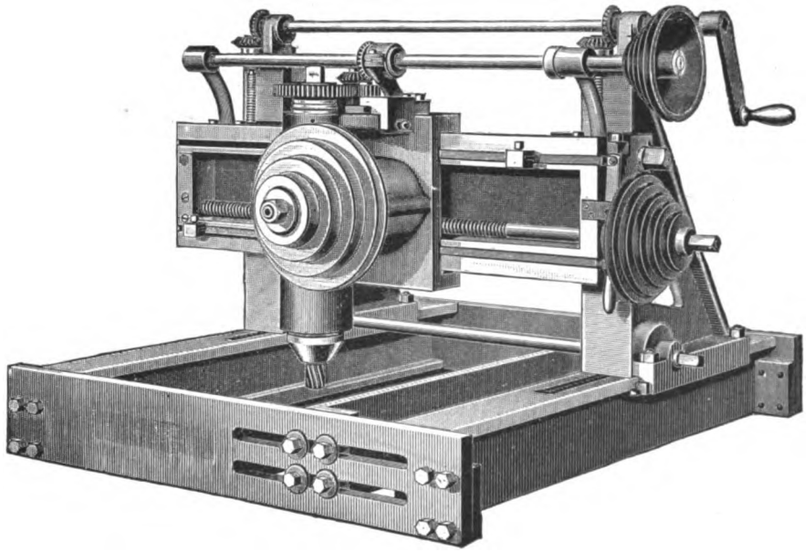


FIG. 3455.

This machine was designed especially to mill the ports of locomotive cylinders. Is made compact, has all movements requisite, ample power to do the work, and can be readily attached to any standard locomotive cylinder.

The frame or bed is fastened to the steam chest seat of the cylinder, using the bolt holes for that purpose.

The uprights are moved on the frame by means of racks and pinions until the milling cutter is over the ports as desired, and are then securely fastened to the frame. A graduated scale let into the side of the frame facilitates accurate measurements.

The cross head carrying the spindle saddle is lowered similar to that of a planer until the milling cutter is at the required depth, and then securely fastened to the uprights.

The spindle is of steel, of large diameter, and runs in conical bronze bearings with adjustment to compensate for wear, and is driven by a cone having four sections for a round belt or rope through gearing, the cone making eight turns to one of spindle.

The feed is 20 inches, and automatic in either direction; is driven by a cone having five sections, and can be stopped automatically as required. Weight, 650 lbs.

PRICE, including one cutter, **$770.00.**

VALVE PORT MILLER.

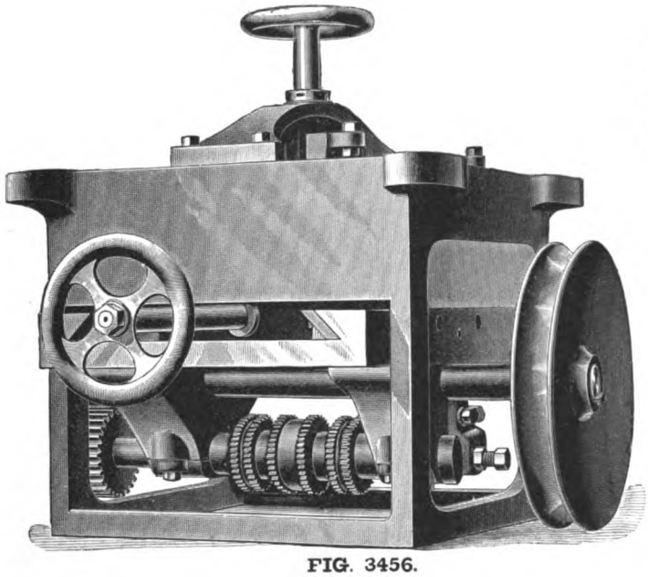


FIG. 3456.

This machine will mill out ports in valve faces of steam cylinders, duplicating work exactly and in the shortest possible time. It is operated by a rope belt similar to that used for driving drills, etc. It is much lighter than the cylinder, and can be readily placed in position, using the stud holes to attach to for that purpose.

PRICE, $400.00.

DESCRIPTION, FIG. 3457.

The cutter bar has a stroke of 10 inches, and cuts to the center of 57 inches, the distance from face of tool block to inside of column or frame being 27 inches.

The circular table is 30 inches in diameter, and is provided with power feeds in all directions.

The cutter bar has quick return movement, and is easily adjustable by means of the crank in front of the bar; the tool block is provided with a relief motion.

Furnished complete with overhead countershaft, pulleys and hangers, wrenches, etc.

Cone pulley takes a 4 inch belt.

Driving pulleys on countershaft are 18 inches diameter and 5 inch face, and speed should be 180 revolutions per minute.

Weight of machine, about 5,750 lbs. Height of frame, 6¾ feet.

PRICE, $850.00.

10 INCH SLOTTER.

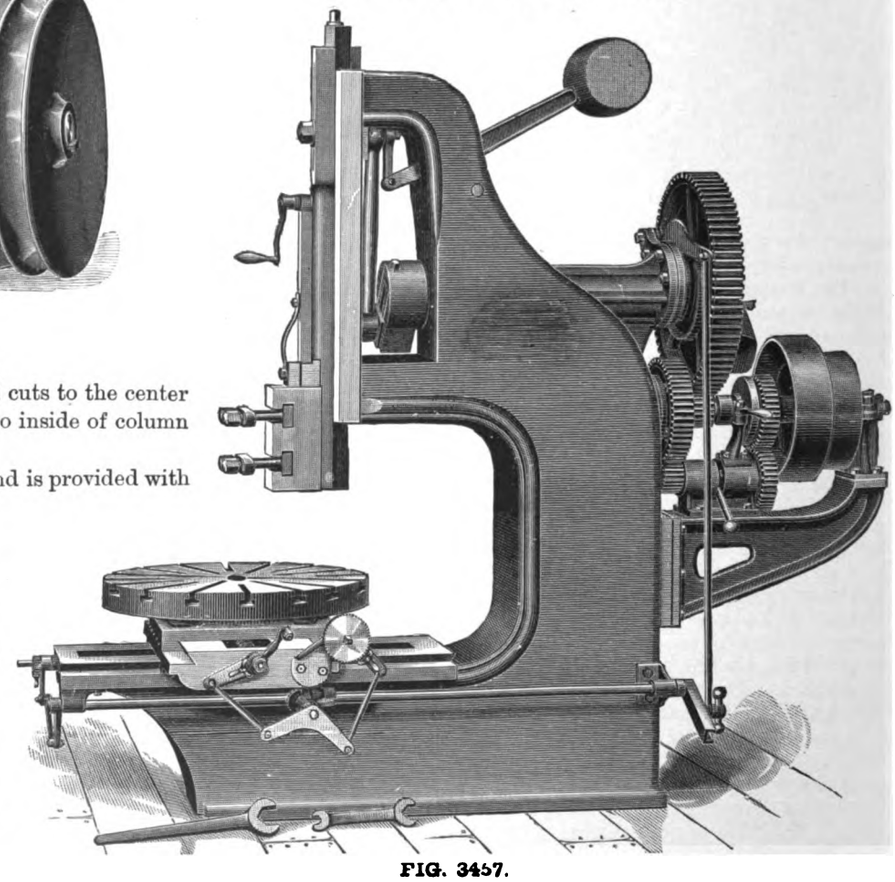


FIG. 3457.

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SLOTTERS.

18 INCH STROKE.

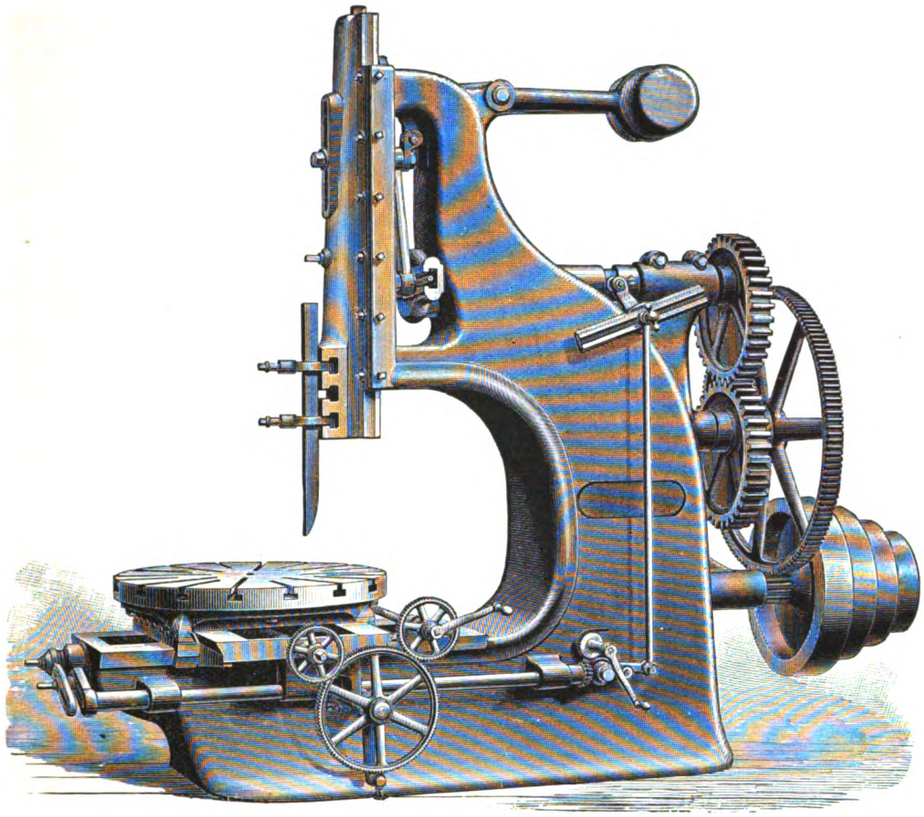


FIG. 3458.

Has a stroke of 18 inches.

Will slot to the center of a 74 inch circle.

Revolving table, 42 inches diameter; in and out traverse, 33¾ inches; cross traverse, 41 inches.

Friction pulley on counter, 28 inches diameter, 8 inches face.

Countershaft should make 85 revolutions per minute.

WEIGHT, 16,000 LBS. PRICE, $.....

These slotters are furnished with three tool holders for ram, wrenches, countershaft; with iron cone and patent friction driving pulley; also with improved friction brake for the purpose of instantly stopping the machine, or to facilitate in placing the cutting tools in proper position when changed or removed from the ram.

DESCRIPTION, FIG. 3459.

13 INCH SLOTTER.

Has a stroke of 13 inches.

Will slot to the center of a 57 inch circle.

Revolving table, 33 inches diameter; in and out traverse, 24 inches; cross traverse, 28½ inches.

Friction pulley on counter, 20 inches diameter, 5½ inches face.

Countershaft should make 100 revolutions per minute.

WEIGHT, 8,000 LBS. PRICE, $.....

10 INCH SLOTTER.

Has a stroke of 10 inches.

Will slot to the center of a 40 inch circle.

Revolving table, 26 inches diameter; in and out traverse, 15 inches; cross traverse, 21 inches.

Friction pulley on counter, 16 inches diameter, 4½ inches face.

Countershaft should make 110 revolutions per minute.

WEIGHT, 6,000 LBS. PRICE, $.....

13 AND 10 INCH STROKE.

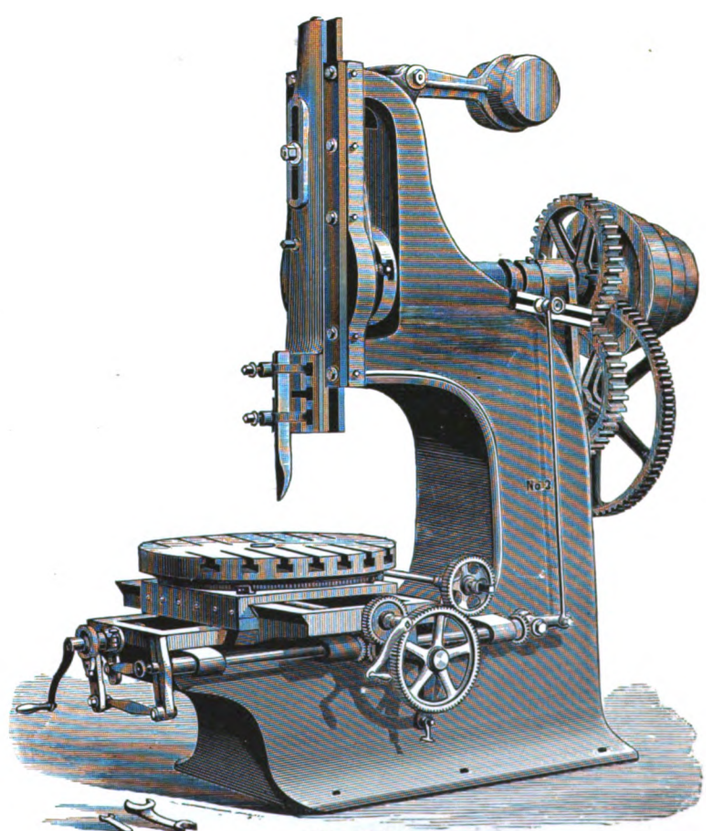


FIG. 3459.

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SLOTTING MACHINES.

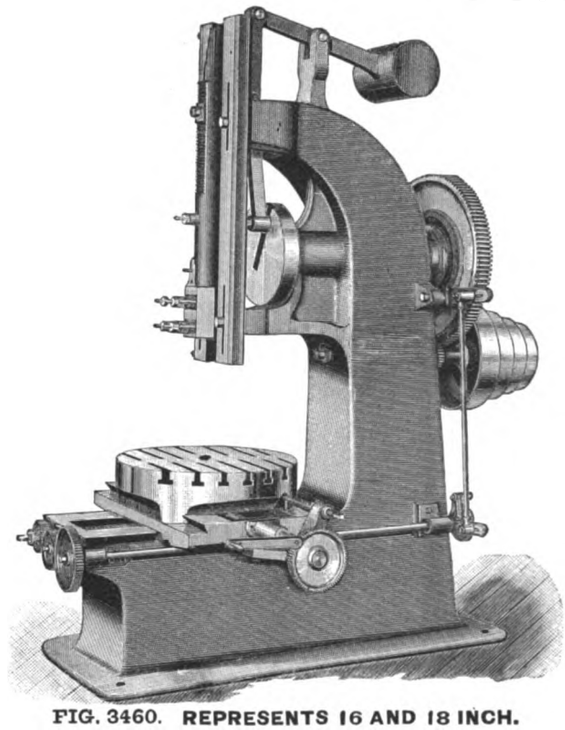


FIG. 3460. REPRESENTS 16 AND 18 INCH.

16 INCH AND 18 INCH SLOTTING MACHINES.

These tools are very heavy and powerfully geared. The carriages are made heavy so that ample metal is left over the tee slots. They are provided with Whitworth's quick return motion, and have large cone pulleys for driving. The cutting bar slide is made adjustable, has automatic feeds in all directions. The feeds can all be operated by hand. The longitudinal feed can be operated in the front or at the working side of the machine, which is a desirable feature on large slotting machines, to have carriages so that they can be adjusted either at the front or at the side. The illustration only shows the front adjustment, the extra adjustment at the side not being shown.

16-inch slotting machine has a full stroke of 16 inches, circular carriage 38 inches in diameter, will admit work in height 26 inches, in diameter 66 inches. Weight, 13,500 lbs.

18-inch slotting machine has a full stroke of 18 inches, circular carriage 42 inches in diameter, will admit work in height 30 inches, in diameter 71 inches. Weight, 16,000 lbs. Will be made with relief tool block if desired.

PRICES ON APPLICATION.

SPECIAL FORGING SLOTTER.

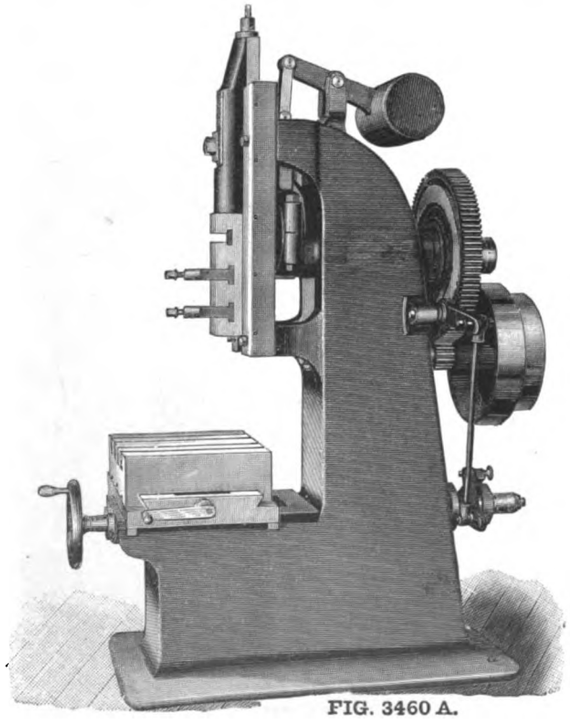


FIG. 3460 A.

DESCRIPTION, FIG. 3460.

6 INCH SLOTTING MACHINE.

With a full stroke of 6 inches. Cutting bar is counterweighted and can be adjusted. Is provided with Whitworth's quick return motion. The circular carriage has a full bearing on the under saddle, the worm wheel being in the center of the saddle. Machine will admit work 23 inches diameter, 10 inches in height. The circular carriage is 17½ inches diameter, and is made very heavy, allowing ample metal over the tee slots for clamping the work. Is provided with automatic feeds in all directions; the feeds can also be operated by hand. Will be made with relief tool block if desired. Ram slide is stationary. Weight, 2,100 lbs.

8 INCH SLOTTING MACHINE.

Is provided with Whitworth's quick return motion; cutting bar is counterweighted and can be adjusted; has a full stroke of 8 inches. The circular table is 19½ inches diameter, has a full bearing on lower table; will admit work in diameter 28 inches, in height 11¼ inches; has an automatic feed to circular carriage, also longitudinal and lateral feeds which work in either direction. All the feeds can be worked independent of the automatic feed. Will be made with relief tool block if desired. Ram slide is stationary. Weight, 3,000 lbs.

10 INCH SLOTTING MACHINE.

The machine will admit work in diameter 38 inches, in height 13 inches. The cutting bar, which is counterweighted, has a full stroke of 10 inches; can be adjusted to any desired point. The circular carriage is 22 inches in diameter; has a full bearing on the lower slide. Has a Whitworth's quick return motion and the carriages have an automatic feed in all directions, also hand-feed independent of the other. Will be made with relief tool block if desired. Ram slide is stationary. Weight, 4,000 lbs.

12 INCH SLOTTING MACHINE.

A slotting machine adapted to railroad and general machine shops, being unusually substantial. The cutting bar is counterweighted and can be adjusted in any position. The cutting bar slide can be adjusted to suit the various thickness of work. The adjustment of the cutting bar slide is a new departure from the ordinary run of slotting machines. The frame of the machine extends out to the back of the cutting bar slide, and the slide adjusted on this instead of being extended back to the face of the frame. This makes the tool very rigid. Machine has a full stroke of 12 inches, will admit work in diameter 48 inches, circular carriage of 25½ inches in diameter. Will admit work in height 15½ inches. Will be made with relief tool block if desired. Weight, 7,200 lbs.

14 INCH SLOTTING MACHINE.

Machine has a full stroke of 14 inches, will admit work in height 20½ inches, admit work in diameter 54 inches. The circular carriage, which has a full bearing on the lower slide table, is 30 inches in diameter. The machine is designed especially for heavy work. The cutting bar is counterweighted, the cutting bar slide is adjustable on the extended frame, which allows the slide to be adjusted to suit the various heights of work, and makes a strong backing where it is necessary to support the cutting bar. Machine has a large driving cone, carriages have automatic feed in all directions and can be operated by hand.

The adjustment to the cutting bar is made in front the same as the 12-inch slotting machine, by the adjustment to the cutting bar on top. Will be made with relief tool block if desired. Weight, 8,500 lbs.

DESCRIPTION, FIG. 3460 A.

Machine built with a stroke of 6 inches, driven by an eccentric giving a positive stroke of 6 inches, or can be made with a crank wheel the same as the ordinary slotter, giving an adjustment in stroke up to 6 inches. The tool is very powerful and is geared as heavy as the ordinary 14-inch and 16-inch slotting machines.

The engraving illustrates machine with automatic feed only in one direction. We can build the tool as it is shown in the cut or with the feed in both directions or a rotary table the same as the ordinary slotting machine. This tool is especially adapted for forging and for cutting the steel rails for frog and switch works.

Slotters for forge work of any stroke designed and built.

Weight, 6,000 lbs.

PRICES ON APPLICATION.

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SLOTTERS.

26 INCH SLOTTING MACHINE.

The cutting bar of this tool has an adjustable stroke from 0 to a maximum of 26 inches, with an adjustment by hand for any position; it is counterbalanced and driven by eccentric wheels and cut gearing ; the cone pulleys have four speeds for 4 inch belt.

The cutting bar is arranged with guide bars which give large wearing surfaces. Distance from the frame to the front side of the cutting bar is 42 inches, making it possible to slot in the center of 88 inches.

Feeds are positive and self-acting in all directions by a cam which operates at the upper end of the stroke; longitudinal movement of table, 38 inches; transverse movement, 32 inches; top table, 50 inches diameter, which is secured by adjustable corner clamps.

Speed of countershaft, 170 revolutions. Fast and loose pulleys, 26 x 6¼ inches.

Weight, 24,500 lbs.

18 INCH SLOTTING MACHINE.

The cutting bar of this tool has an adjustable stroke, from 0 to a maximum of 18 inches, with an adjustment by hand for any position; it is counterbalanced and driven by a variable crank with quick return motion and cut gearing; the cone pulleys have four speeds for a 4 inch belt, which, with two sets of fast and loose pulleys on the countershaft, give eight changes of speed.

The cutting bar is arranged with adjustable guide bars which give large wearing surfaces. Distance from the frame to the front side of the cutting bar is 36 inches, making it possible to slot in the center of 75 inches. Feeds are positive and self-acting in all directions by a cam which operates at the upper end of the stroke; longitudinal movement of table, 30½ inches; transverse movement, 30 inches; top table, 36 inches diameter, which is secured by adjustable corner clamps. Fast and loose pulleys, 20 and 30 x 5¼ inch face.

Speeds of countershaft, 50 and 150 revolutions. Weight, 24,500 lbs.

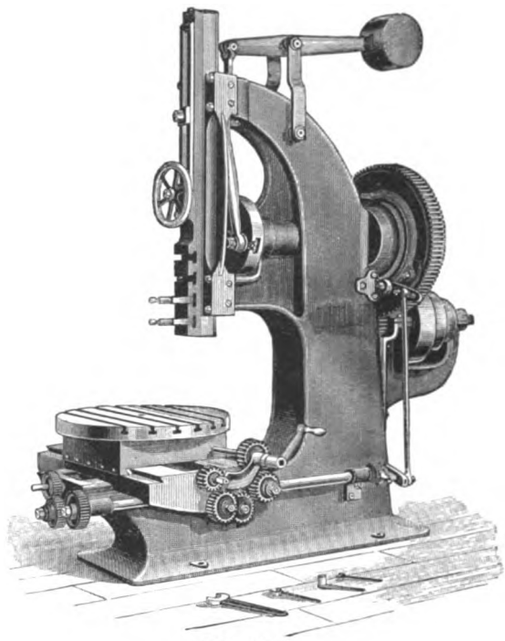


FIG. 3461.

12 INCH SLOTTING MACHINE.

The cutting bar of this tool has an adjustable stroke from 0 to a maximum of 12 inches, with an adjustment by hand for any position; it is counterbalanced and driven by a variable crank with quick return motion and cut gearing; the cone pulleys have three speeds for a 4 inch belt.

The cutting bar is arranged with adjustable guide bars which give large wearing surfaces. Distance from the frame to the front side of the cutting bar is 24 inches, making it possible to slot in the center of 50 inches. Feeds are positive and self-acting in all directions by a cam which operates at the upper end of the stroke; longitudinal movement of table, 20 inches; transverse movement, 20 inches; top table, 30 inches diameter.

Fast and loose pulleys, 16 x 5¼ inch face. Speed of countershaft, 157 revolutions per minute. Weight, 8,400 lbs.

8 INCH SLOTTING MACHINE.

This tool will slot to the center of 36 inches; the cutting bar has 8 inch stroke; arranged with improved adjustable guide bars; has a vertical adjustment by hand, and is driven by a variable crank with quick return motion and cut cog gearing; the cone pulleys have three speeds for three inch belt; the tables have improved self-acting feeds in and out, across, and for circular work, with covered worm wheel and worm.

Fast and loose pulleys, 14 x 4¼ inch face. Speed of countershaft, 200 revolutions per minute. Weight, 3,600 lbs.

SEMI-AUTOMATIC RACK CUTTER.

This machine has a capacity for cutting one or more racks, the faces of same not exceeding four inches in width, and at one setting will cut 19¼ inches in length, and by resetting will cut any desired length. It will cut a rack of 8 diametral pitch or finer.

In use the operator is required to move cutter up to contact with work and throw-in feed. The feed continues automatically until the cutter has traversed the face of blank, when, by an adjustable trip screw, the feed is thrown out. The operator then, by the feed gear with handle, moves the cutter head back, turns index, and throws in feed to cut next tooth.

The cutters for this machine should be not less than 2¼ inches diameter, and have standard ⅞ inch hole in them. The cutter arbor is 1¼ inches in diameter, and runs in the end of the cutter slide, and is driven by a universal joint connection with the shaft and three speed cone, 8, 6½ and 5 inch diameter steps, and 1¾ inch face. On this shaft is also a three speed feed pulley for ½ inch round belt. The table is 31 by 5 inches. Greatest distance from center of cutter arbor to top of table is 7 inches. The hand wheel on the elevating screw of the table is graduated into thousandths of an inch.

The index or lead screw is 1⅜ inches in diameter, and is cut with a view of securing twelve threads in a distance equal to the diametral pitch of 1 inch, or twelve threads in 3.14159 inches. With special gearing we are able to cut this screw with a theoretical error of .0004 of an inch in 3.14159 inches. It being impossible to divide the diametral pitch of one inch into exact divisions to correspond to 6, 8, 10, or any other pitch these divisions are usually and necessarily approximated to, by a combination of gears as close as possible, we put the error once for all in the lead screw, and then the matter of dividing into the different pitches is simple, the error constant, and the same on all pitches, .0004 in the number of teeth cut in 3.14159 inches. This we regard as preferable to a varying error, which after making special index combinations more or less elaborate and expensive, the results accomplished are not usually as close as are possible on this machine.

The combination of gearing furnished, unless otherwise arranged, with each machine is as follows: One gear on screw—100 teeth, one intermediate gear, and one each 120, 100, and 75 teeth change gears. The change gears go on a stud and are keyed to an index gear of larger size, with four teeth for the index pawl. This large index is used at all times, and the few divisions make it simple and easy to handle. Additional gears for all the pitches furnished at slight additional cost.

PRICE OF MACHINE AND COUNTERSHAFT, $350.00.

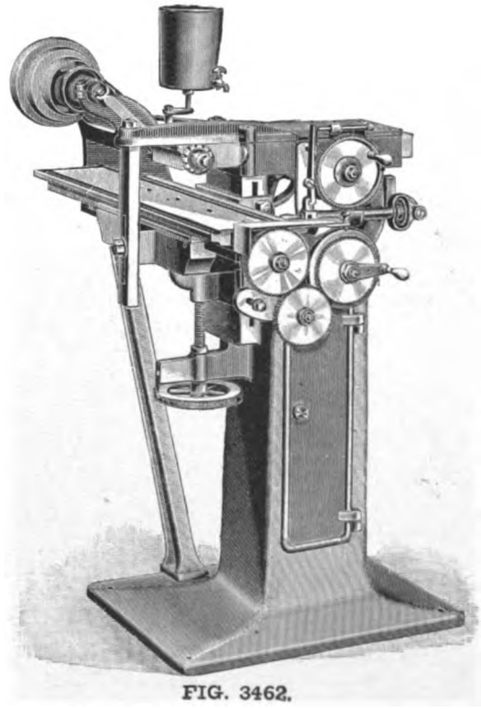


FIG. 3462.

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FULL AUTOMATIC RACK CUTTER.

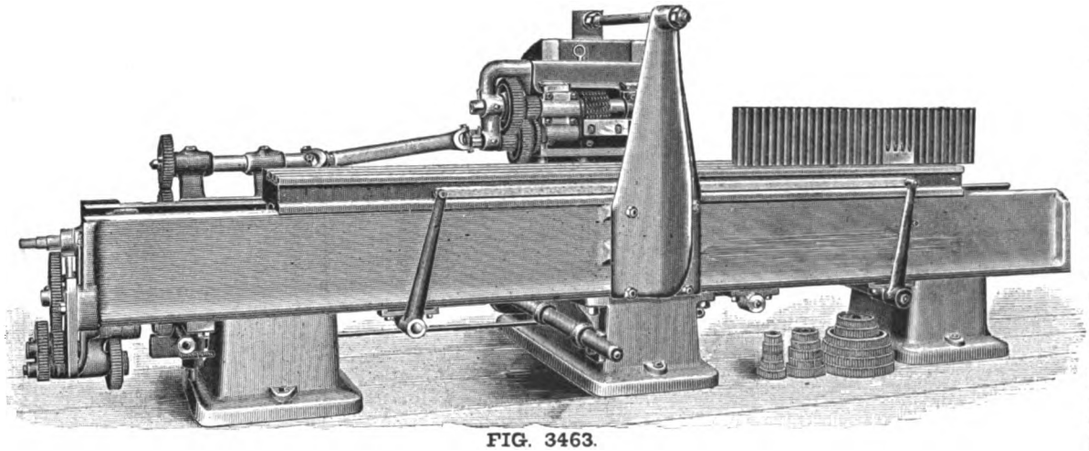


FIG. 3463.

The tool is driven by a friction clutch pulley.

When cutting with a set of gang cutters, the cutting points are set spirally, as shown in cut, avoiding chatter and rapid dulling of the edges. The cutter spindle is geared very strong, driven by means of a sliding sleeve and universal joint, which readily compensates for all movements the slide may make, in cutting various widths of face, and positions it may take. A heavy brace is placed opposite the cutter slide, to connect with the top of head, to prevent any tendency of springing when cutting coarse pitches.

The machine has a capacity for cutting a rack of either circular or diametrical pitch with accuracy, 10 inches wide by 10 feet long, at one setting, and as coarse as 3 inch circular pitch, carrying from 1 to 12 cutters at a time, according to the pitch.

The table can be geared to use the movement when traveling, for cutting in either direction, not requiring the return of the same end of table to commence the cutting, thereby causing the least wear to the parts.

Work of regular, as well as irregular, shape will be found very convenient to fasten to this style of table, which is arranged to stop automatically at each end of the work.

Change wheels are provided for cutting the various pitches as well as for the necessary feeds.

WEIGHT, ABOUT 12,000 LBS.

PRICE, $.....

AUTOMATIC RACK CUTTER.

This machine was designed for cutting the teeth of racks entirely automatic, and holding the work in the best possible position.

The machine, as shown in the engraving, will automatically cut at one setting 36 inches long by 8 inch face, as coarse as 2 inch circular pitch, using two cutters. It is capable of cutting 2 feet of 1¼ inch pitch, 4 inch face cast iron rack, in one hour.

Either circular or diametrical pitches may be cut. The cutter arbor will receive and drive two or more cutters, according to the pitch. For 10 diametrical pitch, we use 12 cutters, 6 pitch, 8 cutters, etc., without tremor or chatter. There are ample feeds to suit the work and pitch being cut.

Countershaft, fast and loose pulleys, 14 x 4 inches, and should make 275 revolutions.

WEIGHT, ABOUT 5,000 LBS.

PRICE, $.....

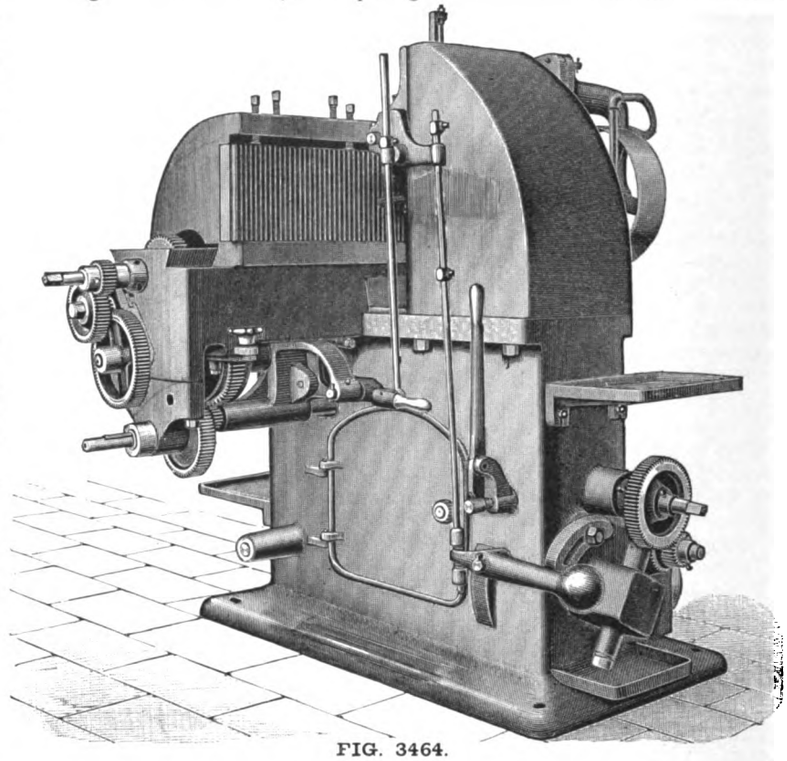


FIG. 3464.

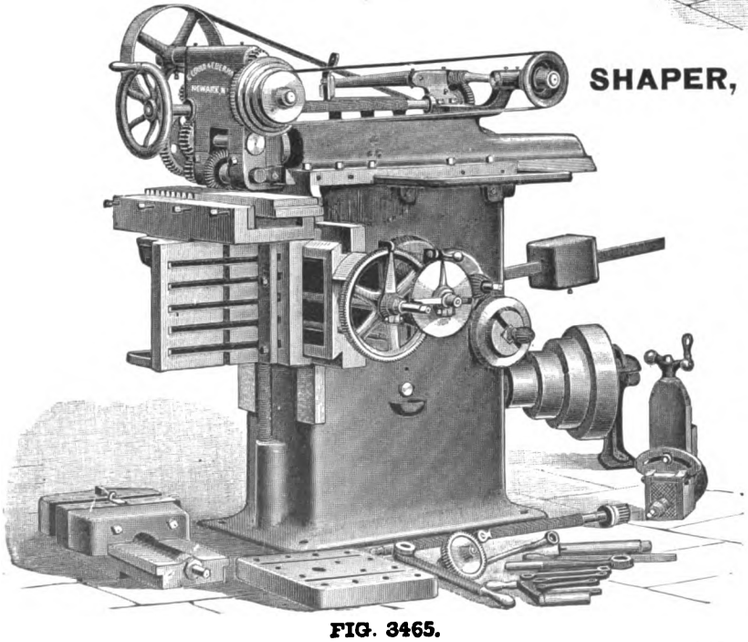


FIG. 3465.

SHAPER, WITH RACK CUTTING ATTACHMENT.

This very useful attachment is designed to meet a want, where the purchaser does not wish to invest a large amount in one tool which could be used only for rack cutting, and would be idle a large part of the time.

In this he has a regular tool for shaper work, and in a few minutes can alter it for rack cutting as complete as any in the market, and do it at a much less expense. The cutter arbor is capable of admitting two cutters, side by side, one for blocking out and one for finishing.

The dividing mechanism furnished will cut either circular or diametrical pitches, without changing any gears, and will divide to the $\frac{1}{10}\frac{1}{000}$ part of an inch.

The work is held in the vise or chuck, made specially for holding racks to be cut, and the cutter is fed through automatically, and is run back by hand wheel. Four changes of feed are obtainable for cutting various metals. All parts are large, well proportioned, and well fitted together.

FOR PRICES, SHAPERS, SEE FIG. 3250.

Size machine.	Will cut at one setting.		Weight, about	Price for attachment fitted to machine.
16 in. stroke.	17 in. long.	4 in. face.	550 lbs.	$200.00
24 " "	24 " "	5 " "		
26 " "	28 " "	6 " "	750 lbs.	300.00
30 " "	35 " "	8 " "		

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108, 72, 48 AND 42 GEAR PLANERS.

The gear is mounted on a horizontal spindle, on the other end of which is the index wheel.

The head which carries this spindle can be moved toward or from the center of machine, so that the apex of the cone lines of bevels will coincide with the center.

The radial arm which carries the tool slide can be swung to angle of gear from 0 deg. for spur gears to 90 deg. for crown wheels, and the end is laid off in degrees so as to make this movement conveniently. It is also hinged to permit a vertical movement for bevel wheels.

The teeth of gears can be planed epicycloidal, involute or any curve preferred, according to the curve given former, which gives shape to the tooth.

The former is put under the radial arm, which is fed over it, and it is moved toward or from the center of machine, so that it is at a distance which shall be the same ratio to the length of cone line of gear as the pitch of former is to pitch of gear. Therefore, gears of different pitch can be planed with the same former.

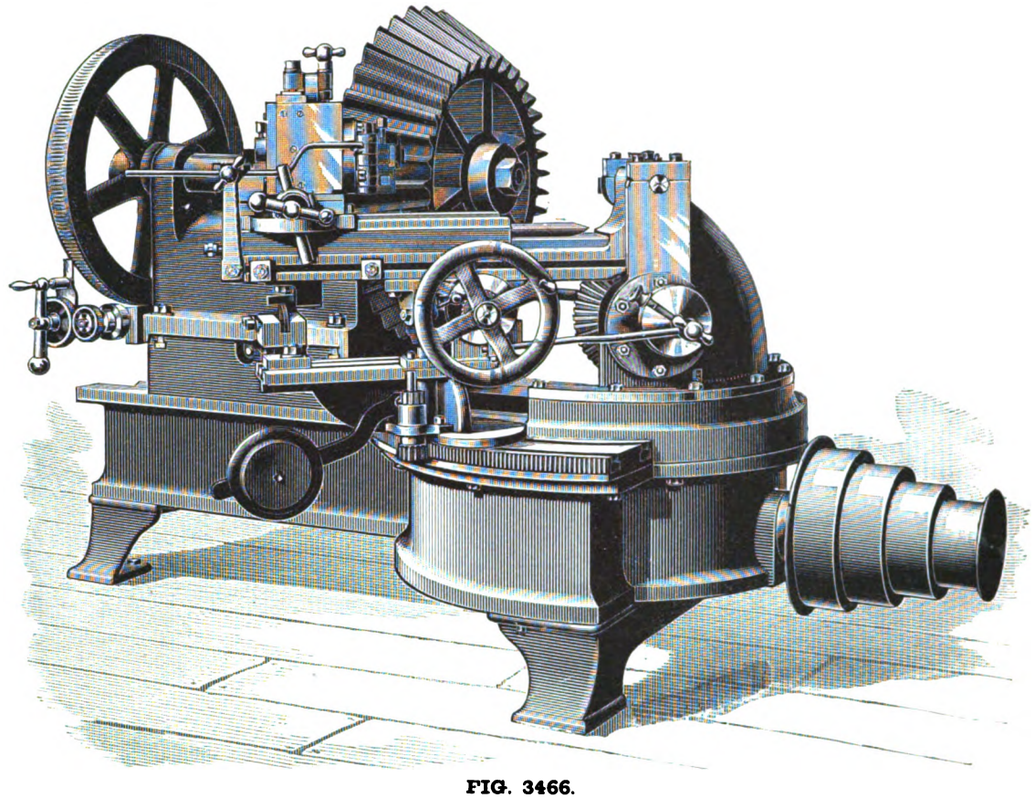


FIG. 3466.

For wood teeth, a thick circular saw is held in the tool post, and is driven by belt over guide pulleys from a radial drum overhead.

The planer gives the perfect reducing cut to bevels, making the small end of cog proportionate in size to large end. The feed is automatic and similar to feed on an ordinary planer.

There are four sizes, to plane gears up to, 42 in., 48 in., 72 in., and 108 in. respectively, and the two larger sizes have the wood-cutting attachment when required.

WEIGHT, ...LBS. PRICE, $.....

DESCRIPTION, FIG. 3467.

MADE FROM IMPROVED PATTERNS.

No. 1 will cut from 1 to 48 in. diameter, 8 in. face.

Tight and loose pulleys on counter, 16 in. diameter, 5 in. face.

Countershaft should make 80 revolutions per minute.

WEIGHT, 3,900 LBS. PRICE, $950.00.

No. 2 will cut from 1 to 48 in. diameter up to 10 in. face.

Tight and loose pulleys on counter, 16 in. diameter, 5 in. face.

Countershaft should make 100 revolutions per minute.

WEIGHT, 4,655 LBS. PRICE, $1,100.00.

No. 3 will cut from 1 to 72 in. diameter up to 11 in. face.

WEIGHT, ...LBS. PRICE, $1,300.00.

The above are furnished with overhead pulleys and hangers; also with belt tighteners.

72 TO 48 INCH GEAR CUTTER.

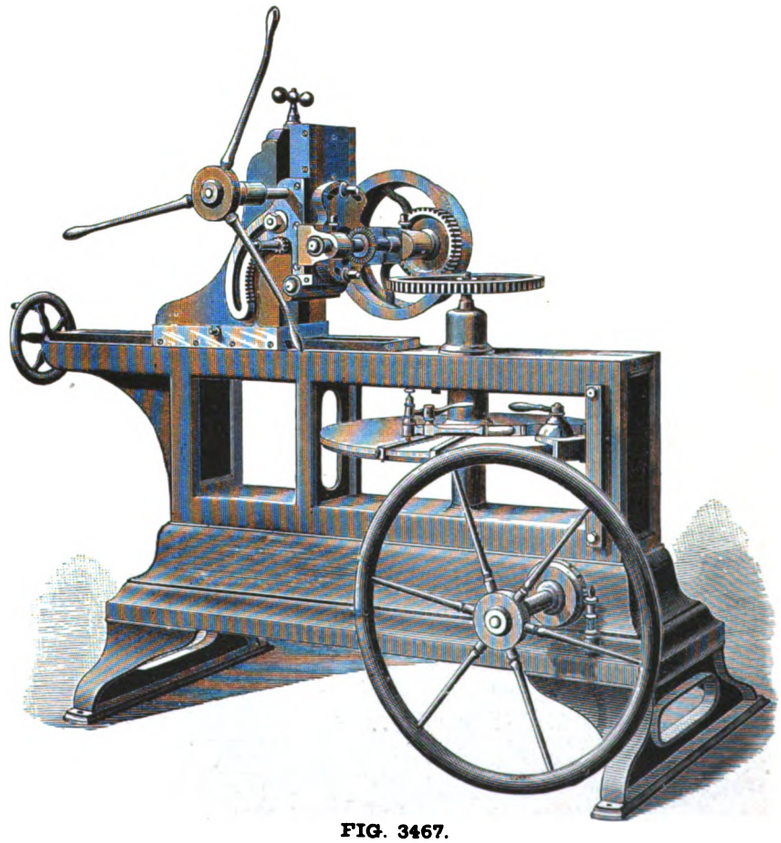


FIG. 3467.

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FULL AUTOMATIC GEAR CUTTERS.

84 INCH.

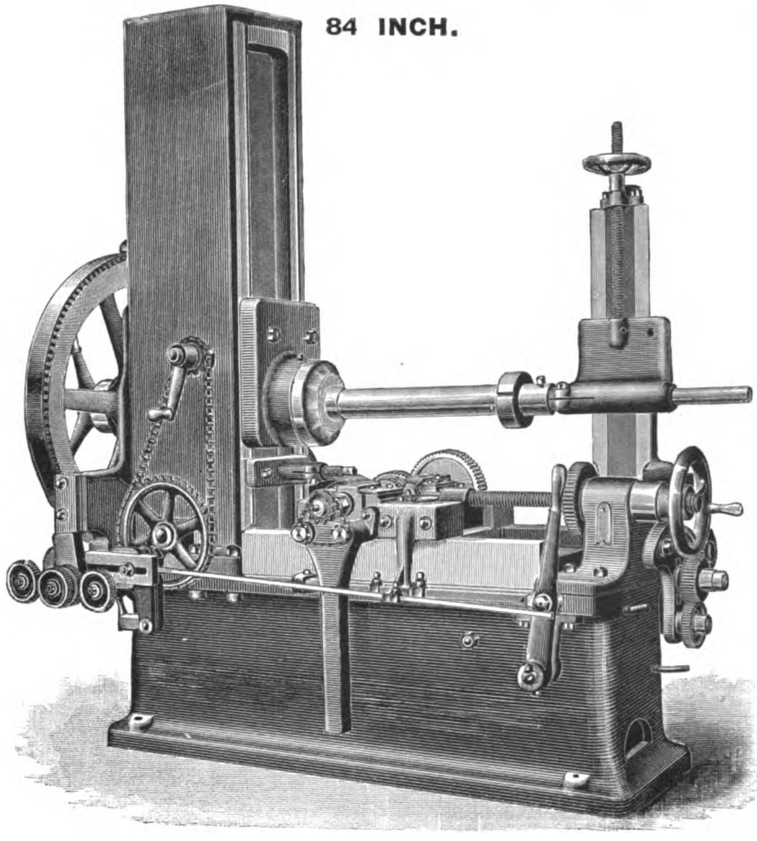


FIG. 3468. FOR SPURS ONLY.

22 INCH.

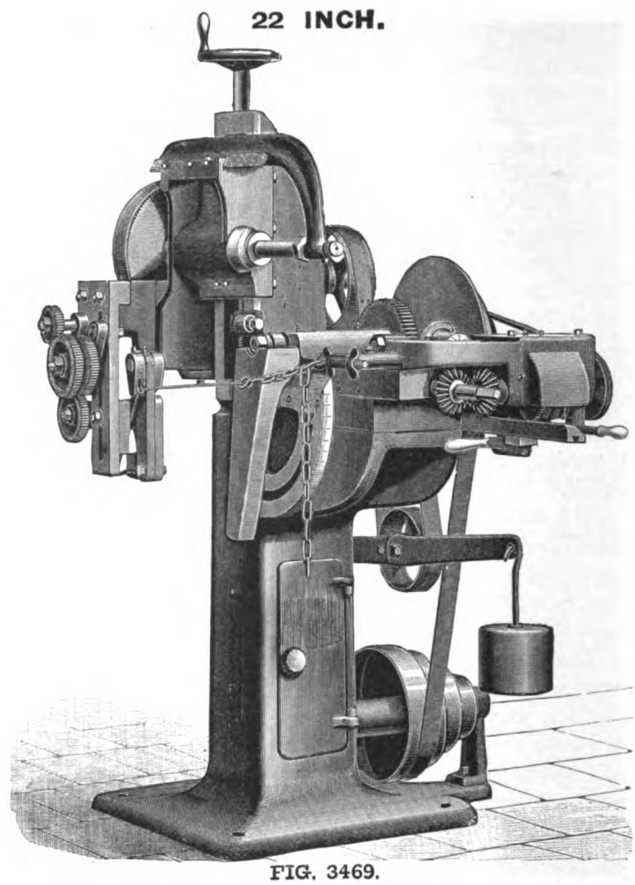


FIG. 3469.

72 TO 30 INCH GEAR CUTTERS.

REGULAR.

Plain gear cutters, hand or power feed, and hand indexing. We will quote reasonable prices on such machines from our latest pattern, upon application.

Can be made to cut internal gears at an extra cost.

The worm dividing wheel is made in two sections, great care being exercised as to its accuracy ; being of a large diameter and coarse pitch, presents strength and large wearing surface to each tooth.

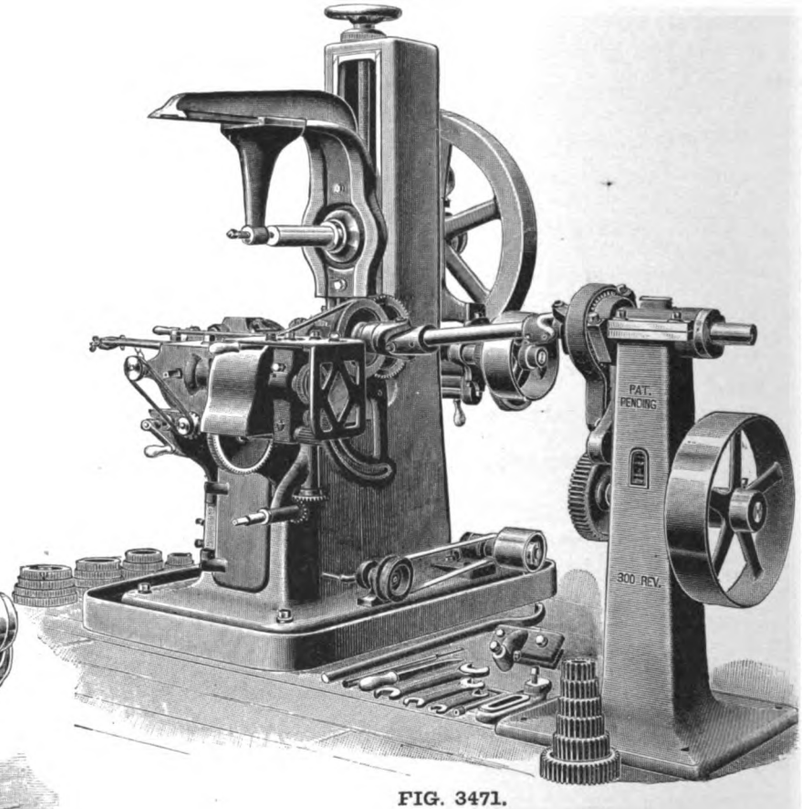


FIG. 3471.

ARRANGED FOR HOBBING WHEELS.

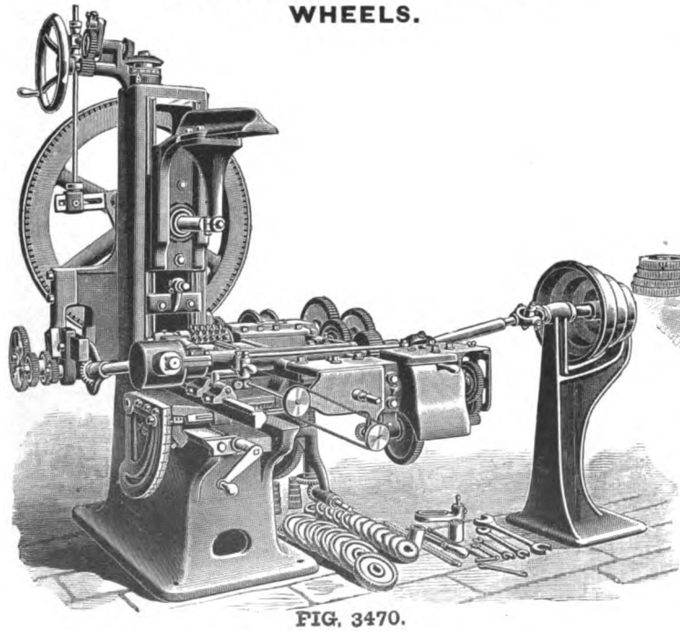


FIG. 3470.

Fig. 3471 represents oil pump and drip pan under base of the 60, 50, 36 and 30 inch machines.

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GENERAL DESCRIPTION, FIGS. 3468, 3470 AND 3471.

With it we can cut, without attention, either bevel, spur or worm gears, and after the machine has been set and started, the cost of running is almost nothing.

They have V tooth worm and worm dividing wheel.

Adjustable rim support to take the strain of cutter on large wheels.

Can withdraw the worm from dividing wheel to test large wheels before cutting them.

Have very large bearings and wearing surfaces. Mandrel barrel on 36 in. is over 4½ in. diameter.

Have an unlimited range of feed, as any combination of the 37 change gears are at the workman's command.

They carry away the chips automatically.

Dial for setting cutter to within a thousandth of an inch in depth is also provided.

They have gauge to set the cutter exactly to center of mandrel.

They have graduation for setting over for worm wheels and bevel gears.

They have graduated quadrant, adjustable, for cutting bevel gears.

They have large and quick adjustment of cutter shaft for cutting bevel gears.

They have an overhanging arm for supporting the outer end of gear blank mandrel, or for work between centers. The arm is of such a shape that the sliding center may be removed entirely to examine or test work; the latter, on being put back, and center screwed to place, is always sure to be in perfect alignment with center of gear mandrel.

They have 37 change gears, and will cut every number up to 100, all but prime numbers to 200, and a very large range of higher ones.

72 in. machine is made to cut to 9 ft. diameter, with extra dividing wheel, &c. (to order).

DESCRIPTION, FIG. 3468.

It is calculated to cut gears as coarse as 3 in. circular pitch and 18 in. face, in steel, with accuracy; work of smaller sizes and pitch can be done equally well. It is so arranged that two cutters, 1 blocking and 1 finishing, may be placed and run together.

Cutters of 7 in. diameter can be used when required.

The cutter spindle has ample bearings on either side of the cutters, equalizing all strains they may receive.

The driving mechanism is of simple construction, requiring the use of no cone pulleys to vary the speed, variation of speed being obtained by the changing of but one gear, greatly reducing the wear and tear of belts, etc.

Power is applied to feed cutter slide, at the best possible point and most direct, to withstand severe strains.

The work mandrel has a direct outward bearing, to support heavy gears while being cut.

Cuttings are removed automatically from the cutter and delivered at the base of the machine.

Great depth and solidity have been given to the main upright, base, main head and slide.

The dividing wheel and mechanism, together with all the running gears, are well proportioned, to withstand the service for which this tool is constructed, namely, the cutting of large and heavy gears, now commonly used with cast teeth.

DESCRIPTION, FIG. 3471.

This machine will cut gearing up to 50 in. diameter, either spur, bevel, miter, face, or the slide can be set off the usual way for gashing worm wheels previous to hobbing. With the above mentioned attachment, and by using a worm cutter or hob in place of a single tooth cutter, worm wheels may be cut automatically, by positive motion from the plain blank, without attention.

The ratio between the cutter arbor and gear being cut, is varied by change gears, to suit the number of teeth to be cut. There are six changes of speed to the cutter arbor, three with the cone, and three by shifting the first driving gear on the shaft to the other train of gearing, making a compact and convenient method for adjusting the speed to suit the work. The universal joint arrangement for driving the parts from the cone, on this size machine, will be found very satisfactory in permitting the cutter slide to be placed in every required position, and no adjustment necessary with the belt.

The cutter arbor is made of tool steel and of unusual large diameter, having an outward bearing support, not a center, to receive severe strains from the cutter. The cutter has a delicate lateral adjustment by means of a small rack and pinion. The sliding parts are of large proportions, with means provided for keeping them in proper alignment.

All adjustments have graduations for close adjusting. The feed for ordinary gearing is the same in principle as our regular machine. The feed, when cutting worm wheels, is automatic, feeding once at every revolution of the wheel being cut, and is regulated by shifting the collars on small rod.

WEIGHT, 4,600 LBS. PRICE, $.....

DESCRIPTION, FIG. 3469.

This machine was designed to meet a want for cutting spur and bevel gearing, of small diameters, with accuracy and dispatch, up to 22 inch.

It is capable of performing work within the range of its capacity, much quicker than could be accomplished on a larger machine.

Its manipulation is very simple, and workings are complete, very little floor space being required.

Its construction is a modification of the universal automatic gear cutters, all parts being built with the same degree of accuracy. The worm dividing-wheel is in sections, thus securing perfect accuracy.

The feed is variable instantaneously, and has very quick return to slide.

Cutter shaft has three changes of speed. Worm can be dropped from wheel for testing gears.

It has an overhanging arm not shown in cut, for supporting the outer end of mandrel, or for work "between centers."

It will cut every number up to 100, all except prime numbers to 200, and a very large range of higher ones. The column is hollow, forming a receptacle for cutters, gauges, etc.

PRICES.

	FIG. 3469.	FIG. 3471.					FIG. 3468. SPUR ONLY.
Will cut diameter, in inches	22	30	36	50	60	72	84
Face, in inches	5	8	10	11	12	16	18
Pitch, diametral	6	5	3	3	2	cir. 2½	cir. 3
Diameter of arbor to place cutters	⅞	⅞, 1 1/8	1 1/8, 1¼	1 1/8, 1¼	1 1/8, 1¼	1¼, 1½	1¼, 1½
Shipping weight, about	1,100	2,300	3,200	3,800	4,000	6,800	9,000
Boxed weight, about	1,400	2,700	3,800	4,100	5,000		
Counter pulleys	9 x 3	9 x 3	12 x 4	12 x 4	14 x 4	14 x 4	16 x 6
Revolutions for do	250	275	250	250	200	240	225
PRICES	$550	$750	$1,100	$1,200	$1,600	$2,000	
Prices arranged to cut spur gears only	$500	$650	$1,000	$1,100	$1,500	$1,800	
Extra for oil pump and pan (Fig. 3471)		$50	$50	$50	$50		
Prices for automatic rack cutting attachment		$250	$275	$300	$350	$450	
Worm hobbing attachment, worm wheel running in unison with hobbing cutters, automatic feeds	FIG. 3470.			$200	$250	$350	

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26 AND 18 INCH AUTOMATIC GEAR CUTTER.

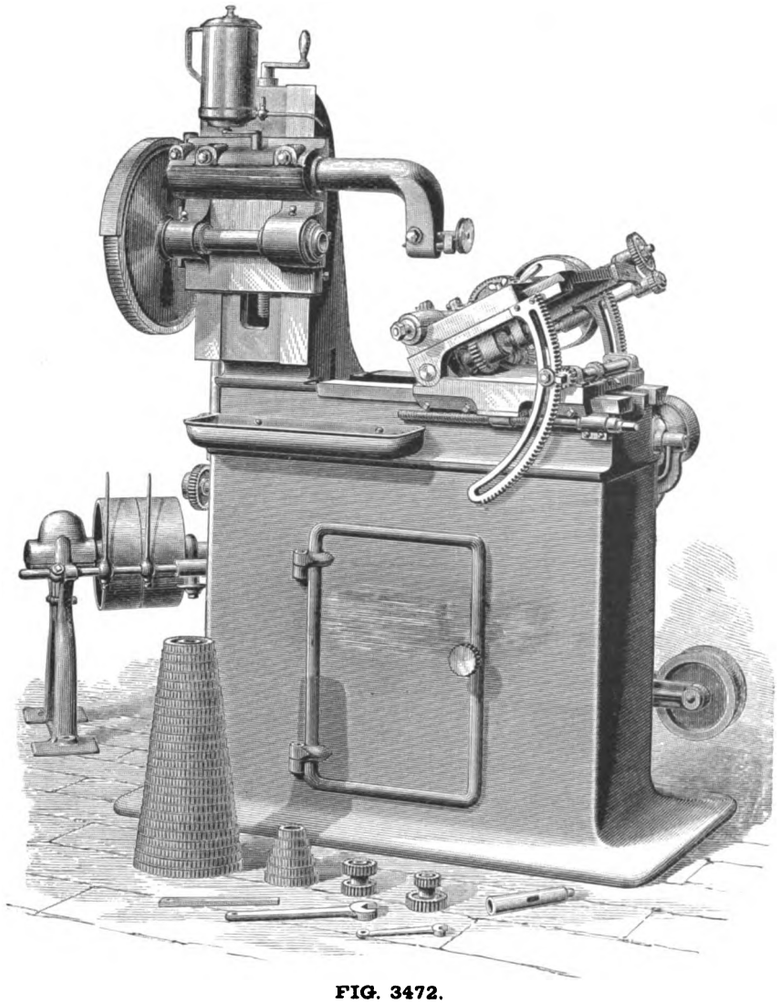


FIG. 3472.

DESCRIPTION, FIG. 3472. NO. 4 MACHINE.

This machine is arranged for cutting both bevel and spur gears of sizes not exceeding eighteen inches in diameter, four inch face, and not coarser than six diametral pitch, about half inch circular pitch. It is entirely automatic in all its motions, cutting through for each tooth, and revolving the wheel until all the teeth are cut, thus enabling the operator to attend to other work.

The indexing is done by a worm and worm wheel moved by change gears. The blank being put in place and the cutter head adjusted for length of stroke, the wheel is lowered by a screw having a dial reading to thousandths of inches, until the proper depth of cut is obtained, when the cutter passes through the blank and back by a quick return movement; the wheel is then moved the proper distance for the next tooth, and so on until finished. The cutter head is adjustable at any angle for cutting bevel wheels, the degrees being marked on a graduated arc, no other change being required. There is also provision for moving the cutter out of center each way, for cutting bevel wheels. A sufficient number of change gears accompany the machine for dividing all numbers from 12 to 50, and all even numbers to 100, also all numbers divisible by 3 to 150, and by 4 to 200.

A closet in the base of machine affords a convenient place for cutters, change gears, arbors and wrenches.

Overhead works are furnished with each machine, consisting of self-oiling hangers, pulleys, shipper stud, stops, etc. Tight and loose pulleys are 10 inches diameter, 3¼ inches face. Countershaft should run 200 revolutions per minute.

Weight of machine complete, prepared for shipment, about 2,200 lbs. Floor space, 47 x 32 inches.

PRICE, $.....

FIG. 3472. NO. 3 MACHINE.

Same as above, made to cut spur gears only, but up to 26 inch diameter and 8 inch face, not coarser than 5 pitch. **WEIGHT,..... PRICE, $.....**

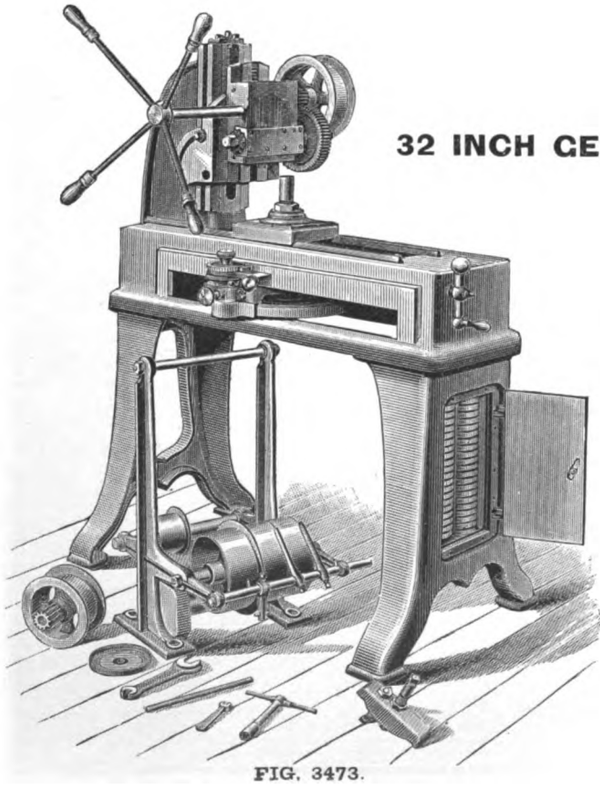


FIG. 3473.

32 INCH GEAR CUTTER, FIG. 3473.

It occupies a floor space of 24 x 48 inches, and weighs, when ready for shipment, about 900 pounds.

It will cut every number to 100, every even number to 186, and has a very wide range of higher numbers.

It is furnished with all necessary change wheels, tables of division, wrenches, etc., one blank arbor, with nut for withdrawing same, and an adjustable rim rest.

It will cut spur, bevel, and worm wheels to 32 inches diameter by 8 inch face, of 6 diametral pitch and less, in steel, iron, brass or wood, and is remarkably effective on all sizes under 15 inches.

It may be accurately set at any desired angle for bevel gears by a nicely graduated arc, and has a graduated adjustment either side of the vertical, so that it may be easily set for cutting wheels to be operated by worms of almost any pitch; also for trimming the sides of bevel gear teeth, when set over at any angle. The cutter may be adjusted to the center, or ½ inch either side, if desired.

The cutter is fed through the blank by hand, as shown, a method necessary by reason of the low price of the machine, and also one by which the largest amount of work, particularly of light work, may be accomplished.

The countershaft should make about 275 revolutions. Pulleys are 7 inch diameter by 2¾ inch face.

This machine is thoroughly well made throughout, and is a complete and very convenient machine, with all the adjustments required in modern practice, and has given excellent satisfaction wherever used.

PRICE, complete in all respects, **$275.00.**

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26 INCH GEAR CUTTER.

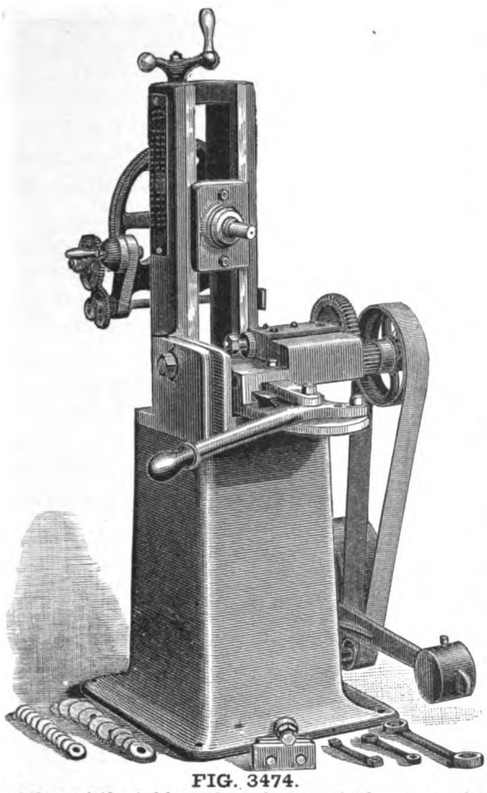


FIG. 3474.

DESCRIPTION, FIG. 3474.

Cut shows lever feed. Screw feed furnished at an extra cost of $5.00.

Machine for light work, which will cut gears from 0 to 26 inches in diameter and 6 pitch with accuracy and dispatch. It is well and substantially built.

It is furnished with an index and change wheels for cutting all numbers from 0 up to 50, and nearly every number up to 200.

Counter pulleys are 9 x 2½, and should make 95 revolutions.

Weight, about 550 lbs.

PRICE, $220.00.

DESCRIPTION, FIG. 3475.

In this machine small gear blanks up to 3 inches in diameter can be placed on arbor and cut automatically in stacks of not over 3 inch face.

The spindle is of steel, running in gun metal boxes, provided with take up, and threaded collars either side of the front bearing provide end adjustment for the cutter. The cutters should have standard ⅞ inch hole in same. The table is raised and lowered by the hand wheel and screw. The index attached to the live center and pawl are moved automatically, so that a string of blanks placed on centers, and machine started, the work will proceed until any number of teeth from 7 to 300, if wanted, are cut, and, at the completion of the last tooth, the feed stops.

In operation, a stack of blanks, as many as the arbor on which they are placed will support, not exceeding 3 inch face, however, are placed on the centers. Where a great portion of the work is to be the same kind, a special index, with the exact number of teeth to be cut, is desirable. The feed is thrown in by the lever handle shown under index, and the work passes by the cutter. At the completion of the cut the table and work are quickly returned to the first position by the weight. At the same time the index is unlocked, the pawl drops back and advances over an adjustable idler shoe, picking up the first tooth presented after leaving the shoe, and carrying it forward to its extreme travel, where the index is locked once more, and the second cut proceeds.

At the completion of the last cut the feed is thrown out automatically. One operator can run a number of these machines. They can generally be run in connection with some other tool, as they only require attention once in one to three hours, according to the work done.

PRICE OF MACHINE, COUNTER AND TWO INDEXES, $250.00.

AUTOMATIC SMALL GEAR CUTTER.

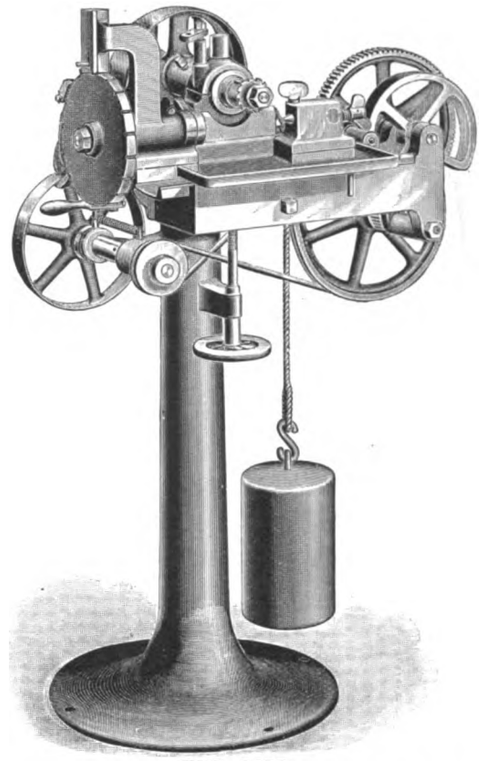


FIG. 3475.

SEMI-AUTOMATIC PINION OR GEAR CUTTER.

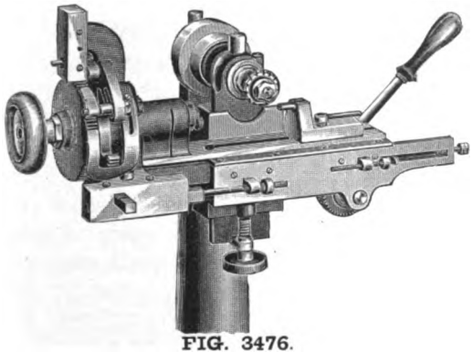


FIG. 3476.

This cut shown illustrates the head and table of pinion or gear cutter, same as Fig. 3475, adapted to cut the same up to 3 inches in diameter, and 12 pitch or finer.

The index head is fitted up with a hollow spindle. The throat of the spindle is that of a bench lathe. Spring chucks, which are quickly opened or closed by the drawing-in spindle and the hand wheel, are designed to be used to hold either the shank of pinion, if cut from the solid, or one end of the mandrel on which gear blank is placed. A slight movement of the hand wheel is sufficient to close chuck, and the opposite end of shank or mandrel can be supported by the tailstock and center shown.

The index head and tailstock are attached to a sliding table, which is traversed in a right line with the cutter arbor, by means of hand lever, pinion and rack. The index spindle is revolved by a pawl, which, by a neat mechanical device, gets its motion from a connection with, and from, the movement of the sliding table. In operation, while the table carrying the head and work is being fed by movement of the hand lever toward the cutter, the index arbor is securely locked in place, and the pawl is dropping back into position to again engage with the index. When the table has been moved forward sufficient to pass work by the cutter, the movement of the hand lever is reversed, and, as the table and work is being carried back, the index is unlocked, the pawl engages with the index at any point desired, the same being governed by the adjustable shoe or guard, which can be set so as to keep the pawl out of engagement until the proper time for the movement of index to commence. The reverse movement being continued until the table has returned to its first position, the pinion or gear blank is securely locked, and in place for the cutting of the next tooth. Thus it will be apparent that after the machine has been properly adjusted, the operator has simply to manipulate the hand lever, the indexing being done both automatically and positively. The indexing arrangements will admit of adjustment to cut seven or more teeth with a proper index gear. With the machine is one index gear with 120 teeth, and, without charge, we will furnish one other index cut as the purchaser may request. The 120 index can be utilized to cut 120, 60, 40, 30, 24, 20, 12, 10 and 8 teeth.

The spindle of the cutter head has a No. 1 Morse taper hole in the front end, to which a cutter arbor to take standard cutters, ⅞ hole, is fitted and furnished. The spindle runs in split brass boxes, and has a limited end adjustment by screw collars on each side of the front bearing.

The two speed pulley on spindle is 3½ and 2½ inch diameter, 1¼ inch face. The corresponding pulley on the countershaft is 14 and 12½ inch diameter and same face. The tight and loose pulleys are 5 inch diameter and 2¼ inch face. Driving the tight and loose pulleys 450 turns per minute will give about 2,500 turns of the cutter.

For the index head we furnish a spring chuck with hole .4 inch, unless otherwise specified. We make thirty-seven sizes of these chucks, holes in same varying by hundredths of inch, and ranging from .4 to .04. Will furnish any one size selected with the machine, and extra chucks at $2.50 each.

WEIGHT, 150 LBS. PRICE OF MACHINE, COMPLETE, $200.00.

GEAR CUTTING ATTACHMENT.

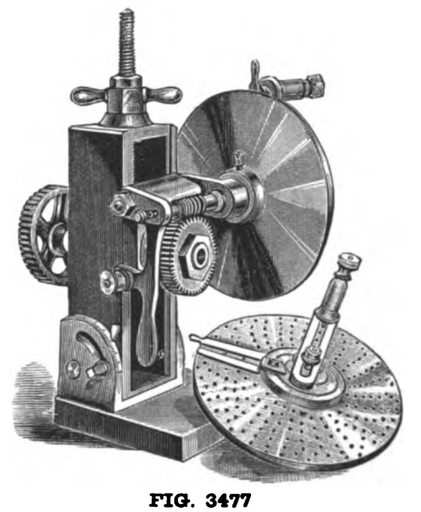


FIG. 3477

The sliding head, or carriage, is provided with a taper hole to take the spindles for carrying the blanks to be cut. The cutters are run on a mandrel between the centers, and the cross feed of the lathe for feeding the blank across the cutter while being cut. The carriage has a vertical adjustment of 4 inches, operated by a square threaded steel screw. The worm or stud is of steel, and the feed gear cast iron.

Two index plates and index card, showing one hundred and thirty-three changes, from two to three hundred and twelve teeth, furnished with each machine.

PRICE, $30.00.

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HEAVY UNIVERSAL MILLER.

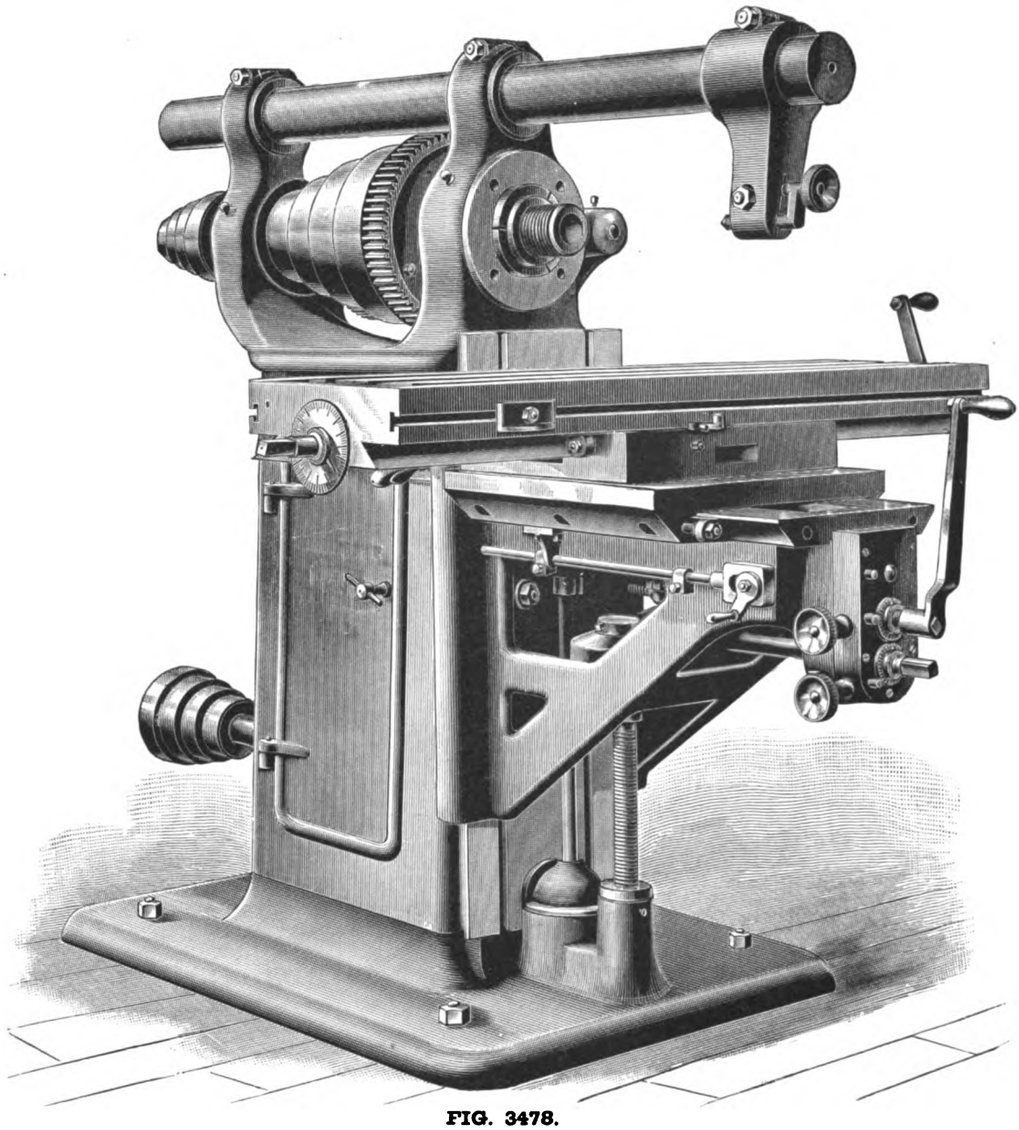


FIG. 3478.

DIMENSIONS.

Base, 49 x 36 inches. Height of spindle from the floor, 50 inches. Face of column, 14 inches wide by 40 inches long. Length of bearing of knee on face of column, 24 inches. Top slide of knee, 14 inches wide. Length of platen, 52 inches. Width of platen, 14 inches. Length of slide-bearing for table, 20 inches. Diameter of swivel base, 12½ inches. Vertical movement of knee, 19 inches. Movement of slide on knee parallel with spindle, 12 inches. Transverse movement of table, 32 inches. Changes of speed, 8. Changes of feed, 4.

WEIGHT, 5,000 LBS. **PRICE, $.....**

This machine is designed for boring, drilling, facing, turning, milling, profiling, key-seating, splining, rack cutting, gear cutting with the vertical attachment up to five (5) feet in diameter. It is specially designed for use in railroad shops, and for builders of locomotives, portable and stationary engines. In repairs to locomotives, where duplication of wearing parts is so frequent, it is particularly valuable on account of its great capacity.

The gearing is made either internal or external, as desired; the internal is 4 to 1 and external 8 to 1. It is driven by a 3½ inch belt on a 4 step cone, of which the largest diameter is 13 inches.

The spindle is of steel, and runs in bronze boxes. The front bearing is 3½ inches in diameter by 6 inches long; back bearing, 2 9/16 inches diameter by 5 inches long, and provided with easy means of adjustment for wear. The bronze boxes have an adjustment by which the original centers are always retained without altering their position laterally.

The cutter arbor supporting bar, with its adjustable center, can be moved out to support cutter arbors 26 inches from the end of the spindle or pushed back out of the way, thus facilitating the milling or boring of a large piece of work, that would be prevented by the ordinary fixed bar. It is 4¼ inches diameter and of solid cast steel, making a very rigid support.

The three feeds, vertical, horizontal in line with spindle and transverse at right angles to spindles, are all reversible, and are operated or stopped altogether by the handles shown in the cut near the cupboard. This reversing device is common to engine lathes, does away with the crossing of belts, and saves time. The 4 step cone on the spindle belts to the lower cone, the shaft of which runs in a hollow stud and drives, by means of the reversing device referred to above, a shaft running through the base of the column. Bevel gears connect this shaft with the vertical shaft, and the latter by bevel gears with the horizontal shaft in the knee, which communicates in turn with the several screws for the various feeds in the front of the knee by clutch gears. These clutch gears can be engaged or disengaged at will by the knurled knobs shown in front, giving a vertical or horizontal feed. The platen feed is operated from the upper shaft in the knee, by means of a pair of miter wheels running in a bearing which is a part of the platen slide on the knee. A vertical stud passes upward to the long screw in the platen, and is connected to it by clutch miter wheels. The screw in the platen is splined and can be engaged and disengaged by a clutch lever, convenient to the operator. In addition, there is an automatic stop for the horizontal feed. These stops can be set at any point.

The platen has three slots for ¾ inch bolts on the top, and on the edges two slots. The latter are very useful and convenient. It can be turned completely around and fed in line with the spindle. It has an automatic stop, while feeding in either direction, and is secured by four ⅞ inch bolts in the swivel base, of easy access with a wrench.

The knee has a bearing 24 inches long and 14 inches wide. In addition, there are two slots, running the whole length of the column, for ⅞ inch bolts.

All gears and screws are of steel, while the bevel gears are cut theoretically correct. The dials read in decimals, or divided by 2, 4, 8, etc., enabling any measurement to be made. Countershaft has friction pulleys, 14 inches diameter and 4½ inches face. Speed of countershaft, from 90 to 120 revolutions per minute, using cross and open belt.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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NO. 1 UNIVERSAL MILLER.

This machine has all the good points of our heavy universal miller. It will make a valuable shop machine, and desirable also for tool room purposes on delicate and accurate work. It is designed for boring, drilling, facing, milling, profiling, key-seating, cotter drilling, rack cutting any length, gear cutting, etc., etc.

The gearing is made either internal or external, as desired; the internal is 4 to 1 and external 8 to 1. It is driven by a 3 inch belt on a 4 step cone, the largest diameter of which is 11 inches.

The spindle is of extra quality hammered cast steel, and runs in bronze boxes. The front bearing is 3 inches in diameter and 4½ inches long; back bearing, 2 inches diameter and 4 inches long, and provided with easy means of adjustment for wear.

The bronze boxes have an adjustment by which the original centers are always retained without altering their position laterally.

The cutter arbor supporting bar, with its adjustable center, can be moved out to support cutter arbors from the end of the spindle, or pushed back out of the way, thus facilitating the milling or boring of a large piece of work, that would be prevented by the ordinary fixed bar. It is 3¾ inches diameter, and of solid cast steel, making a very rigid support.

The three feeds, vertical, horizontal in line with spindle, and traverse at right angles to spindle, are all reversible, and are operated or stopped altogether by the handle shown in the cut near the cupboard board. This reversing device is common to engine lathes, does away with the crossing of belts, and saves time. The 3 step cone on the spindle belts to the lower cone, the shaft of which runs in a hollow stud and drives, by means of the reversing device referred to above, a shaft running through the base of the column. Bevel gears connect this shaft with the vertical shaft, and the latter by bevel gears with the horizontal shaft in the knee, which communicates in turn with the several screws for the various feeds in the front of the knee by clutch gears. These clutch gears can be engaged or disengaged at will by the knurled knobs shown in front, giving a vertical or horizontal feed. The platen feed is operated from the upper shaft in the knee by means of a pair of miter wheels running in a bearing which is a part of the platen slide on the knee. A vertical stud passes upward to the long screw in the platen, and is connected to it by clutch miter wheels. The screw in the platen is splined, and can be engaged and disengaged by a clutch lever, shown in the cut, convenient to the operator.

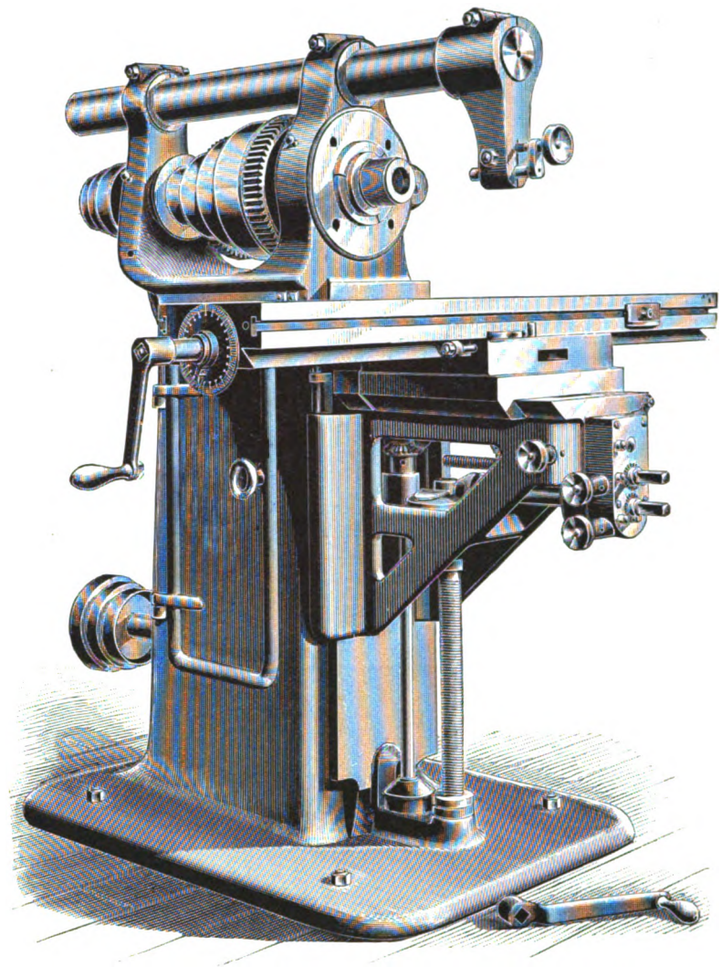


FIG. 3479.

DIMENSIONS.

Base, 40 x 30 inches.
Height of spindle from the floor, 48 inches.
Face of column, 10½ inches wide by 36½ inches long.
Length of bearing of knee on face of column, 17 inches.
Top slide of knee, 10½ inches wide.
Length of platen, 48 inches.
Width of platen, 9¼ inches.
Length of slide-bearing for table, 20 inches.
Diameter of swivel base, 11 inches.
Vertical movement of knee, 21 inches.
Movement of slide on knee parallel with spindle, 7¾ inches.
Transverse movement of table, 33¼ inches.
Changes of speed, 8.
Changes of feed, 3.

WEIGHT, 2,800 LBS. **PRICE, $.....**

Has a bearing 17 inches long and 10½ inches wide.

All gears and screws are of steel, and are accurately cut. The dials read in decimals, or divided by 2, 4, 8, etc., enabling any measurement to be made.

Countershaft has friction pulleys, 14 inches diameter and 4 inches face. Speed of countershaft, from 120 to 140 revolutions per minute, using cross and open belt.

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MILLING MACHINE ATTACHMENTS.

8 INCH PLAIN VISE.

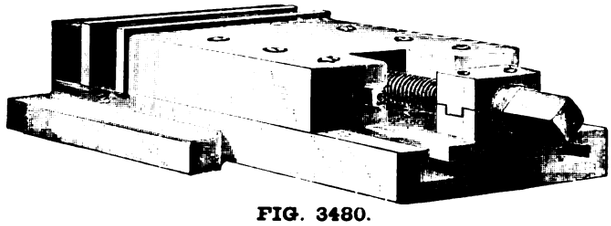


FIG. 3480.

It is made low so as not to raise the work high above the platen. The steel jaws are 8 inches long, 2 inches deep, and open 5 inches. A projecting rim around the base allows clamps to be placed on it to securely hold it in the position desired.

PRICE, $40.00.

CHUCK FOR SQUARING UP BRASS BOXES ON A MILLING MACHINE OR BUTT.

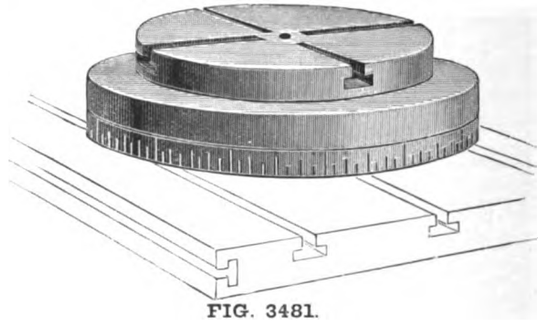


FIG. 3481.

Mill is placed into the spindle of the milling machine, and each part of the box can be finished with one clamping. By loosening the clamps that hold the top plate, it can be shifted to any angle desired, quickly clamped again, and the work on another surface proceeded with. **PRICE, $20.00.**

UNIVERSAL VISE CHUCK.

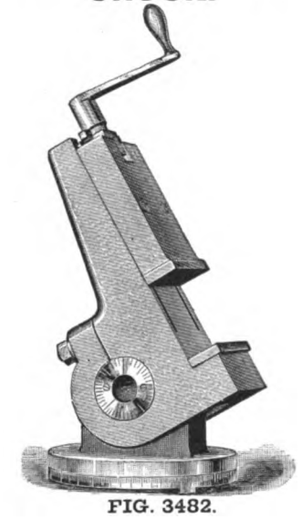


FIG. 3482.

For milling machines, planers, shapers, drill presses, etc. Complete in every particular. Trunnion and base graduated, admitting of great range of positions, and for registering same. Steel jaws. Will stand hard usage.

PRICES.

5 inch	$40.00
7 "	65.00
8 "	75.00

VERTICAL OR ANGULAR ATTACHMENT.

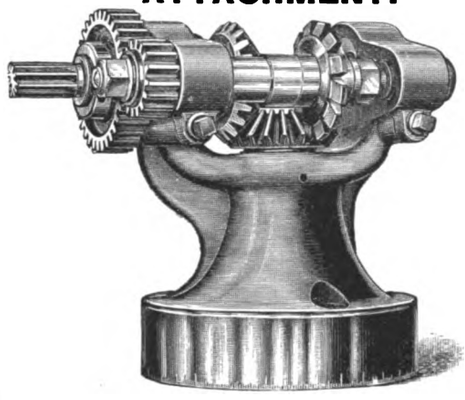


FIG. 3483.

Adapted to the cutting of racks, spur and bevel gears, profiling or angular milling, boring and drilling at right angles to the main spindle of our milling machine, cutting up square stock by saws, milling of slots, links of locomotives, arcs of circles, dies for sheet metal, square pieces on edge, etc.

This attachment furnished with each universal milling machine without charge.

See Figs. 3478 and 3479.

UNIVERSAL INDEX HEAD.

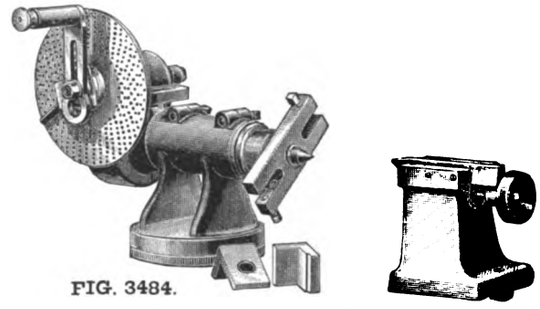


FIG. 3484.

A greater range of positions is obtained with this index head than with any other head now in use. It has a circular base, with a graduated plate with a tongue fitted to slot in milling machine platen. The bottom plate is divided into 360 divisions, a feature that will be appreciated. The spindle is of steel, 3 inch diameter, threaded to receive a chuck plate; it has a taper reamed hole through it from 2 to 1½ inches at small end. This taper is the same as our heavy milling machine cutter arbors. The worm and worm wheel are accurately made and compensating for wear. For cutting spirals the worm gets its motion from a pair of spiral gears instead of miter or bevel gears; they are enclosed to exclude the chips and dirt; the index wheel is also completely covered for the same purpose. Spirals, either right or left, can be cut. Bevel gears and bevel cutters can be cut on this head with our vertical and angular attachment. Ordinary spirals, as mills and drills, can be cut with this attachment.

The cutter is always the same height from platen in cutting angular work.

A back center accompanies each head.

PRICE, WITH SWIVEL BASE, $

LINK MILLER AND SLOTTER.

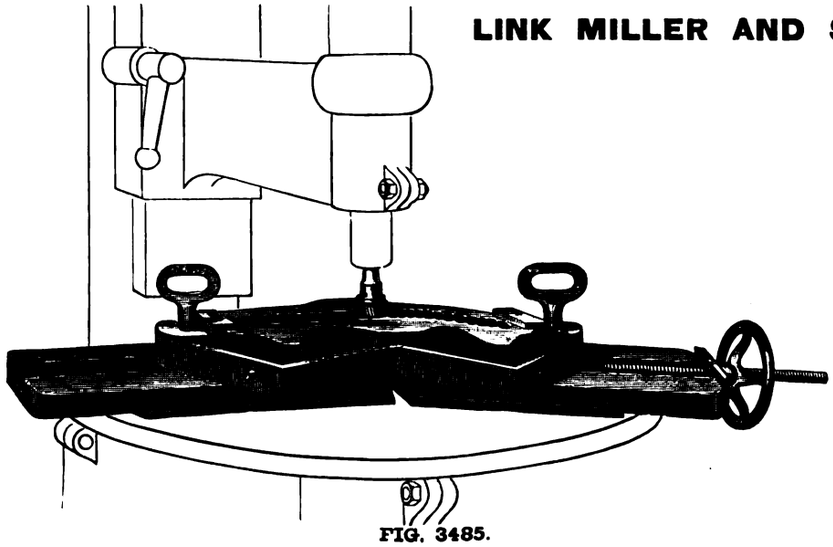


FIG. 3485.

DESCRIPTION, FIG. 3485.

For rapidly and accurately milling out links to any desired radius. Can be used on drill press or as an attachment to our heavy universal milling machine. A link 20 inches long can be finished in four hours.

PRICE, $200.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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MILLING MACHINE ATTACHMENTS.

UNIVERSAL INDEX HEAD FOR SPIRAL MILLING, DIVIDING, ETC.

FOR USE WITH FIGS. 3478 AND 3479.

It is made heavy and strong, so that quite large work can be done with it. It is graduated on the edge and will raise any angle from in line with platen to a vertical position and register same. The worm-wheel has forty teeth, cut three per inch, with an adjustment for wear and protected from chips and dirt; two dial plates are furnished, 8⅝ inches diameter, allowing a greater number of holes to make the divisions and making them very plain. A sector, nicely fitted, when set properly, avoids all counting and makes mistakes less liable. The crank that carries the index pin is long, giving good bearing for it. The hub of same is so arranged that the pin enters the dividing holes exactly the same under all conditions. When set in a horizontal position it will take a piece 12 inches diameter. A tail center or back bearing is furnished that has an adjusting center of sufficient throw for taper work and for all adjustments necessary; eleven gears with bearings and fixtures accompany it.

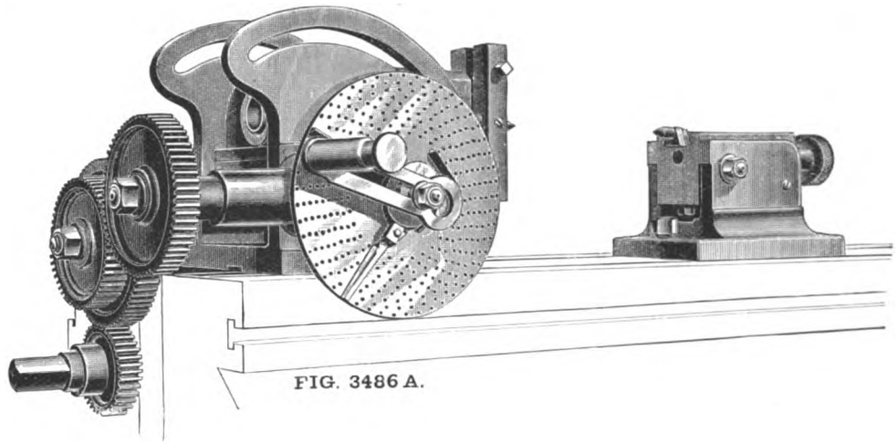


FIG. 3486 A.

PRICES, HEAVY, $300.00; NO. 1, $250.00.

We make also a plain dividing head by leaving off the gearing and substituting a different bearing for worm shaft.

CIRCULAR ATTACHMENT FOR MILLING MACHINES.

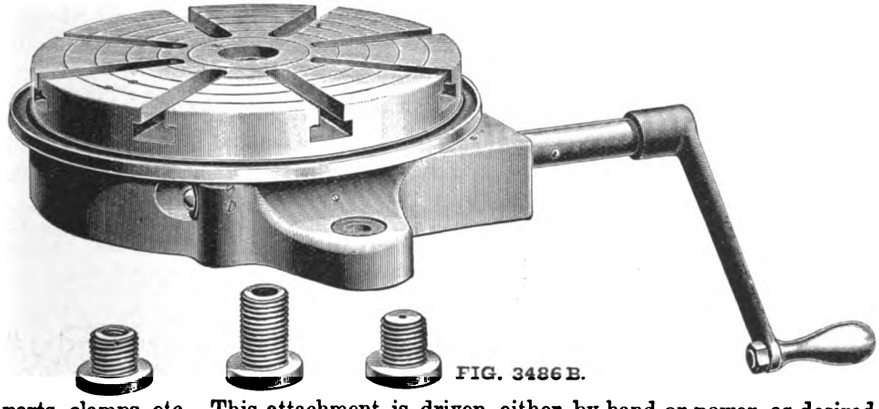


FIG. 3486 B.

This attachment is used on milling machines, Figs. 3478 and 3479, having the vertical and angular attachment, and is an excellent tool for rounding bosses, concave and convex surfaces, profiling and a great variety of work.

It consists of a base plate that bolts on the platen of the miller and contains a shaft with a worm on it, engaging into a large spiral gear that is fastened to the top plate, securely enclosed against accident, dirt or chips. The top plate has eight radial T-slots for ⅝ inch bolts and is counterbored and threaded to receive studs, arbors, or any kind of centering device suitable for securing or centering the work; two bushings are also provided, being threaded to receive smaller studs, arbors, etc. When plate requires to be flat on top a plug is furnished for that purpose. The T-slots are for bolting on parts, clamps, etc. This attachment is driven either by hand or power, as desired. For a great variety of work the hand feed is most convenient, as it is easily placed on or off the machine. Around the edge of circular plate there is an oil pan for collecting oil or water; this also protects the joint from dirt. When this attachment is to be used by power it should be ordered with milling machine, as a different arrangement of platen screw is required and should be fitted and suitable gears provided, when the feed gearing of the miller will give a continuous rotary feed to it. Diameter of top plate, 14 inches; height above platen, 4¼ inches. **PRICE, $150.00.**

VERTICAL INDEX HEAD.

FOR CUTTING LARGE GEARS AND OTHER DIVIDING.

DESCRIPTION, FIG. 3486 C.

This consists of a heavy based tongue to fit the T-slots of milling machine platen, carrying a vertical spindle with taper hole for arbors to support the work. At the base is an eighty tooth worm wheel and worm for dividing. Each head is furnished with spacer, two drilled index plates, slotted crank, and a support to set under the rim of the gear to resist the cutting. This head is very valuable for cutting gears or work over 20 inches diameter. When in operation the vertical feed is used, the support being placed under the rim and nearly over the center of the knee. **PRICE, $175.00.**

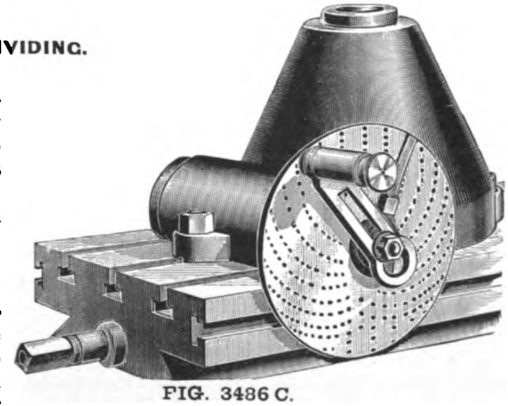


FIG. 3486 C.

UNIVERSAL HEAD AND SIDE CENTER TAIL STOCK.

DESCRIPTION, FIG. 3486 D, FOR USE WITH TOOLS ILLUSTRATED ON PAGE 183.A.

The cut represents a 10 inch universal head and side center tail stock. The head swings 10 inches and can be depressed 20 degrees below a horizontal line and 5 degrees beyond a vertical. The spacing worm gear is made in halves, and can be adjusted for wear from without. The spindle will allow pieces $1\frac{1}{16}$ inches diameter to pass clear through, and the hole is tapered to fit the same arbors used on our milling machines. The end of spindle is threaded to receive a chuck. Three index dials accompany the head, giving all the divisions usually required in an every-day machine-shop practice. The features of the head are its rigidity and the ease of access to all parts requiring adjustment. The foot stock has a new and valuable feature in the placing of the center so that shank or end milling cutters can be used as close to the inner side of the center as to the top. This feature dispenses largely with the use of extremely small diameter cutters, and increases the quantity and improves the quality of work that can be produced on a milling machine. Weight of head and foot stock, 85 lbs.

PRICE, $100.00.

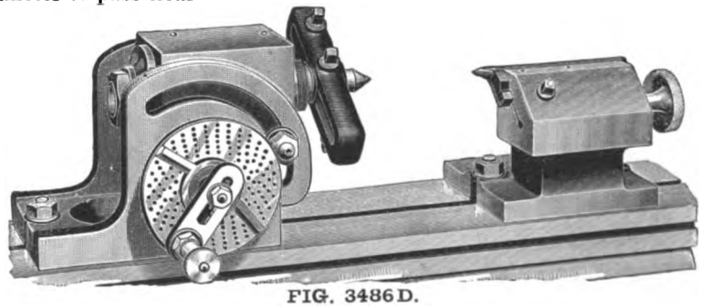


FIG. 3486 D.

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UNIVERSAL MILLING MACHINES.

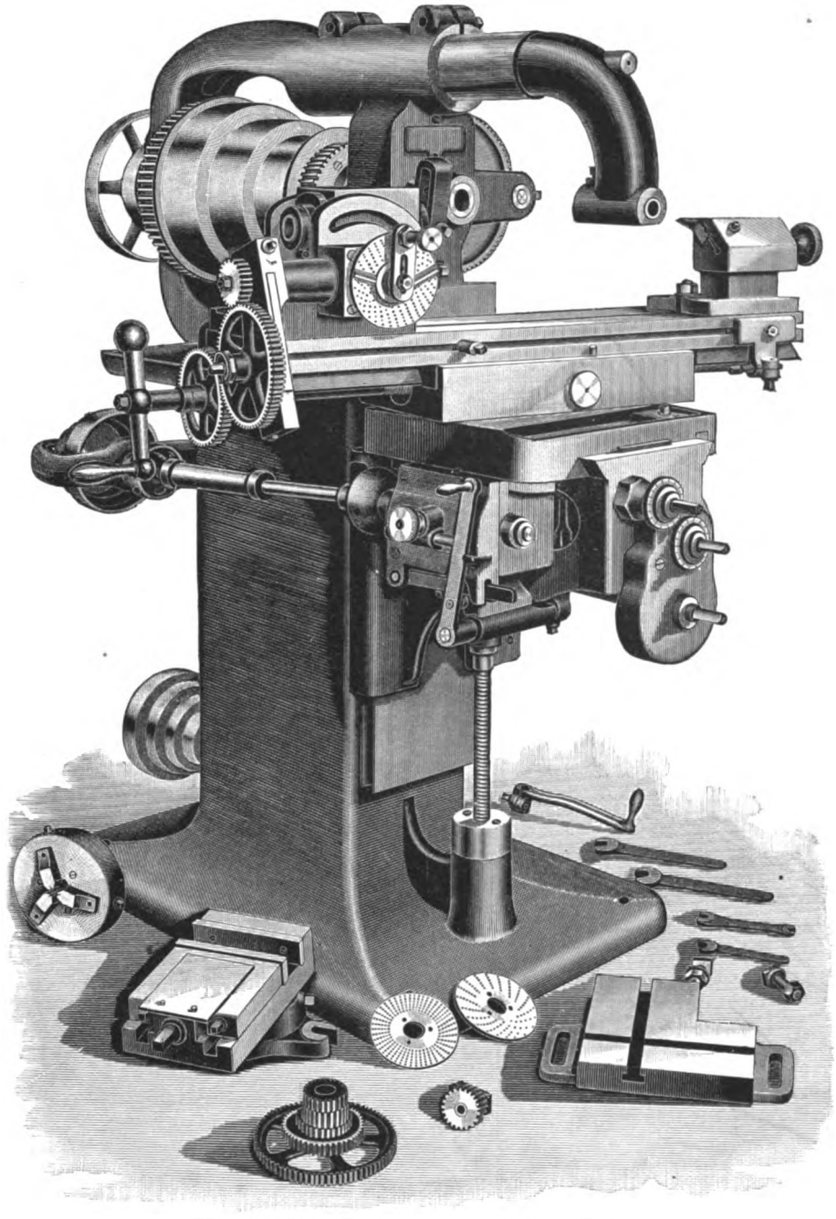


FIG. 3486 E. Table as now made has 3 T slots.

This miller was designed to meet the most exacting requirements of tool work and modern machine shop practice. It has all the features of the best class of these machines and some important additional ones.

The table can be swiveled to any angle and has power feed and automatic trip in every position.

The feed has six changes and can be reversed by a knob, without reversing the motion of the spindle, and is tripped automatically or by hand, under full cut, as easily as when the table is running empty. A full range of spirals, right and left hand, can be cut from one turn in 1 inch to one turn in 100 inches, by both simple and compound gearing. The range of simple geared spirals is amply sufficient, and the gears are as readily changed as on an ordinary screw cutting lathe.

The spindle is of forged steel, hollow its entire length, and the front end threaded, and hole tapered, so that arbors and chucks, fitting spiral head, will interchange with main spindle.

The spiral head is very compact and rigid, and the head can be depressed 20 degrees below a horizontal, and 5 degrees beyond a vertical line. See Fig. 3486 D.

The spindle of the head is hollow, allowing pieces $1_{1}^{1}{}_{6}$ inches in diameter to pass clear through.

The cone pulley has its smallest step toward the front, which permits the top of the column to slope upward toward the front spindle bearing, bracing it and securing rigidity. The two spindle bearings are tied together by an arch at the top, which also supports the overhanging arm. A bearing 12 inches long is bored in the arch, slotted at the top and provided with two clamping screws. The arm can be quickly inserted, clamped fast, and as quickly removed.

The spindle boxes are of bronze, made in halves. They are cylindrical in form, with a deep rib running around the middle, faced square with the turned surface, and forced into a groove cut into the column and box cap. The outside of the box is finished entirely in the lathe, which makes its reproduction, when worn out, a simple matter.

There is a fast and slow elevation to the knee, and both this and the cross motion are indexed and read in thousandths of an inch.

The foot stock of centers has a new and valuable feature in the placing of the center, so that shank or end milling cutters can be used as close to the inner side of center as to the top. This feature dispenses largely with the use of extremely small diameter cutters, and increases the quantity and improves the quality of work that can be produced on a milling machine.

Adjustment to take up wear is provided wherever lost motion would affect the accuracy of the machine.

A double friction countershaft of improved construction, requiring only one adjustment to tighten its grip, together with everything shown in cut, is furnished with each machine.

Countershaft has 12 inch pulleys for 3½ inch belt and should run 160 revolutions per minute.

DIMENSIONS.

Cone pulley, largest step	11 inches.	Length of power feed	24 inches.
Width of belt	3 "	Length of table	36 "
Vertical adjustment	15 "	Width of table	8 "
In and out adjustment	6 "	Swing of centers	10¼ "

Length between centers ..... 16 inches.

WEIGHT, COMPLETE, 2,300 LBS. PRICE, $575.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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UNIVERSAL MILLING AND BORING MACHINE.

FOR BORING.

The main spindles are of steel, telescoping. Outside spindle, 3 inches diameter, and inside, 2¼ inches diameter, with 1 inch hole through entire length. The inner or boring spindle is reamed for No. 5 Morse socket, has a power feed 13 inches in both directions, and its thrust, directly from the back, is operated by a screw attached to it by a new interlocking device. Feed is taken from a worm on main spindle, and is geared to feed shaft for hand or power feed. This feed shaft on its front end has an 11 inch hand wheel, giving a quick return. From there it extends to the end of main spindles, where it is geared to the feed screw by a sensitive friction gear, so that the power feed can be set to regulate the thrust automatically. The main spindle has a two step cone, and gives eight spindle speeds.

The overhead arm of this machine, 5½ inches diameter, having 24 inch endwise adjustment, being 12 inches in the clear above center of spindles, supports our patent detachable drill jig pendant. The platen has a 24 inch adjustment, graduated to .001 of an inch, and has deep grooved T slots open at either end, with circular T slot and attachment seat in center. This platen can be turned at any angle or all the way around, and fastened where desired. The knee has an adjustment of 18 inches up and down, graduated to .001 inch, and the saddle upon the knee has an adjustment of 2 inches to and from the column, graduated to .001 inch.

Large work is attached to the platen by bolts. Smaller pieces are held on the elevated table by screw clamps or bolts. Pieces on arbors or centered are held between the centers. The vise clamps small pieces, and work requiring precise angular relations between holes is set on the center angle table. These attachments can all be fastened to the platen, and have all its adjustments and movements in addition to their own.

After a hole is bored and before it is moved, it may be tapped or reamed by hand in exact line, using the tapping bar through the hollow spindles, the bar being operated by tap wrench from the back end.

Cylinders, 13 inches long and 10 inches diameter, are bored perfectly true. Cylinders, 25 inches long, can be bored by adding the traverse adjustment of saddle to the 13 inch feed of boring spindle.

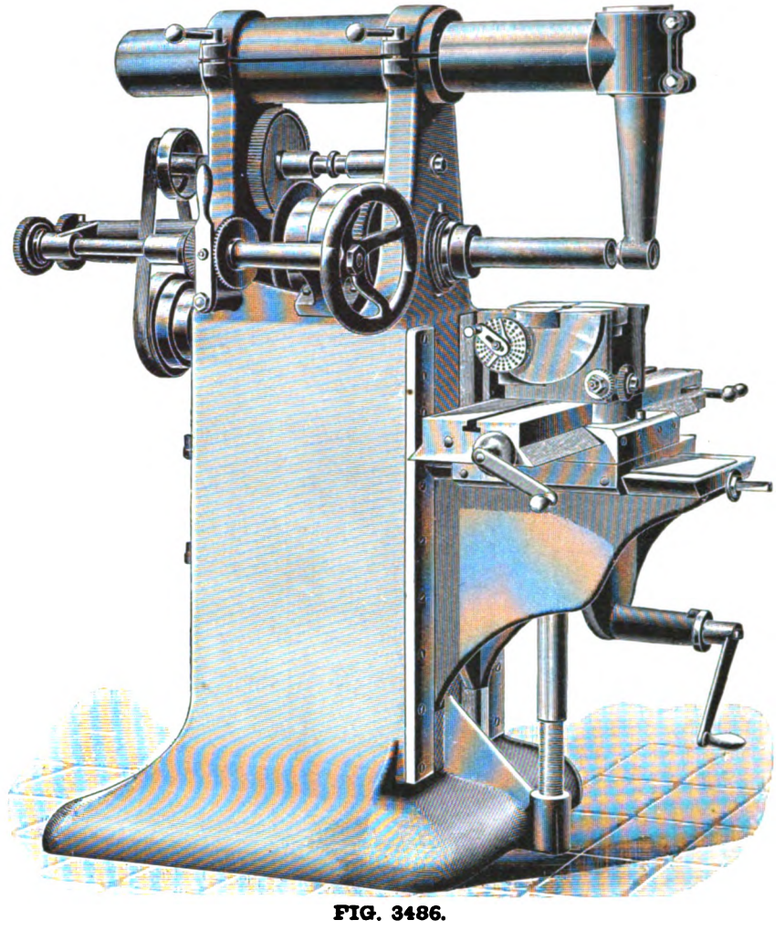


FIG. 3486.

FOR MILLING.

The main spindle, 3 inches in diameter, running in hardened and ground front bearings, does all the milling independent of the telescoping spindle, which does all the boring and drilling. Milling arbors and chucks screw on to the main spindle. Arbors may be of any length to 24 inches. We furnish one 20¼ inches, and an end mill chuck similarly attached. The outboard end of this arbor is supported within the pendant guide. Gangs of cutters, and shape mills of any practical sizes, are placed on this arbor wherever needed.

The milling feed is particularly strong and fast. It is driven from the overhead gears. These gears are mounted on the milling feed shaft, and slide into position endwise upon feathered keys. Either of them may be engaged with the spindle gears or not. Feed shaft pulley is belted to feed cones, and these are connected to platen by a pair of 70° universal joints. This feed cuts much faster per revolution of large mills than smaller mills with fewer teeth. There are 16 changes of milling feed. The platen is fed by power 24 inches, and operates at angle adjustments as well as the usual cross position. The elevating, cross and traverse adjustments are respectively 18 inches, 24 inches and 12 inches.

The circular milling attachment adds new and large capacity to this machine.

The dividing head and centers space gears and produce spirals to a great many divisions and lengths. This head is combined with the center angle table, and places work for operation in accurate angular relations to milling cutters with the same facility as to the boring tools.

T slots and key seats to 24 inches long may be made in large or small pieces of any length. Gear blanks, etc., are milled on each side and on the periphery, two at a time, and hand wheels are milled to shape and between the spokes true to the holes. Gears, spur, bevel, spiral, skew and worm, of sizes to 22 inches, are correctly cut.

With this machine is furnished our center angle table and circular milling attachment, and the following:

A 3⅜ x 6 inch vise on a heavy graduated base, 5 inches high, with center pivot; an elevated table, 10 x 14 inches, with three bolt grooves and a graduated base; one milling arbor, 1¼ x 20 inches, fitted to main spindle, with back center for pendant guide; one shank mill chuck, 5¼ inches long, fitted to main spindle; one set of Morse sockets, No. 1, No. 2, No. 3, No. 4; one 1 inch tapping bar; patent countershaft. Weight, lbs.

PRICE, $.....

CIRCULAR MILLING ATTACHMENT.

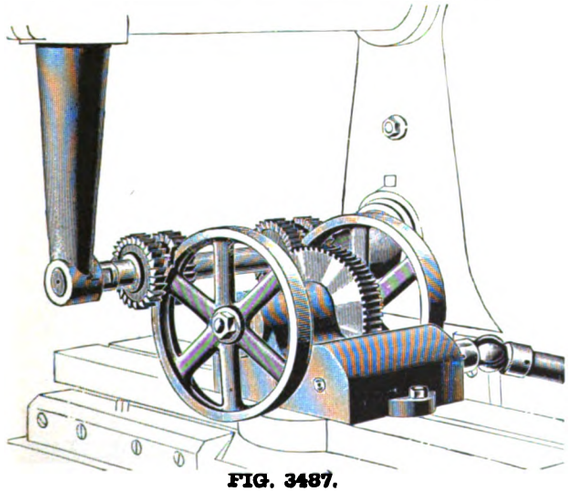


FIG. 3487.

CENTER ANGLE TABLE AND DIVIDING HEAD.

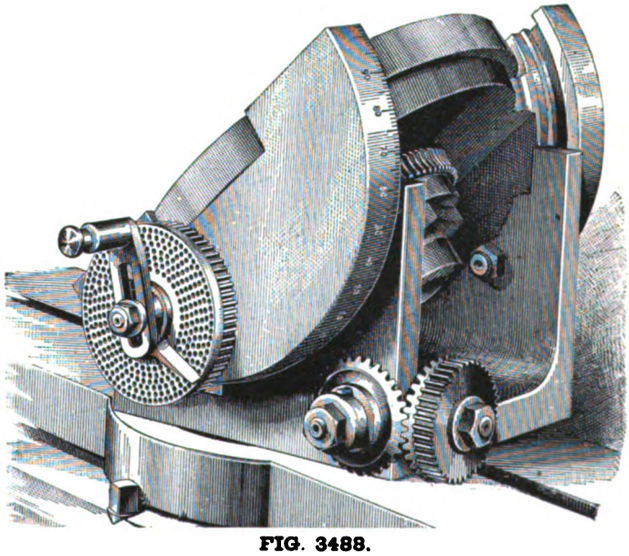


FIG. 3488.

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NO. 4 UNIVERSAL MILLING MACHINE.

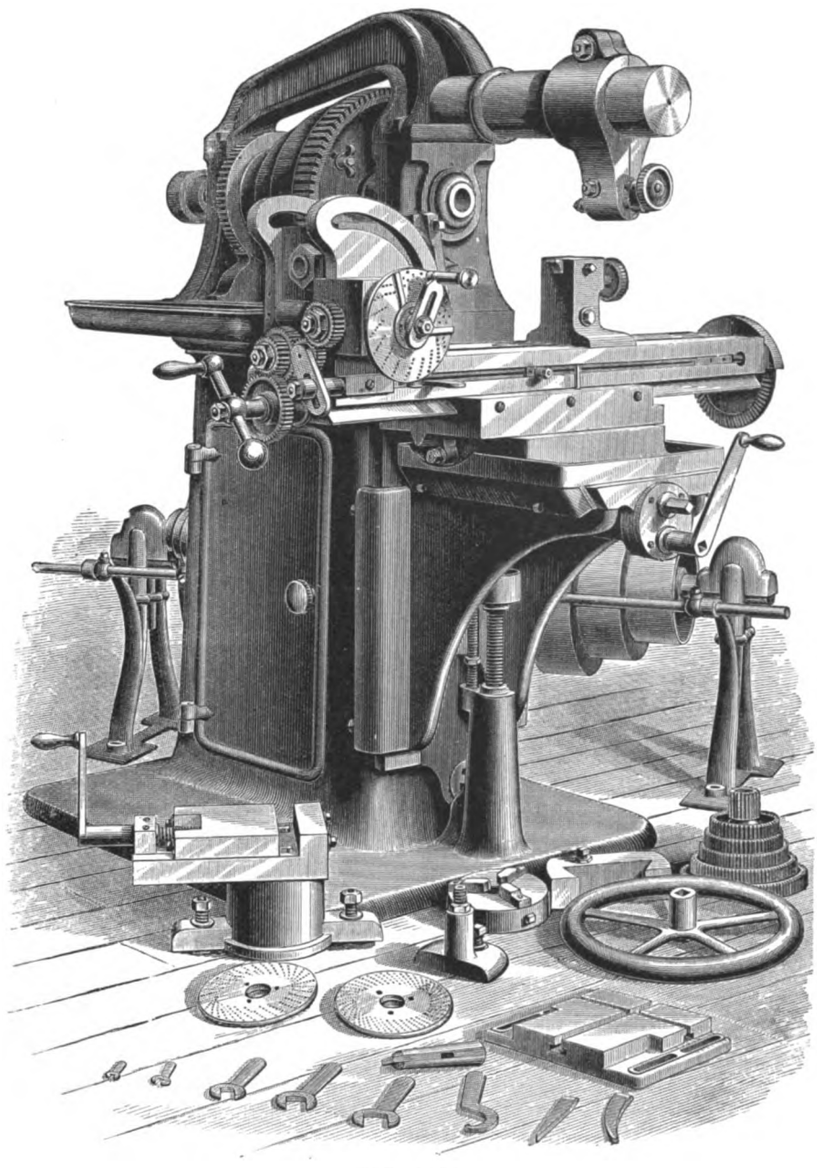


FIG. 3489.

The Universal has all the movements of a plain machine, and, in addition, the table is fed automatically at an angle to the axis of the spindle, and the spiral head is so made and connected with the feed screw that a positive rotary movement may be given to the work.

The wear of the main spindle is taken up by a longitudinal movement, and the end thrust is taken by a collar. The bearings are ground, and the front box is hardened and ground.

The arm, with its adjustable center, affords support for the outer end of arbors up to 15 inches in length. Cutters up to 8 inches diameter can be used. When not required, the arm can be removed.

The cone has three steps for a $3\frac{1}{2}$ inch belt, and, as it is geared, the machine has six changes of speed. There are the same number of changes of feed.

The knee can be moved vertically 17 inches, and the saddle holding the spiral bed can be moved $6\frac{3}{8}$ inches in a direction parallel with the axis of the main spindle.

The table is 40 inches long and 7 inches wide, and has an automatic feed of 22 inches. It can be lowered to a distance of 17 inches from the center of the spindle and set at angles up to 44 degrees each way from the axis of the spindle.

A series of graduations shows, in degrees, the angle to the axis of the spindle at which the table is fed, and index dials show the vertical and horizontal movements of the knee in thousandths of an inch.

The spiral head has indexing mechanism by which the periphery of a piece of work may be divided into equal parts, and the velocity of the rotary movement of its spindle, or of the work, relative to the speed of the feed screw, is regulated by change gears at the end of the bed. The spindle may be set at any angle from 5 degrees below the horizontal to the perpendicular, and may be moved through any required portion of a revolution or rotated continuously. By the use of the raising block, the spiral head may be set at any angle on the bed. A taper hole, $1\frac{1}{4}$ inches diameter at the small end, extends through the spindle, and is fitted to receive the collets and arbors that are used in the main spindle. The front end of the spindle is threaded to receive a chuck. A piece, $11\frac{1}{4}$ inches diameter and $22\frac{3}{4}$ inches in length, can be swung between the spiral head and the foot stock. These centers can be lowered to a distance of 11 inches from the main spindle center.

Each machine is furnished with tables of pitches and angles of spirals, a set of change gears and index plates, a vise, a 9 inch three jawed chuck, stops, raising block, hand wheel, collet, wrenches, and complete overhead works.

The vise has jaws $6\frac{1}{8}$ inches wide, $1\frac{7}{16}$ inches deep, and will open $3\frac{3}{8}$ inches. The base is round, and can be clamped upon the bed at any angle.

The overhead works have two friction pulleys, 16 inches diameter, for 4 inch belt, and hangers with self-oiling and adjustable boxes. The countershaft is usually run at about 105 turns per minute.

The total weight is about 3,800 lbs. Price includes all shown in cut. **PRICE, $** .....

TOOLS FOR USE ON THE NO. 3 UNIVERSAL MILLING MACHINE.

$\frac{1}{2}$ inch screw arbor.
1 " " "
1 " milling "
Fly cutter " with tool.
Collet and key for small end mills.
End mill, $\frac{3}{8}$ inch diameter.
" " $\frac{9}{16}$ " "
" " $\frac{7}{8}$ " "
" " $1\frac{1}{4}$ " "

Face mill, 4 inches diameter, 1 inch face, 1 inch hole.
Milling cutter, $1\frac{11}{16}$ inches diameter, $\frac{3}{16}$ inch face, $\frac{1}{2}$ inch hole.
Milling cutter, $2\frac{1}{2}$ inches diameter, 3 inch face, 1 inch hole.
Milling cutter, $2\frac{3}{4}$ inches diameter, 1 inch hole, for milling teeth of spiral mills, 40° and 12°.

One pair straddle milling cutters, 4 inches diameter, $\frac{5}{8}$ inch face, 1 in. hole.
Metal slitting saw, 3 inches diameter, $\frac{1}{16}$ inch face, 1 inch hole.
60° angular cutter, $1\frac{5}{8}$ inches diameter, $\frac{1}{2}$ inch hole, right hand.
60° angular cutter, $1\frac{5}{8}$ inches diameter, $\frac{1}{2}$ inch hole, left hand.
60° angular cutter, $2\frac{3}{4}$ inches diameter, 1 inch hole, right hand.

PRICE, $56.00.

The tools named in this list we have found by experience to be among those first needed in using the machine, and can only be sold at the price stated in full sets. Should they not be wanted, please pack them carefully, and return the box, per express, at our expense.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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NO. 1 UNIVERSAL MILLING MACHINE.

The Universal has all the movements of a plain machine, and, in addition, the table is fed automatically at an angle to the axis of the spindle, and the spiral head is so made and connected with the feed screw that a positive rotary movement may be given to the work.

The wear of the main spindle is taken up by longitudinal movement, and the end thrust is taken by a collar. The front box is hardened and ground.

The cone has four steps for a 3 inch belt.

The knee can be moved vertically 15 inches, and the saddle holding the spiral bed can be moved 6 inches in a direction parallel with the axis of the main spindle.

The table is 28 inches long and 5 inches wide, and has an automatic feed of 17 inches.

A series of graduations shows, in degrees, the angle to the axis of the spindle at which the table is fed, and index dials show the vertical and horizontal movements of the knee in thousandths of an inch.

The spiral head has indexing mechanism by which the periphery of a piece of work may be divided into equal parts, and the velocity of the rotary movement of its spindle, or of the work, relative to the speed of the feed screw, is regulated by change gears at the end of the bed. Any spiral of the 68 provided for may be cut without interfering with the divisions obtainable from the index plate. The spindle may be moved through any required portion of a revolution or rotated continuously, and, by the use of the raising block, the spiral head may be set at any angle on the bed. A taper hole, $1\frac{1}{16}$ inches diameter at the small end, extends through the spindle, and is fitted to receive the collets and arbors that are used in the main spindle. The front end of the spindle is threaded to receive a chuck. A piece, 8 inches diameter and 14 inches in length, can be swung between the spiral head and the foot stock.

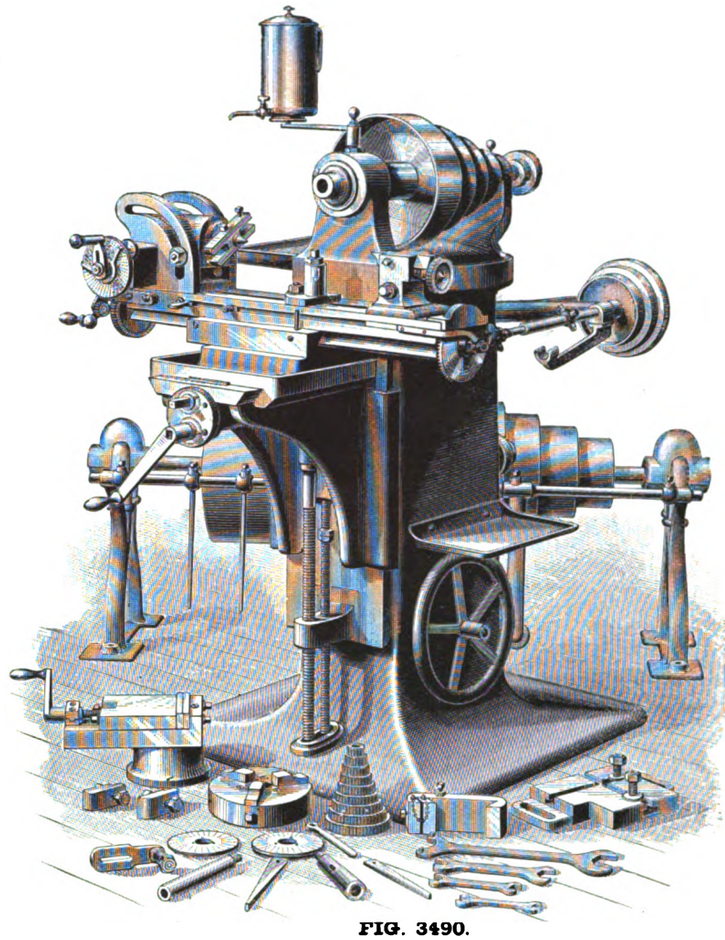


FIG. 3490.

The frame is hollow, and fitted as a closet to hold the small parts that accompany the machine.

Each machine is furnished with a "Treatise on the Construction and Use of Universal Milling Machines," tables of pitches and angles of spirals, a set of change gears and index plates, a vise, a 6 inch three-jawed chuck, stops, raising block, hand wheel, collet, wrenches, and complete overhead works.

The vise has jaws $5\frac{1}{8}$ inches wide, $1\frac{1}{8}$ inches deep, and will open $2\frac{3}{4}$ inches. The base is round, and can be clamped upon the bed at any angle.

The overhead works have two friction pulleys, 14 inches diameter, for $3\frac{1}{2}$ inch belt, and hangers with self-oiling and adjustable boxes. The countershaft is usually run at about 110 turns per minute.

The price includes all shown in cut, packed in one box.

The total weight is about 1,800 lbs.

Machines, with an overhanging arm to support the outer end of the arbor carrying the cutter, are furnished at a slight advance in price. Weight, 1,900 lbs.

PRICE OF MACHINE, WITHOUT OVERHANGING ARM, $.....

PRICE OF MACHINE, WITH OVERHANGING ARM, $.....

TOOLS FOR USE ON NO. 1 UNIVERSAL MILLING MACHINE.

$\frac{3}{8}$ in. screw arbor.
$\frac{1}{2}$ in. milling arbor.
$\frac{7}{8}$ in. milling arbor.
Fly cutter arbor, with tool.
Collet and key for small end mills.
End mill, $\frac{5}{16}$ in. diameter.
End mill, $\frac{3}{8}$ in. diameter.
End mill, $\frac{5}{8}$ in. diameter.
End mill, $1\frac{1}{8}$ in. diameter.

Milling cutter, $1\frac{1}{4}$ in. diam., $\frac{3}{16}$ in. face, $\frac{1}{2}$ in. hole.
Milling cutter, $2\frac{1}{4}$ in. diam., $1\frac{3}{4}$ in. face, $\frac{7}{8}$ in. hole.
Milling cutter, $2\frac{1}{2}$ in. diam., $\frac{7}{8}$ in. hole, for milling teeth of spiral mills, 40° and 12°.
One pair straddle mill cutters, 4 in. diam., $\frac{5}{8}$ in. face, $\frac{7}{8}$ in. hole.

Metal slitting saw, 2 in. diam., $\frac{1}{16}$ in. face, $\frac{1}{2}$ in. hole.
60° angular cutter, $1\frac{1}{4}$ in. diam., $\frac{3}{8}$ in. hole, right hand.
60° angular cutter, $1\frac{1}{4}$ in. diam., $\frac{3}{8}$ in. hole, left hand.
60° angular cutter, $2\frac{1}{2}$ in. diam., $\frac{7}{8}$ in. hole, right hand.

PRICE, $40.00. NET CASH.

The tools named in this list we have found by experience to be among those first needed in using the machine, and can only be sold at the price stated in full sets. Should they not be wanted, please pack them carefully, and return the box, per express, at our expense.

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MILLING MACHINE ATTACHMENTS AND CUTTERS.

GEAR CUTTING ATTACHMENT.

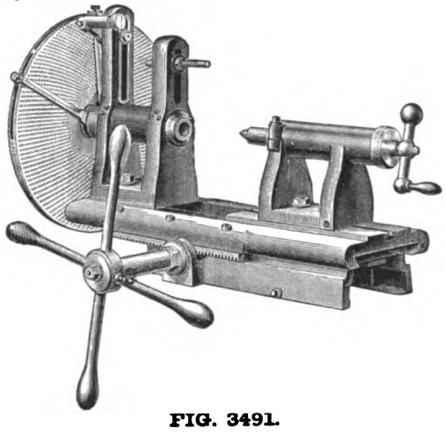


FIG. 3491.

For use with Figs. 3489, 3490, 3528 and 3429.

This device is designed to accelerate the cutting of gear wheels, and also for cutting larger and heavier wheels than can be cut with the ordinary apparatus belonging to the universal milling machine. It swings 14 inches, and is furnished with a 20 inch index containing 4,294 holes. It will divide all numbers to 75, and all even numbers to 150. Arbors fitted to the universal milling machine can be used in this device. The screw with set nuts over the spindle is designed as a support for the wheel while being cut. Weight, 440 lbs.

PRICE, $.....

The head and foot stock of the above attachment can be fitted for use upon the No. 3 universal milling machine, and Nos. 6 and 7 plain milling machine. **PRICE, $**.....

VERTICAL SPINDLE ATTACHMENT.

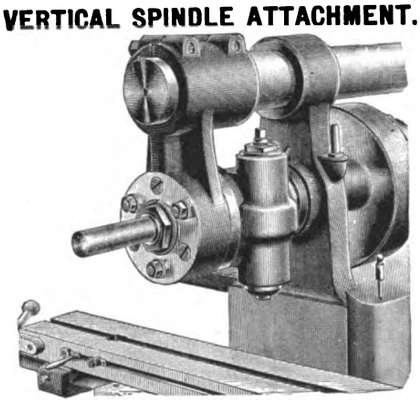


FIG. 3494.

NOS. 1 AND 3 UNIVERSAL AND NO. 6 PLAIN MILLING MACHINES.

This device is used for a large range of light milling, and is of especial advantage for key seating, die sinking, cutting T slots, etc.

The holder, or frame, is secured to the overhanging arm, and the horizontal shaft is inserted in the cone spindle of the machine. The vertical spindle is driven by the horizontal shaft through spiral gears.

PRICES.

For attachment to No. 1 universal milling machine, overhanging arm. See Fig. 3490. $.....

For attachment No. 6 plain milling machines. See Figs. 3489, 3490 and 3528.....$.....



FIG. 3496.

INSERTED TOOTH MILLS.

The teeth in these mills can be taken out, sharpened, and replaced to a gauge. They are for face milling only. Size of hole, 1¼ inches.

5 in. mills....	$5.00	8 in. mills...	$8.00
6 " "	6.00	9 " " ...	9.00
7 " "	7.00	10 " " ...	10.00

Arbor for use with above mills on the

No. 7 plain milling machines.....	$6 00
No. 1 universal milling machine...	4.00
No. 3 universal and No. 6 plain milling machines.....	5.00

Mills varying in size from those in list are made to order.

HIGH SPEED ATTACHMENT.

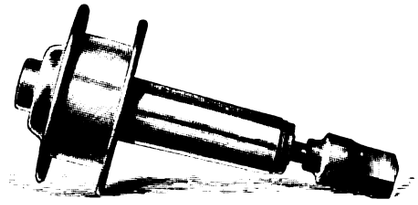


FIG. 3492.

For use with Fig. 3490.

This device is of service for light or finishing cuts with end mills, and consists of a small collet or spindle running in a shell that fits the hole in the cone spindle of the machine. It is driven directly from an extra pulley on the countershaft, and thus small mills may be run much faster than the usual speed of the cone spindle. When the attachment is used the cone pulley is stationary.

The extra pulley and the holder, to which the belt can be shifted when not in use, are furnished with the attachment.

PRICE, $.....

SWIVEL VISES.

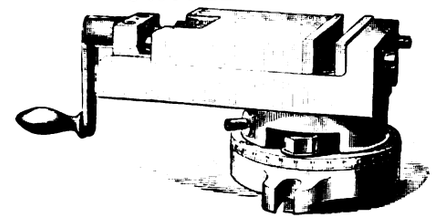


FIG. 3493.

These vices are especially convenient for angular milling or planing. The base is double, and the upper portion is graduated so that the vise may be set at any angle with the ways of the machine. The jaws are made of steel, and left soft unless otherwise ordered.

The No. 2 vise can be used with the No. 1 universal milling machine, and the No. 3 with Nos. 6 and 7 plain milling machines.

See Figs. 3490, 3528 and 3529.

Size.	Depth of jaw.	Width of jaw.	Jaws open.	Weight.	Price.
No. 2	1¼ in.	5⅛ in.	2¾ in.	38 lbs.	$31.00
" 3	1⅞ "	6¼ "	3¾ "	70 "	38.00

INDEX HEAD AND CENTERS WITH CENTER REST.

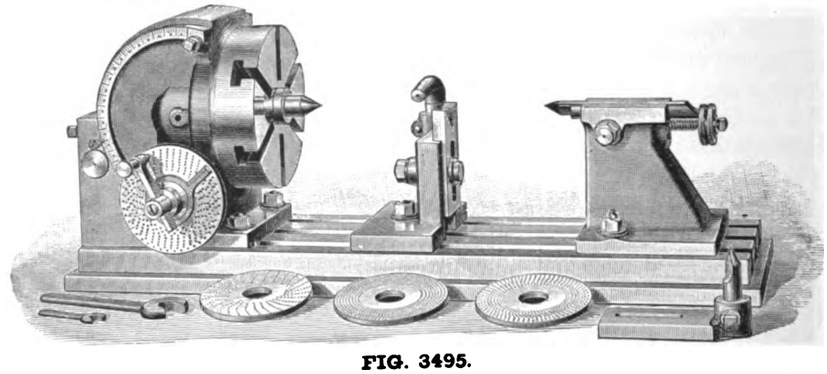


FIG. 3495.

These centers are designed for use, with or without base plate, on Nos. 6 and 7 plain milling machines. The index head, which is strong and stiff, is equally stable in all positions, and will swing 12½ inches. The dividing mechanism consists of a steel worm gear 6 inch diameter, 60 teeth, enclosed in a shell, in connection with a steel worm, and is provided with 4 index plates, dividing all numbers to 100, all even numbers to 134, and by four to 200. The spindle is large, and furnished with a face plate. The table shown is 32 inches long, 8 inches wide, and has three T slots running its length, for bolts. The distance between centers is 14 inches. Hole through head, 1½ inch diameter. Weight, 350 lbs. Centers will receive 42 and 54 inches in length when used on the No. 6 plain, and the No. 7 plain with 60 and 72 inch tables.

PRICE, $**..... **PRICE,** without base plate, **$.....

SIDE MILLING CUTTERS.

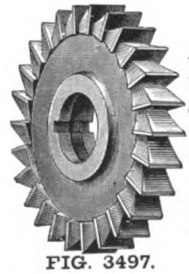


FIG. 3497.

These cutters are often used in pairs for sizing nuts, bolt heads, etc., and are then called "straddle mills." They have teeth upon both sides and edges.

Cutters varying from the above list are made to order.

PRICES.

Diam.	Wid'h of face.	Hole.	Price.	Diam.	Width of face.	Hole.	Price.
2 in.	3/8 in.	½ in.	$2.00	2¾ in.	¼ in.	⅞ in.	$2.30
2 "	1/4 "	½ "	2.00	3 "	¼ "	1 "	2.40
2 "	3/8 "	⅝ "	2.00	3 "	3/8 "	1 "	2.40
2 "	3/8 "	⅝ "	2.00	3 "	½ "	1 "	2.40
2 "	1/4 "	⅝ "	2.00	3½ "	1/8 "	1 "	2.50
2 "	3/8 "	⅝ "	2.00	4 "	3/8 "	1 "	3.25
2¼ "	1/4 "	⅞ "	2.15	5 "	¾ "	1 "	5.50
2¼ "	3/8 "	⅞ "	2.15	6 "	¾ "	1¼ "	8.50
2½ "	1/4 "	⅞ "	2.15	7 "	1 "	1¼ "	17.00
2½ "	1/4 "	⅞ "	2.30	8 "	1¼ "	1¼ "	23.00
2¼ "	3/8 "	⅞ "	2.30				

MILLING CUTTERS.



FIG. 3498.

Cutters of 1 inch face and over, have teeth of a spiral form, by which a shaving cut is made, thus operating with ease, and making a smooth surface.

Cutters varying from the following list are made to order of any required size or form.

Width of face.	Diameter of center.	Size of hole.	Price of each cutter.
3/8 in.	2½ in.	1 in.	$1.40
1/4 "	2½ "	1 "	1.50
5/8 "	2½ "	1 "	1.60
3/4 "	2½ "	1 "	1.70
7/16 "	2½ "	1 "	1.80
1/2 "	2½ "	1 "	1.90
5/8 "	2¾ "	1 "	2.00
7/16 "	2¾ "	1 "	2.10
1/2 "	2¾ "	1 "	2.20
3/4 "	2¾ "	1 "	2.30
7/16 "	2¾ "	1 "	2.50
1 "	2½ "	1 "	2.80
1¼ "	2½ "	1 "	3.00
1½ "	2½ "	1 "	3.20
1¾ "	2½ "	1 "	3.40
2 "	2½ "	1 "	3.70
2½ "	2½ "	1 "	4.10
3 "	2½ "	1 "	4.50
4 "	2½ "	1¼ "	6.00
5 "	2¾ "	1¼ "	7.50
6 "	2¾ "	1¼ "	10.00

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NEW YORK, 113 LIBERTY STREET, AND MOORE, 111 & 113 MAXWELL STREET, CINCINNATI, MANNING,

MILLING CUTTERS.

FOR GROOVING TAPS AND REAMERS.



FIG. 3499.

No. of cutter.	Price of each cutter.	Diam. of cutter.	Hole in cutter.	Diameter of tap.	Number of teeth in tap.
1	$2.00	1¾ in.	⅞ in.	0 to ⅛ in.	4
2	2.10	1¾ "	⅞ "	5/32 " ¼ "	4
3	2.20	1⅞ "	⅞ "	9/32 " ⅜ "	4
4	2.40	2 "	⅞ "	13/32 " ⅜ "	4
5	2.70	2⅛ "	⅞ "	17/32 " ⅞ "	4
6	3.00	2¼ "	⅞ "	21/32 " 1¼ "	4
7	3.30	2⅜ "	⅞ "	1 5/32 " 1⅜ "	4
8	3.60	2⅝ "	⅞ "	1 11/16 " 2 "	4

No. 1 cutter is suitable for grooving taps ⅛ in. or less diameter; No. 2 for taps larger than ⅛ and up to ¼ in. diameter.

No. of cutter.	Price of each cutter.	Diam. of cutter.	Hole in cutter.	Diameter of reamer.	Number of teeth in reamer.
1	$2.00	1¾ in.	⅞ in.	⅛ to ¼ in.	6
2	2.10	1¾ "	⅞ "	9/32 " ⅜ "	6
3	2.20	1⅞ "	⅞ "	13/32 " ½ "	6
4	2.40	2 "	⅞ "	17/32 " ⅝ "	6
4	2.40	2 "	⅞ "	25/32 " 1⅛ "	8
5	2.70	2⅛ "	⅞ "	1 5/32 " 1⅜ "	8
5	2.70	2⅛ "	⅞ "	1 13/16 " 1¾ "	10
6	3.00	2¼ "	⅞ "	1 29/32 " 2 "	10

In ordering, give number of cutter, or diameter and number of teeth of tap or reamer as per above lists.

EPICYCLOIDAL CUTTERS

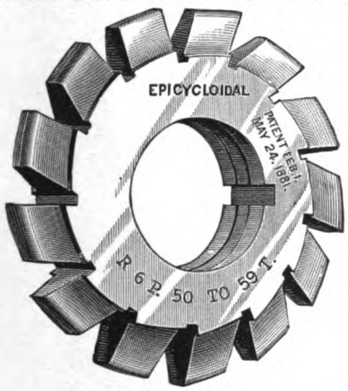


FIG. 3504.

FOR THE TEETH OF GEAR WHEELS,

Which can be sharpened by grinding without changing their form.

All gears of same pitch cut with these cutters are perfectly interchangeable.

Diametral pitch.	Price of each cutter.	Diameter of cutter.	Size of hole in cutter.
2	$15.50	5 ins.	1¼ ins.
2¼	14.00	4½ "	1¼ "
2½	13.00	4¼ "	1¼ "
2¾	11.75	4 "	1¼ "
3	10.75	3 13/16 "	1¼ "
3½	9.75	3 9/16 "	1¼ "
4	6.60	3⅜ "	1¼ "
5	5.65	3 1/16 "	1¼ "
6	4.65	2 11/16 "	1 1/16 "
7	4.40	2 9/16 "	1 1/16 "
8	3.90	2⅜ "	1 1/16 "
9	3.65	2 3/16 "	1 1/16 "
10	3.40	2⅛ "	⅞ "

CUTTERS ARE MARKED WITH LETTERS.

24 CUTTERS IN EACH SET.

Cutter A cuts	12 teeth.	Cutter M cuts	27 to 29 teeth.
" B "	13 "	" N "	30 " 33 "
" C "	14 "	" O "	34 " 37 "
" D "	15 "	" P "	38 " 42 "
" E "	16 "	" Q "	43 " 49 "
" F "	17 "	" R "	50 " 59 "
" G "	18 "	" S "	60 " 74 "
" H "	19 "	" T "	75 " 99 "
" I "	20 "	" U "	100 "149 "
" J "	21 to 22 "	" V "	150 "249 "
" K "	23 " 24 "	" W "	250 or more.
" L "	25 " 26 "	" X "	Rack.

In ordering, give the letter on cutter and the pitch required.

FOR STRAIGHT LIPPED TWIST DRILLS.

No. cutter.	Diam. of drill.	Diameter of cutter.	Hole in cutter.	Price of cutter.
1	1/16 inch.	1¾ inch.	⅞ inch.	$1.50
2	1/8 "	1¾ "	⅞ "	1.70
3	3/16 "	1¾ "	⅞ "	1.90
4	¼ "	1¾ "	⅞ "	2.10
5	5/16 "	2 "	⅞ "	2.30
6	⅜ "	2 "	⅞ "	2.40
7	7/16 "	2 "	⅞ "	2.60
8	½ "	2 "	⅞ "	2.80
9	9/16 "	2 1/16 "	⅞ "	3.00
10	5/8 "	2 1/16 "	⅞ "	3.20
11	11/16 "	2 1/16 "	⅞ "	3.40
12	¾ "	2 1/16 "	⅞ "	3.60
13	13/16 "	2 1/16 "	⅞ "	3.80
14	⅞ "	2 1/16 "	⅞ "	4.00
15	15/16 "	2½ "	⅞ "	4.20
16	1 "	2¾ "	⅞ "	4 50
17	1 1/16 "	2¾ "	⅞ "	5.00
18	1¼ "	3 "	⅞ "	5.50

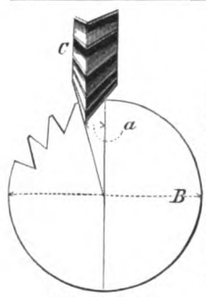


FIG. 3500.

CUTTERS FOR SPIRAL MILLS.

We make a form of cutter specially adapted to the cutting of spiral mills. It is 40° angle on one side and 12° on the other and is a right-hand cutter. The cut exhibits a cutter in connection with the work, showing the position required in cutting the teeth of a spiral cutter. The distance *a* equals one-tenth of *B*. Cutters 2½ inches diameter, ½ inch thick, ⅞ inch hole.

Price of special cutters for spiral mills, $2.70 each.

V-shaped cutters of any angle made to order.

INVOLUTE CUTTERS FOR TEETH OF GEAR WHEELS.



FIG. 3505.

Diametral pitch.	Price of each cutter.	Diameter of cutter.	Hole in cutter.
*2	$12.50	5 inch.	1¼ inch.
*2¼	11.25	4½ "	1¼ "
*2½	10.00	4¼ "	1¼ "
*2¾	9.00	4 "	1¼ "
3	7.00	3 13/16 "	1¼ "
*3¼	6.50	3 9/16 "	1¼ "
*3½	6.25	3½ "	1¼ "
*3¾	6.00	3⅜ "	1¼ "
4	5.50	3⅛ "	1¼ "
*4½	5.00	3¼ "	1¼ "
5	4.50	3 1/16 "	1¼ "
*5½	4.20	2⅞ "	1¼ "
6	3.90	2 11/16 "	1 1/16 "
7	3.60	2 9/16 "	1 1/16 "
8	3.40	2½ "	1 1/16 "
9	3.20	2⅜ "	1 1/16 "
10	3.00	2⅛ "	⅞ "
11	2.75	2 1/16 "	⅞ "
12	2.65	2 "	⅞ "
14	2.55	2 "	⅞ "
16	2.45	1 15/16 "	⅞ "
18	2.35	1 13/16 "	⅞ "
20	2.30	1 11/16 "	⅞ "
22	2.20	1 11/16 "	⅞ "
24	2.10	1¾ "	⅞ "
26	1.95	1¾ "	⅞ "
28	1.80	1¾ "	⅞ "
30	1.80	1¾ "	⅞ "
32	1.80	1¾ "	⅞ "
36	1.80	1¾ "	⅞ "
40	1.80	1¾ "	⅞ "
48	1.80	1¾ "	⅞ "

Cutters marked * are not kept in stock, but are made to order.

Spur-wheel cutters on above list, with special size holes, and bevel and worm wheel cutters, are made to order at 50 cents advance on list prices. If six of one pitch are ordered at one time, with special size hole, the list price will be charged. Cutters of extra large diameters or coarser pitches, made to order at special rates.

Eight cutters are made for each pitch, as follows:

No. 1 will cut wheels from	135	teeth to a rack.					
" 2 " " "	55	" "	134	teeth.			
" 3 " " "	35	" "	54	"			
" 4 " " "	26	" "	34	"			
" 5 " " "	21	" "	25	"			
" 6 " " "	17	" "	20	"			
" 7 " " "	14	" "	16	"			
" 8 " " "	12	" "	13	"			



FIG. 3501.

FOR MAKING TWIST DRILLS.

Number of cutter.	Diameter of drill.	Diam. of circle made by cutter.	Hole in cutter.	Diameter of cutter.	Price of each cutter.
1	1/16 inch.	.06 inch.	⅞ inch.	1¾ ins.	$1.50
2	1/8 "	.08 "	⅞ "	1¾ "	1.70
3	3/16 "	.11 "	⅞ "	1¾ "	1.90
4	¼ "	.15 "	⅞ "	1¾ "	2.10
5	5/16 "	.19 "	⅞ "	2 "	2.30
6	⅜ "	.23 "	⅞ "	2 "	2.40
7	7/16 "	.27 "	⅞ "	2 "	2.60
8	½ "	.31 "	⅞ "	2 "	2.80
9	9/16 "	.35 "	⅞ "	2 1/16 "	3.00
10	5/8 "	.39 "	⅞ "	2 1/16 "	3.20
11	11/16 "	.44 "	⅞ "	2 1/16 "	3 40
12	¾ "	.50 "	⅞ "	2 1/16 "	3.60
13	13/16 "	.56 "	⅞ "	2 1/16 "	3.80
14	⅞ "	.62 "	⅞ "	2 1/16 "	4.00
15	15/16 "	.70 "	⅞ "	2 1/16 "	4.20
16	1 "	.77 "	⅞ "	2¾ "	4.50
17	1 1/16 "	.85 "	⅞ "	2¾ "	5.00

These cutters can be sharpened by grinding without changing their form.

In ordering, give diameter of drill or number of cutter as per above list.

ARBOR.

Hole ¾ in. Diam.



FIG. 3502.



FIG. 3503.

Emery wheel for grinding cutters.....$1.00
Arbor for same..... 2.50

ANGULAR CUTTERS.

RIGHT-HAND CUTTER. RIGHT-HAND CUTTER.

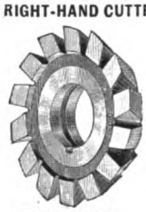


FIG. 3506.

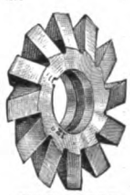


FIG. 3507.



FIG. 3508.

We keep in stock angular cutters suitable for cutting the teeth of cutters and mills. Cutters of 50, 60, 70 and 80 degrees angle, both right and left hand, are usually kept in stock. Cutters 2½ inch diameter, ½ inch thick, ⅞ inch hole.

Price of angular cutters, $2.70 each.

METAL SLITTING SAWS.

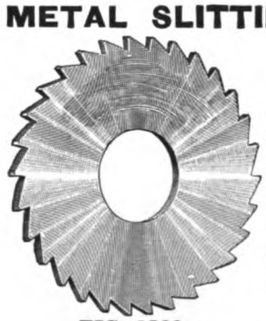


FIG. 3509.

These are thin milling cutters of suitable temper for cutting metals, the sides of which are finished true by grinding. They are a little thicker at the outer edge than near the center, so as to give a proper clearance in cutting deep slots.

Diameter.	Thickness.	Hole.	Price.
5 ins.	1/16 inch.	1 inch.	$1.50
5 "	3/32 "	1 "	1.60
5 "	⅛ "	1 "	1 80
4 "	1/16 "	1 "	1.20
4 "	3/32 "	1 "	1.20
4 "	⅛ "	1 "	1.25
4 "	5/32 "	1 "	1.45
3 "	1/16 "	1 "	1.00
3 "	3/32 "	1 "	1.00
3 "	⅛ "	1 "	1 00
3 "	5/32 "	1 "	1.10
3 "	3/16 "	1 "	1.25
2½ "	1/16 "	⅞ "	.90
2½ "	3/32 "	⅞ "	.90
2½ "	⅛ "	⅞ "	.90
2½ "	5/32 "	⅞ "	1.00
2½ "	3/16 "	⅞ "	1.00

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MANDRELS AND MILLING CUTTERS.

TAPER MANDRELS AND EXPANSION BUSHINGS.



FIG. 3510.

TAPER 1-2 IN. TO THE FOOT.

Mandrel No.	Whole length.	Diameter at small end.	Price.
3	3 11/16 in.	.3125 in.	$1.40
4	4 1/16 "	.35 "	1.50
5	4 1/2 "	.45 "	1.65
6	5 1/8 "	.50 "	1.80
7	5 13/16 "	.60 "	2.00
8	6 5/16 "	.75 "	2.25
9	7 3/16 "	.90 "	2.60
10	7 3/4 "	1.05 "	3.00
11	8 3/8 "	1.25 "	3.50
12	9 "	1.50 "	4.00
13	9 5/8 "	1.75 "	4.75

EXPANSION BUSHINGS.

TAPER 1-2 IN. TO THE FOOT.

Outside diam. of bushings.	Length.	Diam. of taper at small end.	Price.
1/2 in.	1 1/2 in.	.3125 in.	$0.55
9/16 "	1 5/8 "	.3125 "	.55
5/8 "	1 3/4 "	.35 "	.65
11/16 "	1 7/8 "	.35 "	.65
3/4 "	2 "	.35 "	.65
13/16 "	2 1/16 "	.45 "	.80
7/8 "	2 1/8 "	.45 "	.80
15/16 "	2 3/8 "	.45 "	.80
1 "	2 1/2 "	.50 "	.95
1 1/16 "	2 5/8 "	.50 "	.95
1 1/8 "	2 3/4 "	.50 "	.95
1 3/16 "	2 7/8 "	.60 "	1.15
1 1/4 "	3 "	.60 "	1.15
1 5/16 "	3 1/16 "	.60 "	1.15
1 3/8 "	3 1/8 "	.75 "	1.40
1 7/16 "	3 3/4 "	.75 "	1.40
1 1/2 "	3 1/2 "	.75 "	1.40
1 5/8 "	3 5/8 "	.90 "	1.70
1 3/4 "	3 3/4 "	.90 "	1.70
1 7/8 "	3 7/8 "	.90 "	1.70
2 "	4 "	1.05 "	2.00
2 1/8 "	4 1/8 "	1.05 "	2.00
2 1/4 "	4 1/4 "	1.05 "	2.00
2 3/8 "	4 3/8 "	1.25 "	2.40
2 1/2 "	4 1/2 "	1.25 "	2.40
2 5/8 "	4 5/8 "	1.25 "	2.40
2 3/4 "	4 3/4 "	1.50 "	2.80
2 7/8 "	4 7/8 "	1.50 "	2.80
3 "	5 "	1.50 "	2.80
3 1/8 "	5 1/8 "	1.75 "	3.20
3 1/4 "	5 1/4 "	1.75 "	3.20
3 3/8 "	5 3/8 "	1.75 "	3.20

END MILLS.



FIG. 3511.

RIGHT-HAND MILL.

Diam of mill.	Length of cut.	Whole length.	Diam. small end of shank.	Price.
5/16 in.	7/8 in.	2 7/16 in.	.35 in.	$1.00
3/8 "	7/8 "	2 7/16 "	.35 "	1.10
3/8 "	7/8 "	3 1/32 "	.45 "	1.25
3/8 "	1 1/8 "	3 1/32 "	.45 "	1.35
1/2 "	1 1/8 "	5 3/8 "	.60 "	1.75
7/8 "	1 1/2 "	5 7/8 "	.60 "	2.25
7/8 "	1 3/4 "	7 1/16 "	.90 "	2.25
1 1/8 "	2 "	6 1/4 "	.60 "	2.25
1 1/8 "	2 "	7 1/4 "	.90 "	2.25
1 1/4 "	2 "	7 1/4 "	.90 "	2.75

In ordering, please state which hand is required.

END MILLS.



FIG. 3513.

WITH THREADED SHANKS, FOR USE WITH DRAW BAR.

SHANK 2-3 SIZE.

Diam.	Price.	Diam.	Price.
3/8 in.	$1.25	1 1/4 in.	$1.80
7/16 "	1.35	1 3/8 "	2.00
1/2 "	1.50	1 7/16 "	2.15
9/16 "	1.60	1 1/2 "	2.25
5/8 "	1.75	1 "	2.25

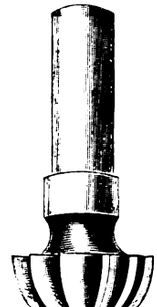


FIG. 3515A.

ROUND NOSE MILLS.

Diam.	Price.
1/4 in.	$0.75
5/16 "	.80
3/8 "	.90
7/16 "	1.00
1/2 "	1.25
9/16 "	1.50
5/8 "	1.75
3/4 "	2.00
7/8 "	2.25
1 "	

END MILLS.



FIG. 3512.

WITH STRAIGHT SHANKS, TO BE USED WITH SPRING CHUCKS.

Diam.	Price.	Diam.	Price.
1/8 in.	$0.25	5/16 in.	$0.55
5/32 "	.30	11/32 "	.60
3/16 "	.40	3/8 "	.65
7/32 "	.50	13/32 "	.70
1/4 "	.50	7/16 "	.90
9/32 "	.50	1/2 "	1.00

TAPER REAMERS

For shanks of end mills are kept in stock. The taper is 1/2 in. per foot.

Diam. of small end.	Length of flukes.	Price.
.35 in.	3.40 in.	$2 50
.45 "	3.80 "	3.00
.60 "	4.40 "	3.50
.90 "	5.60 "	4.00

SPRING CHUCK.

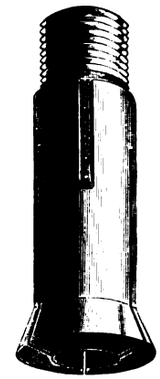


FIG. 3514.

These Chucks are made of the highest grade of tool steel, hardened. Inside of holes ground to fit all sizes of stubs wire gauge up to 11/32 in. diameter.

PRICE, $2.50.

FACE MILL.



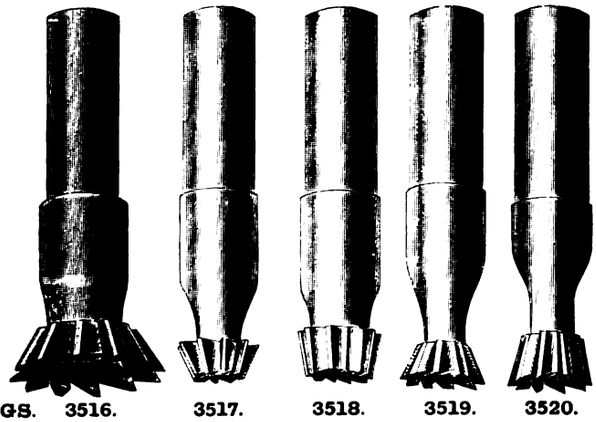
FIG. 3515.

2-3 SIZE.

Is made with removable teeth, and is very useful for surface milling on brass. **PRICE, $5.00.**

BEVEL MILLS.

FULL SIZE.

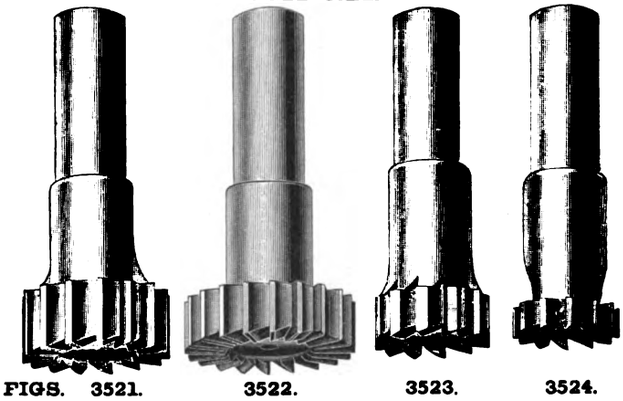


FIGS.	3516.	3517.	3518.	3519.	3520.
PRICES,	$2.00	$1.50	$1.50	$1.50	$1.50

MADE TO ORDER OF ANY SIZE OR SHAPE.

SURFACING MILLS.

FULL SIZE.



FIGS.	3521.	3522.	3523.	3524.
PRICES,	$2.00	$2.00	$1.75	$1.75

FOR IRON OR STEEL, WITH STRAIGHT SHANKS TO USE WITH SPRING CHUCKS, FIG. 3514.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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MILLING CUTTERS.

SHANKS, 1-4 INCH DIAMETER.

Nos. 1 2 3 4 5 6 7 8 9

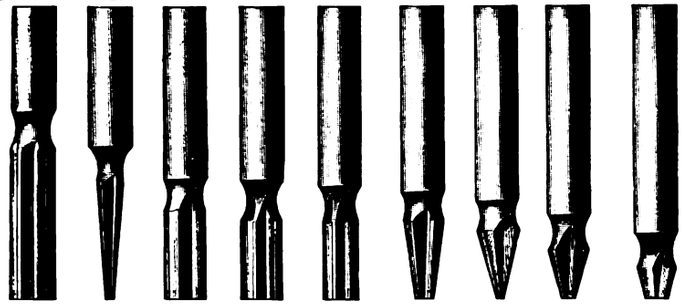


FIG. 3525.

A set of these end mills will be found to be of general usefulness on jig work, profiling, die sinking, etc.

PRICE, 50c. EACH; $5.00 PER DOZ.

SHANKS, 1-8 INCH DIAMETER.

Nos. 25 26 27 28 29 30 31 32 33 34 35

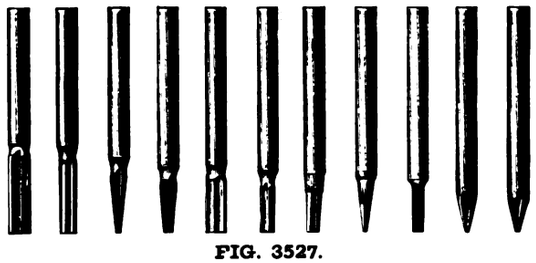


FIG. 3527.

These cuts are specially adapted for engraving purposes and very delicate millings in brass.

PRICE, 25c. EACH; $2.50 PER DOZ.

SHANKS, 3-16 INCH DIAMETER.

Nos. 13 14 15 16 17 18 19 20 21 22

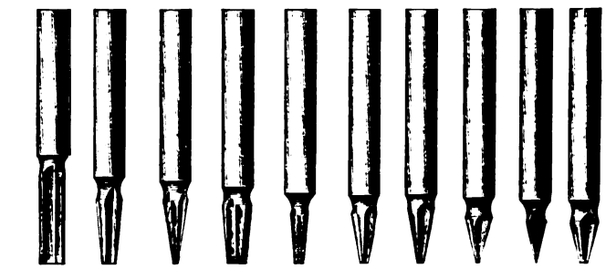


FIG. 3526.

The wide range of usefulness of this size of cutters on all kinds of experimental and electrical work on brass is unquestionably very great. We make, at short notice, cutters of any special degree of bevel, without additional charge.

35c. EACH; $3.75 PER DOZEN.

NO. 4 PLAIN MILLER.

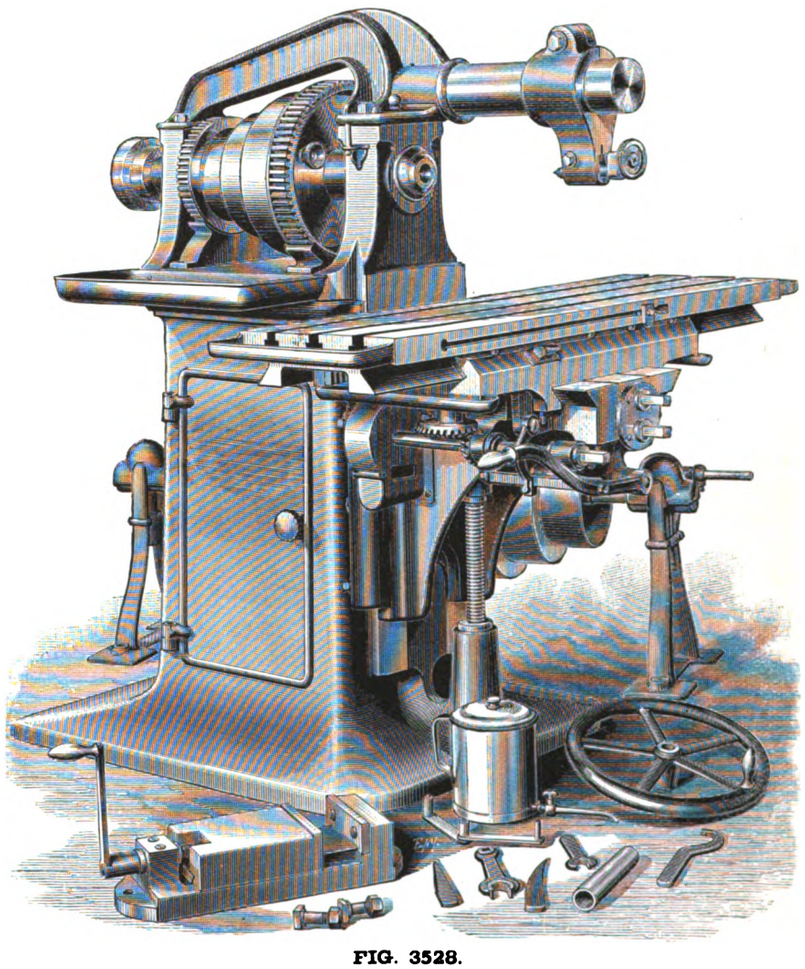


FIG. 3528.

DESCRIPTION OF FIG. 3528.

The adjustments of this machine are such as to allow work to be performed upon top and side, or at different parts upon the surfaces, without changing the position of pieces upon the platen.

This machine, as regards the standard or base, with cone, gearing, spindle and supporting arm holding center for steadying outside end of arbors, is the same as our No. 3 Universal Milling Machine, Fig. 3489.

The platen, which is 48 inches long by 14 inches wide, has three T slots for bolts lengthwise, for the holding of work upon the same. It has a horizontal movement of feed of 33 inches, and a movement in line with axis of spindle of 7¼ inches; also a perpendicular movement from center of spindle to 19¼ inches below, both the horizontal and vertical movements being capable of adjustment to thousandths of inches by a dial and pointer.

There are three changes of feed, suitable for steel or cast iron work.

A vise is furnished for the holding of small work, having steel jaws 7 inches long by 1⅞ inches deep, and will open 4½ inches. This can be held upon the platen at an angle.

A vertical spindle milling attachment can be furnished, with which die sinking, T slot milling and work of a similar character can be readily done upon the top surface of any piece held upon the platen, at an extra charge.

Overhead works accompany the machine, having two 16 inch friction pulleys, for 4 inch belts, allowing the cutters to be run in either direction.

Counter should be run from 110 to 120 turns per minute.

Weight of machine, boxed for shipment, 3,600 lbs.

PRICE, $..... VERTICAL ATTACHMENT, PRICE, $.....

FOR ATTACHMENTS, SEE FIGS. 3494, 3491, 3493.

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HEAVY PLAIN MILLER.

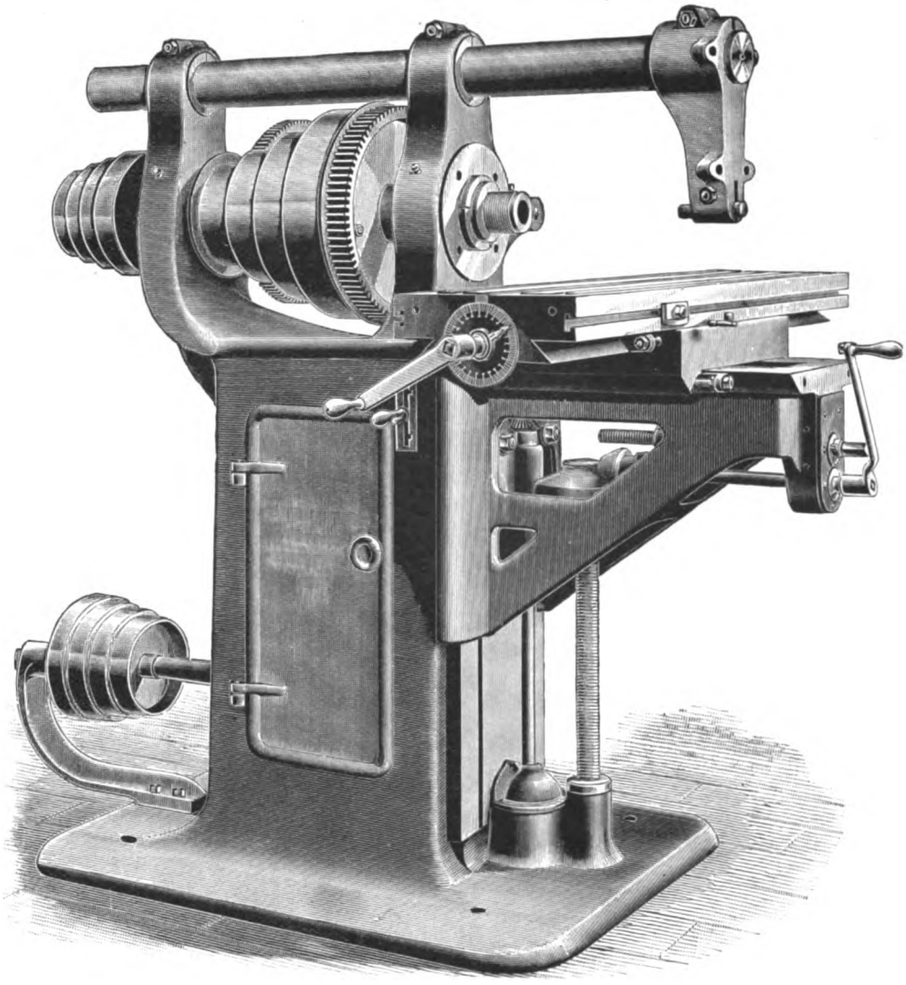


FIG. 3528 A.

The spindle is of steel, finished by grinding, and runs in crown bronze boxes, using concentric self-closing bearings, that always keep the spindle in its original position, both laterally and central. The front bearing is 3½ inches diameter, 6 5/16 inches long, rear bearing 2 9/16 inches diameter, 5¾ inches long. The taper hole in the spindle is 12 inches long, 2 inches diameter at large end, 1½ inches diameter at small end, with a 1 1/16 inch hole continuing through it, allowing the use of a rammer to drive out the arbors or bushings. The platen is 68 inches long, 14 inches wide, with 3 T slots on top and one T slot on each side for bolting stops for setting work against, etc. It can be lowered below the center of spindle 20½ inches, and has an automatic feed of 40 inches either way without changing the belt, and an adjustment in line with spindle of 12 inches. This is very useful in boring and gives a great range for work of peculiar shapes. Milling can be done 26 inches from face of column, and cutters 18 inches diameter can be used to reach into parts when necessary. The spindle is driven by a four-step cone, largest diameter being 18 inches and smallest 9 inches diameter for 3¾ inch belt, and is back geared 8 to 1; cone feed belt is 2 inches wide, running on large diameters of cones, back geared with steel gears, the smallest ones being made of bar steel, which makes the feed mechanism of the most durable character.

The cutter arbor supporting bar is 4¼ inches diameter, of hammered machinery steel, and is supported by a harness, that holds the bar, knee and center together, making it impossible for the bearing to yield to very heavy cutting with proper milling tools; an extra center support is also furnished, when short arbors are to be used, the bronze outer support, or center, being interchangeable.

A plain vise, with steel jaws 8 inches wide, 2 inches deep, opening 5 inches, with clamps to fasten to the bed in any position, is furnished with machine. Countershaft is furnished with either friction clutch pulleys on shifting belt, arranged to have two speeds, or to run either way. Weight of machine, about 5,500 lbs.

The gibs are all either steel or bronze and are accurately fitted, being of the wedge or taper class; wear and adjustment are taken up by a stud and nuts on the end.

Face of column, 14 in. wide by 42 in. long.
Length of bearing of knee on face of column, 23½ in.
Top slide of knee, 14⅜ in. wide.
Length of platen, 68 in.
Width of platen, 14 in.
Length of slide-bearing for table, 29 in.
Vertical movement of knee, 20½ in.
Movement of slide on knee parallel with spindle, 12 in.
Transverse movement of table, 40 in.
Changes of speed, 8.
Changes of feed, 4.
Weight, 5,500 lbs.

PRICE, $800.00.

SMALL PLAIN MILLER.

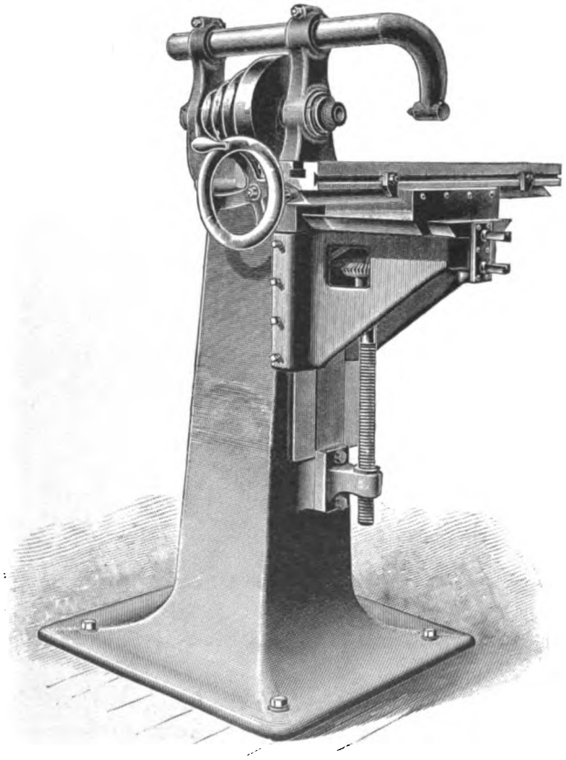


FIG. 3528 B.

The spindle runs in bronze boxes, so arranged that wear can be taken up and still keep the arbor always central and laterally in same position. It is made with all hand feeds or with table feed by power, as desired. Spindle is driven by a four-step cone, largest diameter being 10 inches and smallest 4¾ inches diameter for 2 inch belt, with overhanging arbor support, with adjustable center or bushing to receive same.

The platen is 30 inches long and 7½ inches wide, has travel of 20 inches and has two T slots and center groove. One side of table has a T slot to set stops, etc.; the travel of cross slide is 7½ inches; greatest distance table lowers below center of spindle is 13 inches; weight about 900 lbs.

Face of column, 8½ in. wide by 22 in. long.
Length of bearing of knee on face of column, 11 in.
Top slide of knee, 8 in. wide.
Length of platen, 30 in.
Width of platen, 7½ in.
Length of slide-bearing for platen, 10½ in.
Vertical movement of knee, 12 in.
Movement of slide on knee parallel with spindle, 7½ in.
Transverse movement of table, 20 in.
Changes of speed, 4.
Weight, 900 lbs.

PRICE, $350.00.

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NO. 3 BACK GEARED PLAIN MILLER.

The table, as now made, has 3 T slots.

The spindle is of forged steel, hollow its entire length. The two spindle bearings are tied together by an arch at the top, which also supports the overhanging arm. A bearing 12 inches long is bored in this arch, slotted at the top and provided with two clamping screws. The arm can be quickly inserted, clamped fast and as quickly removed.

The spindle boxes are of bronze, made in halves. They are cylindrical in form, with a deep rib running around the middle, faced square with turned surface, and forced into a groove cut into the column and box cap.

The outside of the box is finished entirely in the lathe, which makes its reproduction, when worn out, a simple matter.

The knee has a vertical movement of 15 inches, and the saddle a cross movement of 5 inches. Both of these motions are indexed and read in thousandths of an inch. The table has an automatic screw feed its entire length. A bronze screw of large diameter, running in oil, engages with a thread cut in the table itself, which gives a smooth and powerful feed without tendency to chatter. The feed can be tripped automatically with the table running in either direction. One turn of the hand crank moves the table one inch.

All feed gearing and the universal joints are covered. Adjustment to take up wear is provided wherever looseness would affect the accuracy of the machine.

A double friction countershaft of improved construction, requiring only one adjustment to tighten its grip, together with everything shown in cut, is furnished with each machine.

PRICE, $330.00.

The countershaft has 12 inch pulleys for 3½ inch belt and should run 160 revolutions per minute.

Cone pulley, largest step	11 inches.
Width of belt	3 "
Vertical adjustment	15 "
In and out adjustment	5 "
Length of power feed	34 "
Length of table	34 "
Width of table	7½ "

WEIGHT, 2,000 LBS.

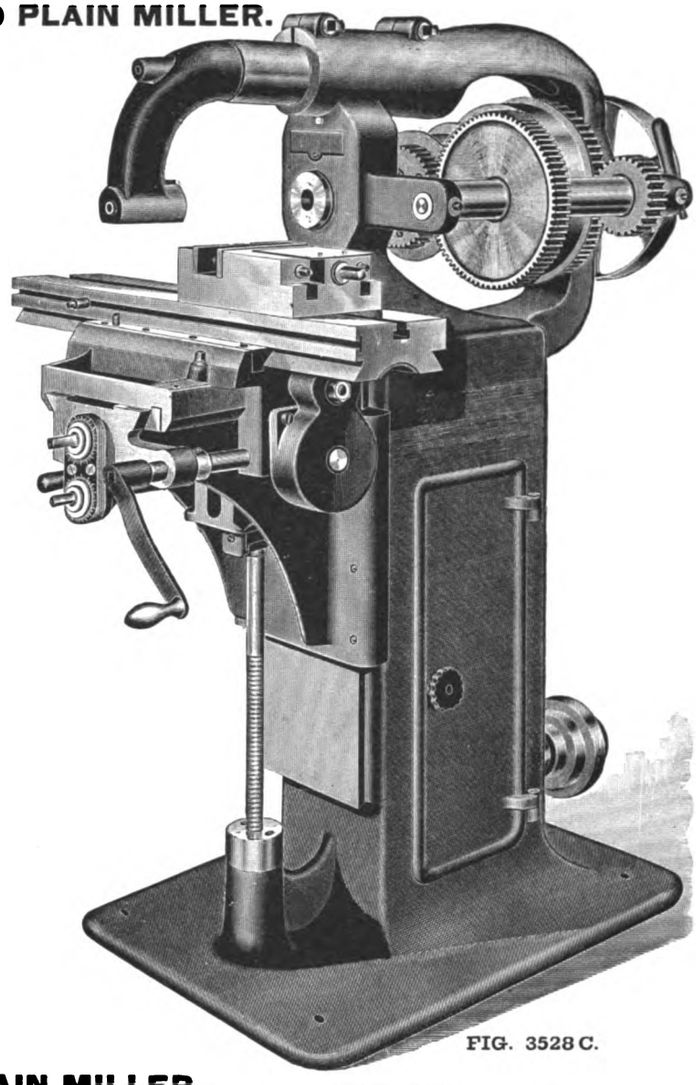


FIG. 3528 C.

NO. 2 PLAIN MILLER.

It was designed for rapid handling of light work, such as electrical, gun, sewing machine and bicycle factories are required to produce in large quantities. The general design of the column, spindle and boxes and overhanging arm is the same as our larger machines. The machine is driven with a four-step cone for 2 inch belt. We can also furnish, in place of the above, a three-step cone for 2¾ inch belt.

The knee has a vertical movement of 14½ inches, and the saddle a cross movement of 3¾ inches; both of these movements are indexed and read in thousandths of an inch.

The table has an automatic rack feed of 18 inches, and the feed is tripped automatically, with the table running in either direction.

All feed gearing and the universal joints are covered, to protect them from chips and dirt. Adjustment to take up wear is provided wherever looseness would affect the accuracy of the machine.

Everything shown in cut is furnished with each machine, including a countershaft with two friction pulleys, 10 inches diameter for 2¾ inch belt, and should run 140 revolutions per minute.

DIMENSIONS.

Cone pulley, largest step	10½ inches.
Width of belt	2 "
Vertical adjustment	14½ "
In and out adjustment	3¾ "
Length of power feed	18 "
Length of table	24 "
Width of table	6¾ "
Size of front spindle bearing	2 in. x 3¾ "

WEIGHT, 1,000 LBS. **PRICE, $225.00.**

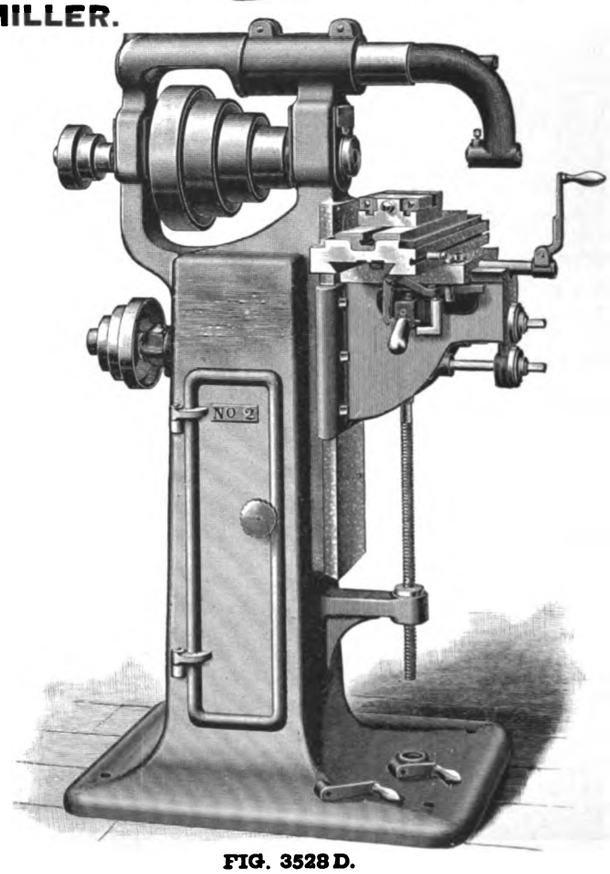


FIG. 3528 D.

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NO. 24 PLAIN MILLER.

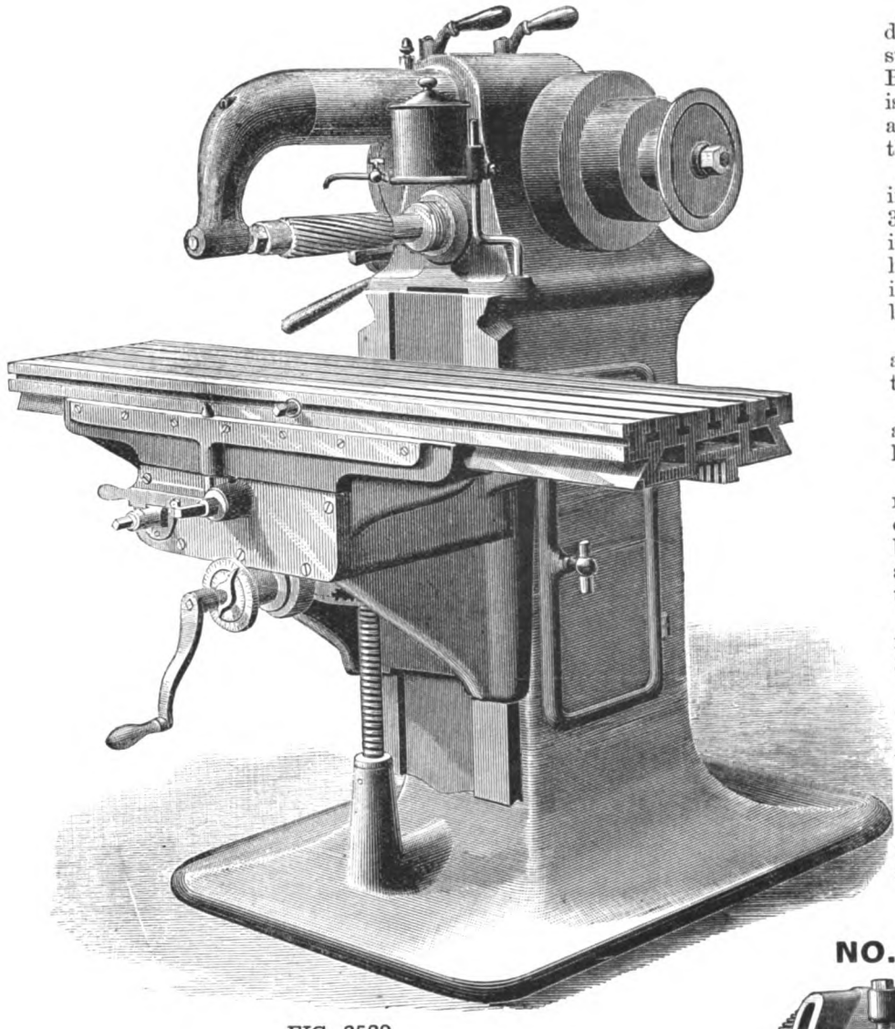


FIG. 3529.

FOR EXTRAS, SEE FIGS. 3491 AND 3493.

DESCRIPTION, FIG. 3530.

The spindle is driven by a gear and pinion from a three-step cone with three inch belt. It has a vertical adjustment of 6 inches.

The table is 9 inches wide, 27 inches long, and has 12 inch longitudinal and 4½ inch transverse movement, and is moved longitudinally 2 inches by one turn of the hand wheel.

The feed is automatic, with three changes, stopping automatically at any required point.

The vise has jaws 6⅛ inches long, $1\frac{7}{16}$ inches deep, and will open 3⅜ inches.

Countershaft has pulleys 10 inches diameter for 3 inch belt, and should run about 375 turns per minute.

The price includes vise, countershaft, wrenches, etc.

WEIGHT, 2,550 LBS.

PRICE, $.....

The spindle is steel with taper bearings, and is driven by a worm and worm gear. The worm is steel and hardened, and the worm gear is bronze. Both run in oil. The front bearing of the spindle is 3½ inches diameter, 6 inches long. The boxes are solid. A hole, 1½ inch diameter, runs through the spindle.

The head has a horizontal movement of 12 inches. A dial shows this movement in 16ths, 32ds, etc., or by decimals to thousandths of an inch. An overhanging arm slides in the top of the head, and is held by clamp screws. An arm brace is provided. Cutters up to 10 inches diameter can be used.

The knee can be moved vertically 18¾ inches, and its movements are indicated on a dial similar to that connected with the head.

The table is 60 inches long, 14½ inches wide, and has 5 T slots, for bolts, running the entire length.

The feed can be varied from 0 to $\frac{1}{16}$ per one revolution of the spindle, and is automatic in either direction the entire length of the table. It is driven by a leather-covered disc with connections which automatically adjust themselves to any position of the head or knee.

Countershaft has 12 and 18 inch friction pulleys for 3½ and 4½ inch belts, and should run about 300 and 200 revolutions per minute.

The vise has jaws 7⅛ inches wide and 1⅞ inches deep, and will open 4½ inches.

The price includes vise, countershaft and wrenches.

WEIGHT, 4,350 LBS. PRICE, $.....

For extra long and heavy work, we are prepared to furnish this machine with a table 72 inches long, and bearings in knee 48 inches long.

WEIGHT, 4,750 LBS. PRICE, $.....

NO. 13 PLAIN MILLER.

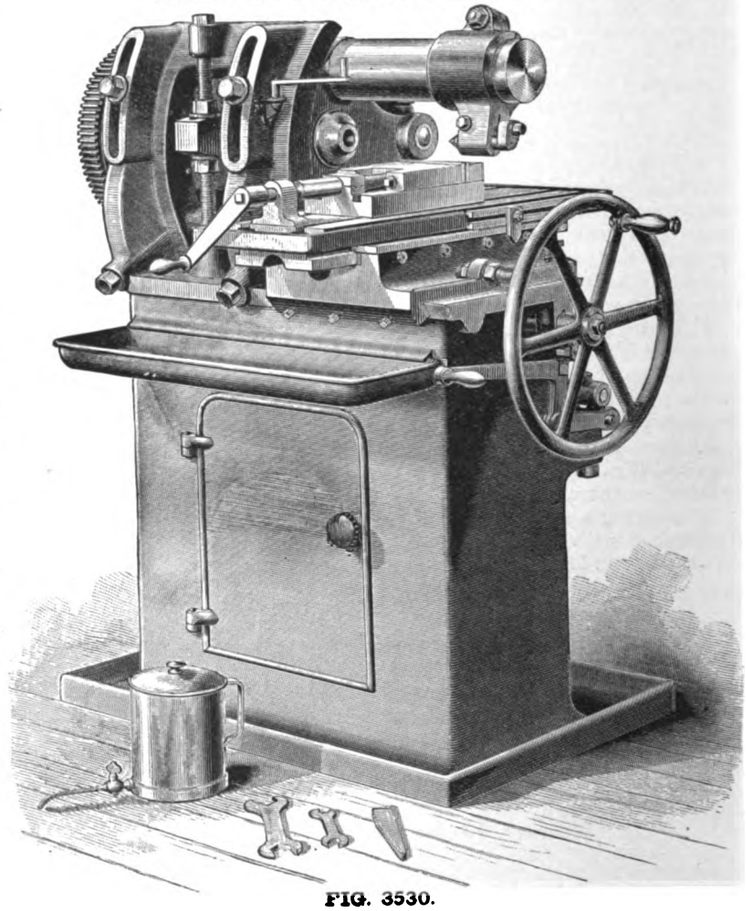


FIG. 3530.

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PLAIN MILLERS.

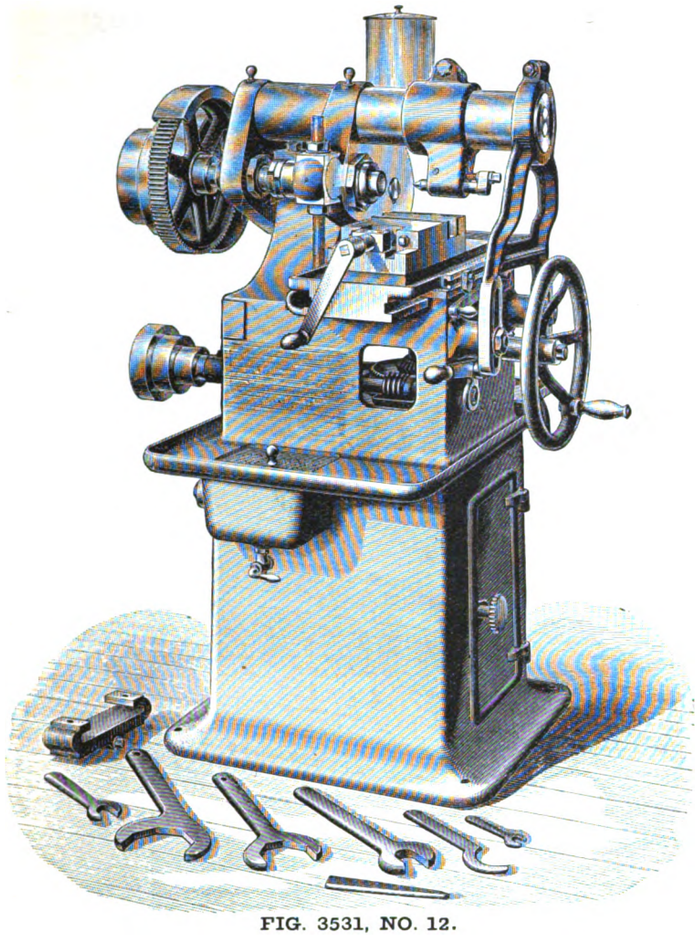


FIG. 3531, NO. 12.

The greatest distance from the center of spindle to top of table is 6 inches; the least distance, $2\frac{7}{16}$ inches.

The table is 28 inches long, $9\frac{1}{2}$ inches wide. The platen, to which the work is secured, is 19 inches long and 6 inches wide. The total length of feed, $17\frac{1}{2}$ inches.

The vise has jaws $6\frac{1}{8}$ inches wide, $1\frac{7}{16}$ inches deep, and will open $3\frac{3}{8}$ inches.

The countershaft pulleys are 10 inches diameter for 3 inch belt, and should run about 280 turns per minute.

WEIGHT, 1,600 LBS. **PRICE, $.....**

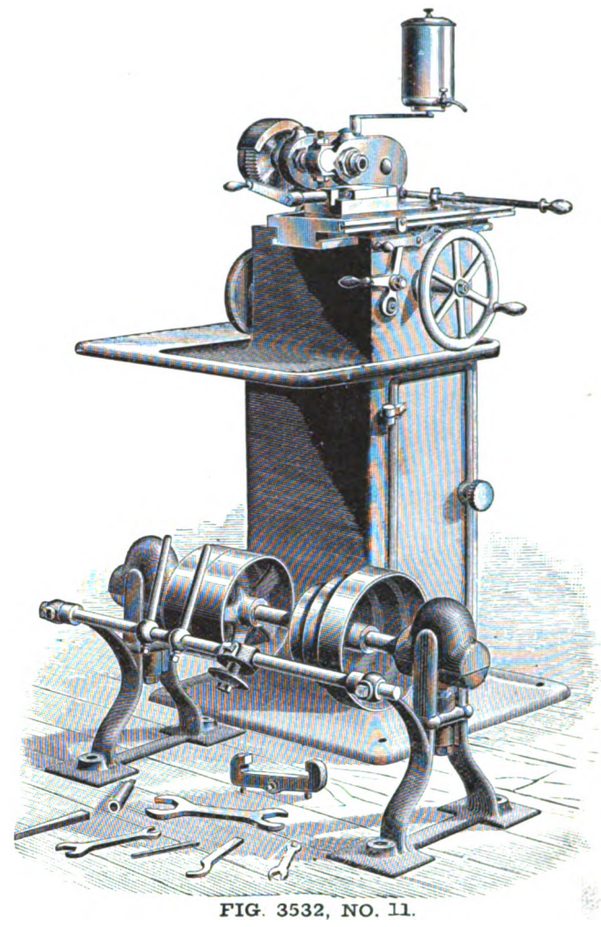


FIG. 3532, NO. 11.

Length of the table is 20 inches; width, $7\frac{3}{4}$ inches; the length of feed is 12 inches; the platen, or finished portion of the table, is 11 inches long, $3\frac{1}{2}$ inches wide.

The greatest distance from its center to top of table is $3\frac{1}{4}$ inches; the least attainable distance is $1\frac{1}{2}$ inches.

The vise has jaws $3\frac{5}{8}$ inches wide, $1\frac{3}{4}$ inch deep, and will open $1\frac{1}{2}$ inches. The overhead works have tight and loose pulleys 8 inches in diameter for $2\frac{1}{4}$ inch belt, and should run about 300 turns per minute.

WEIGHT, 850 LBS. **PRICE, $.....**

PLAIN MILLER.

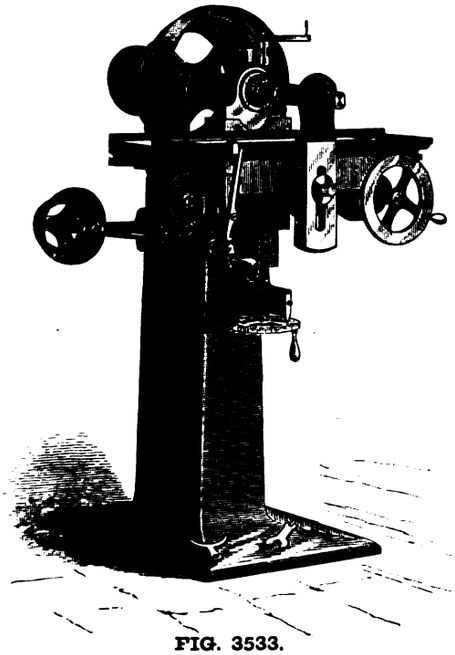


FIG. 3533.

In place of overhanging extension usual on other machines, for supporting out end of arbor, a box and adjustable arm connecting with table bed is used, insuring rigidity and at the same time allowing for contraction and expansion. The table slide is connected with frame by clamp bolts which pass through both lips of slide and through cored slots in frame casting, and when set up these bolts insure a true and unyielding joint.

The boxes are made of best phosphor bronze, and provided with take up for wear.

The spindle is made of steel, and is $1\frac{3}{16}$ inches diameter. The front end has taper socket to receive end of arbor. The arbor is driven by collar on same, which is flattened and fits into corresponding recess in collar on spindle, thus avoiding any keyway through spindle.

The spindle has half inch hole through center, through which a steel rod passes, threaded at back end and squared for wrench, which is a handy device for forcing arbor from taper socket. At the center bearing the spindle runs in a box threaded and split, and collars either side give end adjustment of $\frac{3}{8}$ of an inch. One arbor, fitted to spindles, and set of collars, are furnished with each machine.

Greatest distance from center arbor to top of table, $6\frac{1}{2}$ inches. Table has vertical adjustment of 4 inches, graduated to a scale of $\frac{1}{1000}$ of an inch; horizontal adjustment and automatic feed, 20 inches, which can be made longer if machine is desired for splining, shafting or similar work, and is so ordered. Distance from face of column to inside of outside support, 8 inches. Change of feed, 3. Change of speed, 3. Cone pulley has three grades, 14, 12 and 10 inches in diameter. Countershaft has tight and loose pulley, $12 \times 2\frac{1}{2}$ inches, and is fitted with self-oiling boxes. For ordinary work should make 150 revolutions per minute.

The column has door and closet, and forms a convenient receptacle for tools. Spindle, shaft, etc., are of steel, and workmanship and material are guaranteed first-class.

WEIGHT OF MACHINE, 675 LBS.

PRICE, WITH COUNTERSHAFT, $250.00.

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NO. 3 MILLING MACHINE.

WITH BACK GEARS.

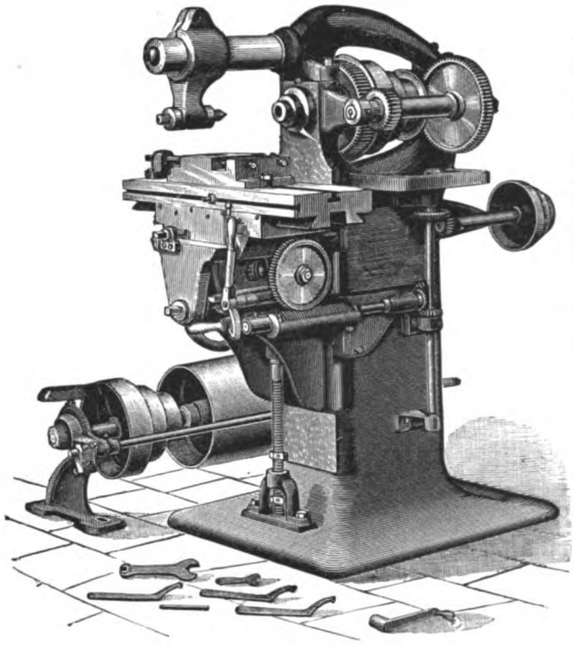


FIG. 3534.

Weight, complete, with vise and countershaft, 1,550 lbs.
PRICE, with arm and vise, as shown in cut, $ .....
PRICE, without arm, and with vise, - $ .....

This machine is made from new designs and patterns. The driving cone is large in diameter, with three changes for a 2½ inch belt.

Spindle is large in diameter, with ⅝ inch hole through its entire length, and is fitted with adjustable bearings.

Table is moved by the hand wheel shown at front of machine, in connection with a rack and pinion gear, which admits of quick and easy adjustment, and is provided with an automatic feed its entire length. The vertical adjustment is by means of a hand wheel on opposite side from the worm and gear, to which is attached a graduated disk and finger by which accurate adjustment can be made to thousandths of an inch.

Feed works are simple in form, positive in operation, and have three changes of speed.

Standard is provided with shelves and door for safe keeping of cutters and tools.

All studs and shafts in the machine are made of steel. The sliding surfaces are accurately fitted by scraping, and the workmanship throughout is first-class. Countershaft has tight and loose pulleys, and adjustable hangers with self-oiling boxes.

WITHOUT BACK GEARS.

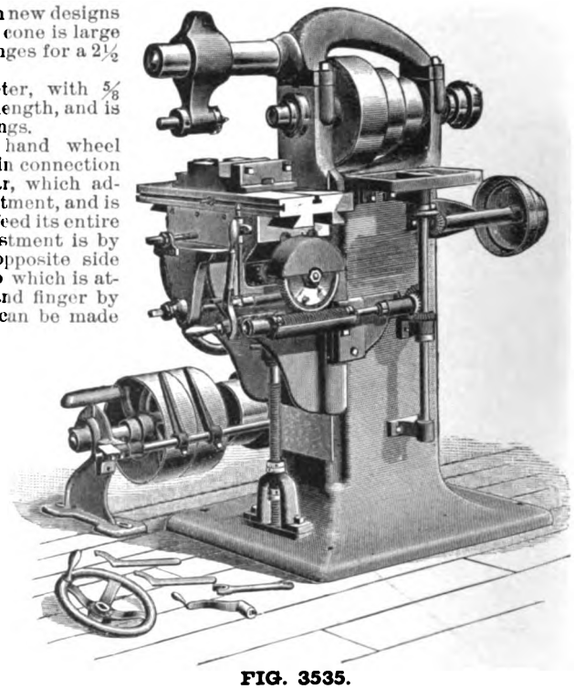


FIG. 3535.

Weight, with vise and countershaft, 1,550 lbs.
PRICE, with arm and vise, as shown in cut, $ .....
PRICE, without arm, and with vise, - $ .....

GENERAL DIMENSIONS, FIGS. 3534 AND 3535.

Distance from center of spindle to top of table, at lowest point, 14 inches. Distance from center of spindle to top of table, at highest point, 1 inch. Adjustment of carriage to and from face of column, 5 inches. Length of feed table, 33 inches. Width of feed table, 9 inches. Diameter of spindle, 2¼ inches. Taper hole in spindle at large end of taper, 1¼ inch. Tight and loose pulleys on countershaft, 12 x 4 inches. Number of revolutions of countershaft per minute, 185.

NO. 2 HAND MILLER.

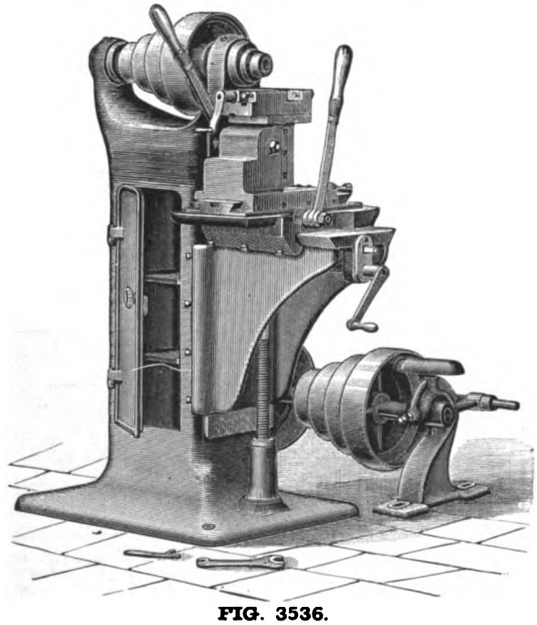


FIG. 3536.

This machine has driving cone of 4 sections, 4, 6, 8 and 10 inches diameter by 2¾ inches face. Spindle is large in diameter; has a ⅝ inch hole through its entire length, and is provided with adjustable bearings. Distance from center of spindle to top of table, at lowest point, 16 inches. Adjustment of carriage to and from face of column, 6 inches. Hand attachment has vertical movement, 2½ inches. Hand attachment has horizontal movement, 6 inches. Diameter of spindle bearing, 2⅛ inches. Length of front spindle bearing, 4 inches. Tight and loose pulleys on countershaft, 12 x 3¾ inches. Weight, 970 lbs.

PRICES.

Without vise, $ ..... With vise, $ .....

LINCOLN PATTERN MILLER.

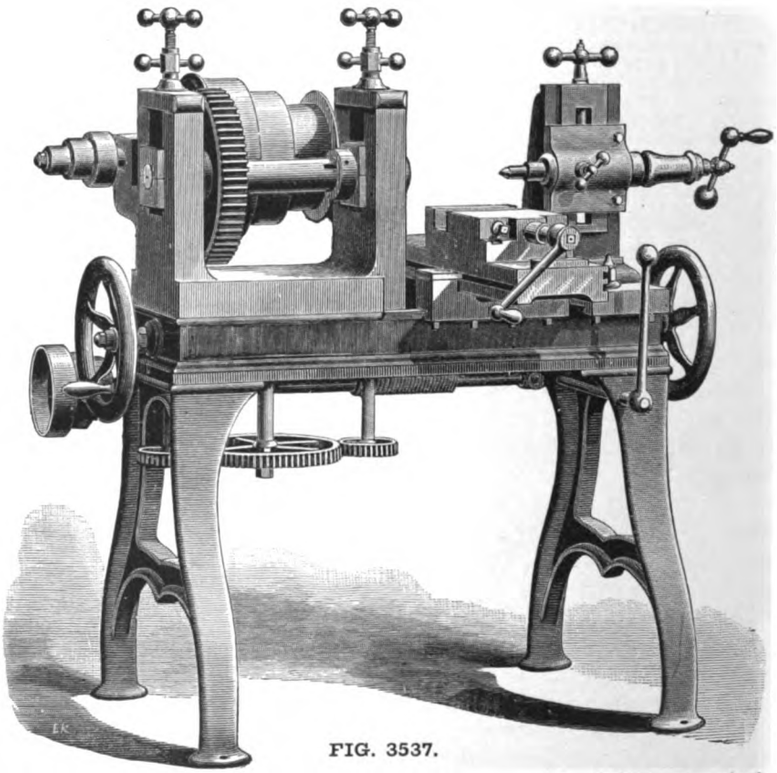


FIG. 3537.

No. 2 is designed for gun-work, sewing-machines, etc. Has hand or power feed, countershaft, hangers and wrenches. Weight, 1,750 lbs. **PRICE, $450.00.**

No. 3 is designed for gun-work, sewing-machines, etc. Has hand or power feed, countershaft, hangers and wrenches. Weight, 1,800 lbs. **PRICE, $500.00.**

No. 4 is designed for gun-work and heavy milling. Has hand or power feed, is double geared, and extra heavy. Weight, 1,925 lbs. **PRICE, $575.00.**

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IMPROVED LINCOLN PATTERN MILLERS.

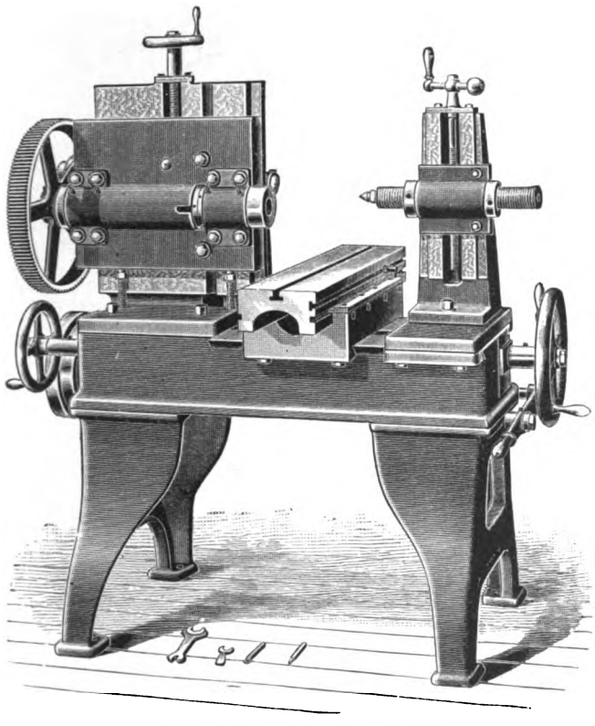


FIG. 3538.—FRONT VIEW.

This is a heavy and substantial machine. The bed is 16¾ inches wide and 7 inches deep. The spindle is made of hammered steel, mounted on a heavy square slide, gibbed to both sides of the large upright, and is raised and lowered by a single screw, and held in position by two ¾ inch bolts, and under each end of this slide is a stop screw. By this arrangement the greatest rigidity and accuracy are secured.

Spindle gear is 16¾ inch diameter, and the driving gear on cone shafts are 4 inch diameter. They are connected by a yoke, and are not thrown out of gear by the adjustment of the spindle.

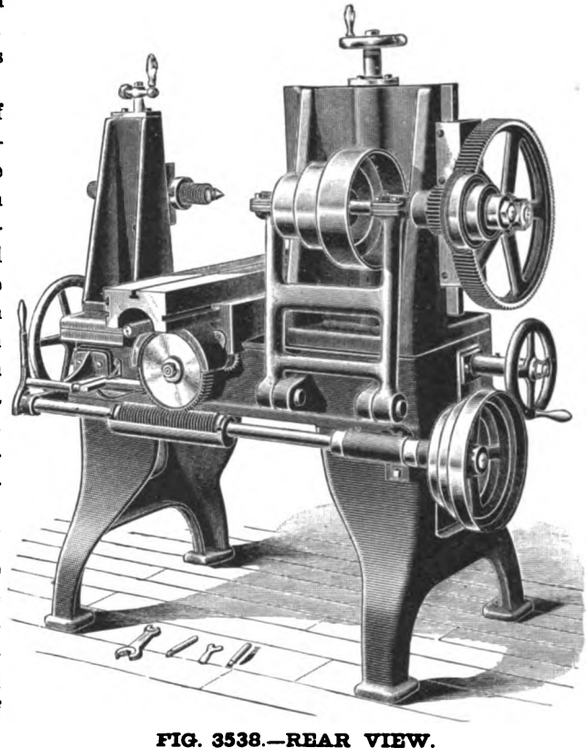


FIG. 3538.—REAR VIEW.

Table is 33½ inches long by 7 inches wide, and is provided with an automatic feed motion of 22 inches, adjustable at any point.
Vertical adjustment of spindle, 9 inches.
Cone pulley has three changes for a 3 inch belt.
Driving pulleys on countershaft are 12 inch diameter by 4 inch face, and should make 125 revolutions per minute.
This machine can be made with overhanging arm and without foot stock, to order, at same price as with foot stock.

WEIGHT, 2,150 LBS. **PRICE, $.....** **EXTRA FOR VISE, $.....**

DUPLEX MILLING MACHINE.

This machine is designed for manufacturing purposes, taking cuts on one side of two pieces, or on two sides of one piece at the same time, the article passing between the ends of the spindles, and the work done by face mills, which produce the best results when the nature of the work will admit of their use. Milling cutters of this character are the most economical to construct and maintain.

The bed is 7½ feet long, 18 inches wide, 27 inches deep, and very heavy.

Heads.—There are two heads, one fixed; the other can be moved horizontally, by means of a screw, to any desired position on the bed, and securely fastened.

The spindles run in bronze boxes. The front bearing is 4⅞ inch diameter, 6 inches long; back bearing, 3⅜ inch diameter, 5 inches long. The greatest distance from end to end of spindles is 2 feet 8 inches; least distance, 5 inches. The driving pulleys are 16 inch diameter for 5 inch belt. The back gearing is in the ratio of 6 to 1.

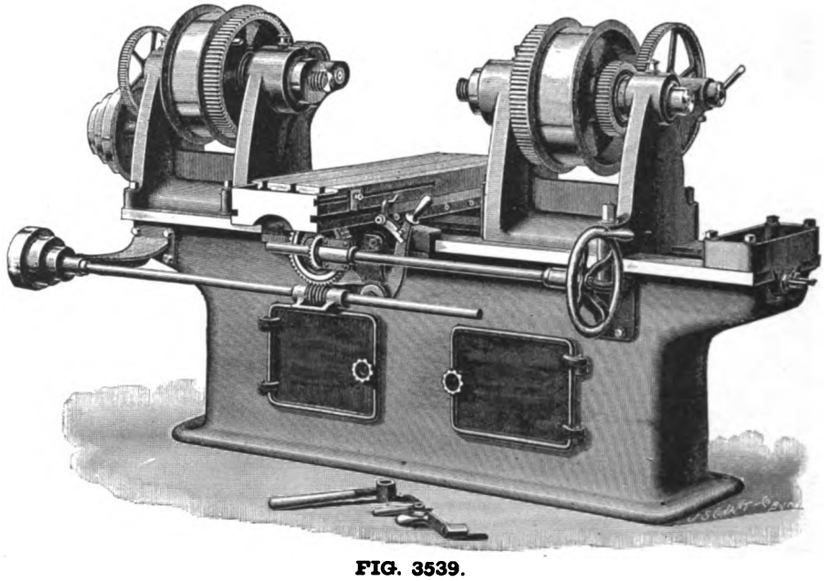


FIG. 3539.

The carriage is moved on the bed, by a screw, to the desired position, and then fastened.

The table has no vertical adjustment, the article to be operated on being held in a suitable fixture. The top has three T slots, and is 40 inches long, 14 inches wide, and has an automatic screw feed of 24 inches; the length and feed can be increased, if desired. The distance from center of spindles to top of table is 10 inches.

Countershafts.—There are two countershafts, each having a three section cone, giving six properly arranged speeds to the spindles. The first shaft has tight and loose pulleys 16 inches in diameter for a 5 inch belt, and should run about 120 turns per minute.

WEIGHT, INCLUDING TWO COUNTERSHAFTS, 5,500 LBS. **PRICE, $.....**

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NO. 1 NEW PATTERN MILLER.

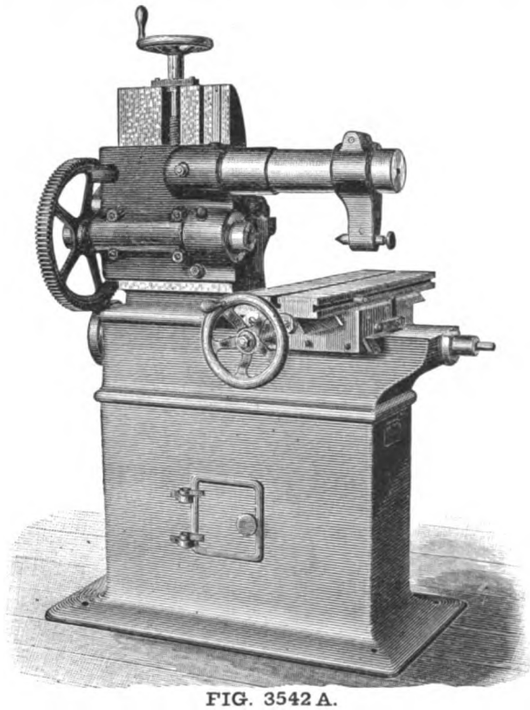


FIG. 3542 A.

Designed for sewing machine factories, armories, etc. The spindle head has an overhanging arm to support the outer end of arbor, the back boxes are connected to the head by links, keeping the gears in correct mesh while spindle is raised or lowered; this allows the cutter, when necessary, to be fed down into the work. The carriage is 30 inches long, 8 inches wide, vertical adjustment of spindle 10 inches above carriage. Has 3 changes of speed and 3 changes of automatic feed with stop. Feed screw is double lead, giving a quick return to carriage. Carriage can be made longer if required.

WEIGHT, 2,000 LBS. PRICE ON APPLICATION.

NO. 3 NEW PATTERN MILLER.

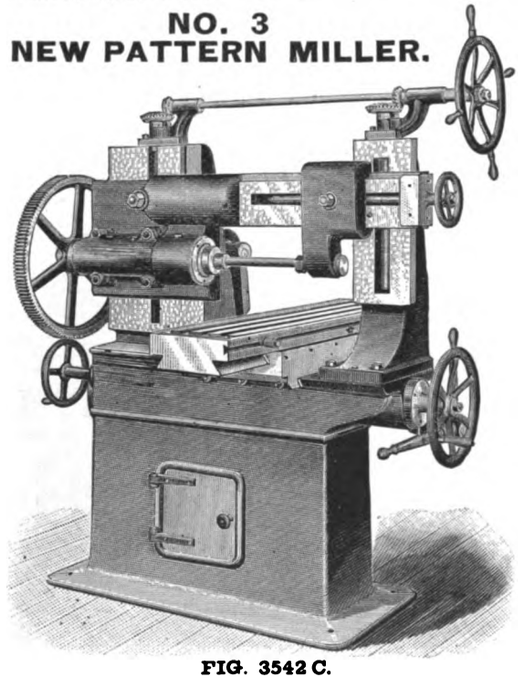


FIG. 3542 C.

The machine is designed especially for locomotive builders and other shops building large work. Has an improved self-feed and automatic stop. The feed screw of carriage is double lead, giving a quick return. The head and back boxes are connected by links, allowing the head to be adjusted and keeping the gears in perfect mesh. We build machine with independent heads or with overhanging arm. Has 3 changes of speed and feed. Carriage 42 inches long, 12 inches wide, vertical adjustment of spindle 12 inches from carriage. Carriage can be made longer if required.

WEIGHT, 3,500 LBS. PRICE ON APPLICATION.

NO. 2 NEW PATTERN MILLER.

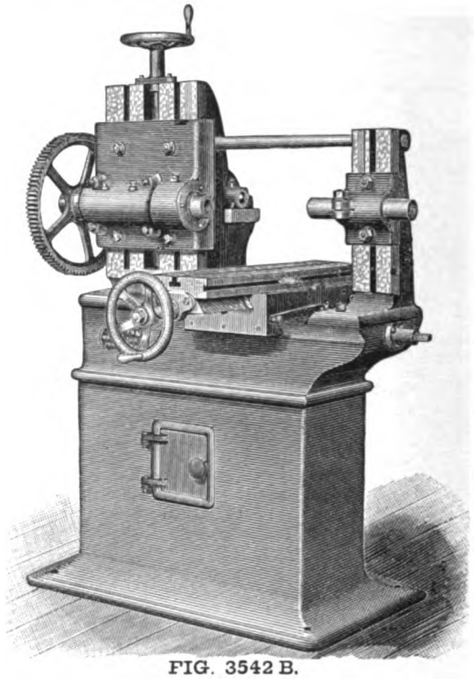


FIG. 3542 B.

An improved designed milling machine, superior to the ordinary gun milling machines, with an improved self-feed and automatic stop motion. For work in electric light manufactories and other work within the range of the tool. We build the tool with independent heads or with an overhanging arm. The back boxes and spindle head are connected with links, which keep the gears in perfect mesh while the head is being adjusted; this allows the cutter to be fed down into the work when necessary. The carriage feed screw is double lead, giving a quick return. Has 3 changes of speed and feed. Carriage 44 inches long, 9 inches wide, vertical adjustment of spindle 11 inches from carriage. Carriage can be made longer if required.

WEIGHT, 2,200 LBS. PRICE ON APPLICATION.

NO. 1 DUPLEX MILLER.

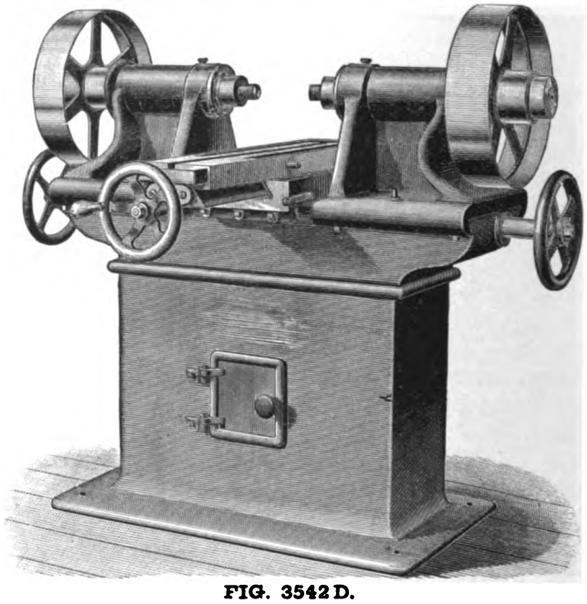


FIG. 3542 D.

Machine is adapted to mill both sides of small work on light engines and small parts of high speed engines, or other work adapted to the range of the tool. Machine has two heads which are adjustable so that the cutters can be closed up to each other or can be opened out to admit 24 inches between the nose of the spindles. Carriage of the machine is 33 inches long, 8 inches wide, has an automatic feed of 20 inches; tool can be used with fixtures for milling hexagon nuts, heads of bolts, etc. Distance between center of spindles to top of carriage 5½ inches; this distance can be changed to suit, at a slight additional cost.

WEIGHT, 2,100 LBS. PRICE ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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NO. 1 1-2 DUPLEX MILLER.

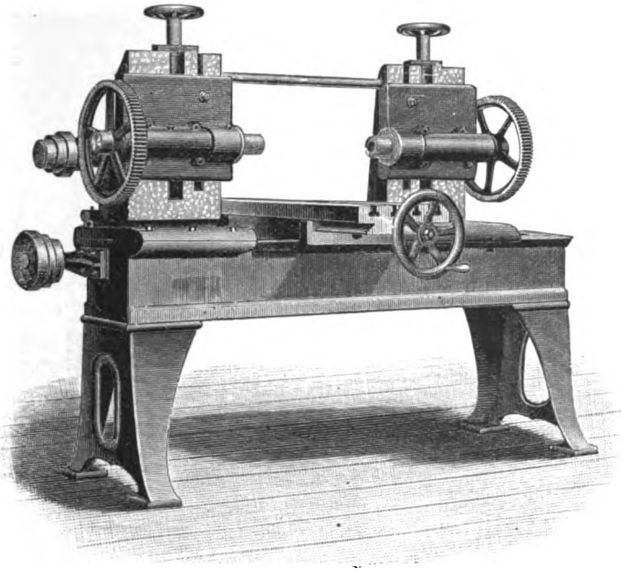


FIG. 3542 E.

Machine has a capacity to admit work between end of spindles, 31 inches; between upright, 40 inches; carriage, 15 inches wide, 48 inches long, with a feed of 31 inches, or can be made longer if necessary. Center of spindle will raise 10 inches above table; the heads are adjustable in and out toward carriage for the different widths of work. The tool can be used as a double-headed milling machine with two face cutters, or can be used singly with one head running or connected up with the arbor, as shown in the illustration, driven from both ends of the arbor. A very convenient tool for work within the range.

WEIGHT, 1,000 LBS. PRICES ON APPLICATION.

NO. 2 1-2 DUPLEX MILLER.

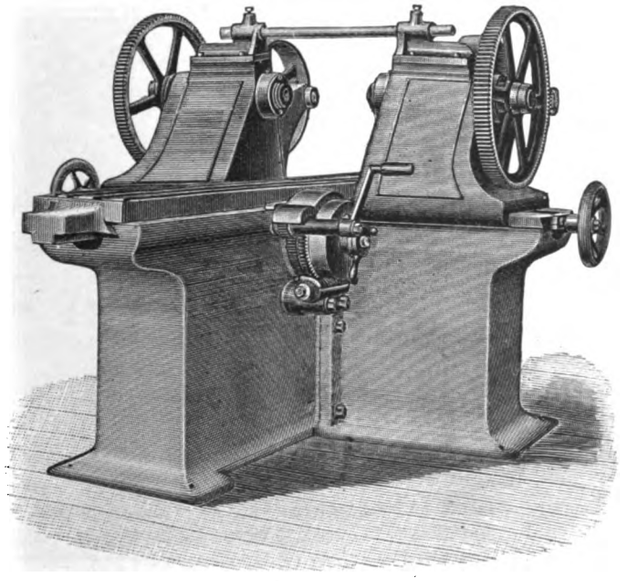


FIG. 3542 G.

Machine is adapted to milling stub ends of connecting rods, guide blocks, straps, etc., for locomotive and engine builders, and any parallel work that can be placed on centers or fixtures. The machine has two independent heads, which can be adjusted to suit the various sizes of work. The carriage of machine is 6 feet long—can be made longer—12 inches wide; has three changes of automatic feed. Distance between center of spindles and top of carriage can be made to suit purchaser. Carriage is fed with rack and spiral pinion, the same as the larger sizes.

WEIGHT, 8,700 LBS. PRICES ON APPLICATION.

NO. 4 DUPLEX MILLER.

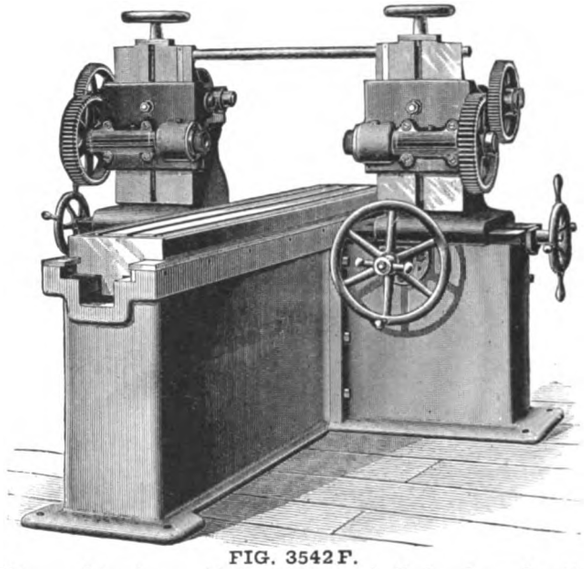


FIG. 3542 F.

This machine is provided with two spindle heads, and cutters of any required size may be used in them. The spindles, which are very heavy and are driven with compound gearing, have four changes of speed. If desired, we make machine with back gears, giving eight changes of speed. The spindle heads are adjustable in all desirable directions. The carriage has an automatic feed with six changes, with quick return by hand. The carriage is fed with a rack and spiral pinion. Work to be milled is placed in a proper holder, and face cutters having inlaid teeth are brought to bear upon each side, and both sides are milled at once. For ordinary milling, or when two cutters cannot be used, cutters of any desired shape, profile or size are placed on an arbor in the left-hand head. The right head acts as a foot-stock, or bearing, for the arbor, or for very heavy milling great power may be obtained by using both heads on one arbor. Has a carriage 13 inches wide to mill 6 feet long; spindles can be raised 16 inches above carriage and will admit work 39 inches between them. We furnish a pump and drip pans and reservoir for soda water or oil at a small additional cost. Carriage can be made any length.

WEIGHT, 10,000 LBS. PRICES ON APPLICATION.

NO. 2 DUPLEX MILLER.

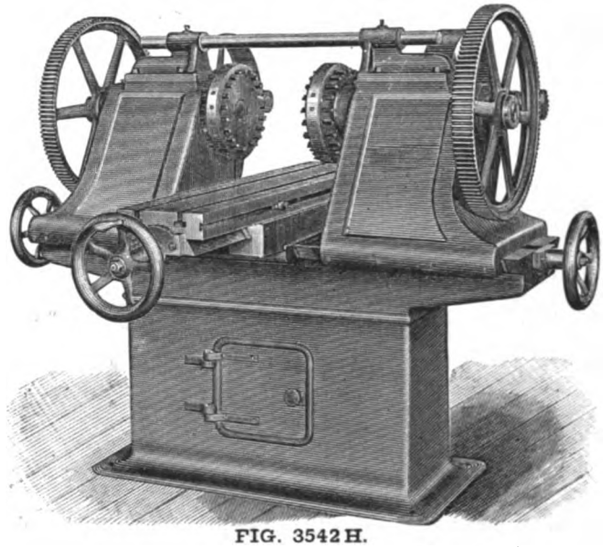


FIG. 3542 H.

This machine is adapted to milling stub ends of connecting rods, guide blocks, straps, etc., for locomotive and engine builders, and any parallel work that can be placed on centers or fixtures. The machine has two independent heads, which can be adjusted to suit the various sizes of work. The carriage of machine is 53 inches long, 12 inches wide; has three changes of automatic feed with automatic stop. Distance between center of spindles and top of carriage can be made to suit purchaser.

WEIGHT, 5,125 LBS. PRICES ON APPLICATION.

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NO. 4 DUPLEX MILLER.

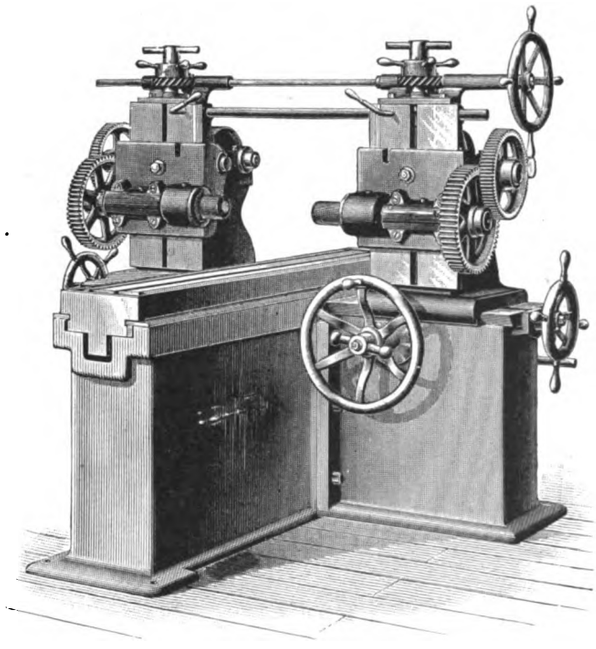


FIG. 3542 K.

Illustrates machine the same as illustrated, Fig. 3542 F, with additional attachments for convenience in handling the work. The heads, as shown, are connected together so that a simultaneous adjustment can be obtained for lowering the cutter down into the work. On engine rods, locomotive rods, or any work where it is desired to lower the cutter into the work it will be found a very useful attachment, and milling brasses and other work of the kind.

We can furnish a pump and reservoir for soda water or oil, or any necessary arbor, face cutters or attachments, and should be pleased to quote prices on application.

WEIGHT, 10,100 LBS.

NO. 5 DUPLEX MILLER.

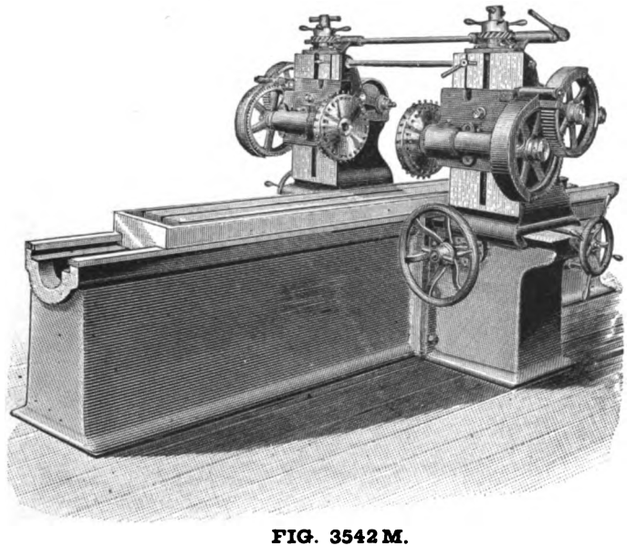


FIG. 3542 M.

The above illustration shows the same machine as illustrated, Fig. 3542 L, with additional attachments, which are furnished with the machine at an advance in cost. The heads as shown are coupled together, giving a simultaneous adjustment to the heads where it is desired to lower the cutter down into the work while it is in operation. It will be found a very useful tool for filleting locomotive rods and work of that description. The face cutters are also illustrated, showing a pair of face cutters screwed to the end of the spindles. Machine will be furnished, if necessary, with drip pans and reservoir for soda water or oil.

WEIGHT, 16,200 LBS. PRICES ON APPLICATION.

NO. 5 DUPLEX MILLER.

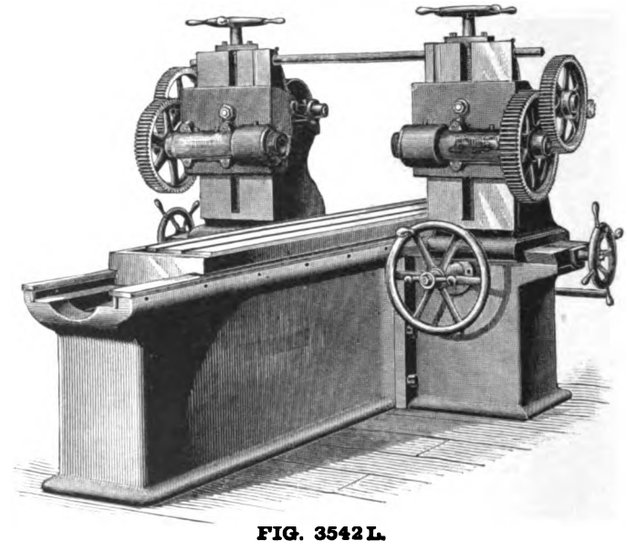


FIG. 3542 L.

This machine is provided with two spindle heads, and cutters of any required size may be used in them.

The spindles, which are very heavy and driven with compound gearing, have four changes of speed. If desired, we make machine with back gears, giving eight changes of speed. The spindle heads are adjustable in all desirable directions. The carriage has an automatic feed with six changes, with quick return by hand. The carriage is fed with a rack and spiral pinion. Work to be milled is placed in a proper holder, and face cutters having inlaid teeth are brought to bear upon each side, and both sides are milled at once. For ordinary milling, or when two cutters cannot be used, cutters of any desired shape, profile or size are placed on an arbor in the left-hand head. The right head acts as a foot stock or bearing for the arbor, or for very heavy milling great power may be obtained by using both heads on one arbor. Many operations can be performed with these tools 50 per cent. quicker than with an ordinary milling machine. Has a carriage 18 inches wide to mill 7 feet 3 inches long; spindle can be raised 17 inches above carriage and will admit 42 inches between them.

WEIGHT, 16,000 LBS. PRICES ON APPLICATION.

NO. 6 DUPLEX MILLER.

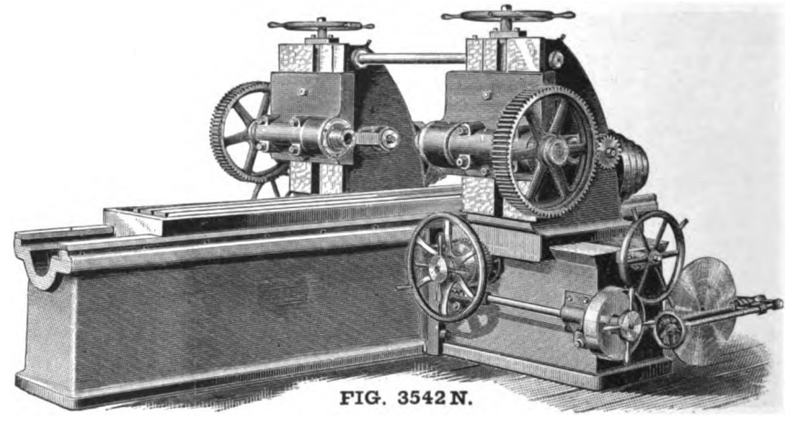


FIG. 3542 N.

The machine is of a design to meet the requirements of very heavy work. Has two uprights carrying spindle heads, allowing the spindles to be adjusted vertically to the height of 23 inches from carriage, and uprights can be adjusted to admit 58 inches between them. The spindles are very heavy and are driven by cut spur and worm wheels. The carriage is 22 inches wide, to mill 8 feet long—can be made any desired length—has an automatic feed with hand and power quick return. The feed motion derives its power from back driving shaft through a train of helical and worm wheels; the variation of feed is made by a friction plate and roller, giving the desired feed for all sizes of cutters. The carriage is driven on feed by a rack and spiral pinion. The uprights are prevented from springing apart on heavy cuts by the rod on top. The machine can be used for facing both sides of parallel work at one time or as an ordinary milling or slabbing machine.

WEIGHT, 30,000 LBS. PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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NUT-FINISHING MACHINERY.

NUT-FACING MACHINE.

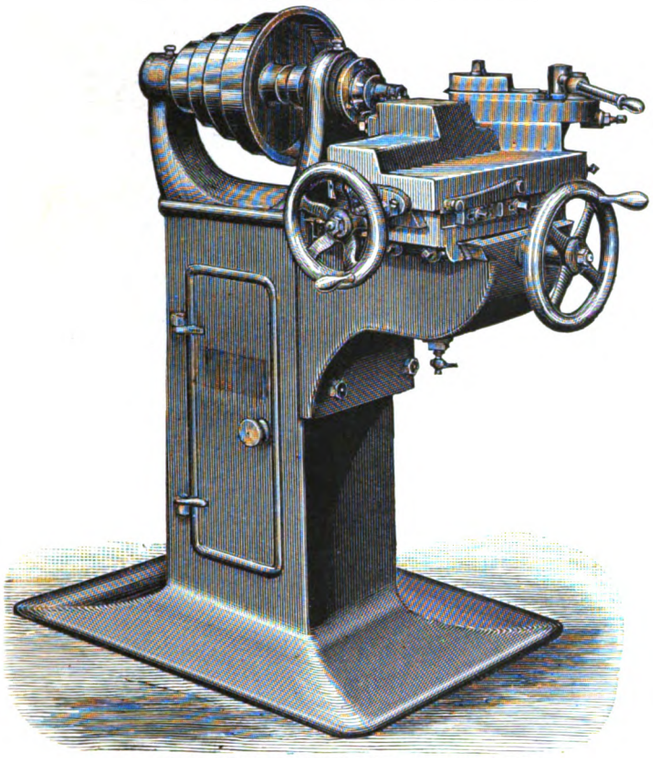


FIG. 3542 P. WEIGHT, 2,100 LBS.

DOUBLE-HEADED NUT-MILLING MACHINE.

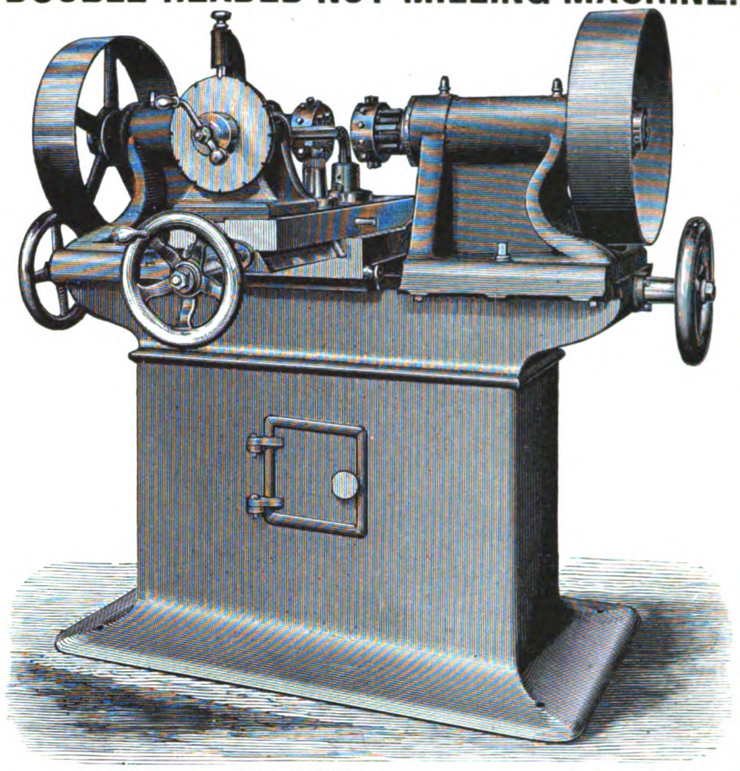


FIG. 3542 S. WEIGHT, 2,000 LBS.

A NUT-FINISHING PLANT.

Is composed of a nut-facing machine for facing the end of the nuts, and nut-milling machine for finishing the sides. These tools are in use in most of the locomotive and nut and bolt works, and are giving universal satisfaction. Fig. 3542 P represents the nut-facing machine. This machine has many advantages over a lathe or ordinary facing machine. The tools for facing can be made 12 inches long, the profiles desired are planed or milled in lengthwise on the faces of them, and tool is ground on the end and always retains its shape; the tools are tempered the whole length, and no dressing is required. A pair of sample tools is furnished with each machine. Ball and socket arbors from ⅜ inch to 1⅛ inches are furnished with the machine, by the use of which the nuts are faced at right angles with the axes of the thread. An important feature of this tool is a device for reaming the burr from the thread. A small tool is held in the carriage and operates on the nut the same time it is being faced, requiring only one operation to face the nut and ream the burr from the thread.



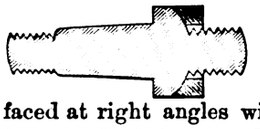


Fig. 3542 S illustrates the double-headed nut-milling machine. It has two independent head-stocks, each provided with an improved adjustable cutter, the teeth of which are made of ⅜ inch square steel, and are 4 inches in length. The teeth are placed in two rows or circles in the cutter-head, and are held in position by set screws. The first row acts as an advance or roughing cutter, and the inner row, which projects $\frac{1}{64}$ inch further, takes the finishing cut. A set of nut-arbors from ⅜ inch to 1⅛ inches are furnished with machine, and arbors from 1⅛ inches to 2 inches are furnished at $6.00 each, and from 2 inches to 3 inches at $10.00 each. There is also a device provided for setting the nuts in position on the arbors, so that they will come exactly square with the face of the cutter when they are placed for milling, and no further setting is required. The machine mills two sides of from 12 to 20 nuts at once, depending on the thickness of the nuts.



NUT-FACING, ETC., TOOL GRINDER.

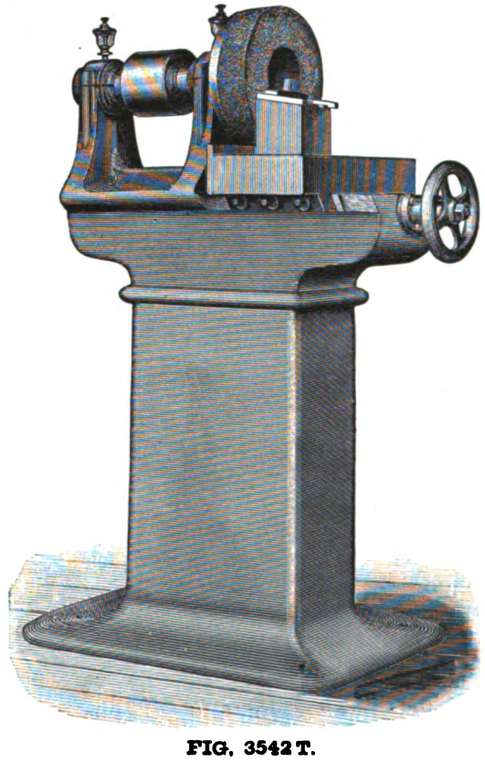


FIG. 3542 T.

With this machine a cup or side-wheel is used, and tools of different kinds for the nut-facing machines or milling machines can be ground to any desired angle or profile. This machine is desirable with our nut-finishing plant. We also build the machine with compound carriages for key grinding when desired.

PRICES ON APPLICATION.

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MILLING MACHINES.

HORIZONTAL SPINDLE.

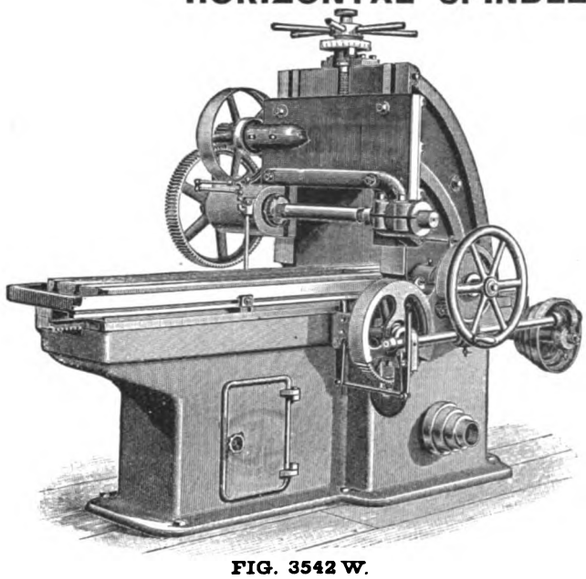


FIG. 3542 W.

This machine is intended for long and heavy cuts, such as guide bars, connecting rods, key seating shafting, axles to 10 inches diameter, etc., and is a very solid, substantial tool.

The bed is heavy and well stiffened by a number of girts, making a firm support for the table and housings.

The table is 14 inches wide, has three T slots and is furnished six or eight feet long as desired, moves by cut rack, and so geared as to be easily operated by hand, and is surrounded by a trough to collect lubricant used on cutters.

The cross head is gibbed to the housings and adjusted by a screw with graduated dial reading to thousandths, which facilitates accurate measurement for sinking and other cuts. The distance between housings is 19 inches.

The spindle runs in bronze bearings $4\frac{3}{8}$ inches diameter and $5\frac{1}{2}$ inches long, is driven by a $3\frac{1}{2}$ inch belt over a 16 inch pulley, through gearing in the ratio of 5 to 1, arranged for 4 speeds. Provision is made for horizontal adjustment of cutters, in addition to that afforded by washers. The greatest distance from top of table to center of spindle is 14 inches; the least, 3 inches. Cutters to $8\frac{1}{2}$ inches diameter can be used. Cutter section of spindle is $1\frac{3}{4}$ inches diameter, 14 inches long.

The feed is actuated by means of a worm and gear driven by cones having four sections, and can be thrown out by hand as desired, or stopped automatically by adjustable stop, and is the full length of table.

A pump returns the lubricant to the cutters as collected in a tank contained in the bed. Countershaft has tight and loose pulleys 14 inches diameter for $4\frac{1}{2}$ inch belt, and should run 190 turns per minute. Weight, 5,500 lbs.

PRICES.

With table 6 feet long.....$.....
" " 8 " " .....

SPECIAL VERTICAL MILLER.

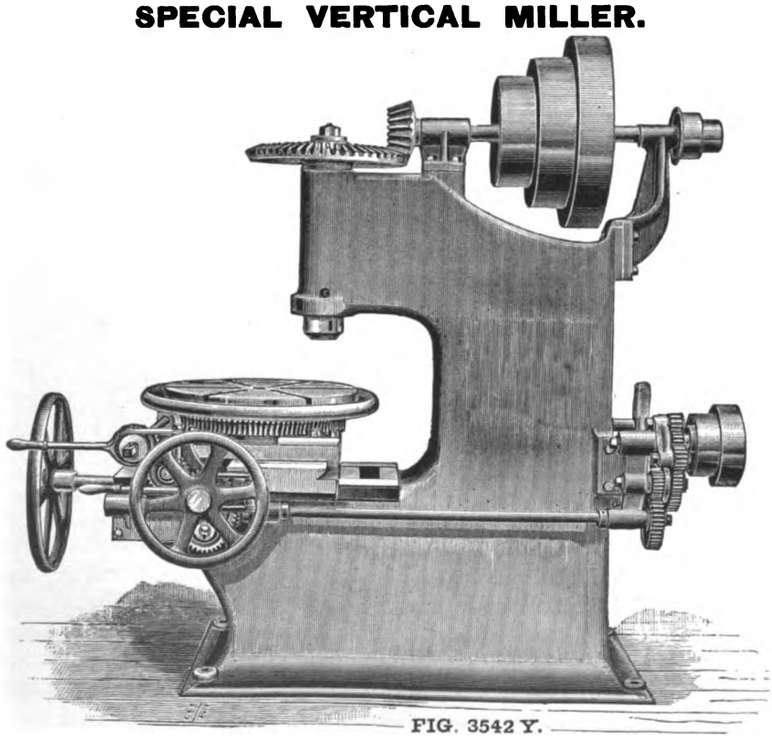


FIG. 3542 Y.

VERTICAL SPINDLE.

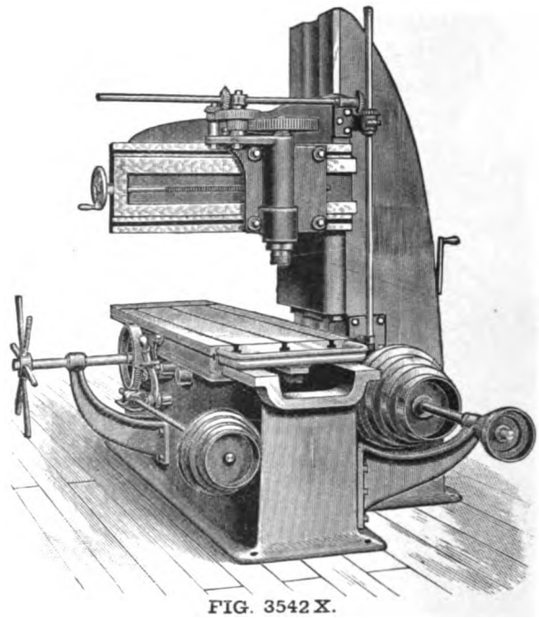


FIG. 3542 X.

This machine is designed for surface milling, using face or end cutters from 4 inches to 12 inches diameter.

The bed is heavy and well stiffened with girts, and calculated to absorb all vibrations.

The upright is firmly attached to the bed, is of box pattern $8\frac{1}{2}$ feet high, 24 inches wide, and so constructed as to best withstand torsional strains and vibrations.

Table is 24 inches wide, 96 inches long. Pans project from each end to protect bearings on bed, which are flat, and to which it is firmly gibbed. There are three T slots running its entire length.

Cross head has a bearing on upright of 24 inches wide, 42 inches long, and is well braced to resist action of cutter. It is adjusted by means of a screw geared down to a hand crank provided with graduated dial reading $\frac{1}{1000}$ inches.

Saddle which carries the spindle is securely gibbed to the cross head, on which it has a movement of 24 inches at right angles to that of the table.

Spindle is of hammered steel, and runs in hard bronze boxes; the lower one is conical, 4 inches diameter, 5 inches long. It is driven by a $3\frac{1}{2}$ inch belt on a 4 section cone through gearing in the ratio of 16 to 1 calculated to give proper speeds for cutters ranging from 4 inches to 12 inches diameter.

Feed is by hand or power the full length of table, and is provided with automatic stop. There are four changes to correspond with size of cutter used, so arranged as to give a uniform rate of 2 inches feed per minute.

Countershaft has tight and loose pulleys 16 inches diameter for $4\frac{1}{2}$ inch belt, and should run 340 turns per minute.

Weight, 10,000 lbs.

PRICE, $.....

We are prepared to furnish this machine with two spindles, so placed as to best perform the duty required, or make such other changes as may be thought advisable.

DESCRIPTION, FIG. 3542 Y.

This machine is designed to do a great variety of work, in wrought and cast iron, where a vertical adjustment of the spindle is not required, and the spindle bearing being so close to the table makes it a very stiff and rigid machine, and will do very much larger work than would be supposed. It will mill a full size locomotive connecting rod in remarkably short time.

Diameter of table, 24 inches.

Weight, lbs.

PRICE, $_____

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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VERTICAL MILLERS.

NO. 4 MACHINE.

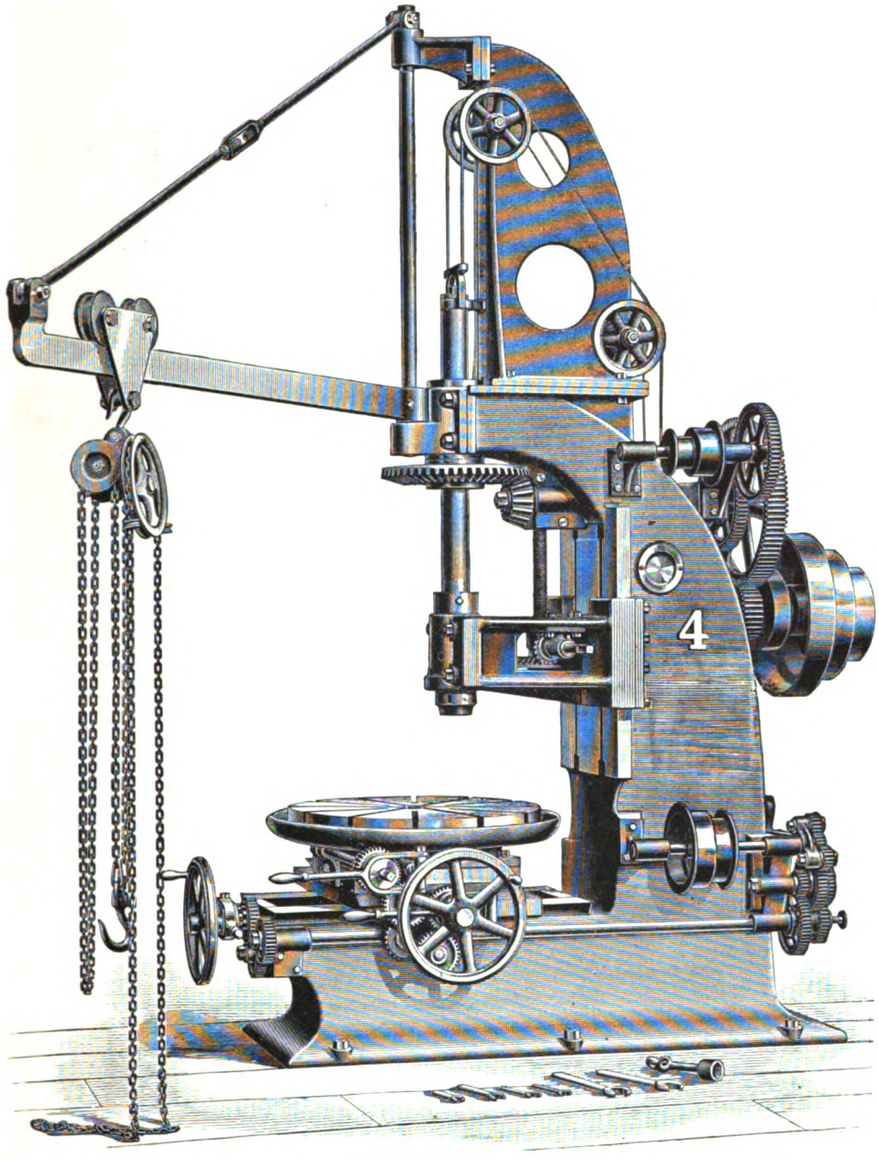


FIG. 3543.

SIZES AND PRICES.

Figure.	Size.	Diameter of table.	Weight.	Price.
3544	No. 1	18 inches.		$ .....
3544	" 2	24 "		.....
3544	" 3	36 "		.....
3543	" 4	36 "		.....

Price No. 4 includes crane and chain block.

DESCRIPTION, FIGS. 3543 AND 3544.

STANDARD DESIGNS FOR LOCOMOTIVE AND STEAM ENGINE WORK.

We call special attention to the powerful gearing, large spindle, and spindle bearing, with vertical adjustments, all designed for doing work rapidly.

By actual demonstration it has been proven that one of these vertical milling machines will do work that is now done on slotting machines, with a saving of at least 50 per cent. of time.

To mill links, connecting rods, guide yokes, etc., make the milling cutter of proper diameter, so that the radius of fillets will be correct when they come from the machine. The cutters should be made spiral, same as used in small horizontal milling machines.

We attach to the machine a pump and tank for soda water, which is so arranged as to keep a constant stream upon the cutter, keeping it cool. We furnish an overhead countershaft with each machine.

NOS. 1, 2 AND 3 MACHINE.

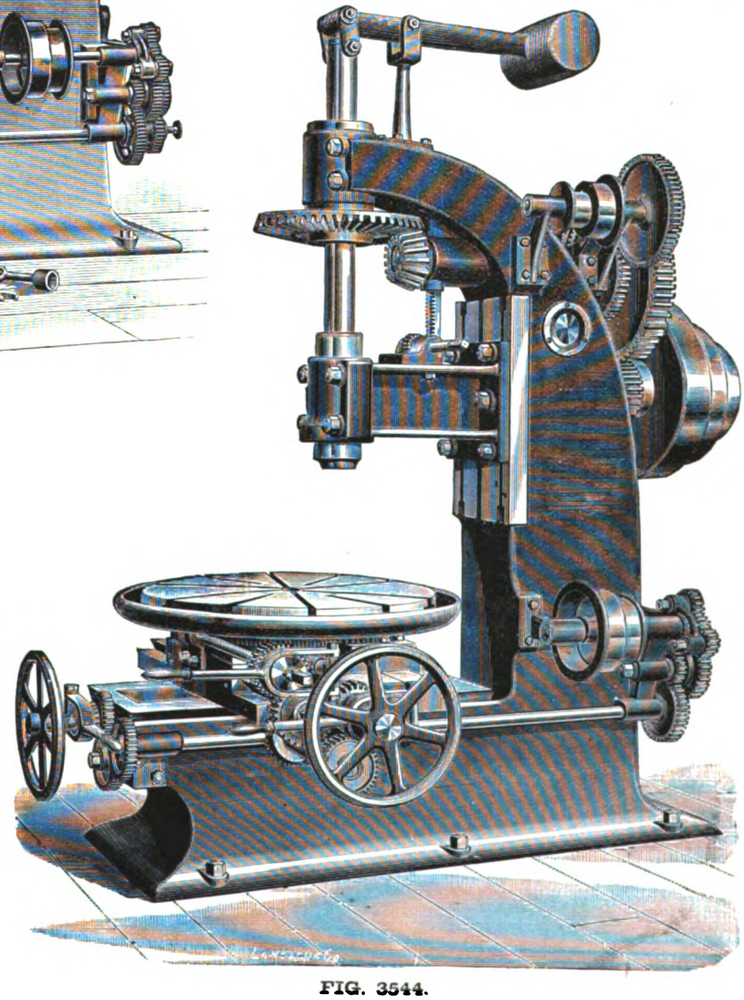


FIG. 3544.

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2 SPINDLE VERTICAL MILLER.

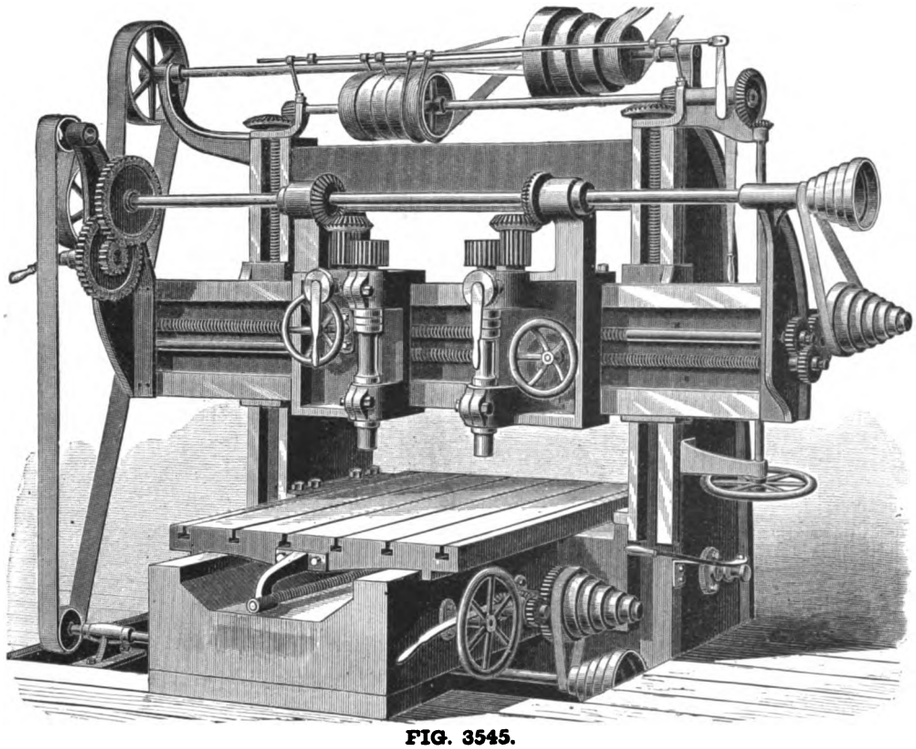


FIG. 3545.

DESCRIPTION, FIG. 3545.

PRICE	**$3,000.00**
Weight, about	18,000 lbs.
Length of table as desired, or	72 in.
Width of table	42 "
Width between housings	54 "
Least width between centers of spindles	8 "
Vertical adjustment of cross head	24 "
Cone faces	16, 14, 12 and 10 in. diam. x 3¼ in. wide.
Ratio of back gear to speed of cutter	7 to 1.
Floor space over all, front and back by right and left	12 x 14 ft.
Height over all	9 ft.

The table has a longitudinal travel of 66 inches, and is fed by a screw that may be operated by hand or power in either direction. The table feed has four changes of speed, besides a power "rapid transit" motion to run the table in either direction.

The quick motion is especially intended for running the table back after the cut is finished, and, being entirely independent of the cone feed, both can be in operation at one and the same time.

The cross head is raised and lowered by power, and in addition each spindle has an independent vertical adjustment of 2 inches.

Each saddle is capable of independent lateral motion, operated by the large hand wheel at front, and has also a power attachment for feeding, with four changes of speed. The saddles may be moved independently from the power feed while the latter is in operation. The cross head is made of sufficient length to allow the saddles to be run out far enough to bring the milling cutters outside of the housings.

VERTICAL MILL.

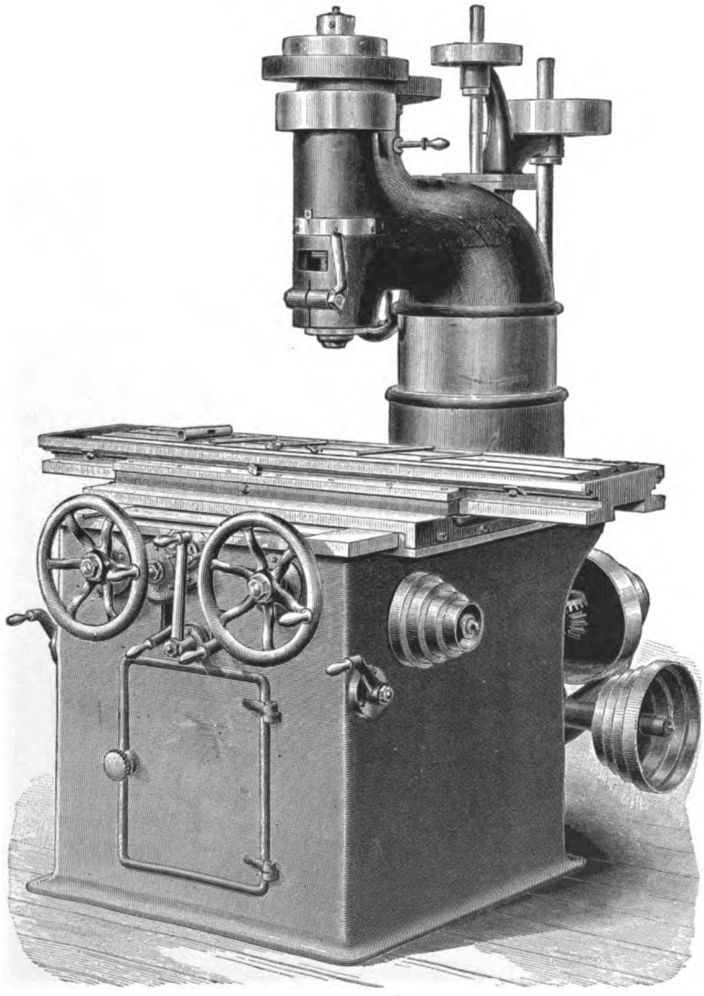


FIG. 3546.

DESCRIPTION, FIG. 3546.

The platen is gibbed solidly to a broad and substantial base, and rests upon flat and ample bearings. It is 41 inches long and 13¾ inches wide, and is fed in either direction automatically or by hand its entire length and width. It has eight changes of speed for each speed of spindle, and all its movements are controlled from the front of the machine.

Vertical adjustments are obtained by raising or lowering the column, and very fine variations in the height of the spindle are made by means of a collar nut. This is graduated, and reads to thousandths of an inch. At its lowest position the spindle is 1½ inches, and at its highest 15 inches above the platen. The bearings of the spindle are long and large, and are provided with means to compensate for wear. The spindle has three belt and three gear speeds, which, with two speeds of counter, make twelve speeds in all. The arbors may be held by a bolt which passes through the hole in the spindle. Cutters up to 8 inches diameter may be used for surfacing.

The countershaft has friction pulleys 12 and 16 inch diameter for 3½ and 4 inch belts, and should run 220 and 165 revolutions.

Weight, 5,100 lbs.

PRICE, $.....

Circular milling attachment, 18 inch diameter, with automatic feed in either direction, is furnished when desired.

PRICE, $.....

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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NO. 1 VERTICAL MILLER.

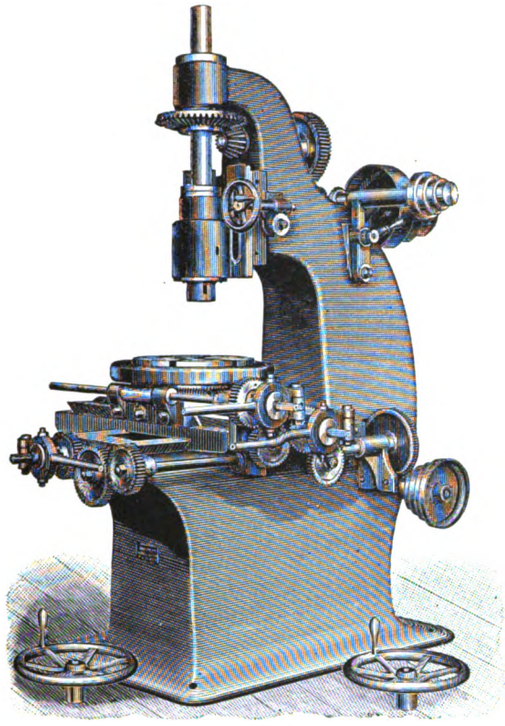


FIG. 3546 A.

The machine is powerfully geared and driven by cone pulleys of large diameter. The spindle can be raised and lowered for operating on work of varying depths. The carriage has longitudinal, transverse and circular movements, all fed automatically or at the will of the operator. The automatic feed can be reversed. Each machine is provided with drip pan and reservoir for oil or soda water. When desired, we furnish a pump for oil or soda water, at a small additional cost. Will admit work 12 inches high, distance from center of spindle to face of column 16½ inches, diameter of table 22 inches. Largest diameter of spindle 4¼ inches.

WEIGHT, 5,000 LBS.

NO. 2 VERTICAL MILLER.

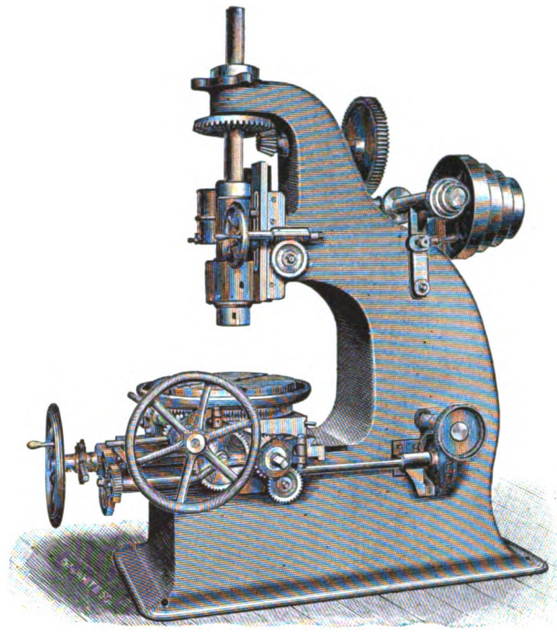


FIG. 3546 B.

The machine is powerfully geared and driven by cone pulley of large diameter. The spindle can be raised and lowered for operating on work of various depths. The carriage has longitudinal, transverse and circular movements, all fed automatically or at the will of the operator. The automatic feed can be reversed. Each machine is provided with drip pan and reservoir for oil or soda water. When desired, we furnish a pump for oil or soda water, at a small additional cost. Will admit work 15 inches high, distance from center of spindle to face of column 23 inches, diameter of table 38½ inches. Largest diameter of spindle 7 inches.

WEIGHT, 12,000 LBS.

NO. 3 VERTICAL MILLER.

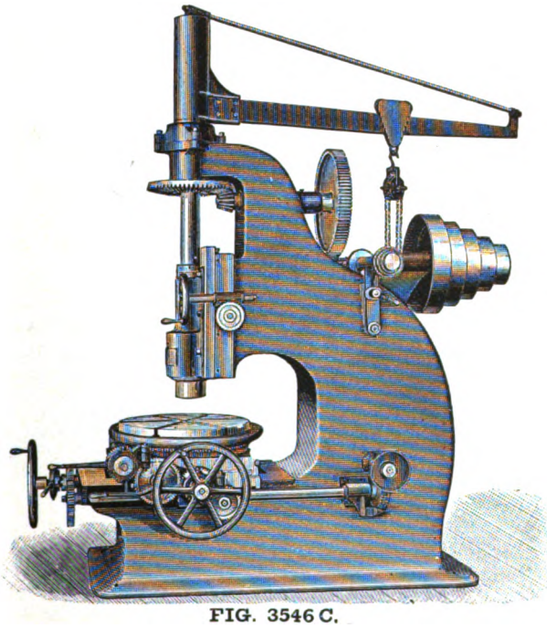


FIG. 3546 C.

The machine is powerfully geared and driven by cone pulleys of large diameter. The spindle can be raised and lowered for operating on work of varying depths. The carriage has longitudinal, transverse and circular movements, all fed automatically or at the will of the operator. The automatic feed can be reversed. Each machine is provided with drip pan and reservoir for oil or soda water. When desired, we furnish a self-contained crane for heavy work and a pump for oil or soda water, at a small additional cost. Pattern arranged to admit work 15 or 20 inches from carriage to frame, as desired. Carriage is 49½ inches diameter. Largest diameter of spindle 8 inches.

WEIGHT, 16,000 LBS.

SPECIAL NO. 2 VERTICAL MILLER.

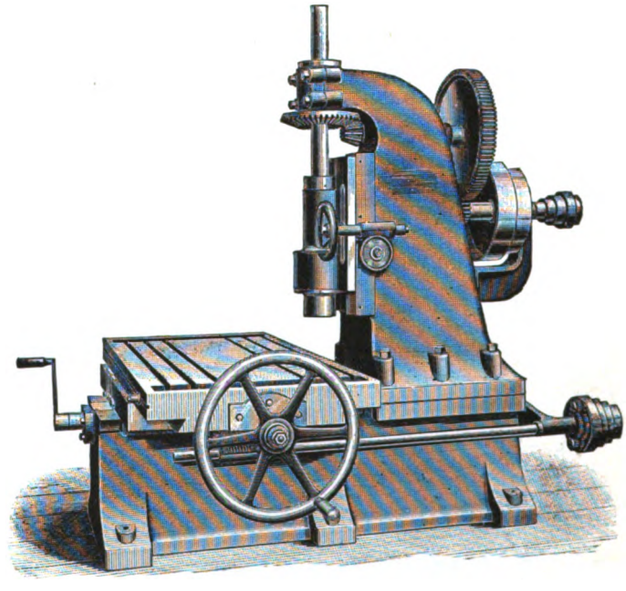


FIG. 3546 D.

Machine is built specially for milling the ends of street-car rails where they are to be jointed for the crossings. Adapted to other work where an ordinary milling cutter can be used on the end of the work, or where face milling is required on one end of long work.

The tool is very powerfully geared; has a large driving cone; table is 36 inches wide, 6 feet long, and has a traverse of 48 inches.

WEIGHT, 13,000 LBS.

PRICES ON APPLICATION.

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NOS. 1 AND 2 VERTICAL UNIVERSAL MILLERS.

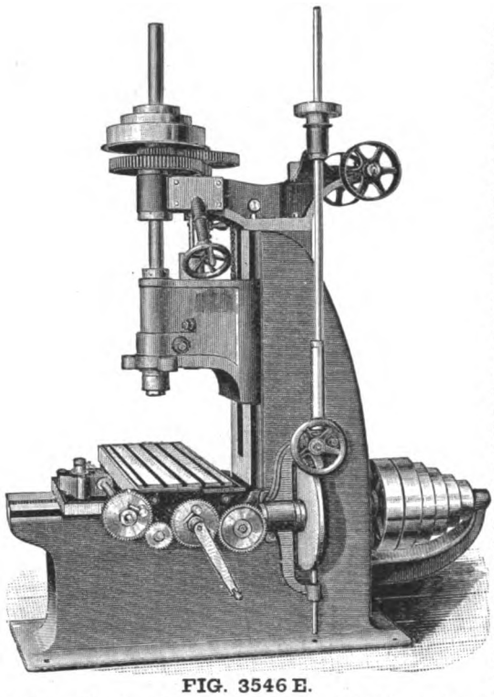


FIG. 3546 E.

This cut illustrates No. 2 Vertical Universal Milling Machine, a machine which is specially adapted to universal work of either a light or heavy character. The machines have an automatic feed longitudinally and transversely, which can be reversed.

The No. 1 machine is of the same general design as the No. 2, with the exception that it has no back gears, being driven with the belt alone. The machine can be used as a slabbing and milling machine or can be used with a small cutter for the smallest work, having a variable automatic feed arranged to suit cutters from ½ inch diameter to 6 inches diameter.

The spindle head of the machine is gibbed to the upright and can be lowered down close to the table. The head, being counterweighted, can be readily adjusted.

The No. 1 has a carriage 12 inches wide, 42 inches long, and an automatic feed of 26 inches. The heads can be raised to allow 16 inches from the nose of the spindle to top of the carriage and will admit work in diameter of 23 inches.

WEIGHT, 4,500 LBS.

The No. 2 has a carriage 16¼ inches wide, 54 inches long, automatic, having a longitudinal feed of 36 inches, transverse 19 inches. The head can be raised to admit 21 inches between the carriage and the nose of the spindle.

WEIGHT, 6,500 LBS.

NO. 2 VERTICAL UNIVERSAL MILLER.

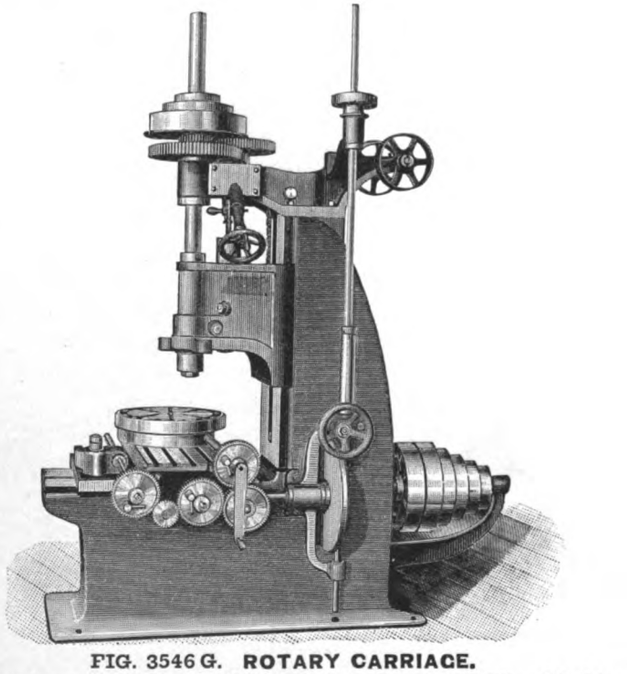


FIG. 3546 G. ROTARY CARRIAGE.

The above cut illustrates No. 2 Vertical Universal Milling Machine with a rotary carriage, which is a separate attachment and can be readily removed from the flat carriage when not required. In using this attachment mills as small as ⅜ inch can be used. By throwing in back gears heavy outside work can be milled, such as stationary engine straps or light locomotive work.

Spiral cutters can be made; gear cutting, die sinking, heaving slabbing, milling, and every operation within the range of these tools can be performed.

WEIGHT, 7,300 LBS.

NO. 2 VERTICAL UNIVERSAL MILLER.

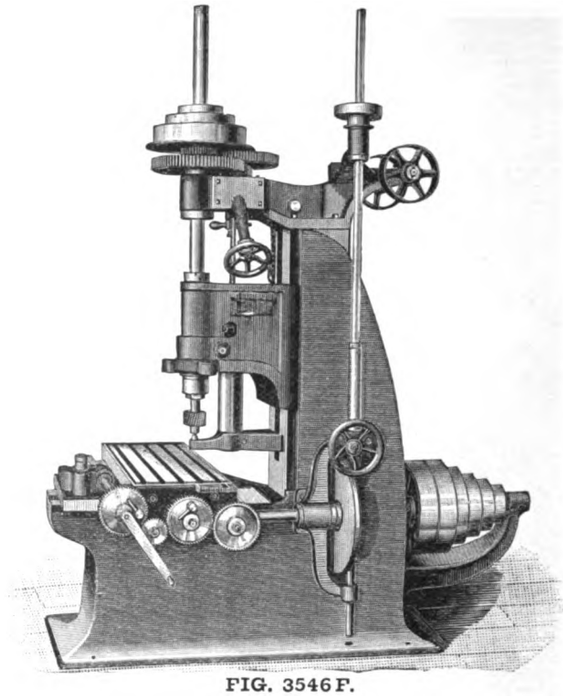


FIG. 3546 F.

The above cut illustrates the No. 2 Vertical Universal Milling Machine with the overhanging arm lowered down to support the end of the cutter. By means of this attachment heavy work, where it is desired to have the cutter away from the nose of the spindle, can be performed on this machine. Cutters of any size up to 8 inches can be supported with this method, the overhanging arm being braced from the head against the face of the upright. This attachment is furnished on all the No. 2 machines and when not in use can be raised up out of the way. There is a micrometer attachment for adjusting the head to $\frac{1}{1000}$ inch on the carriages, and both the longitudinal and the transverse feed have micrometers to read $\frac{1}{1000}$ inch. Not shown on the illustrations there is an attachment which is furnished at an additional cost, to use the horizontal spindle; the attachment bolts to the projectings on the end of the head and can be swung around at any angle and used for milling racks, cutting spiral gears and other work where it is required.

WEIGHT, 6,500 LBS.

NO. 3 VERTICAL SLABBING MACHINE.

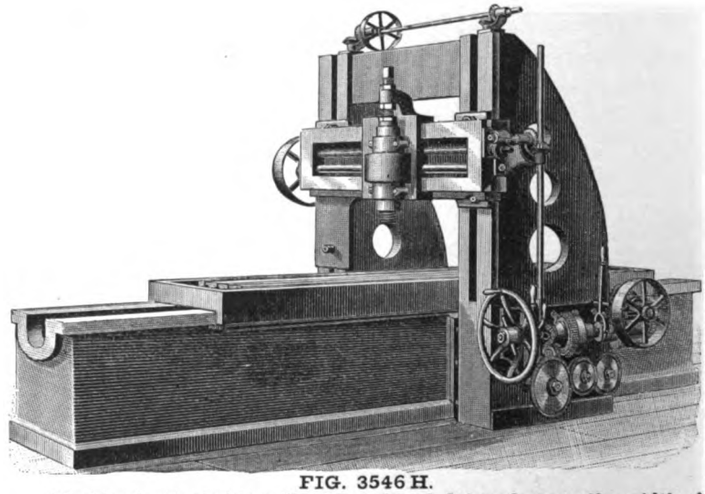


FIG. 3546 H.

Machine is adapted to mill off broad and flat surfaces to the width of 24 inches; cutters of that diameter can be used facing off the entire surface at one cut, or smaller cutters can be used. The carriage is 30 inches wide and 8 feet long over the tee slots and can be made any desired length. The spindle head on rail can be raised to admit 26 inches under the cutter; uprights will admit work 36 inches broad.

The spindle is driven with a steep lead worm and worm-wheel, powerfully geared. The driving cone-pulley is set low on the bed. The rail has power and hand vertical adjustment. The spindle, which can be adjusted in any position across the rail, has a fine adjustment for making finishing cuts if necessary. The carriage is fed with a rack and a spiral pinion and has a variable feed and power quick movement in both directions independent of the hand movement.

WEIGHT, 20,000 LBS.

PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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VERTICAL MILLERS.

	16 INCH.	24 INCH.
PRICE	**$875.00**	**$1,100.00**
Weight	3,800 lbs.	5,500 lbs.
Length of head	18 in.	18 in.
Adjustment of head	16 in.	16 in.
Distance back from center of spindle	18 in.	24 in.
Standard cut back	8½ in.	14 in.
Width of standard	16 in.	17 in.
Diameter of table	16 in.	24 in.
Length of longitudinal feed	16 in.	24 in.
Length of cross feed	16 in.	20 in.
Distance table to top of throat	8 in.	8 in.
Distance bed to top of throat	19 in.	20½ in.
Floor space over all, front to back	6 ft.	6 ft. 6 in.
Floor space over all, right to left	3 ft. 5 in.	4 ft. 4 in.
Height to top of cone	8 ft. 8 in.	8 ft. 9 in.
Height to top of spindle, when up	8 ft. 8 in.	9 ft. 5 in.

Circular, longitudinal and cross feeds are provided, the latter being automatic, and having four changes of speed. The head which carries spindle has long adjustable bearings, is adjustable as to height, and is counter-balanced. The spindle itself is of large diameter, is provided with adjustments to keep same working smoothly, and is equally well suited for operating side, bottom and facing cutters.

The bed and upright portion of frame are made in a single casting, giving the machine great strength and rigidity. A small blower is attached to keep the cutter clear of chips.

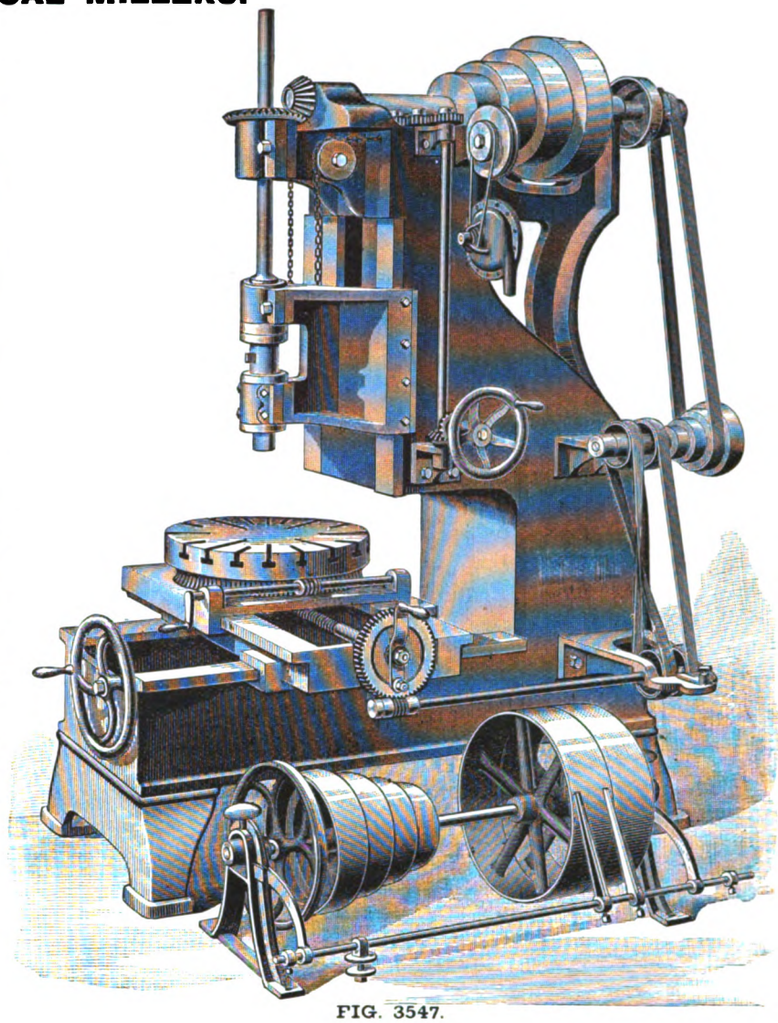


FIG. 3547.

VERTICAL MILLERS.

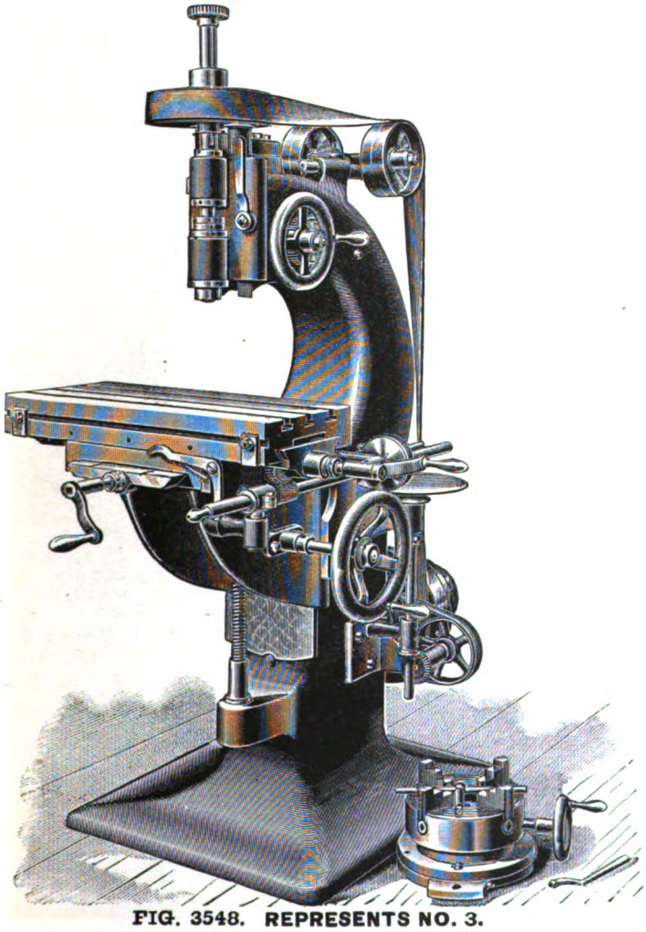


FIG. 3548. REPRESENTS NO. 3.

These machines are designed for the most delicate milling on brass, steel, iron, copper, zinc and wood, and are made in 4 sizes. They have high spindle speed, arrangements for preventing side wear from the effect of the belt, and delicate adjustments for spindle movements and table slides.

Nos. 1 and 2 spindles have foot pad feeds, or by hand, respectively, of 2 and 3 inches. No. 3 has movement of 4 inches, with stop gauges for depth of cut.

Table No. 1 is 14 x 8 inches, with 3 T slots; all hand feeds: vertical, 6 inch; longitudinal, 12 inch; lateral, 10 inch.

Table No. 2 is 9 x 16 inches, with 3 T slots; all hand feeds: vertical, 16 inch; longitudinal, 13 inch; lateral, 12 inch.

Table No. 3 is 27 x 10¼ inches, with 3 T slots; all power feeds: vertical, 16 inch; longitudinal, 18 inch; lateral, 12 inch.

Rotary have a round table or universal chucks, rotated by a worm, and gear is furnished as an extra, and on Nos. 3 and 4 power feeds are applied for all motions.

On the Nos. 3 and 4 the feed is derived from a friction disk, which gives a variable feed right or left hand, from 0 to any desired speed.

Weight: No. 1, 750 lbs.; No. 2, 1,200 lbs.; No. 3, 1,800 lbs.; No. 4, 2,000 lbs.

Prices made on application. Special countershafts made to order, with friction pulleys, according to class of work to be done.

For special tools for use on these machines, see pages 182 and 183.

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UNIVERSAL CUTTER AND REAMER GRINDER.

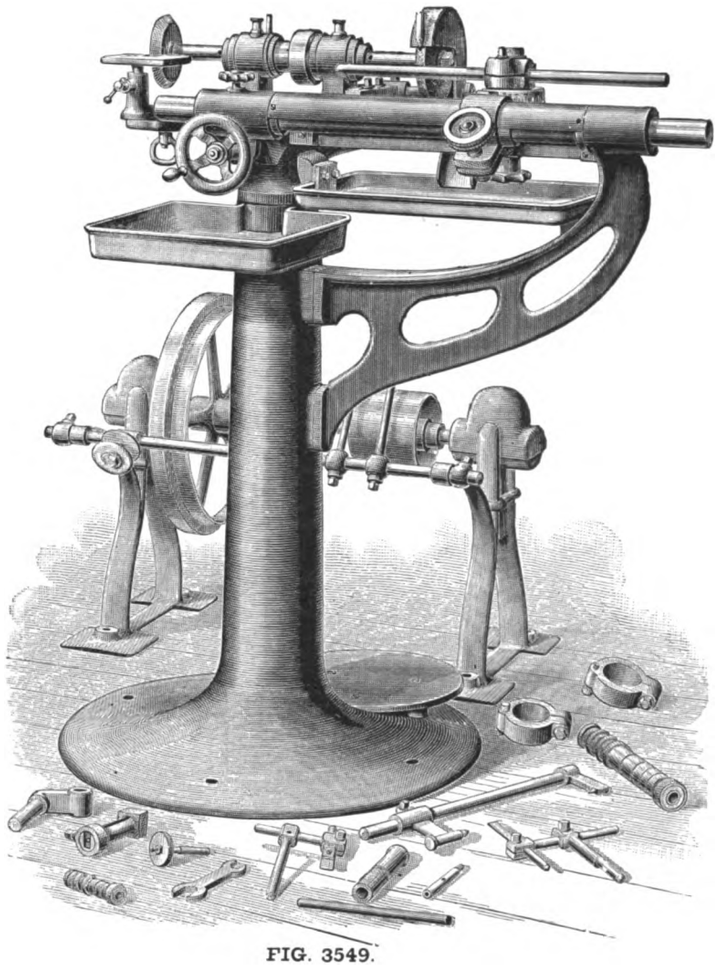


FIG. 3549.

TOOL GRINDER NOS. 1 AND 2.

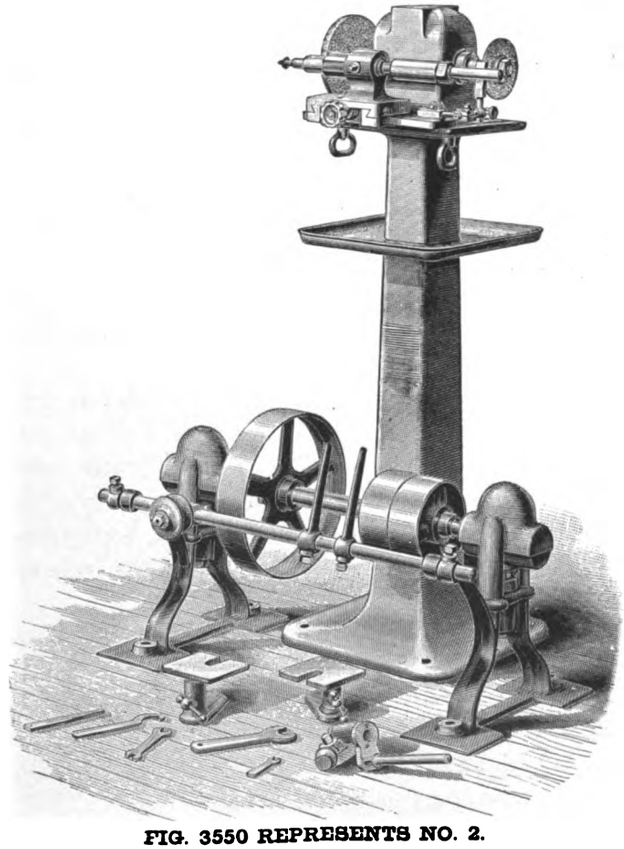


FIG. 3550 REPRESENTS NO. 2.

DESCRIPTION, FIG. 3549.

This machine is adapted to perform a great variety of work, and is constructed with reference to the attachment of special appliances.

It is extensively used for sharpening straight or taper, shell or shank reamers, and for grinding edge and bevel cutters of any angle, straddle and face mills, cotter and hollow mills, and straight or taper milling cutters, cut either straight or spiral, with holes or shanks. It can also be used for sharpening worm or thread tools. All moving parts are adjustable. Movements quick and accurate, simple and mechanical. Spindle has two speeds. Distance between centers, 12 inches. Mills or shell reamers, 6 inch diameter, and not over 6 inches long can be satisfactorily ground. Emery wheels used up to 7 inch diameter, either with or without water.

Countershaft has tight and loose pulleys 6 inch diameter for 2 inch belt, and should run 375 turns per minute.

Price includes everything shown in cut, and an attachment for grinding end mills not shown. Weight, 750 lbs.

PRICE, $.....

BENCH CUTTER GRINDER.

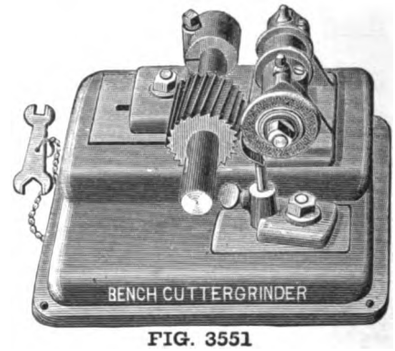
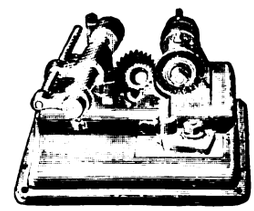
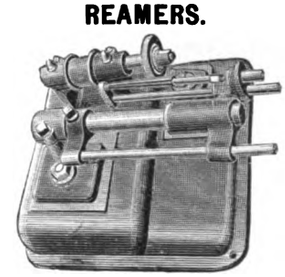


FIG. 3551

GRINDING BEVEL CUTTERS.



GRINDING TAPER REAMERS.



This machine will grind mills and shell reamers, cut spiral or straight, from 5 inch diameter and 4 inch face down to the smallest; side or face mills, bevel or angle cutters, from 8 inch diameter down; reamers, hand, machine, rose and taper, as large as 1¼ inch diameter and 8 inches long; butt mills, either straight or taper; cutters for milling T slots and hollow mills, such as used on screw machines. Saws, cutters for gear teeth, drills, and all such tools as are generally ground by hand, can also be handled. Both spindle and arbor are of steel, hardened and ground, the latter to 1 inch standard size. All adjusting screws and nuts are case hardened, and fit wrench attached to the machine. The machine can be placed on the bench, where most convenient, and driven by straight or quarter turn belt. A single hanger countershaft, with 4½ x 2 inch tight and loose pulleys, completes the machine.

Speed of countershaft, 600 revolutions.

PRICES.

Complete with emery wheel, as show in cut, **$35.00**
Mounted on column..... **42.50**

DESCRIPTION, FIG. 3550, NO. 1.

The boxes are of hardened cast steel, and accurately ground. The arbor is arranged for two wheels, one at each end, one for ordinary tool grinding, and one beveled for tap and gear cutters. A pan is fastened to the column, making a convenient place to lay tools, etc., before being ground. The tight and loose pulleys are 6 inches in diameter, 2¼ inch face. Speed of countershaft should be 375 turns per minute. Weight, 285 lbs.

PRICE, $.....

DESCRIPTION, FIG. 3550, NO. 2.

This machine is the same as the No. 1, with cutter sharpening attachment in addition. This attachment is for use on straight, spiral or cotter mills, and angular cutters. The straight or spiral mills are held upon a sleeve and moved past the wheel, the tooth being guided by a rest set to give the proper clearance. The bevel cutters are held upon a piece adjustable to any angle, being guided by tooth rest as on straight or spiral mills. Cutters up to 4 inches long and 5 inches in diameter can be ground. The attachment can be instantly attached or detached. Weight, 320 lbs.

PRICE, with everything shown in cut, **$**.....

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UNIVERSAL CUTTER AND REAMER GRINDER.

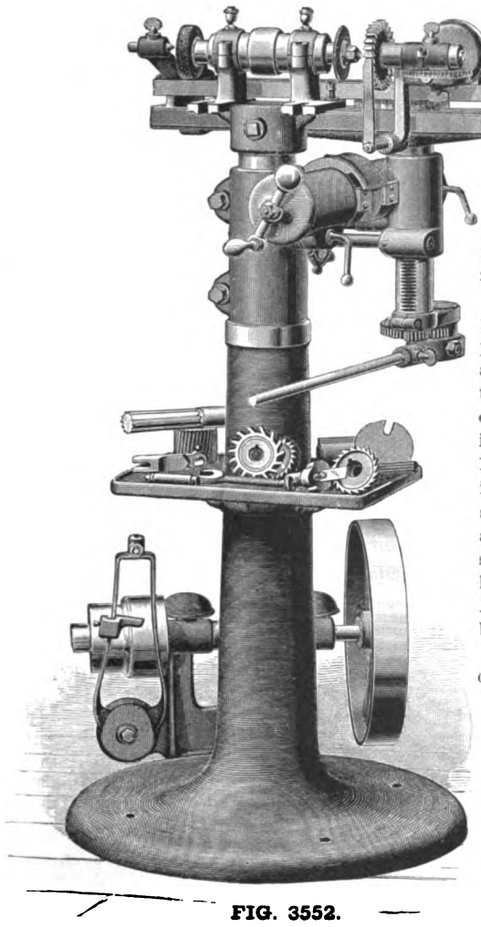


FIG. 3552.

DESCRIPTION, FIG. 3552.

This machine is provided with all adjustments necessary to grind reamers and milling cutters of all shapes up to 8 inches diameter, such as face mills, angular cutters, end mills, spiral mills, slitting saws, taper and straight reamers. It is perfectly universal. It differs from other machines from the fact that it will grind everything specified without the use of special attachments, and that all work is done on a horizontal slide.

The table is moved forward and back by means of slide and lever. This lever can be placed to suit the position of the operator. The adjustment toward the emery wheel for continuous cuts is by means of screw. Table is elevated or lowered by means of rack and pinion; is 21½ inches long, will take in between centers 15 inches, and has a horizontal movement of 10 inches. It is provided with adjustable dogs for stops on each end. It may be swung at any angle for taper work. The work holder or swiveling head, swivels both vertically and horizontally for clearance, and work at an angle. All adjustments of table and head are indexed by degrees.

Countershaft fast and loose pulleys, 5 inches diameter; 600 revolutions. Weight, lbs.

PRICE, $.....

COMBINATION GRINDING MACHINE.

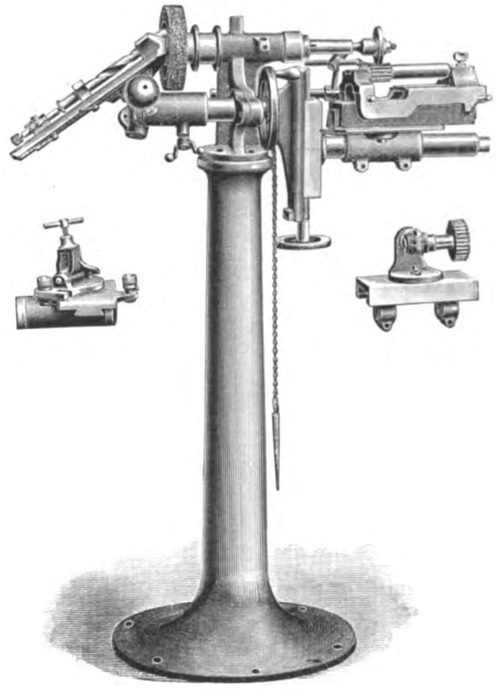


FIG. 3553.

This machine, with the different attachments, is adapted for sharpening, by grinding, milling machine cutters with straight, spiral, bevel, radial, or disc teeth; reamers, long or short shanked, either straight toothed, spiral, or taper; also twist drills from 0 to 1½ inches in diameter; and the grinding of thread tools to proper angle, and the extensive variety of work of this class, usual to the tool room or general shop.

Weight, 350 lbs. **PRICE, $215.00.**

UNIVERSAL GRINDER.

The machine will swing work between centers 20 inches diameter and 6 feet long. The table can be swiveled to either side of its central position to grind tapers from 0 to 2 inches per foot, and from 0 to 10 degrees angular measurement. For grinding work on the face plate or chuck, the headstock can be set to any angle within the whole circle.

The machine is provided with a small wheel stand for internal grinding, a three jawed chuck for holding work in which holes are to be ground, a center rest for use in grinding out holes, as in the end of spindles, also two back rests, arbors, dogs, wrenches, and complete overhead works.

The overhead works consist of three shafts with two drums, tight and loose pulleys 12 inches diameter for 4½ inch belts.

The countershaft should run about 250 turns per minute.

The total weight is about 8,400 lbs.

The price includes a small wheel stand for internal grinding, a three jawed chuck, a center rest for use in grinding out holes, as in the end of spindles, also back rests, arbors, dogs, wrenches, and complete overhead works.

PRICE, $.....

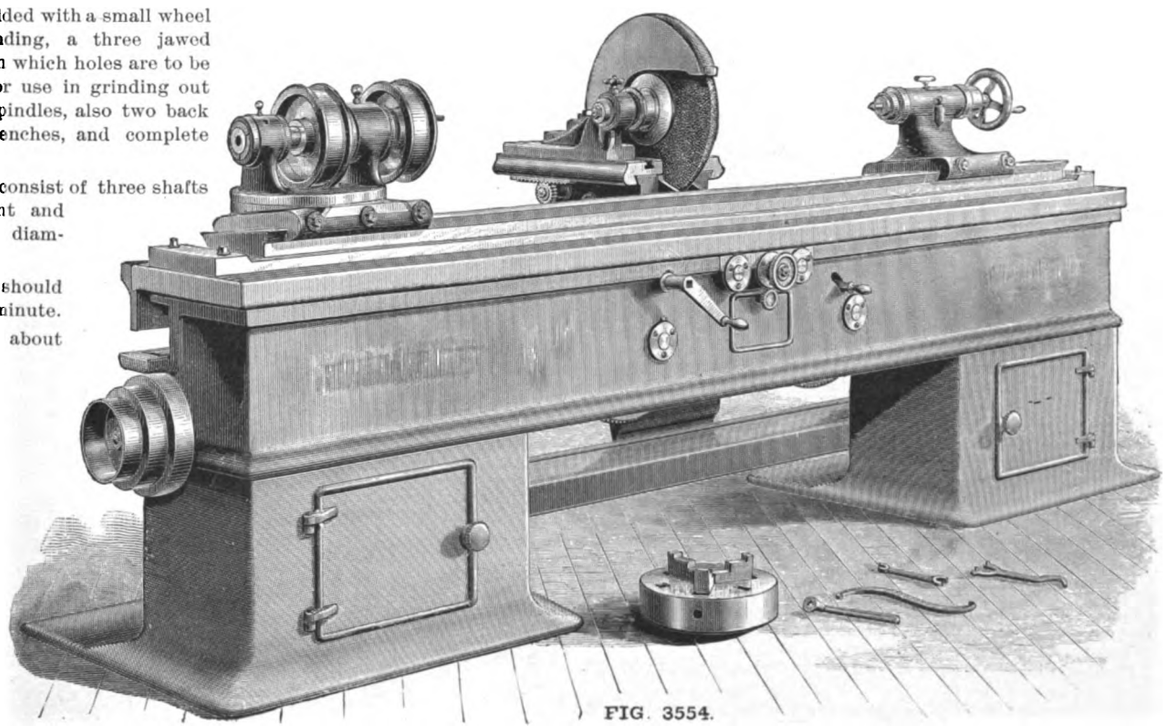


FIG. 3554.

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IMPROVED UNIVERSAL GRINDING MACHINES.

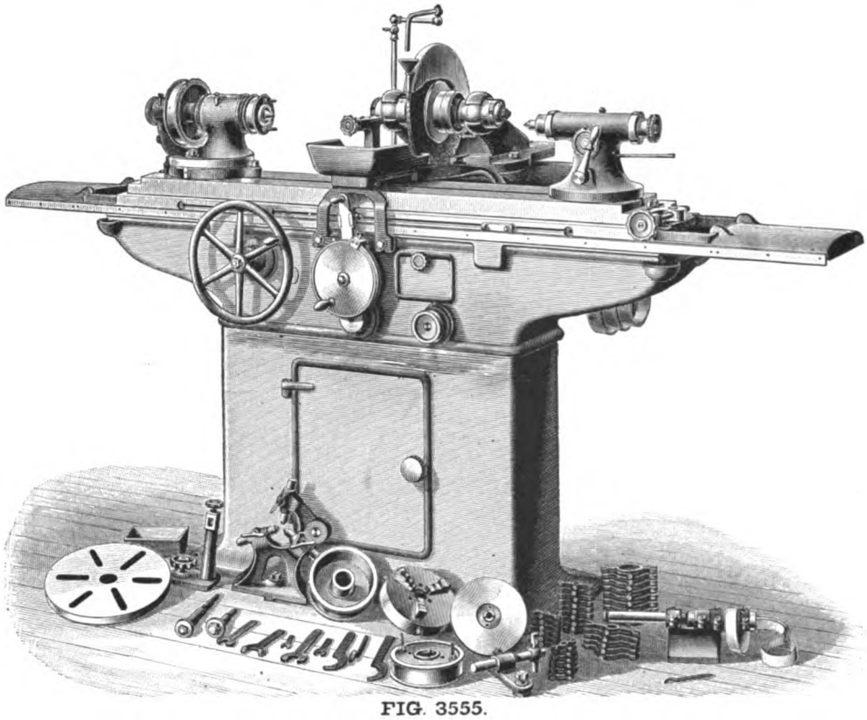


FIG. 3555.

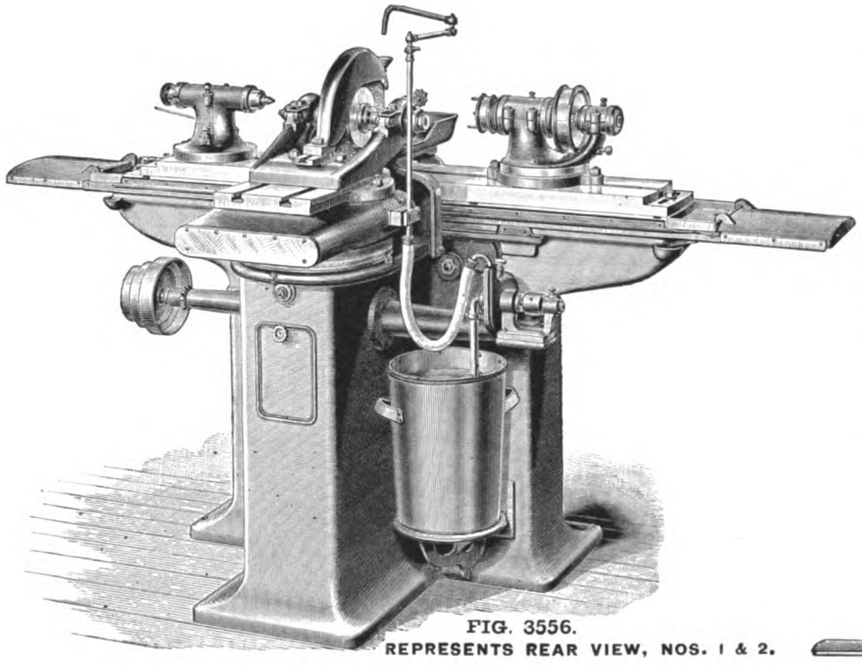


FIG. 3556.
REPRESENTS REAR VIEW, NOS. 1 & 2.

DESCRIPTION, FIGS. 3555 & 3556.
NO. 2 MACHINE, IMPROVED.

The support for the wheel extends to the floor. The bearing surfaces are large, the reversing mechanism improved, and the cross feed arranged for finer adjustments. The overhead works provide for a wider range of speeds of wheel and work. It is especially adapted for circular grinding where accuracy and uniformity are required, and is used in the manufacture of spindles, boxes, arbors, either hard or soft, cutters, either straight or angular, reamers, jewelers' rolls, and standard plugs and rings. It will grind straight or taper pieces, either inside or outside, and any angle, obtuse or acute, can be readily produced.

The sliding or reciprocating table carries a second table, which turns upon a center pin, and admits of taper grinding with centers of the machine always in line. This swivel table is adjusted by a tangent screw and graduated arc. The headstock can be set at any angle within the circle, and the grinding wheel can also be set at any angle, and two tapers can be ground without changing the settings. Wheels from $\frac{1}{4}$ inch to 12 inches in diameter are used. Arrangements are made to carry off water, which may be used in external grinding. The work can be ground upon fixed centers, or the headstock spindle can be revolved. All bearings are protected from dust, and all oil holes are provided with plugs or screws. All screws, bolts and nuts requiring frequent adjustment are hardened. The wheel stand and headstock spindles are hardened. The wheel stand boxes are self-aligning. The machine will swing work between centers 12 inches diameter and 30 inches long.

The overhead works consist of three shafts with two drums, tight and loose pulleys, 10 inches diameter for 3 inch belt, and hangers with self-oiling and adjustable boxes. The shafts are arranged for any speed from 1,300 to 2,000 for emery wheel, and for 12 speeds between 36 and 800 for the work. The countershaft should run about 325 turns per minute. Weight, 4,000 lbs.

The price includes wheel stand for internal grinding, three jawed chuck, special chuck for thin cutters, face plate, center rest, back rest, arbors, boxes, pump, wrenches and overhead works.

PRICE, $.....

The same machine is also made to take 40 inches between centers. Weight, 4,050 lbs.

PRICE, $.....

DESCRIPTION, FIG. 3557.

The machine will swing work between centers eight inches diameter and sixteen inches long, while the table may be fed several inches beyond that length. The swivel table will swing to either side of its central position to grind tapers from zero to $1\frac{1}{2}$ inches per foot, or from zero to three and one-half degrees in angular measure. For grinding work on the face plate or chuck, the headstock can be set at any angle within the whole circle. The wheel slide has a movement of four inches, and may be fed at any angle from zero to ninety degrees on either side of a line at right angles with the slide bed. The wheel stand will take a wheel seven inches diameter and one-quarter thick, with a two inch hole in center.

The internal grinding fixture usually sent with this machine will grind holes 5 inches long, and $\frac{3}{4}$ inch and upward in diameter. Wheels not larger than 1 inch in diameter are used with this fixture.

The overhead works consist of three shafts with two drums, tight and loose pulleys, 8 inches diameter, for three inch belt. The shafts are arranged for any speed from 2,000 to 3,400 for emery wheel, and for six speeds between 93 and 640 for the work. The countershaft should run about 280 turns per minute.

Each machine is provided with an internal grinding fixture, a special speed counter for internal grinding, a three jawed chuck, special chuck for thin cutters, center rest, back rest, wheel truing stand, tooth rest, pump, wrenches, dogs and complete overhead works.

Weight, 2,600 lbs.

Price includes overhead works and everything shown in cut.

PRICE, $.....

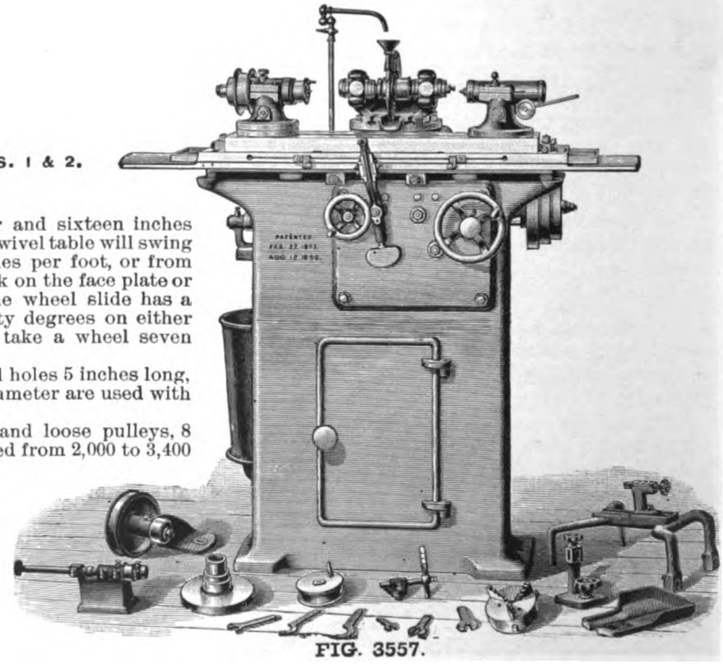


FIG. 3557.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PLAIN AND UNIVERSAL GRINDERS.

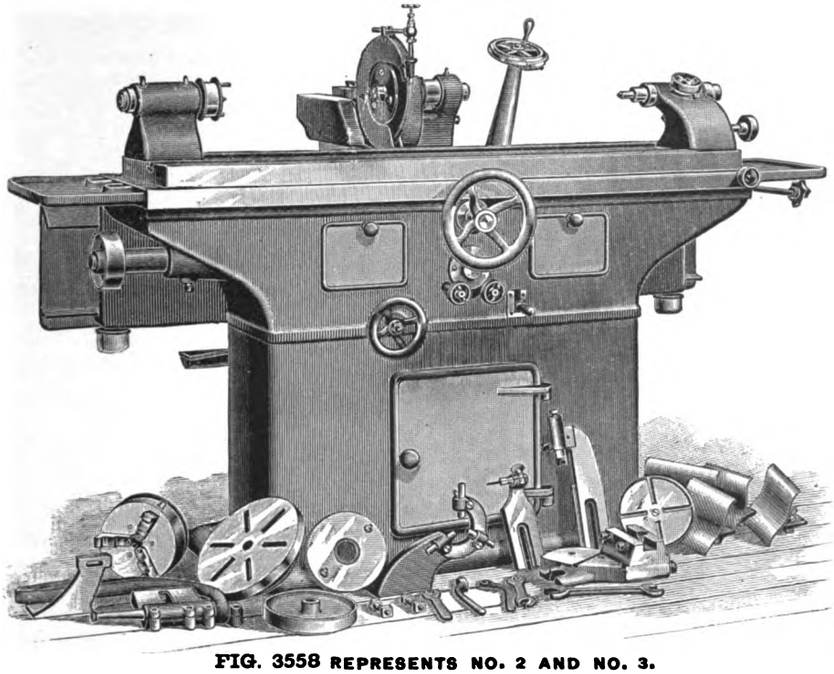


FIG. 3558 REPRESENTS NO. 2 AND NO. 3.

These machines are adapted for all universal operations in cylindrical and face grinding. Cutters, reamers, arbors, boxes and sides of thin saws can be ground, and all angular work, such as taper shafts, holes, plates, etc. The centers are upon a pivotal table, which retains them in line when setting for taper work. A fine screw adjustment is provided for this adjustment, which is excluded from dirt. The pivotal table is clamped at both ends simultaneously by hand from one end of the machine. It has most thorough provision for the free use of water in all grinding operations, without running over the finished portions of the machine and entering into the slots. The pivotal table has no slots at its ends, and is easy to keep clean. The traverse is varied by a hand wheel on the front of the machine to any speed from $\frac{1}{64}$ inch to $\frac{1}{4}$ inch to one revolution of the work in an instant. The speed of the work is also varied in an instant to any speed from 10 to 500 revolutions, by a rod to the overhead works. No cones or belts are used for this purpose. The emery wheel can be adjusted to the work, indicating .0002 inch to the diameter of same, and has a quick movement when wishing to move the wheel a little distance either from or to the work. The traverse reversing points are set with a fine adjustment to .005 inch by graduations, and can even be set by thousandths variation. The traverse hand wheel is graduated, and the emery wheel can be set longitudinally by these graduations to .001 inch and even less, making it very desirable to grind shoulders. The movements and adjustments are quickly and easily accomplished. The emery wheel arbors are hardened and ground cast steel, running in phosphor bronze bearings. The machine is built in all respects for doing accurate work in a rapid manner. Workmanship and material guaranteed to be first-class.

The machines are provided with a special chuck for thin saws, a regular chuck, face plate, cutter and reamer grinding rest, following rest for thin shafts, stationary rest for taper and straight shafts, a center rest to support a shaft to grind out a hole in its end or otherwise operate on its end; an internal grinding fixture, and three double-tailed equalizing dogs to take all work up to three inches. The machines are made in the following sizes:

PRICES.

No. 1	universal,	swings	8	inches	diameter,	takes	18	inches	between	centers;	weight,	about 1,600 lbs.	$
" 2	"	"	10	"	"	"	30	"	"	"	"	3,000 lbs.	$700.00
" 3	"	"	10	"	"	"	42	"	"	"	"	3,300 "	775.00
" 4	"	"	20	"	"	"	62	"	"	"	"	8,000 "	1,300.00
" 5	"	"	20	"	"	"	96	"	"	"	"	about 9,500 lbs.	1,500.00

SMALL UNIVERSAL GRINDER.

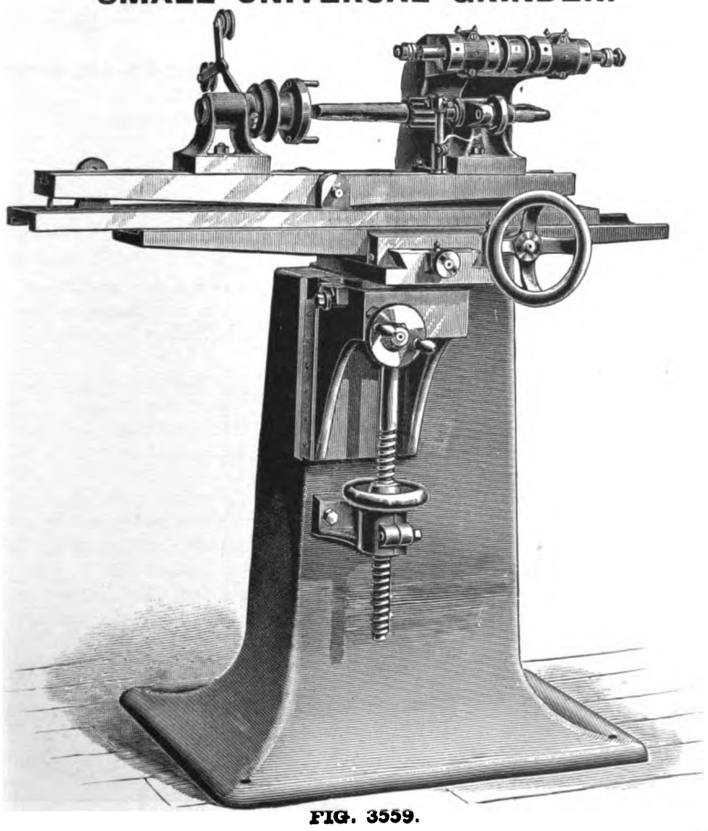


FIG. 3559.

The above machines are also furnished for straight and taper shaft grinding only, the universal fixtures being omitted.

No. 2, plain machine	$600.00
" 3, " "	675.00
" 4, " "	1,150.00
" 5, " "	1,300.00
Pump, extra	25.00

DESCRIPTION OF FIG. 3559.

By locking the hand wheel and using a work and worm wheel on the screw, the table can be adjusted to $\frac{1}{1000}$ of an inch; the table swivels, and will travel in any position, from parallel with the emery shaft to 90° or at right angles to it.

Two countershafts go with the machine, one to drive the wheel shaft, the other to revolve the work that is held on dead centers; this latter countershaft follows the table in any position that it may be used in, and has a device for keeping the belt at equal tension at all times.

The table will take in 18 inches long by 6½ inches diameter between centers; has a pan around it for the water when mandrels are being ground.

The spindle has holes in each end to fit Morse No. 2 taper, and the wheels are placed on taper mandrels that fit the spindle.

PRICE, $300.00.

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NOS. 3 AND 4 SURFACE GRINDERS.

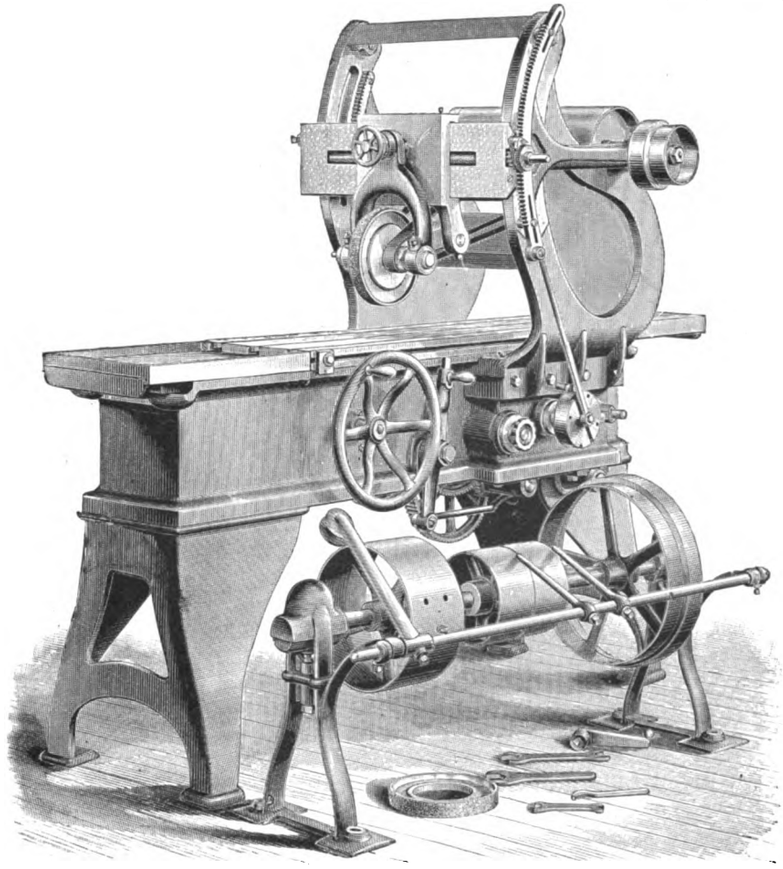


FIG. 3560.

NO. 3 SURFACE GRINDER.

This machine is designed for general surface grinding and finishing. It is an effective substitute for the operations of filing and stoning. The entire cost of files and three-quarters of the labor usually expended on these operations are saved, besides obtaining better surfaces upon the work done. For all finished parts of machinery of cast iron or steel, hard or soft, for punches or dies, flattening dies, etc., it will prove invaluable, and will produce fine work with little expense.

It will grind 14 inches wide, 36 feet long, 11½ inches high. Distance between uprights, 22½ inches. Wheels are used from 6 to 12 inch diameter.

The countershaft has tight and loose pulleys, 8 inch diameter, 4½ inch face, and should run about 320 turns per minute. Weight, 2,500 lbs.

PRICE, $.....

We furnish this machine lengthened to grind 5 feet long. Weight, 3,000 lbs. Floor space.....

PRICE, $.....

NO. 4 SURFACE GRINDER.

Similar in general characteristics to the No. 3, described above. Will grind 8 feet in length by 2 feet wide and 2 feet high.

PRICE, $.....

NO. 2 SURFACE GRINDER, FIG. 3561,

Is intended for grinding and finishing hardened dies, punches, etc., also many of the small parts of machinery and tools requiring a true and bright surface.

The spindles run in boxes provided with means to compensate for wear and the exclusion of emery dust.

The platen is automatically moved back and forth under the wheel, the distance being regulated by adjustable stops. It is also moved transversely under the same, automatically, for a feed. Both these movements are also accomplished by hand, with the hand wheels shown in cut.

Using a 6 inch emery wheel, a piece 5 inches high, 6

NOS. 1 AND 2 SURFACE GRINDERS.

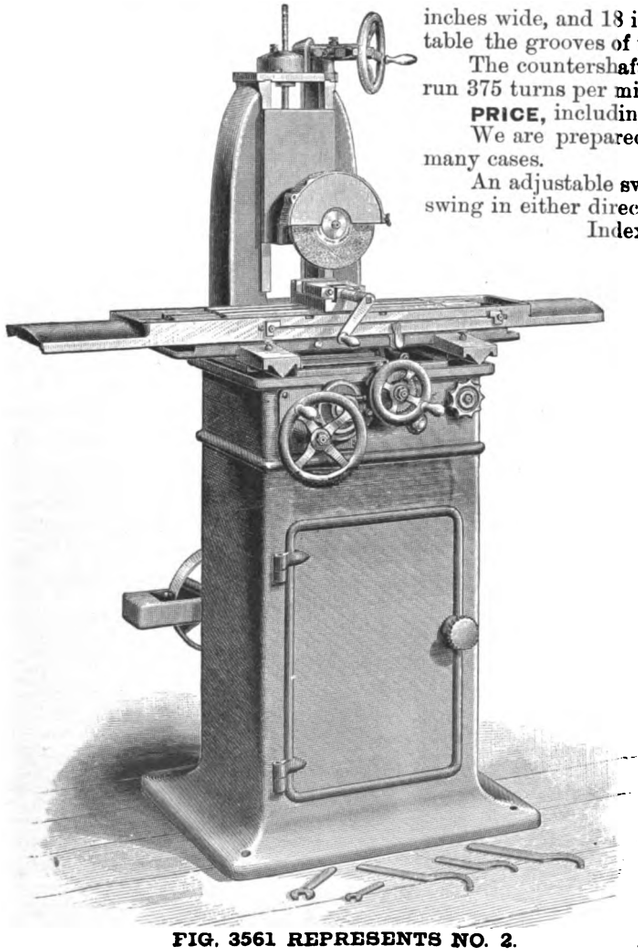


FIG. 3561 REPRESENTS NO. 2.

inches wide, and 18 inches long can be ground, and by fastening a pair of small centers on the table the grooves of taps, reamers, etc., may be readily sharpened and finished.

The countershaft has tight and loose pulleys 6 inch diameter, 3¼ inch face, and should run 375 turns per minute. Weight, 1,300 lbs.

PRICE, including countershaft, vise, wrenches, etc., all complete, **$.....**

We are prepared to furnish the following attachments, which will be found convenient in many cases.

An adjustable swivel vise, the jaws are 5 inches wide, 1 inch deep, will open 2¾ inches, and swing in either direction to an angle of 45 degrees from the horizontal. **PRICE, $.....**

Index centers will swing a piece 4¾ inch diameter, 2¼ inches long.

PRICE, $.....

NO. 1 SURFACE GRINDER

Is similar in design to Fig. 3561.

The platen is automatically moved back and forth 7 inches, and can be changed from that to any distance down to 2 inches; it has a finished surface, 13 inches long, 6 inches wide, for the reception of work.

The wheel slide has a transverse movement of 4 inches, and is fed automatically at each reverse movement of the platen, the finest feed is $\frac{3}{1000}$ of an inch, and can be raised by $\frac{3}{1000}$ of an inch to $\frac{8}{100}$ of an inch, and is easily and quickly set to feed in either direction.

The knee, when at its lowest position, gives a distance of 8 inches from top of platen to center of wheel spindle, and can be adjusted to any position to within 3½ inches of center of spindle.

The wheel spindle is hardened steel, the boxes are adjustable for wear, and all bearings are well protected from dust.

The countershaft has tight and loose pulleys 6 inch diameter, 2¼ inch face, and should run 425 revolutions per minute.

The price includes overhead works, wrenches, etc., all complete.

WEIGHT, 860 LBS. PRICE, $.....

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FACE GRINDING MACHINE.

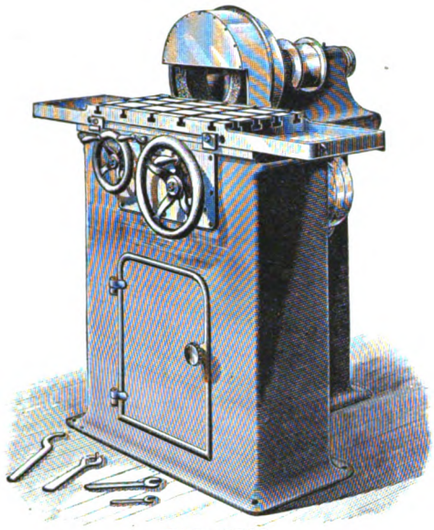


FIG. 3562.

This machine is well adapted to a large variety of grinding, where but a small amount of stock is to be removed, and a flat surface is desired, the pieces being held in suitable fixtures fastened to the platen, or clamped to the platen itself.

The platen has a longitudinal movement sufficient to grind pieces 18 inches long, either by means of a hand wheel, or by power, the distance of movement being regulated by adjustable stops on edge of platen.

The head, which carries an annular wheel 12 inches in diameter, has a transverse movement by means of a hand wheel for adjustment to the work, and to compensate for the wearing away of the wheel. The bearings are well protected from dust, and provision is made for the attachment of an exhaust fan.

The countershaft has tight and loose pulleys 8 inches diameter, 6 inches face, with the necessary pulleys for driving the wheel and machine, and should run 450 revolutions per minute.

Price includes countershaft, wrenches, and one emery wheel.

WEIGHT, 2,300 LBS. **PRICE, $**.....

SECTIONAL VIEW.

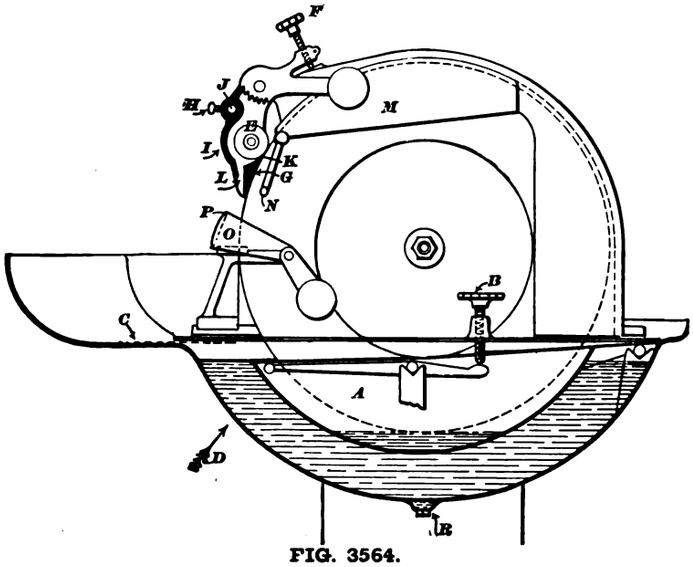


FIG. 3564.

A machine designed to overcome the objectionable features of the time-honored grindstone, and the modern "Wet Emery Wheel Tool Grinder."

A feature of this machine is its freedom from annoying contrivances.

It has no pumps, hose, piping, sieves, settling tanks, cupboard doors, wet pump belts, filters, chains or treadles.

No other machine made but that has some, or most of these objectionable features.

TOOL GRINDER, WITH GRINDSTONE.

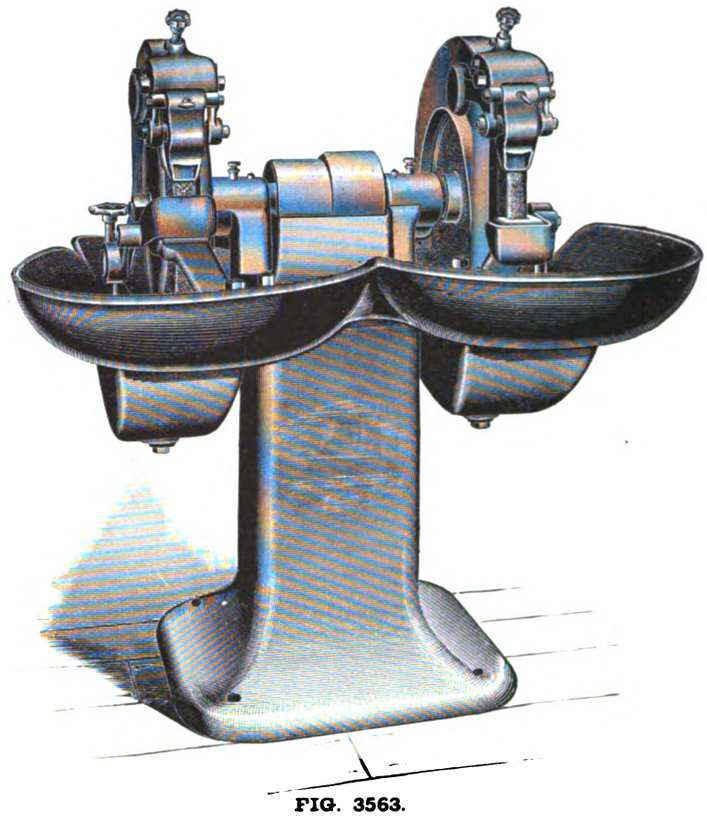


FIG. 3563.

Water pan, 45 x 49 inches. Distance from floor to center of spindle, 38 inches. Spindle bearings, 2⅛ inches, 8 inches long. Spindle pulleys, one, 7 inches, the other 8 inches in diameter. 4 inch belt. Wheels, 24 inch diameter, 1½ inch face. Distance between wheels, 25½ inches.

WEIGHT.....**LBS.** **PRICE, $**.....

WATER SUPPLY.

The water supply may be perfectly regulated by the operator. Any desired amount, from a slightly moist stone to a flood, may be obtained without wetting either the operator or the floor, by turning a hand wheel, and after the water is adjusted the supply is constant, as there are no pipes, cocks or pumps to clog the flow. The wheels are thus constantly saturated with water. A little reflection will convince one that this is a very desirable result as compared with the intermittent wet and dry wheel, which is a feature of all other machines.

DEVICE FOR KEEPING WHEELS TRUE.

The wheels are kept true and in the most perfect condition for their work, without the use of a diamond, with its inevitable extravagance in money and time. This result is accomplished by simply turning a small hand wheel. It can be done at any time without in the least interfering with the work, or removing the rest, or any part of the machine, and requires but an instant to make them perfectly true.

TRUING ROLLS

Are of steel, the arbor hardened and ground, and run in bronze bearings; are inexpensive and easily replaced.

GRINDSTONES.

For those who prefer grindstones, we offer in this machine a perfect "grindstone rig." When desired, we furnish an imported "Free Grit" grindstone, which is in all respects superior to the ordinary stone; can be run at same speed as emery wheels and are perfectly uniform. These grindstones have been sold and used with the Brown & Sharpe grindstone trough for a number of years past, giving satisfaction. The price is about one-fifth that of a first-class emery wheel.

QUALITY OF WORKMANSHIP AND MATERIAL.

It has been designed with great care to meet all the necessities of this class of work; the materials are the best obtainable, spindle of crucible steel carefully ground to size, bolts and studs where essential of bronze metal; collars are turned all over, insuring a perfect balance. Dimensions ample.

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UNIVERSAL TOOL GRINDER.

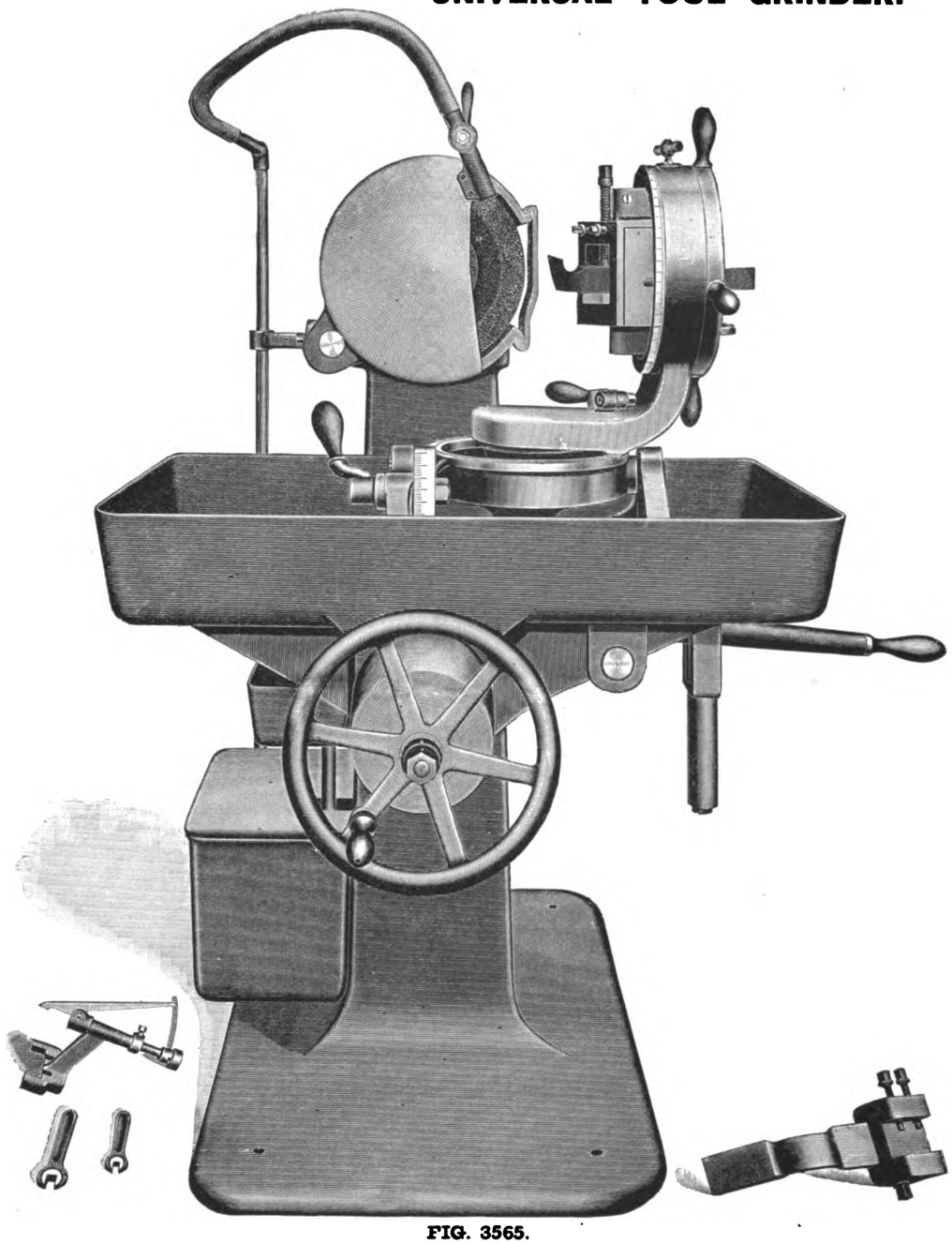


FIG. 3565.

FOR GRINDING LATHE AND PLANER TOOLS.

There are four main structural parts in the machine :

1st. A column in which is journalled the emery wheel arbor, and through which is forced the heavy circular arm on which the pan oscillates.

2d. An oscillating pan supporting the tool holder, and having a transverse motion on the arm.

3d. A tool holder provided with a tool clamp and graduated circles, by means of which the tool may be made to assume any desired position with respect to the emery wheel.

4th. A tubular emery wheel mounted on an arm about which the pan oscillates. As grinding takes place on the side face of the emery wheel, it will be readily seen that flat surfaces may be ground by oscillating the pan by means of the hand lever at the right of the machine.

The arbor is made of crucible steel, is ground on dead centers, and fitted to the long bronze boxes by scraping. The journals are cylindrical. The boxes are tapering on the outside, and are adjusted by nuts on either end. A very substantial end thrust bearing is provided at the outer end of the spindle. A large hardened and ground steel collar is secured to the arbor and bears against vulcanized fiber washers which are adjustable for wear.

The driving pulley is of ample size, and is placed between the bearings. The arm on which the pan oscillates, after being accurately ground, is forced into the frame. It is provided with a hand wheel, shown at the left of the machine, and a feed screw for moving the pan in and out from the frame.

The pan is arranged with a lever fulcrumed on its lower side, by means of which it may be oscillated through a limited arc in a plane at right angles to the emery wheel arbor.

The tool holder is fitted to the upper surface of the pan, so as to slide in a direction parallel to the arbor.

A tool held in the tool clamp may be moved about four different centers for the following purposes :

1st. If the tool is bent, it may be moved 30 degrees either side of the center line to bring the face to be ground parallel to the face of the emery wheel. This is the only change required for bent tools. They are ground to the same settings otherwise as straight tools. The tool is moved to the same amount as it is bent. This setting is designated by the term "tool holder."

2d. A tool may be rotated through the full circle about its own axis as a center. In this way the sides and top may be ground. This circle is denoted in the chart as the "vertical" circle.

3d. A tool may be rotated through about 320 degrees in a horizontal plane. This serves for grinding the angular faces of tools. This circle is denoted in the chart by the term "horizontal."

4th. The entire tool holder may be rotated in the base to the amount of 15 degrees on either side of the horizontal, for the purpose of obtaining clearance on thread tools without distorting the top angle, and thereby making it unnecessary to calculate fractional settings. This setting is denoted in the chart as "clearance."

The operation of the machine is extremely simple and can be readily learned.

SEND FOR SPECIAL CIRCULAR AND CHART.

Counter pulleys are 8 inch diameter by 4 inch face. Should run 500 revolutions for ordinary work.

WEIGHT, 1,500 LBS. PRICE, $350.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PROFILERS.

SINGLE SPINDLE.

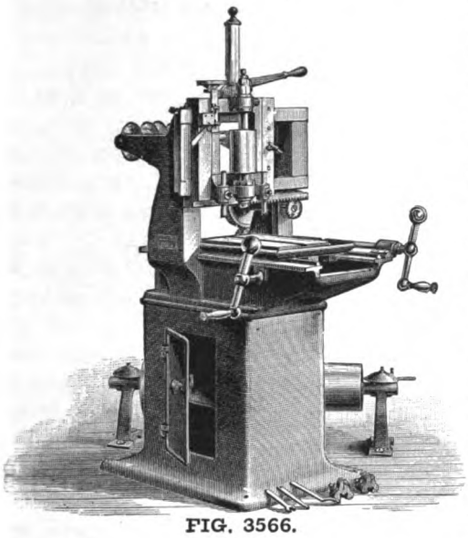


FIG. 3566.

DESCRIPTION, FIG. 3566.

The spindle is driven by a belt running from the countershaft over sliding idler pulleys, which gives a strong uniform drive. Change of speed is made by using cones on the countershafts. The four motions necessary in this class of machine are accomplished by rack and pinion movement in connection with two ball handles conveniently located. Allowance is made for taking up all the wear and lost motion in the racks and gears. The spindle slide is fitted with two former pin sockets, so that the spindle can be employed in cutting a former from a sample piece, and then, by carrying the former pin to the other socket, the former is used in a position in which it was milled. The spindle slide is balanced by a spring, and the notched stop has adjusting screw with hand wheel graduated to $\frac{1}{1000}$ giving a fine adjustment for height of spindle. Stops are provided both ways, for the cross slide and the table slide. Friction pulleys of two speeds go with the machine.

GENERAL DIMENSIONS.

Countershaft should run for slow speed	75 rev.
" " " " fast "	150 "
Working surface of table	14 x 10 in.
Movement of table	18 "
" " cross slide	11 "
Distance from bed to cross slide	$5\frac{1}{2}$ "
Diameter of spindle	$1\frac{5}{16}$ "
Up and down movement	$3\frac{1}{2}$ "
Tight and loose pulleys	14 x 3 and 8 x 3 "
Weight	1,425 lbs.
PRICE, as shown in cut	**$375.00**
" of extra countershaft, giving 6 spindle speeds	**18.00**

DOUBLE SPINDLE, NOS. 1 & 2.

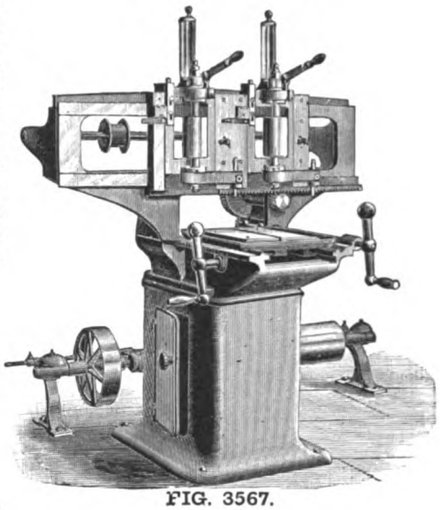


FIG. 3567.

DESCRIPTION, FIG. 3567.

The No. 1 profiler has $3\frac{1}{2}$ inches between spindles, and No. 2 has 7 inches. Where profiling work requires the use of two mills in succession, the advantage gained by having two spindles, each with its independent stops and former pin, is easily to be seen. The vertical stop consists of a notched plate and lock bolt. This bolt is withdrawn by a lever handle when the spindle is to be moved vertically. The weight of the spindle is balanced by a coiled spring, whose tension can be altered to suit the weight of different mills. The arrangement of the operating handles shown has proved to be very convenient, as they are both within easy reach when standing where the best view of the work can be obtained. All motions by rack and pinion are provided with effective means for taking up all slack in the gearing. This feature is essential to good work when turning corners in following an irregular outline. The spindles are driven by one long belt passing from countershaft drum and under sliding idler pulleys. This gives a very steady motion to the spindles, and furnishes ample power for the heaviest cuts with mills adapted to the machine. A friction countershaft of two speeds accompanies each machine.

GENERAL DIMENSIONS.

Countershaft should run for slow speed	75 rev.
" " " " fast "	150 "
Working surface of table	14 x 10 in.
Movement of table	18 "
Distance between spindles, No. 1	$3\frac{1}{2}$ "
" " " No. 2	7 "
" from bed to cross slide	$5\frac{1}{2}$ "
Diameter of spindles	$1\frac{5}{16}$ "
Up and down movement of spindles	$3\frac{1}{2}$ in.
Friction clutch pulleys	14 x 3 and 8 x 3 "
Weight, No. 1	1,875 lbs.
" No. 2	2,184 "
PRICE, NO. 1	**$550.00**
" **NO. 2**	**700.00**
" of extra countershaft giving 6 spindle speeds.	**18.00**

2 SPINDLE EDGE MILLING MACHINE.

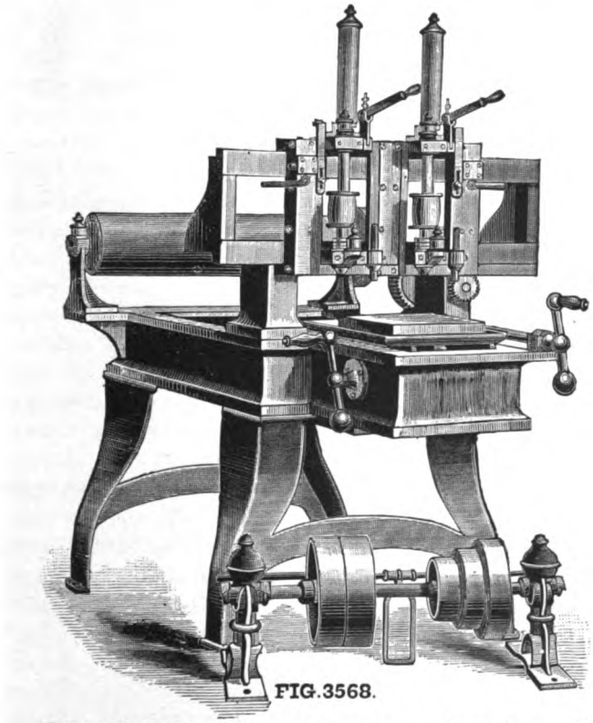


FIG. 3568.

Especially adapted for gun and sewing machine shops. From entire new drawings and patterns. Has take-up for wear in rack and gears, is made of the best material, and with the utmost care to insure good workmanship and correct results. Finished weight of machine and countershaft, 2,500 lbs. **PRICE, $700.00.**

JOINTER FOR FACING LOCOMOTIVE BRASSES.

Will hold any size brass same as held by strap when in use. No more time required to place brass than screw up an ordinary vise.

PRICE, $150.00.

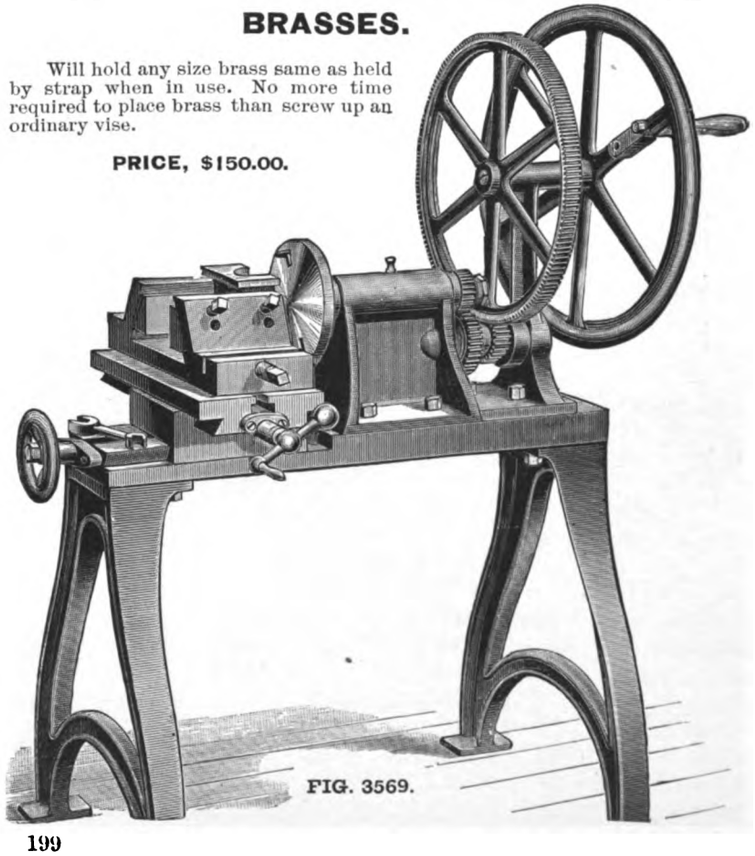


FIG. 3569.

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MARKING MACHINES.

NO. 3 MARKING MACHINE.

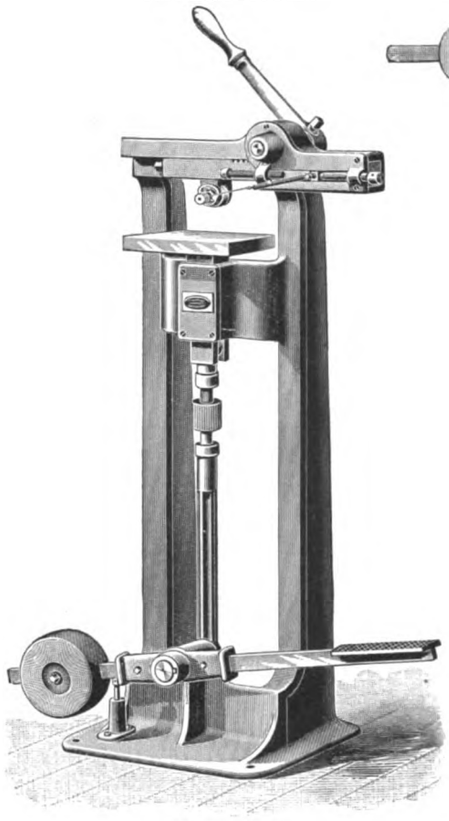


FIG. 3570.

Weight, 300 lbs. **PRICE, $100.00.**

NO. 2 MARKING MACHINE.

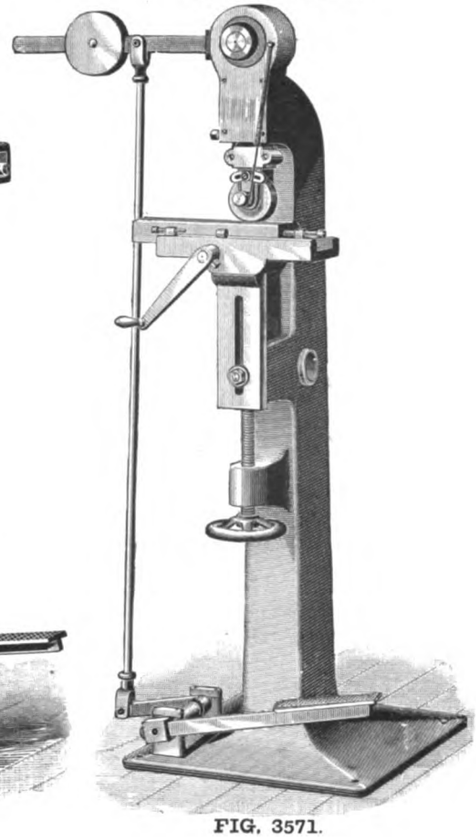


FIG. 3571.

Weight, **PRICE, $125.00.**

DESCRIPTION, FIG. 3571.

The extreme travel of table as regularly built is 6 inches. Distance from center of die to frame, 3½ inches. Fixtures for holding work and marking dies are made at reasonable cost.

PRICE, INCLUDING BLANK DIE, $125.00.

DESCRIPTION, FIG. 3570.

The height of table is adjustable by screw. As to capacity on both this and the No. 2 machine, twist drills and taps are marked at rate of 12 to 20 per minute; table knives, 600 dozen in 10 hours. Other work according to how easily it can be handled and set to the gauge pins. The finest work can be done with exactness. In ordering for special work, we would suggest that the piece be sent us, and suitable fixture for holding will be made or recommended. It can be adapted to a wide range of work, is mounted on column of convenient height, and is strong and well made.

PRICE, $100.00.

ROTARY STAMPING MACHINE.

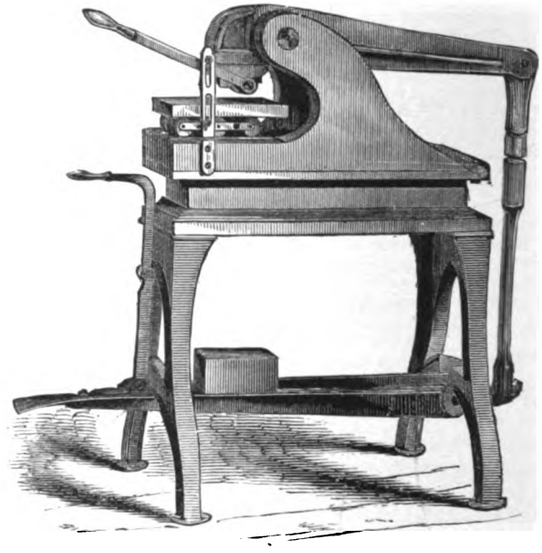


FIG. 3572.

This machine is used for stamping names, dates, and other characters, upon lock plates, sewing machines, type writing machines, and other finished work. The work to be stamped is laid upon a movable platen, which is supported by iron rollers. A steel cylinder, having the characters to be impressed arranged upon its surface, is then pressed down upon the article by a foot lever, and is at the same time rotated by means of a hand lever attached to the cylinder arbor. As the cylinder revolves the platen is carried along until the stamping is complete. The characters, being impressed in rotation, are of uniform depth, and the process is attended with less pressure, and consequent danger of injuring dies or fragile articles than when all impressed at once.

We have two patterns of head, one adapted for stamping thin plates, the other for work requiring six inches space or less under the cylinder.

Length of bed, 2 ft. 9 in. Weight, 1,000 lbs.

PRICE, $.....

PATENT LATHE ANVILS, OR POUNDING BLOCKS.



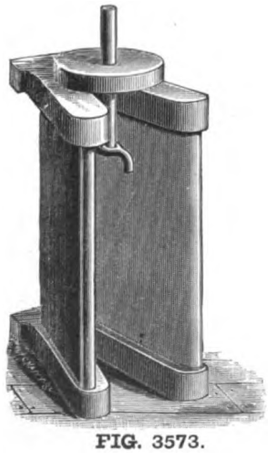


FIG. 3573.

PRICE OF EITHER SIZE, $12.00.

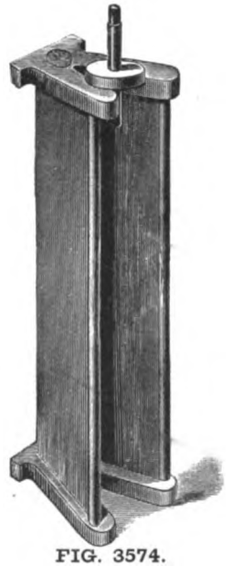


FIG. 3574.

UPPER SURFACE CHILLED AND FINISHED.

The above are largely introduced and have an increasing sale and popularity. Saving the expense of breaking vises, hunting for pieces with suitable holes in them for the mandrel to pass through, removing and replacing the lathe dog, they prove a profitable part of the shop outfit. They take all sizes of mandrels or arbors from the smallest to 3 or 4 inches, and are valuable as straightening anvils and Vs or crotches for holding shafts or pipes. With them the patent raw-hide hammers should be used. These are much superior and more durable than babbitt or copper, and save many times their cost in damage to mandrels or finished work around the shop.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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MANDREL PRESSES.

ADJUSTABLE SCREW PRESS.

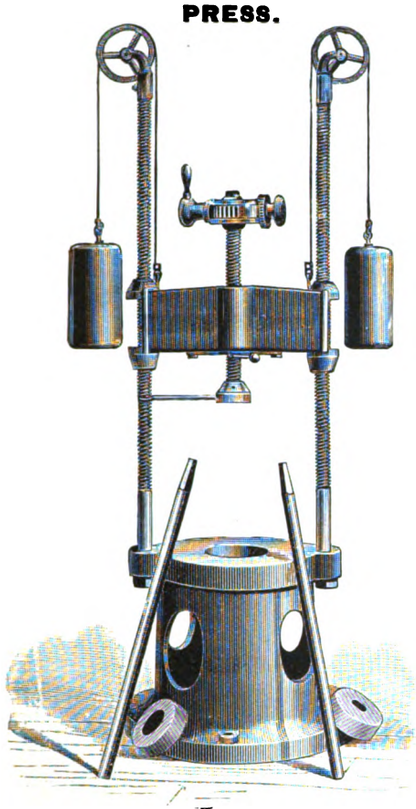


FIG. 3575.

From the table rise two screw guides, upon which the cross head is adjustably supported, having semi-screw nuts and toggle mechanism by which the cross head is held fast or released for vertical adjustment. The cross head is balanced by weights, and a steadying bar connects the press cup with the press screw. On the press screw is fixed a spur-toothed ratchet wheel, embraced by a forked lever head fulcrummed to oscillate on the press screw. A double acting spring pawl engages the teeth of the ratchet, and to the press screw a hand crank is fixed.

After the object has been placed in press, the cross head, in which the central screw is placed, can be instantly dropped to the work, and with a few turns of the screw the required pressure is applied.

PRICES.

No. 1. 12 x 24, capacity 20 tons pressure, $75.00.

No. 2, 20 x 36, capacity 75 tons pressure, $100.00.

SCREW PRESS.

For ordinary work, the cross head at the top of the machine would remain stationary, the adjustment of the screw 12 inches being all that would be necessary; but for larger or smaller work than this, the head can be readily raised or lowered by removing the keys in uprights at ends of table, cross head being counterbalanced so that this adjustment can be made quickly.

DIMENSIONS OF PRESS.

The distance between uprights, 22 inches; range of forcing head above table, 3 inches to 30 inches; height of table from floor, 28 inches; size of hole in table, 4 inches; range of screw, 12 inches.

WEIGHT, 500 LBS.

PRICE, $85.00.

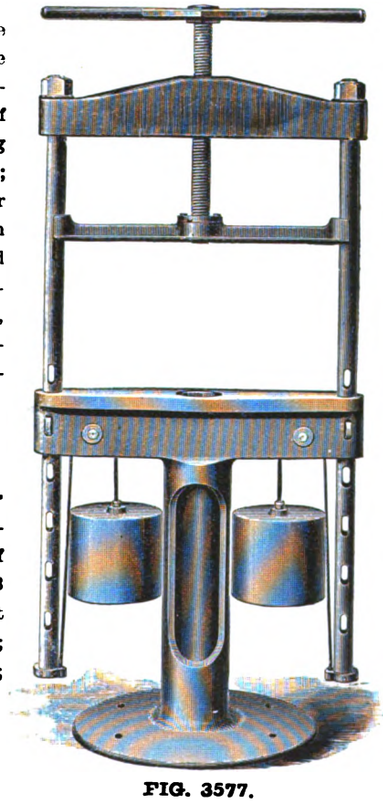


FIG. 3577.

POWER PRESS.

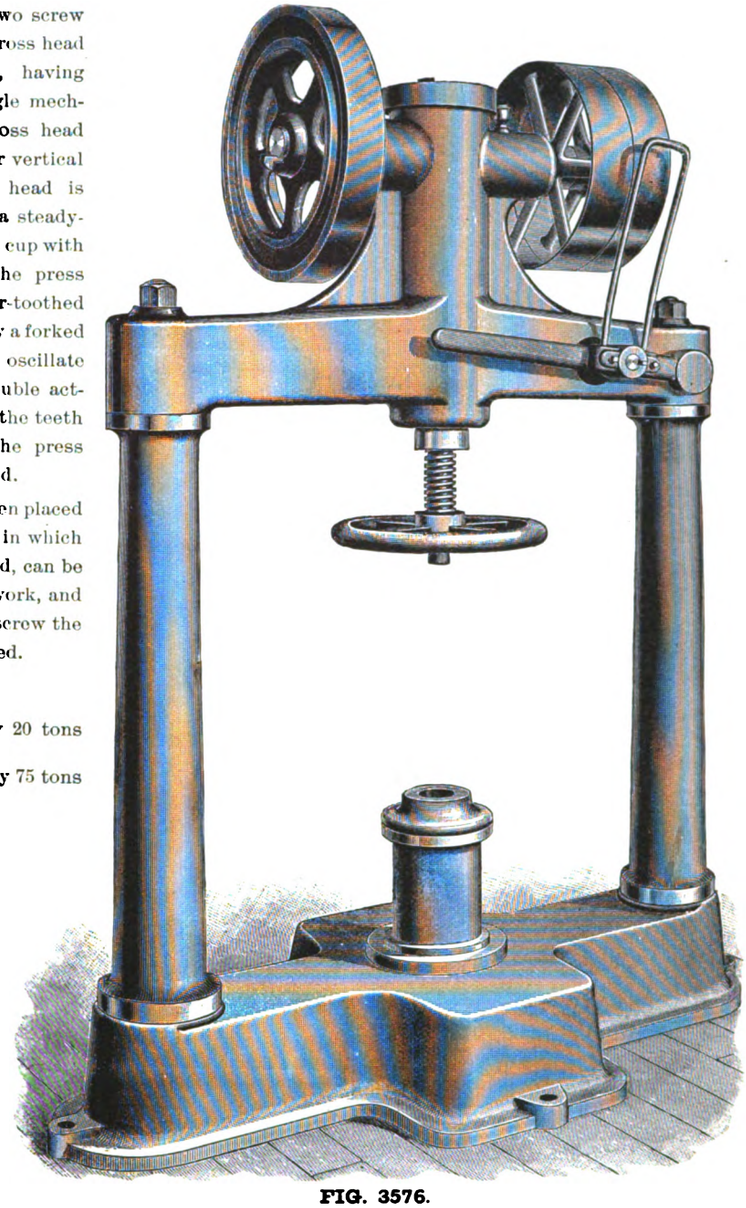


FIG. 3576.

This machine is designed to be used in forcing mandrels into work of all kinds; also for driving mandrels out of the work. The forcing is done by short, quick blows of the ram; the hand wheel and screw, shown in the cut, being used to follow the mandrel as it is being driven into the work.

The ram has a movement of only ¼ inch, but makes from 175 to 200 strokes per minute, and from the nature of the blow is exceedingly powerful. When the machine is in operation, one man cannot follow the mandrel with the hand wheel as fast as the ram will drive it in.

The distance between the uprights is 36 inches; the distance from the base to the end of the ram, at its highest point, 2 feet 9 inches.

The screw in the ram has travel or feed of 18 inches.

Each machine is furnished with three stands for holding the work, 6, 9, and 12 inches high, and 4 sizes of caps to go on the top of the stand for holding the mandrels. These caps are made of the following sizes: 1¼, 2¼, 3¼, and 4¼ inch hole; and the holes in the stands and the base being 5¼ inches, the machine will receive mandrels from 1¼ inches up to 5¼ inches in diameter.

Tight and loose pulleys are 16 inches in diameter, 3½ inches face, and should make from 175 to 200 revolutions per minute; the number of strokes of the ram being the same number as the revolutions of the pulley.

WEIGHT, 1,800 LBS. PRICE, $225.00.

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HAND REAMING MACHINE.

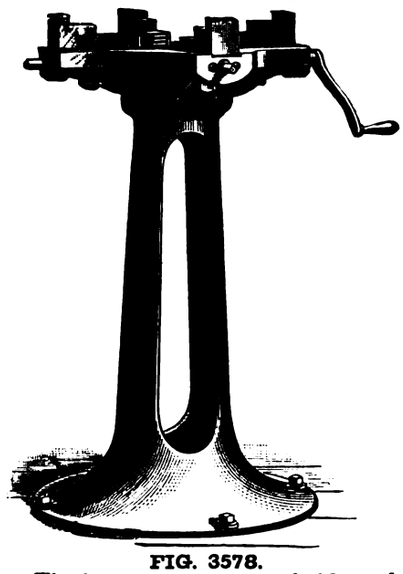


FIG. 3578.

The No. 1 machine will hold work from 20 inches down to 1¼ inches in diameter. There is a hole in the center of the chuck 4 inches in diameter so the reamer will go through the chuck and can be taken out of the side of stand. The jaws of the chuck are extra large and strong and are made of steel castings. The screws are also made of steel.

No. 2 machine will hold work from 30 inches to 2½ inch hole, in center, 6 inches.

PRICES.

No. 1, 20 inch diameter.....$45.00
" 2, 30 " " 85.00

MAGNETIC METAL SEPARATOR.

This machine has been found very useful for separating iron turnings, filings, etc., from brass, composition and other materials. The wheel, represented in the cut, over which the mixed metals are falling, contains 360 magnets to which the iron adheres. The iron is carried to the brush cylinder on the back side of the machine, and there removed, while the brass and other materials fall into the box on the front side. The machine pays for itself in a short time in the saving of labor effected by it, to say nothing of the improved quality of stock thus treated. Brass stock cleansed with the machine can be used for the best kinds of work. The machine may also be used for separating iron from emery, granular rubber, ores, etc., and is doubtless capable of various other applications.

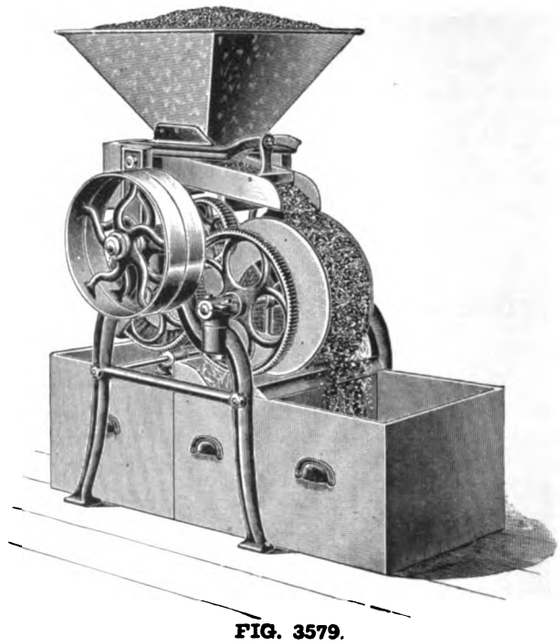


FIG. 3579.

DIRECTIONS FOR STARTING.

The driving shaft should run 90 to 100 turns per minute. Size of pulley, 12 inches diameter, width of face, 2 inches; a 1¼ inch belt will drive it.

There are two things absolutely necessary in using the machine.

1st. Remove the iron bands, and replace them whenever the machine is not running; raise also the brush. When it is running do not drop the brush too low; it will wear out too quick.

2d. The tray under the hopper should strike equally on each side, so as to distribute the stock evenly on the wheel.

If you wish it to feed faster, draw the hopper forward.

PRICES.

No. 1 machine,	5¼	inch face,	10	inch diam.		$135.00
" 2 "	10½	" "	10	" "		225.00
" 3 "	21¾	" "	10	" "		350.00

CENTRIFUGAL OIL SEPARATOR.

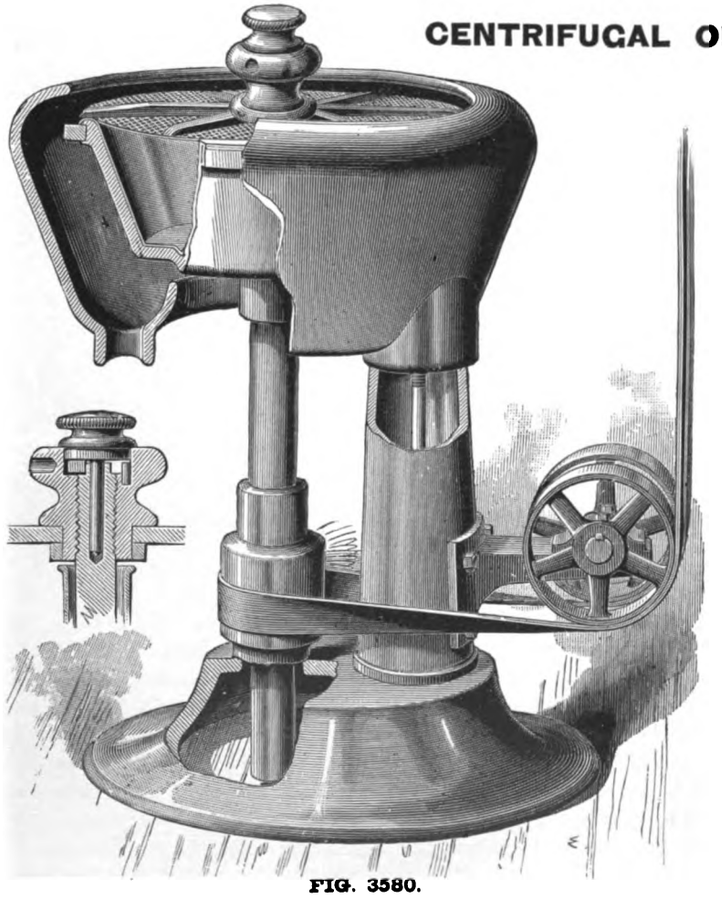


FIG. 3580.

This centrifugal oil separator is designed to thoroughly and quickly remove the oil from metal turnings formed in the manufacture of bolts and screws, and from small articles, such as screws, bolts and nuts, which in their manufacture are coated with oil.

Our oil separator is about 30 inches high, requires a floor space 20 inches square, is adapted to run at a speed of about 2,000 revolutions per minute, is noiseless in operation, and produces no jar.

The oil separator is made in the best possible manner, will not get out of order, and is accompanied with countershaft and hangers. It is estimated by some who have used the machine, that the saving of oil in any manufacturing establishment consuming annually from eight to ten barrels of oil, will be amply sufficient to warrant and necessitate the purchase of an oil separator.

The revolving drum has within it a removable pan in which the oily chips, or turnings, or screws are placed, the pan being removed to discharge its contents when the oil has been thrown off between it and the metal cover, locked down closely by a lock-nut. The oil discharged into the outer casing is delivered from an outlet into a suitable vessel, ready to be used over again.

PRICE, INCLUDING COUNTERSHAFT, $160.00.

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SURFACE PLATES AND SCREW MACHINES.

PRICES, FIG. 3581.

Size.	Weight, about	Price.
6 in. x 10 in.	15 lbs.	$9.00
8 " x 12 "	25 "	13.00
10 " x 15 "	40 "	21.00
12 " x 18 "	75 "	27.00
12 " x 48 "	220 "	74.00
14 " x 14 "	50 "	25.00
16 " x 24 "	125 "	55.00
18 " x 36 "	250 "	83.00

STANDARD SURFACE PLATE.

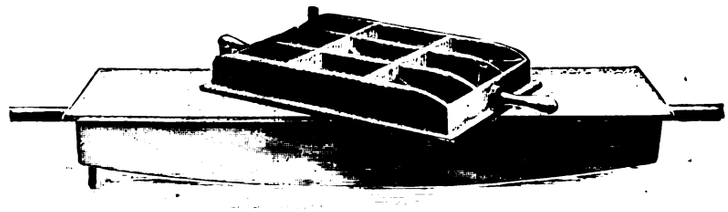


FIG. 3581.

SCREW MACHINES, PLAIN AND FRICTION GEARED HEADS, AND WITH AND WITHOUT WIRE FEED.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Diameter of hole in spindle...	¾ in.	1⅛ in.	1 1/16 in.	1¾ in.	2⅛ in.
Diameter of hole in wire feed plunger	17/32 "	7/8 "	1 1/16 "	1 7/16 "	1¾ "
Diameter of turret	4 1/16 "	6⅛ "	7¼ "	8 1/16 "	10 "
Diameter of holes in turret...	¾ "	1 "	1¼ "	1¼ "	1¾ "
Length that can be milled....	3 1/16 "	5¼ "	6¼ "	7 "	9 "
Length of bed	3 ft. 0 "	4 ft. 0 "	4 ft. 6 "	5 ft. 0 "	6 ft. 0 "
Diameter of pulleys on countershaft	8 "	10 "	12 "	12 "	14 "
Width of belt on countershaft	2 1/16 "	3 "	3¼ "	3½ "	4 "
Countershaft speed of	300 rev.	250 rev.	200 rev.	200 rev.	160 rev.

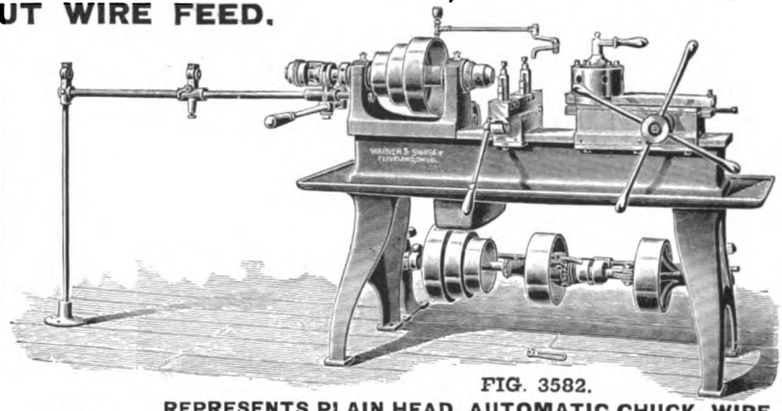


FIG. 3582.

REPRESENTS PLAIN HEAD, AUTOMATIC CHUCK, WIRE FEED, AND TURNSTILE FEED TO SLIDE.

PRICES.

No.		Weight, lbs.	Prices.
1.	Plain head, lever feed to slide	700	$
1.	" " " " " auto. chuck and wire feed,	725	
2.	" " " " "	1,050	
2.	" " " " " auto. chuck and wire feed,	1,075	
2.	" " turnstile " "	1,050	
2.	" " " " " auto. chuck and wire feed,	1,100	
3.	" " lever " "	1,400	
3.	" " " " " auto. chuck and wire feed,	1,450	
3.	" " turnstile " "	1,400	
3.	" " " " " auto. chuck and wire feed,	1,450	
3.	Geared friction head	1,525	
3.	Geared friction head, automatic chuck and wire feed	1,600	$
3.	Extra for power feed for turret		
4.	Plain head, turnstile feed to slide	1,750	
4.	" " " " " auto. chuck and wire feed,	1,800	
4.	Geared friction head	1,900	
4.	" " " automatic chuck and wire feed	1,975	
4.	Extra for automatic feed to turret		
5.	Geared friction head	2,400	
5.	" " " automatic chuck and wire feed	2,500	
5.	Extra for automatic feed for turret		

No. 6 SCREW MACHINE, BACK GEARED.

This machine is new in design and unusually strong and heavy. It is suitable for making a large variety of pieces from the bar, or for finishing work held in a chuck when several tools are required or a number of operations are to be performed. The back gears are underneath the spindle cone and are entirely enclosed. They run continuously and are engaged or disengaged by a friction clutch without stopping the machine. This clutch is positive and will hold the full belt power of the machine. The gears on the cone are also enclosed.

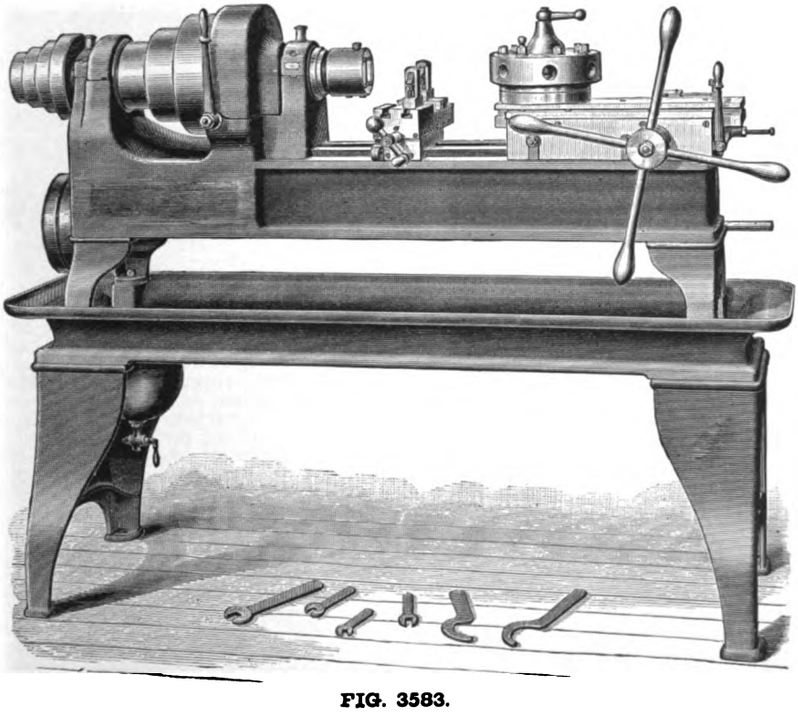


FIG. 3583.

The turret is fed automatically or by hand and has eight different speeds. The feed cones have four steps, and by shifting a lever each of the four speeds can be varied, so that the tools may be fed fast or slow without changing the belt. The spindle cone has three steps, 6, 8½ and 11 in. diameter.

The back gears are 4.63 to 1; size of hole through spindle, 1 7/16 in.; diameter of turret, 9½ in.; number of holes in turret, 7; size of these, 1¼ in.; movement of turret head slide, 9⅝ in.; greatest distance between turret and chuck, 17 in.; length that can be milled, 6 in.; swing over slide, 6¼ in.; swing over bed, 13½ in.; length of bed, 56 in.

Countershaft has friction pulleys 14 in. in diameter, 3½ in. face, and should run about 175 revolutions per minute.

Weight, 1,800 lbs. Floor space, 30 x 78 inches.

Price includes overhead works and everything shown in cut.

PRICE, $.....

An oil pump, pipes, etc., are furnished when desired.

PRICE, $.....

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NO. 1 SCREW MACHINE.

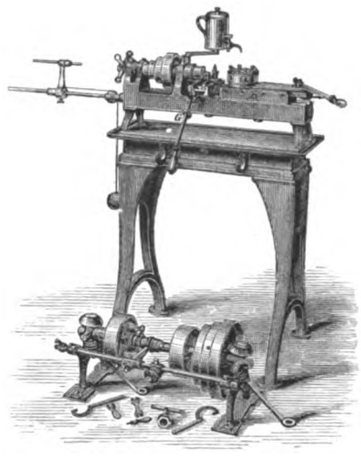


FIG. 3584.

The spindle has a hole bored through it, seven-sixteenths of an inch in diameter, and is provided with an ingenious device for opening and closing the jaws in the chuck which holds the wire from which the screws are made.

This operation of opening and closing the jaws of the chuck is performed in an instant without stopping the machine, and effects a great saving of time in making small screws. The revolving head is made entirely of steel.

Diam. hole through spindle, $\frac{7}{16}$ inch; 6 holes in revolving head, $\frac{9}{16}$ inch diam.; length that can be milled, $2\frac{1}{2}$ in.; friction pulleys on countershaft are 8 inches diameter and $2\frac{1}{4}$ inches face. Floor space, 26 x 64 in.

Countershaft should run 260 turns per minute.

Weight, 500 lbs.

PRICE of machine, with overhead work and everything shown in cut, $.....

DIE AND TAP HOLDERS.

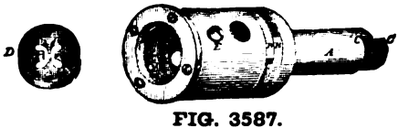


FIG. 3587.

FOR USE IN THE REVOLVING HEADS OF SCREW MACHINES. FIGS. 3583 TO 3586.

In threading screws and in tapping it is often desirable to cut the thread up to a shoulder or to a given point, or to run the tap in to a shoulder or a given distance and positively no further, and this is necessarily quite a difficult and delicate operation, requiring great expertness to avoid breaking the threading tool or injuring the shoulder of the screw. The engraving represents a die holder which remedies this difficulty, without regard to the skill with which it is operated.

PRICE OF DIE HOLDERS FOR SCREW MACHINE.

No. 1.	Will hold dies for screws to	$\frac{5}{16}$ in. diam.	...$8.00
" 2.	" " " " "	$\frac{3}{8}$ " "	...10.00
" 4.	" " " " "	$\frac{5}{8}$ " "	...16.00
" 5.	" " " " "	$\frac{3}{4}$ " "	...20.00

TAP HOLDERS FOR USE WITH SCREW MACHINES.

Diameter given is for shank of tap.

No. 1.	For No. 1	screw machine,	$\frac{5}{16}$	in. diam.	..$8.00
" 2.	" " 2 and 3	" machines,	$\frac{1}{2}$	" "	10.00
" 4.	" " 4 and 5	" "	$\frac{5}{8}$	" "	16.00
" 5.	" " 4 and 5	" "	1	" "	20.00

SCREW MACHINE AUTOMATIC FEEDING APPARATUS.

For the revolving head slides of Nos. 2, 3, 4 and 5 screw machines are made and applied to machines when required.

PRICE for automatic feeding apparatus for Nos. 2 or 3 screw machine,..... **$50.00**

PRICE for automatic feeding apparatus for Nos. 4 or 5 screw machine..... **$75.00**

Extra screw leaders and nuts, either of United States or French standard of pitch of thread, are made when required.

SPECIAL TOOLS FOR SCREW MACHINES.

Having had much experience in manufacturing with these machines, we believe it will be to the advantage of most parties to order, with the first machine, special tools for making one or more screws or parts of machines.

NO. 2 & 3 SCREW MACHINE.

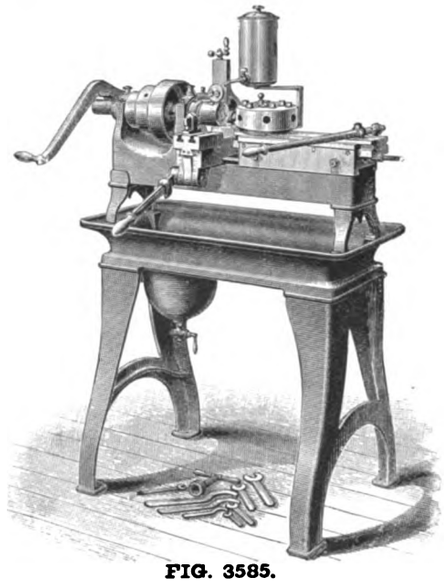


FIG. 3585.

For making screws, turning, boring and facing bushings, tapping and facing nuts, making washers, pins, etc.

The spindle boxes are steel, hardened and ground inside and out. The spindle is also steel; its front bearing is hardened, and both bearings are ground. Diam. of hole through spindle, $\frac{3}{4}$ in.; 6 holes in revolving head, $\frac{13}{16}$ in. diam.; length that can be milled, $3\frac{1}{2}$ in.

Countershaft has friction pulleys 10 in. diam., $3\frac{1}{4}$ in. face, and should run 270 turns per minute. Price includes a 16 pitch leader and nut, countershaft, wrenches, etc.

Weight, 750 lbs.

Floor space, 47 x 30 in. **PRICE, $**.....

NO. 2 SCREW MACHINE.

This is the same as No. 3 screw machine, without a chasing bar. Weight, ready for shipment, 715 lbs. **PRICE, $**.....

SCREW SLOTTER.

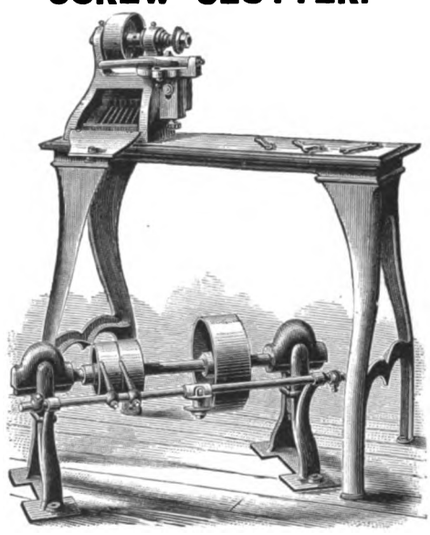


FIG. 3588.

This machine, as will be observed by an examination of the cut, is very simple, and is well adapted for slotting studs and screws expeditiously. Duplicate bushings, suitable for different sizes of screws, can be fitted to the clamping jaws. The machine contains a closet, in which is a rack for holding the various sizes of cutters, and also furnishing a place for bushings, wrenches, etc. Countershaft should run 160 turns per minute. Tight and loose pulleys, 6 inches diameter, 3 inches face. Weight of machine, with countershaft, 370 lbs.

PRICE, with everything in cut, $.....

FOR CUTTERS, SEE PAGE 181.

NO. 4 & 5 SCREW MACHINE.

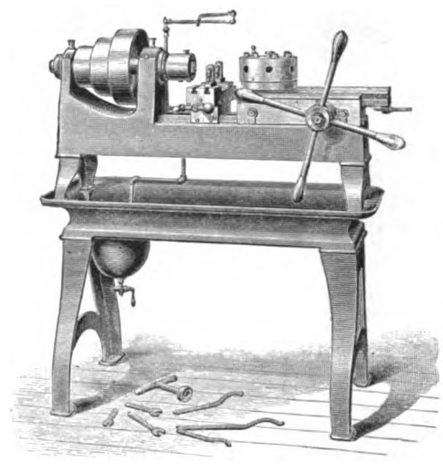


FIG. 3586.

This machine is suitable for making from bar iron all kinds of screws and studs ordinarily used in a machine shop. Nuts can be drilled, tapped, and one side faced up, and many parts of sewing machines, cotton machinery, gas and steam fittings made with a great saving of time and labor. The diam. of hole through spindle is $1\frac{9}{32}$ in.; 7 holes in revolving head, $1\frac{1}{16}$ in. diam.; length that can be milled, 6 in. Swing over bed, $13\frac{3}{8}$ in. Swing over rest, $6\frac{1}{4}$ in.

The countershaft has friction pulleys 14 in. diam., $3\frac{1}{2}$ in. face, and should run 190 turns per minute.

Price includes countershaft, wrenches, etc., and all shown in cut. Weight, 1,450 lbs. Floor space, 32 x 62 inches.

PRICE of machine, with back gears, $.....

PRICE " " without " $.....

NO. 5 SCREW MACHINE.

It is the same size machine as the No. 4, with a chasing bar. A 12 pitch leader and nut furnished with the machine. It is not back geared. Weight, 1700 lbs. **PRICE, $**.....

POLISHER AND FINISHER.



FIG. 3589.

This machine is suitable for finishing and polishing a large variety of small pieces, screws, studs, pins, collars, etc. The head of the machine is the same as that of our universal hand lathe. The spindle and boxes are steel, hardened and fitted by grinding. The bearings are thoroughly protected from grit and dust, and are lubricated from beneath. The hole through the spindle is $\frac{1}{2}$ in. in diameter the greater part of its length, and tapers at the front to $\frac{3}{4}$ in. in diameter.

The machine swings $9\frac{1}{2}$ in. over the table, which is 12 in. wide and 40 in. long. The overhead works consist of countershaft with tight and loose pulleys, 6 in. diam., $2\frac{1}{4}$ in. face, and should run about 450 revolutions per minute. Weight, 350 lbs. Price includes one spanner wrench, one shell chuck and overhead works complete.

PRICE, $.....

PRICE, WITHOUT TABLE, $.....

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SCREW, MACHINES AND TURRET LATHES.

1 9-16 HOLE SCREW MACHINE, WITH WIRE FEED.

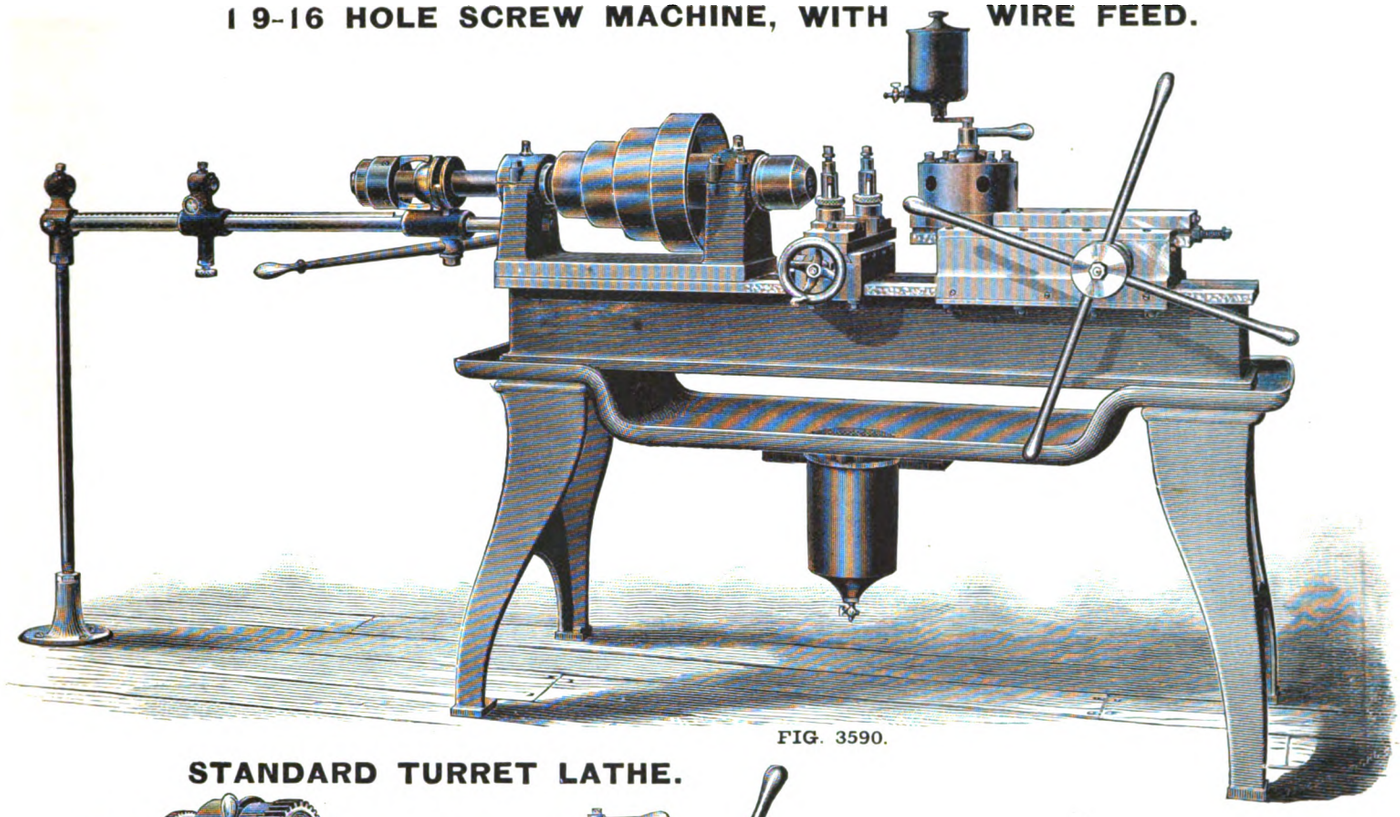


FIG. 3590.

STANDARD TURRET LATHE.

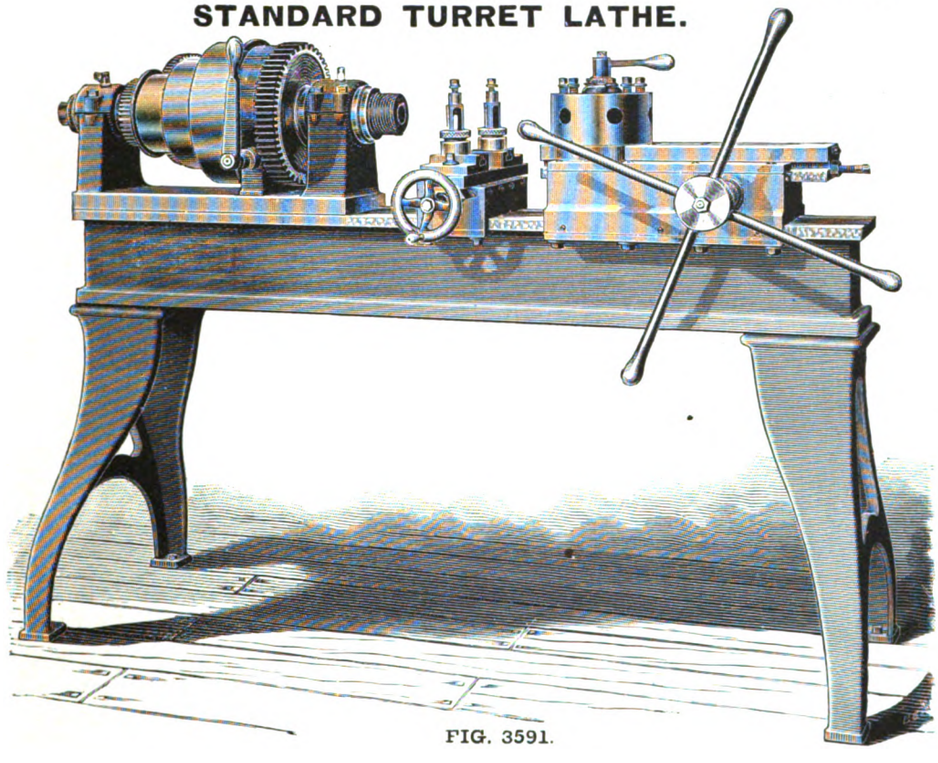


FIG. 3591.

These machines can be furnished with or without wire feed, automatic chucks, plain back gears or geared friction heads.

The swing is 16 inches.

The bed is 5 feet 6 inches long.

The spindle is of tool steel, the front bearing being 3 inches in diameter and 4¾ inches long. The hole through the spindle is $1\frac{9}{16}$ inches diameter. The thrust is taken upon hardened and ground steel rings which are doweled to and revolve with the spindle.

The cut-off is usually furnished with a hand wheel and screw feed, but will be fitted with a lever if desired.

The turret revolves automatically on an adjustable taper bearing. It is bored for six tools, 1¼ inches diameter, unless otherwise ordered.

The standard turret lathe is a plain head machine. It has a four grade cone and is furnished with a double friction countershaft and wrenches. It has no pan or oil pots. Any of the attachments described below can be added at the additional prices named. **PRICE, $350.00.**

The standard screw machine is a plain head machine. It has a four grade cone and is furnished with a double friction countershaft and wrenches. It has pan and oil pots. Any of the attachments described below can be added at the additional prices named. **PRICE, $420.00.**

The wire feed includes an automatic chuck, combined with the mechanism for feeding the stock through the chuck, all with one movement of the lever and without stopping the machine. It will handle 1⅛-inch stock. **PRICE, $160.00.**

The automatic chuck is operated by means of a lever at the left of the head, allowing the work to be put in and taken out without stopping the machine. **PRICE, $100.00.**

One collet is furnished with an automatic chuck or wire feed. Extra collets, $3.50 each.

A split chuck, operated by means of a hand wheel at left of spindle, can be furnished. **PRICE, $18.00.**

Plain back gears can be furnished, in which case the cone will only have three steps. **PRICE, $75.00.**

The geared friction head is preferable to the plain back gear for work requiring different speeds on the same piece, as the gears can be thrown in or out of service by the movement of a lever, convenient to the left hand of the operator. This head has a three grade cone. **PRICE, $150.00.**

An automatic feed can be applied to the slide. **PRICE, $80.00.**

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SCREW MACHINES, WITH ROLLER FEEDS AND AUTOMATIC CHUCKS, CLUTCH BACK GEARS, AND POWER FEEDS TO CARRIAGES AND TURRETS.

GENERAL DESCRIPTION OF FIG. 3592 TO FIG. 3595.

They are heavily built and will do work from the continuous bar up to the limit of spindle hole, and chucking up to limit of swing.

They may be fitted with a roller feed and automatic chuck—see Figs. 3171 and 3172—which handle, equally well, either round, square or hexagon stock, and operate while the machine is running.

The turrets have power feed and revolve automatically on the backward movement. This feed is given by a belt on a cone or by gearing, whichever may be ordered. A proper stop-gauge or knock-off is provided for milling or drilling to a desired length.

The carriages or cut-off rests have power and hand reversible lateral feed. The cross feed is by hand. There are two tool posts, one in front and the other behind the work.

There are clutch back gears that operate while the machine is running.

There are rotary pumps to maintain a steady supply of oil on cutting tools.

Each machine has a countershaft with friction pulleys, a cat-head for the back end of spindle when without roller feed, as shown, Fig. 3172, bushings for turret heads, and suitable wrenches.

They can be furnished with or without automatic chucks, Fig. 3171, roller feeds, Fig. 3172, chasing apparatus, Fig. 3596, and second end attachments, Fig. 3597.

NO. 12X SCREW MACHINE.

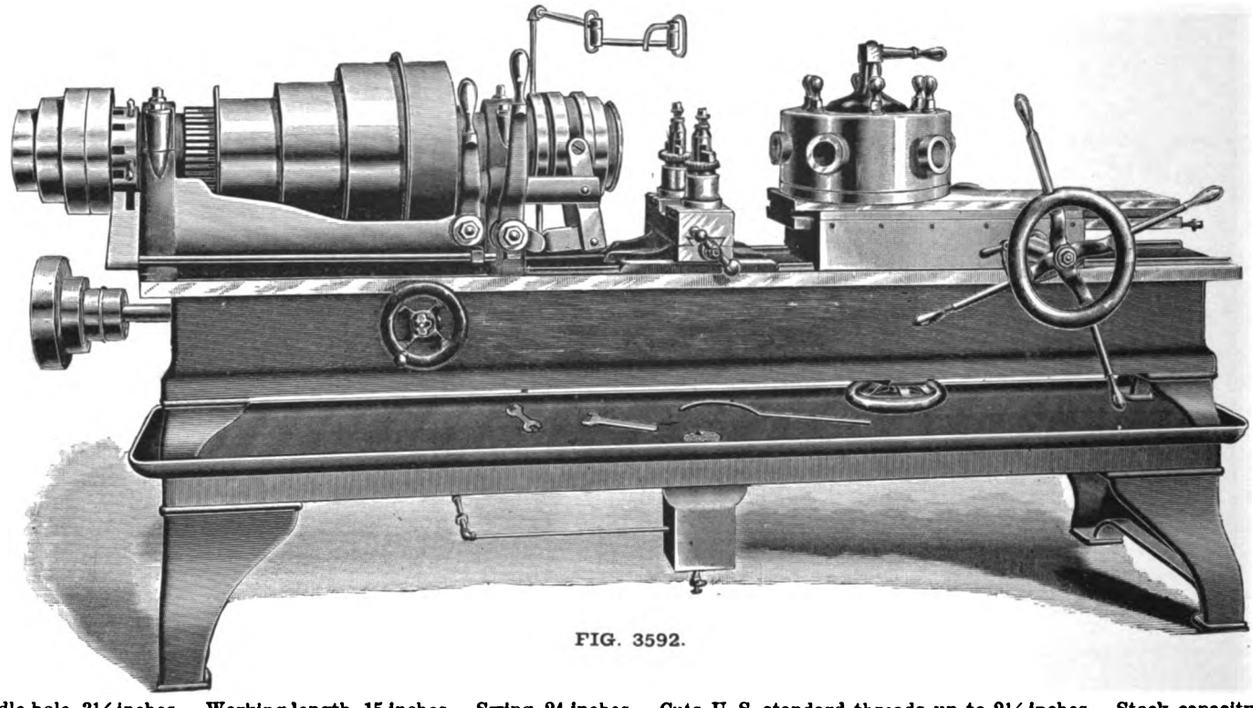


FIG. 3592.

Spindle hole, 3¼ inches. Working length, 15 inches. Swing, 24 inches. Cuts U. S. standard threads up to 2½ inches. Stock capacity, square, 2¼ inches; hexagon, 2¾ inches. Diameter of turret holes, 3 7/8 inches. Number of turret holes, 6. Diameter of turret, 16½ inches. Bed length, 8 feet 7½ inches. Weight, 5,000 lbs. Countershaft pulleys, 18 x 5¼ inches. 100 revolutions per minute. **PRICE,** including power feed for turret, clutch back gears, $..... Extras as follows: Roller feed and automatic chuck, Figs. 3171 and 3172, $..... Chasing apparatus, Fig. 3596, $..... Second end attachment, Fig. 3597, $..... Adjustable hollow mills and holders, Fig. 3598, $..... Clutch holders for dies, Fig. 3599, $..... Plain steel chucks, Fig. 3601, $..... 3-jaw chuck and face plate, $..... Taper turning tool, Fig. 3603, $..... Straight box tool, Fig. 3600, $..... Necking tool, Fig. 3602, $..... Hobs and leaders, per pair, $..... Collets, per set, $..... Collet dies, each, $.....

NO. 11X SCREW MACHINE.

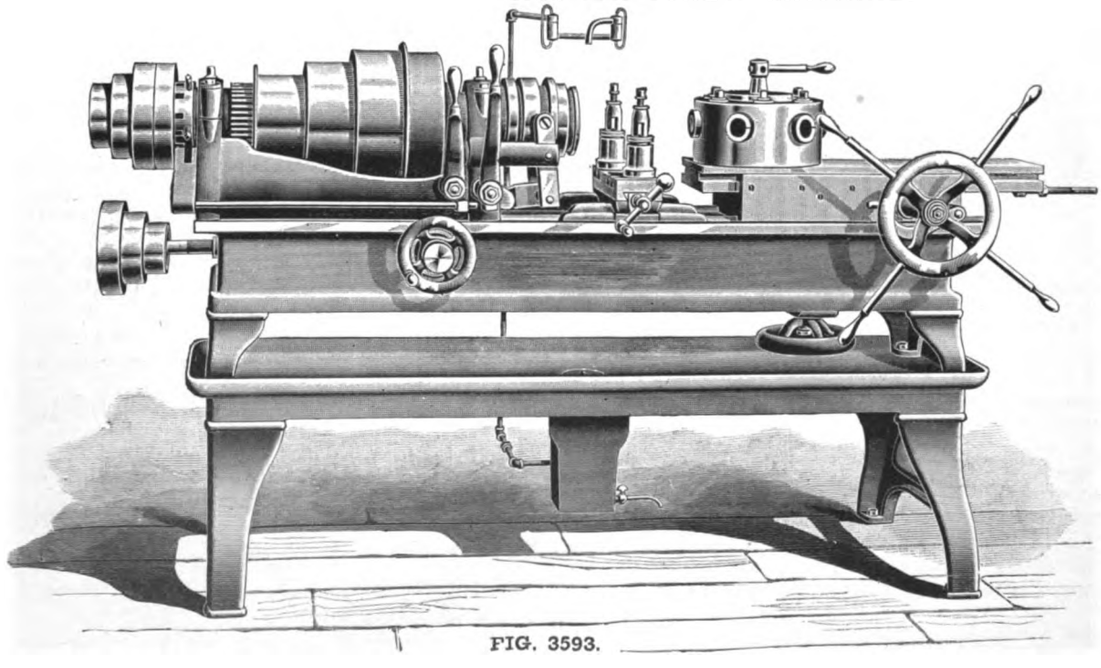


FIG. 3593.

Spindle hole, 2¾ inches. Working length, 14 inches. Swing, 20 inches. Cuts U. S. standard threads up to 1¾ inches. Stock capacity, square, 1 7/8 inches; hexagon, 2 5/8 inches. Diameter turret holes, 2¾ inches. Number turret holes, 6. Diameter of turret, 13 inches. Bed length, 6 feet 7 inches. Weight, 4,000 lbs. Countershaft pulleys, 16 x 4¼ inches. 200 revolutions per minute. **PRICE,** including power feed to turret and clutch back gears, $.....

Extras as follows:
Roller feed and automatic chuck, Figs. 3171 and 3172, $..... Chasing apparatus, Fig. 3596, $..... Second end attachment, Fig. 3597, $..... Adjustable hollow mills and holders, Fig. 3598, $..... Clutch holders for dies, Fig. 3599, $..... Plain steel chucks, Fig. 3601, $..... 3-jaw chuck and face plate, $..... Taper turning tool, Fig. 3603, $..... Straight box tool, Fig. 3600, $..... Necking tool, Fig. 3602, $..... Hobs and leaders, per pair, $..... Collets, per set, $..... Collet dies, each, $.....

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SCREW MACHINES, WITH ROLLER FEEDS AND AUTOMATIC CHUCKS, CLUTCH BACK GEARS, AND POWER FEEDS TO CARRIAGES AND TURRETS.

NO. 8 X SCREW MACHINE, PLAIN AND BACK GEARED.

DESCRIPTION OF PLAIN MACHINE, WITH NO BACK GEARS.

Spindle hole, $1\frac{9}{16}$ inches. Working length, $10\frac{1}{4}$ inches. Swing, 16 inches Cuts U. S. standard threads up to 1 inch. Stock capacity, square, $1\frac{1}{16}$ inches; hexagon, $1\frac{5}{16}$ inches. Diameter of turret holes, $1\frac{1}{4}$ inches. Number of turret holes, 6. Diameter of turret, $9\frac{1}{2}$ inches. Bed length, 5 feet 1 inch. Weight, 1,600 lbs. Countershaft pulleys, 14 x $3\frac{3}{4}$ inches. 200 revolutions per minute.

PRICE, $.....

Extras same as for 8 x, back geared.

DESCRIPTION, NO. 8 X, WITH BACK GEARS.

Spindle hole, $2\frac{1}{8}$ inches. Working length, $10\frac{1}{4}$ inches. Swing, 16 inches. Cuts U. S. standard threads up to $1\frac{3}{8}$ inches. Stock capacity, square, $1\frac{7}{8}$ inches; hexagon, $1\frac{3}{4}$ inches. Diameter of turret holes, 2 inches. Number of turret holes, 6. Diameter of turret, $9\frac{1}{2}$ inches. Bed length, 5 feet 1 inch. Weight, 1,900 lbs. Countershaft pulleys, 12 x $3\frac{1}{2}$ inches. 300 revolutions per minute.

PRICE, including power feed to turret and clutch back gears, $.....

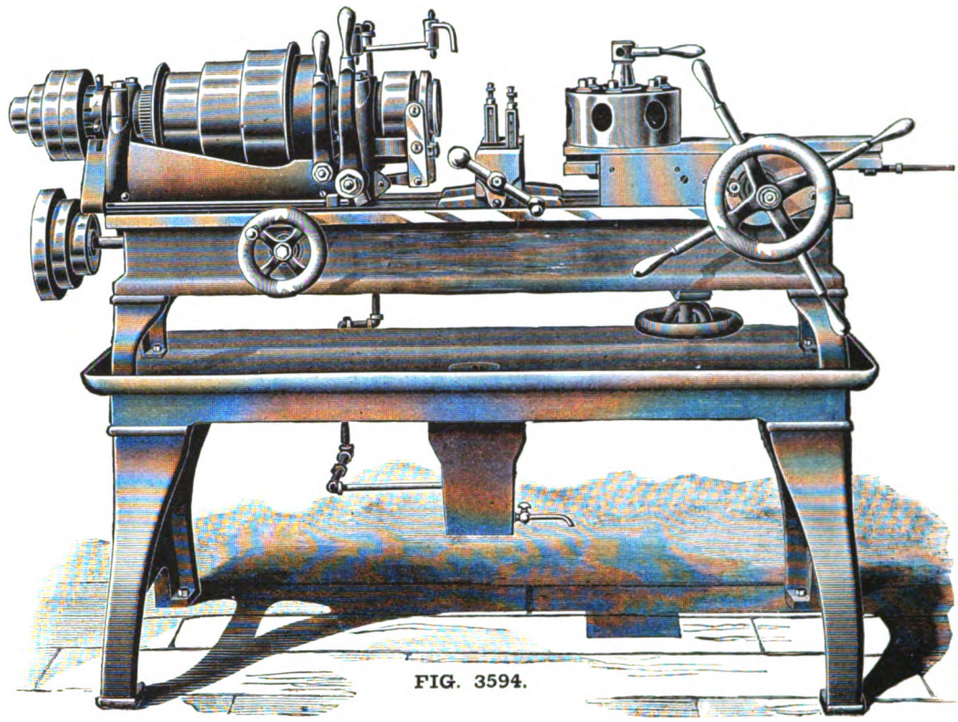


FIG. 3594.

Extras as follows: Roller feed and automatic chuck, Figs. 3171 and 3172, $..... Chasing apparatus, Fig. 3596, $..... Second end attachment, Fig. 3597, $..... Adjustable hollow mills and holders, Fig. 3598, $..... Clutch holders for dies, Fig. 3599, $..... Plain steel chucks, Fig. 3601, $..... 3-jaw chuck and face plate, $..... Taper turning tool, Fig. 3603, $..... Straight box tool, Fig. 3600, $..... Necking tool, Fig. 3602, $..... Hobs and leaders, per pair, $..... Collets, per set, $..... Collet dies, each, $.....

NOS. 7 X AND 6 X SCREW MACHINES.

DESCRIPTION, NO. 7 X.

Spindle hole, $1\frac{5}{16}$ inches. Working length, $10\frac{1}{4}$ inches. Swing, 15 inches. Cuts U. S. standard threads up to $\frac{7}{8}$ inch. Stock capacity, square, $\frac{7}{8}$ inch; hexagon, $1\frac{1}{16}$ inches. Diameter of turret holes, $1\frac{1}{8}$ inches. Number of turret holes, 6. Diameter of turret, $9\frac{1}{2}$ inches. Bed length, 4 feet 10 inches. Weight, 1,500 lbs. Countershaft pulleys, 12 x $3\frac{1}{2}$ inches. 175 revolutions per minute.

PRICE, $.....

DESCRIPTION, NO. 6 X.

Spindle hole, 1 inch. Working length, 7 inches. Swing, 12 inches. Cuts U. S. standard threads up to $\frac{5}{8}$ inch. Stock capacity, square, $\frac{11}{16}$ inch; hexagon, $\frac{7}{8}$ inch. Diameter turret holes, 1 inch. Number turret holes, 6. Diameter of turret, 6 inches. Bed length, 3 feet 7 inches. Weight, 1,000 lbs. Countershaft pulleys, 12 x $3\frac{1}{2}$ inches. 200 revolutions per minute.

PRICE, $.....

EXTRAS FOR NOS. 7 X AND 6 X.

Roller feed and automatic chuck, Figs. 3171 and 3172.....$.....
Power feed for turret.....
Clutch back gears .....
Chasing apparatus, Fig. 3596.....
Second end attachment, Fig. 3597.....
Adjustable hollow mill and holder, Fig. 3598.....
Clutch holders for dies, Fig. 3599.....
Plain steel chucks, Fig. 3601.....
3-jaw chuck and face plate.....
Taper turning tool, Fig. 3603.....
Straight box tool, Fig. 3600.....
Collets, per set.....

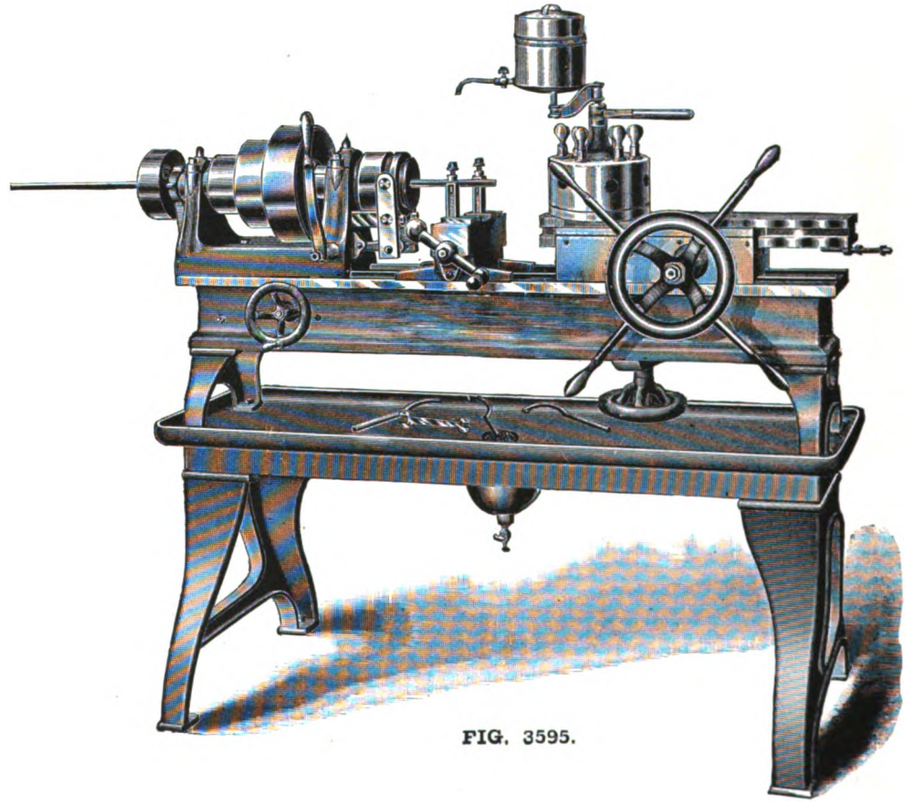


FIG. 3595.

Necking tool, Fig. 3602.....$..... Hobs and leaders, per pair.....$.....
Collet dies, each, $.....

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CHASING APPARATUS FOR SCREW MACHINES, FIGS. 3592 TO 3595.

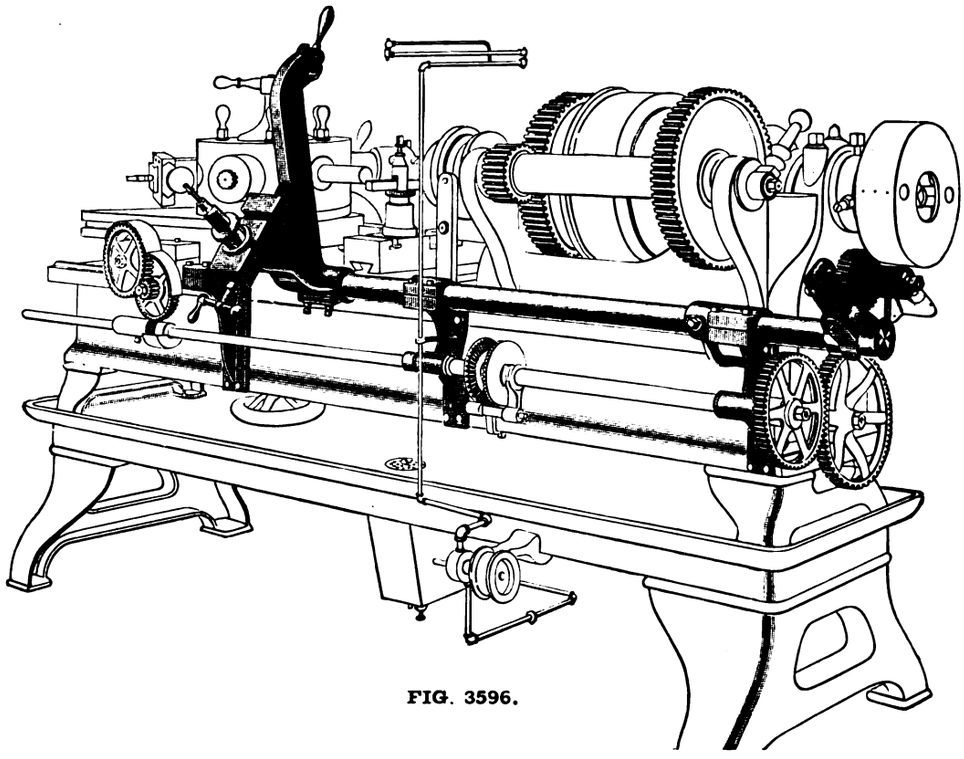


FIG. 3596.

With it are furnished one hob, leader and nut, as sample, the pitch of which should be designated when ordering.

The chaser is the quickest means of cutting a perfect thread, as reversing the motion is done away with, and the time lost in running back on an ordinary engine lathe is saved.

When the desired length of thread has been cut, by lifting the arm which carries the tool, the nut or follower is released from the leader, and a spring returns the bar to its original position, when the tool is ready to cut anew.

Taper and special threads are done more accurately with this tool than in any other way, as it is capable of the finest adjustment.

It is also used for roughing extra heavy threads that are to be sized with a die.

The chaser bar is placed just behind the bed, a position giving much greater stiffness than if it were placed above or in front. It is supported by three substantial bearings, which give it great strength.

The leader runs on a stud at the left end of head; it is geared from the spindle, so that the threading tool cuts two threads to one on the leader.

The arm or carriage, which carries the threading tool, is pivoted to the chasing bar, on which it can be set at any desired position, by the binding screws.

The carriage end of the chaser bar does not overhang from its bearings; on the contrary, there is a box each side of the carriage, hence that part of the chaser bar where the greatest strains come, is supported at both ends. The carriage is therefore rigid and will not spring, which is the great essential to accurate work.

When not in use, the carriage can be thrown back in an instant, where it is entirely out of the way.

The tool block is operated by a screw, with ball handle, and has a stop that can be quickly set for any depth of thread.

When cutting a thread a lug on the end of the carriage rests on the top of a guide bar in front, while a lip on the rocking handle bears on the under side of this guide bar. By this means, together with the correct angle at which the tool approaches the stock, the point of the threading tool is easily held down to the work.

The guide bar is adjustable for any taper as well as straight threads.

SECOND END ATTACHMENT FOR SCREW MACHINES, FIGS. 3592 TO 3595.

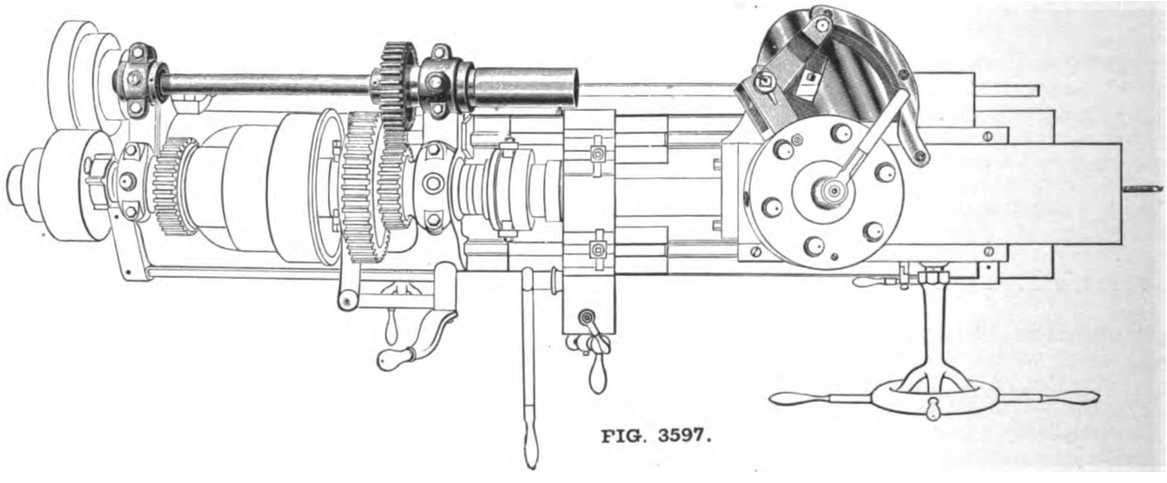


FIG. 3597.

FOR THREADING BOTH ENDS OF STUDS, SHAVING BOLT HEADS, AND FINISHING SECOND END OF WORK.

DESCRIPTION OF THE SECOND END ATTACHMENT.

When one of these tools has this attachment, the back gears, if it is a back geared machine, are placed directly beneath the main spindle, where they are thrown in and out by a friction clutch. In the place of the back gear shaft is an additional spindle, which is run at the same speed and in the same direction as the main spindle. The supplementary spindle carries a die, tap or any other tool, according to the requirements of the work. On the turret is a chuck which occupies but one hole, and, like a turret tool, it is taken off when not in use. After the last operation has been performed upon the continuous bar by a turret tool, the hole occupied by the turret chuck comes next into line. As it is brought forward, the jaws of the chuck come loosely over the work, and after cutting off, the piece is left in them. This chuck has an arm on its lower side, at the end of which is a lug, so that as the turret travels backward and revolves, a fixed cam attached to the turret slide acts upon it, swinging the unfinished end of the work into line with the supplementary spindle, while the jaws of the chuck are automatically closed upon it. At the same time the turret tool that is to perform the first operation upon the bar in the main spindle is also brought into line, as it occupies the next turret hole. With the forward travel of the turret, the second end of the piece in the turret chuck is operated upon by the tool on the supplementary spindle, while the first end of a new piece from the stock in the main spindle is operated upon by the turret tool, thus two tools are cutting simultaneously, and the time of the two operations is halved. The turret is now drawn back, the lug on the chuck arm is once more acted upon by the cam, which swings it around, opens the jaws, and ejects the finished piece in a box conveniently placed. The automatic ejector is regularly put only on the smaller sizes, as heavy pieces would be injured by being thrown against each other.

The immense advantage, on some kinds of work, of a machine with this attachment can be seen at once.

As two tools are cutting at the same time, one operation is gained without loss of time, and without second handling.

This attachment does not in the least impair the quick re-setting and adjusting powers of the machine it is on.

When not in use, it is out of the way, and the machine can be run the same as if without it.

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EXTRAS FOR SCREW MACHINES, FIGS. 3592 TO 3595.

HOLLOW MILL AND HOLDER.

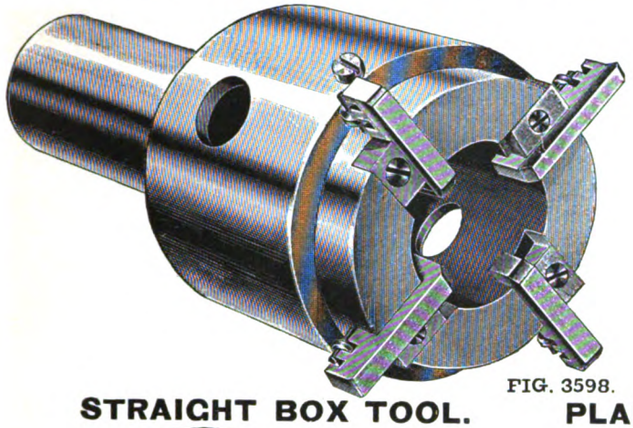
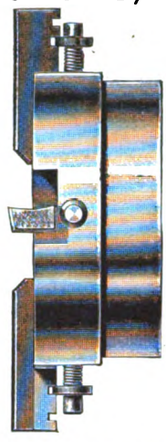


FIG. 3598.



CLUTCH HOLDER FOR DIES OR TAPS.



FIG. 3599.

STRAIGHT BOX TOOL.

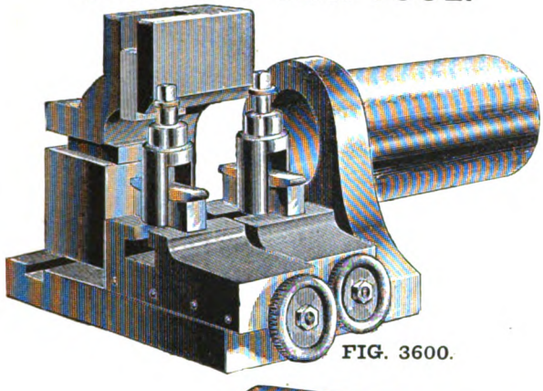


FIG. 3600.

PLAIN STEEL CHUCK.

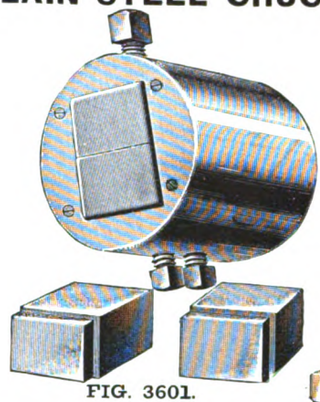
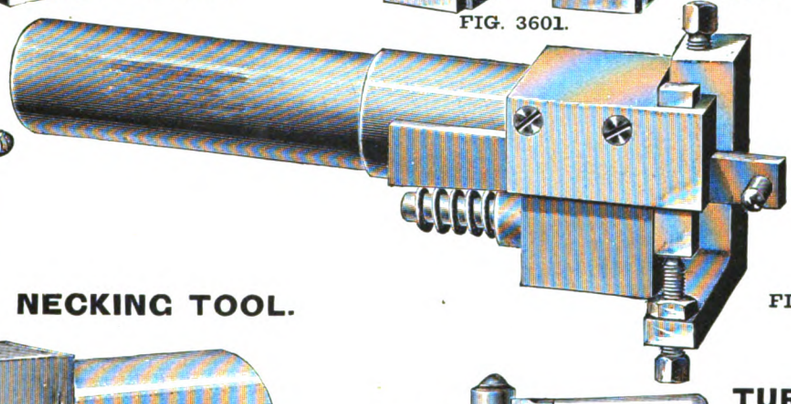


FIG. 3601.



FIG. 3599.

TAPER TURNING TOOL.



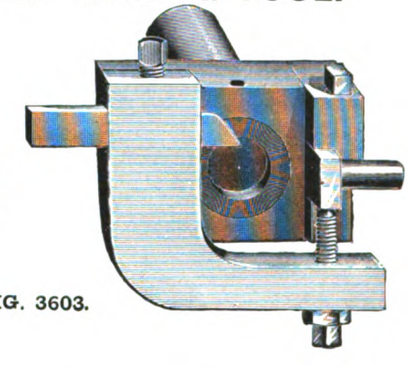


FIG. 3603.

NECKING TOOL.

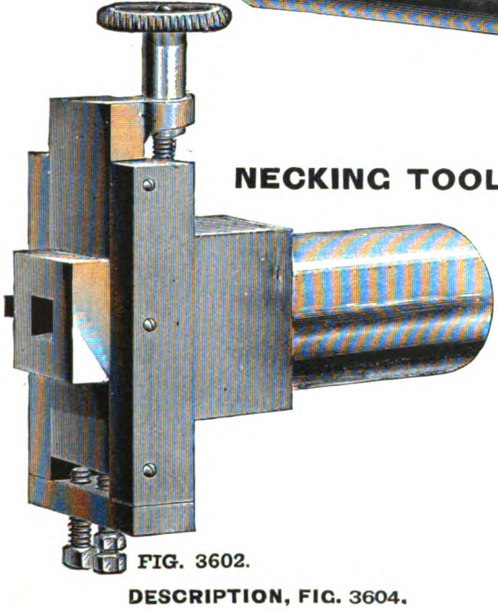


FIG. 3602.

TURRET, SLIDE AND SLIDE BED.

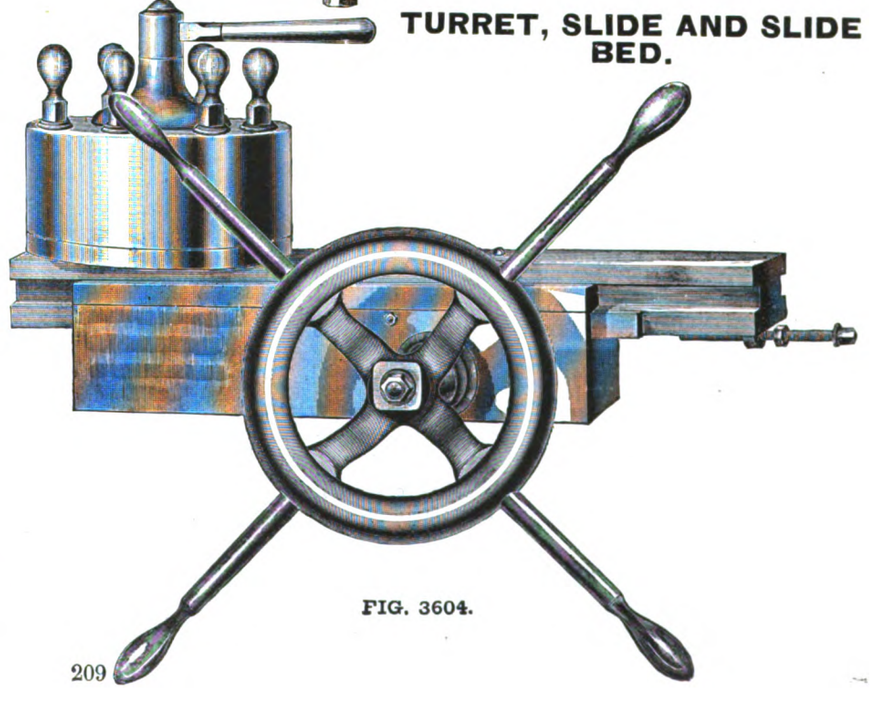


FIG. 3604.

DESCRIPTION, FIG. 3604.

No. of machine.	6 X	8 X	11 X	12 X
Swing	12	15	20	24
Length of slide bed.	15½	17½	21½	25¾
Width of slide bed..	6½	8½	11¼	13¾
Working length....	5¾	10	13	15
PRICE	$.....	$.....	$.....	$.....

The planing and fitting of the ways must be done by the party ordering, and to insure perfect alignment the turret must be bored after it is fitted to the lathe bed, so it is sent solid.

The slides are provided with an adjustable stop screw that can be set for any point of its milling length.

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BRASS FINISHERS' TURRET LATHES.

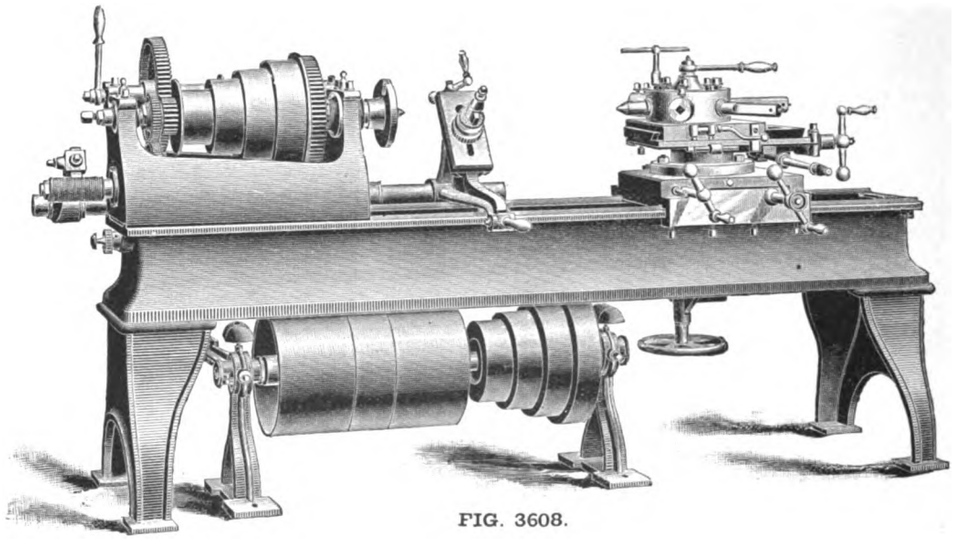


FIG. 3608.

No. 0 Turret Lathe is 24 inch swing, 8 foot bed; has engine feed, back gears, screw chasing apparatus and taper attachment. Headstock has 4 grade cone for 3 inch belt. Countershaft has plain pulleys as shown in cut, or friction pulleys 14 inch diameter, 4 inch face, and should make 150 revolutions per minute. Weight, 2,850 lbs. **PRICE, $1,100.00.**

No. 1 Turret Lathe is 18 inch swing, 6 foot bed; has engine feed, back gears, screw chasing apparatus and taper attachment. Headstock has 5 grade cone for 2¼ inch belt. Countershaft has plain pulleys as shown in cut, or friction pulleys inch diameter, inch face, and should make 150 revolutions per minute. Weight, lbs. **PRICE, $800.00.**

NO. 2 IMPROVED BRASS TURRET LATHES.

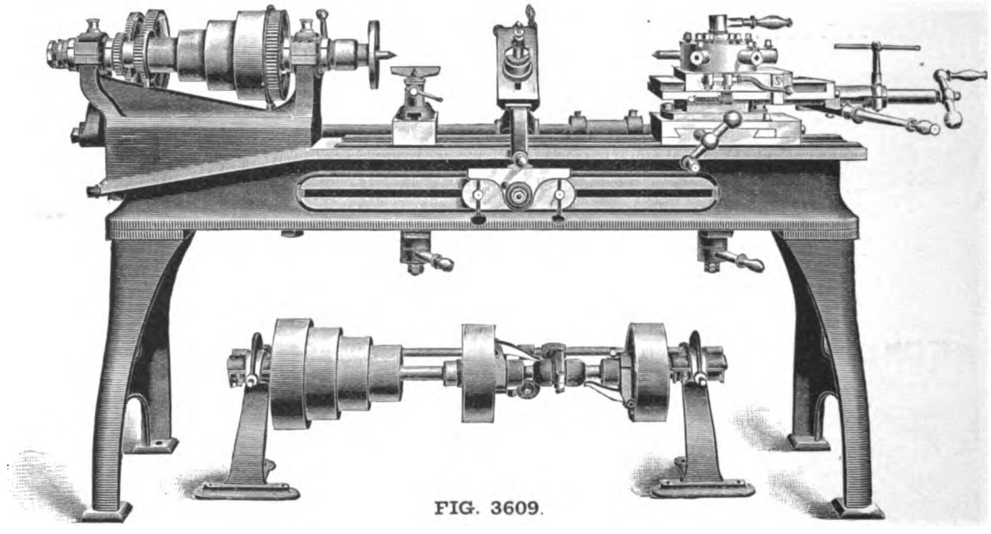


FIG. 3609.

This lathe is 18 inch swing, 6 foot bed; has back gears, screw chasing apparatus, taper attachment. The headstock spindle has a 1⅛ hole through its entire length. Has self-oiling boxes, 4 grade cone for 2¾ inch belt. Countershaft has friction pulleys 10 inch diameter, 3 inch face, and should make 180 revolutions per minute. Weight, 1,500 lbs. **PRICE, $600.00.**

FOR SLIDE RESTS AND CHUCKS, SEE PAGES 218 AND 219.

In a lathe, it is of vital importance that both heads be made in line, and adjustable to same line whenever a change of centers occurs, and this is always transpiring, the change generally being in the levels of the spindles or centers, the head spindles wearing either up or down, from the weight of the spindle or its work, or from the pull of the belt, and the back head always wearing down from the moving of that head back and forth upon the slides. The inclined plane, as shown, provides for this purpose.

The lathe is provided with thrust bearings, which continually run in oil.

The boxes are made self-oiling and have reservoirs large enough for several months' supply of oil, which is a very desirable feature in a *new* lathe, to which, as a rule, more damage occurs to the spindles and boxes in the first day's use than in a year following.

A very simple, effective and desirable feature on this lathe is that one by which the spindle is kept within the boxes to a perfect running fit; and all parts (boxes, caps and spindles) held in a manner so rigid that shaking is impossible, and all so plain and simple that the most inexperienced person can make proper adjustment.

As the headstock can be adjusted to all downward wear of the turret head, and as the turret head can swivel and has sidewise movement in either direction, it will be seen that a perfect alignment of centers can be made at the will of operator. The cutting tool can be fed into the work by the lever or by the screw, and the change from one to the other can be made in a moment by turning the wrench seen near the rear end of turret head. The taper attachment seen on the front end of the bed can be adjusted quickly and accurately.

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BRASS FINISHER'S CABINET TURRET LATHES.

PRICES.

No. 1 Cabinet Turret Lathe has headstock with four grade cone for 2¾ inch belt. Countershaft has friction or F. & L. pulleys, 12 inch diameter, 4 inch face. Should make 160 revolutions per minute. Weight, 2,950 lbs. With 7 foot bed, 20 inch swing, and with engine feed, back gears, screw apparatus and overhead works,

PRICE, $875.00.

Side rest (see Fig. 3613)..... ..... **$60.00**

No. 2 Cabinet Turret Lathe has headstock with four grade cone for 2¼ inch belt and hardened spindle and boxes. Countershaft has friction or F. & L. pulleys, 10 inch diameter, 3 inch face. Should make 180 revolutions. Weight, 2,000 lbs. With 6 foot bed, 18 inch swing, engine feed, and with back gears and screw apparatus and overhead works,

PRICE, $750.00.

Same, without engine feed.....**$700.00**
Slide rest (see Fig. 3613)..... **50.00**

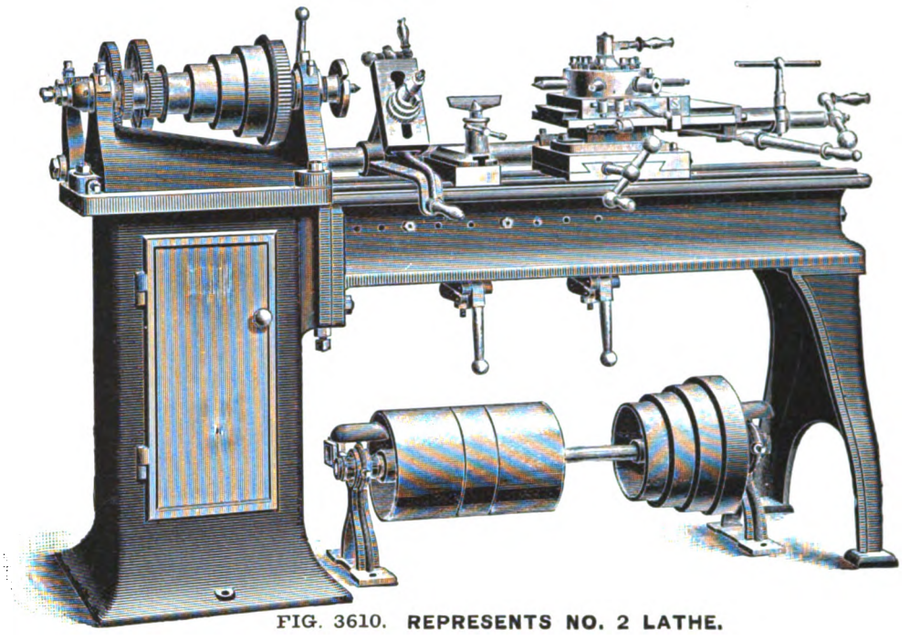


FIG. 3610. REPRESENTS NO. 2 LATHE.

SQUARE AND ROUND ARBOR BRASS LATHES.

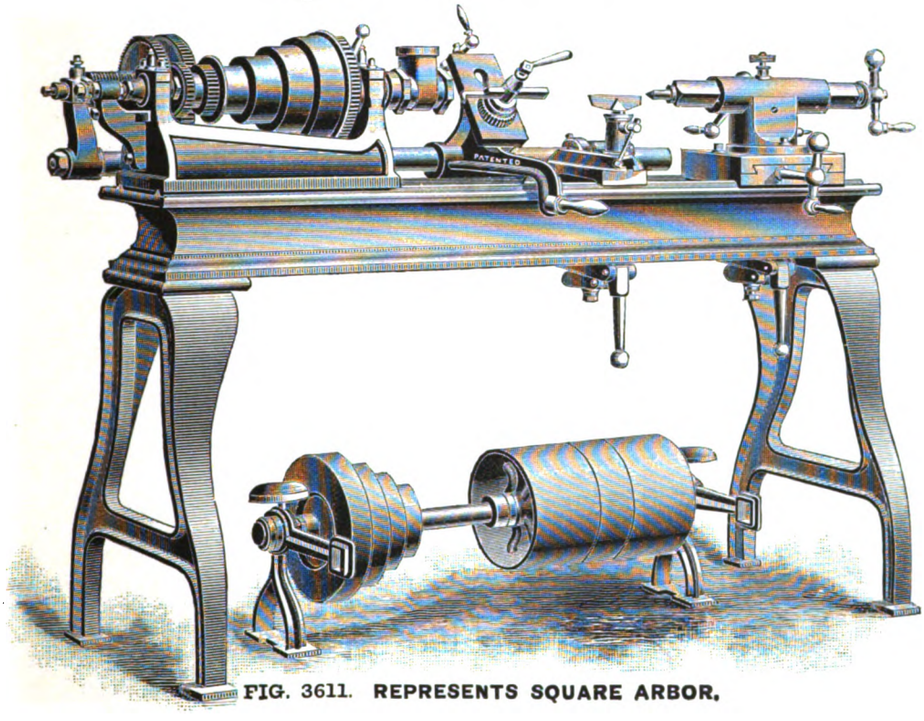


FIG. 3611. REPRESENTS SQUARE ARBOR.

PRICES.

No. 1 Square Arbor Lathe, 5 ft. bed, swings 15 in., with dovetail set over, swivel and back motions, back gears, screw apparatus and overhead works. **$475.00**

No. 1 Round Arbor Lathe, 5 ft. bed, swings 15 in., with dovetail set over, swivel and back motions, back gears, screw apparatus and overhead works..... **$425.00**

WEIGHT, EACH, 950 LBS.

Hardened spindle and boxes, for No. 1 lathe, extra.....**$45.00**

FOR SLIDE RESTS AND CHUCKS, SEE PAGES 218 AND 219.

Countershaft for both lathes has friction or F. & L. pulleys, 10 inch diameter, 3 inch face. Should make 180 revolutions per minute.

HOBS AND LEADERS.

One hob and leader are furnished with each lathe as sample. Extra hobs, including cutter and leader.....per pair, $5.50

SMALL PLAIN BRASS LATHES.

PRICES.

No. 2 lathe, 5 ft. bed, swings 13 in., with dovetail set over, and back motion, with overhead works $160.00

No. 2 lathe, 5 ft. bed, swings 13 in., with dovetail set over, and overhead works $150.00

No. 2 lathe, 5 ft. bed, swings 13 in., with back motion and overhead works $145.00

No. 2 lathe, 5 ft. bed, swings 13 in., with plain tailstock and overhead works.....$130.00

Hardened spindle and boxes for No. 2 lathe, extra 30.00

No. 3 lathe, 5 ft. bed, swings 12½ in., with dovetail set over, and back motions, with overhead works $140.00

No. 3 lathe, 5 ft. bed, swings 12½ in., dovetail set over, and overhead works $130.00

No. 3 lathe, 5 ft. bed, swings 12½ in., back motion and overhead works $120.00

No. 3 lathe, 5 ft. bed, swings 12½ in., plain tailstock and overhead works $110.00

No. 4 lathe, 3½ ft. bed, swings 10 in., plain tailstock and overhead works $60.00

No. 4 lathe, 3½ ft. bed, swings 10 in., plain tailstock, with table and foot motion..... .....$75.00

No. 5 lathe (formerly No. 4), 3 ft. bed, swings 9 in., with plain tailstock and overhead works.....$50.00

No. 5 lathe, 3 ft. bed, swings 9 in., plain tailstock, with table and foot motion..... .....$60.00

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NO. 1 IMPROVED BRASS LATHE.

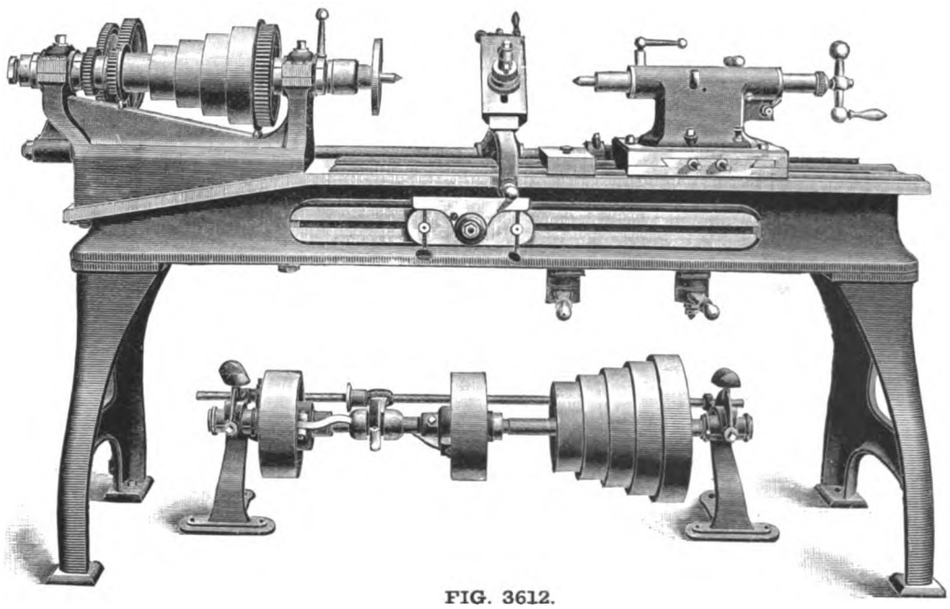


FIG. 3612.

SEE NOTE, NEXT PAGE, FOR OUTFITS.

This lathe is fitted with headstock, spindles, boxes and taper attachment, same as No. 2 Turret Lathe, Fig. 3609.

The construction of the spindle in tailstock more effectually resists a tendency to partially rotate when boring is being done with the spindle than is effected even with a square spindle, and is again superior to that, for, when worn enough to produce chattering, it can be adjusted to its original degree of tightness.

DIMENSIONS.

Swings 17 inches; length bed, 6 feet; is back-geared; screw-chasing apparatus, taper attachment; tailstock has swivel and back motion and dovetail set over; headstock has hollow spindle, 1⅛ hole self-oiling boxes, 5 grade cone for 2¼ belt; countershaft has friction pulleys, 10 inch diameter, 3 inch face, and should make 150 revolutions per minute; weight, 1,300 lbs. **PRICE, $450.00.**

COMPOUND SLIDE REST FOR BRASS LATHES.

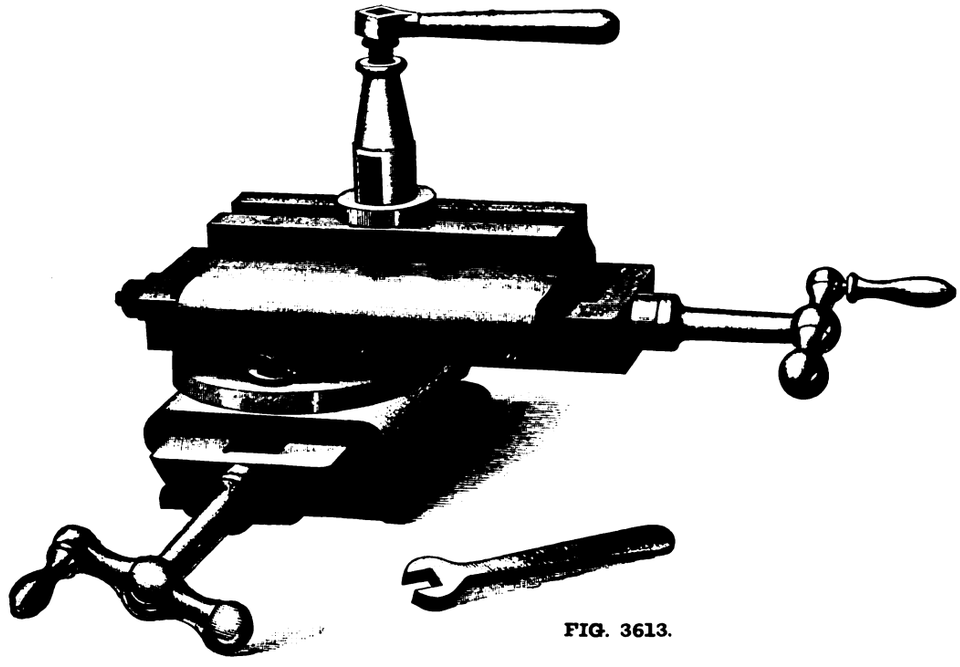


FIG. 3613.

PRICES.

No. 000 fits No. 0 Turret Lathe, Fig. 3608	$75.00
" 00 " " 1 Cabinet Turret Lathe, Fig. 3610	60.00
" 0 " " 2 " " " " 3610	50.00
" 0 " " 2 Improved " " " 3609	50.00

BALL REST.

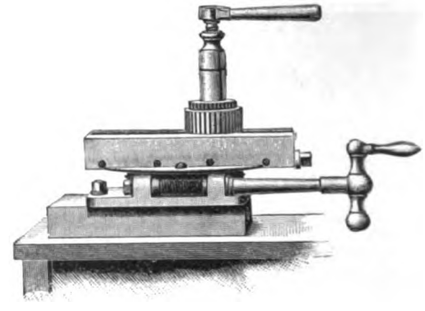


FIG. 3613A.

This is designed for use on lathes of 15 inch swing, and will turn balls up to 5 inch diameter.

PRICE, $50.00.

DRILL CHUCKS.

No. 1, Steel, with set screw	$2.70
" 2, " " " "	2.50
" 2, " " " "	2.25
" 4, " " " "	2.00

ROUND BODY CHUCKS, WITH JAWS AND SCREWS OF STEEL.

36 in., 4 Jaws, Independent Screws	$120.00
30 " 4 " " "	100.00
24 " 4 " " "	80.00
22 " 4 " " "	70.00
20 " 4 " " "	60.00
18 in., 4 Jaws, Independent Screws	$50.00
15 " 4 " " "	42.00
12 " 4 " " "	36.00
9 " 4 " " "	30.00
6 " 4 " " "	25.00

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PLAIN SLIDE REST FOR BRASS LATHES.

PRICES, FIG. 3614.

No. 1 fits 15 in. round or square arbor lathe, Fig. 3611 and Fig. 3612 ...$45.00
No. 2 fits lathes Nos. 2 and 3 (see bottom of page 217) 40.00
No. 3 " " " 4 and 5 " " " " 32.00

DESCRIPTION, FIG. 3615.

This cut shows our two-jawed chuck, with the cast iron, or false jaws, in position for use, and also with them detached from the chuck. We make these chucks of two varieties, one with a connected or right and left hand screw, which moves the jaws simultaneously to and from the center, and the other with separate screws, by which either of the jaws can be moved at will.



FIG. 3614.

BOX CHUCK FOR BRASS LATHES.

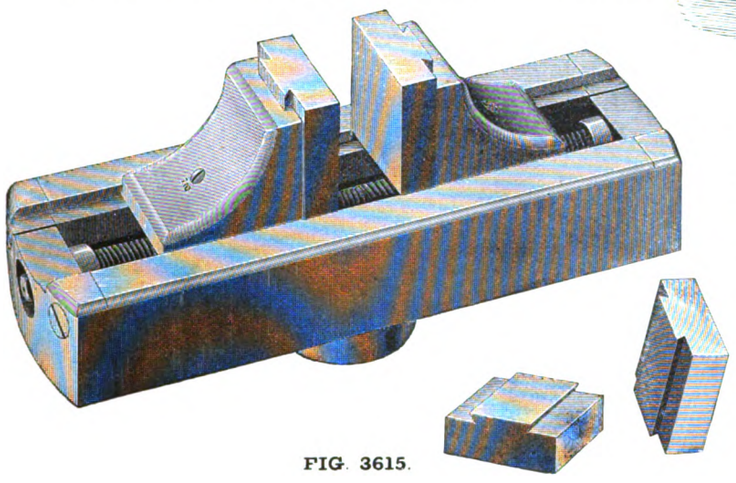


FIG. 3615.

PRICES, FIG. 3615.

Specify, in ordering, whether with connected or right and left hand screw.

16 inch chuck	box body,	jaws open 6 in		$45.00
14 "	"	"	5½ in.	40.00
12 "	"	"	5 in.	36.00
9 "	"	"	3¼ in.	30.00
7 "	"	round body, "	2¼ in.	26.00
6 "	"	" "	1¼ in.	24.00

Larger sizes, to order, up to 24 inch.

Blank jaws for 16 and 14 inch chuck ..... $1.00 per pair.
" " " 12 " " ..... .40 "
" " " all smaller sizes ..... .30 "

OUTFIT FOR ROUND OR SQUARE ARBOR LATHES, FIGS. 3611 AND 3612.

One slide rest No. 1; one box chuck, 12 inch; dozen pairs false jaws, and hub and leader for each thread wanted to be cut. One hub and leader only is furnished with the lathe.

Similar outfits should be ordered with Figs. 3607 to 3612, according to the class of brass work to be done.

18 x 5 FORMING LATHE.

This machine is especially designed and adapted for surfacing or turning castings of irregular shapes in britannia ware or brass. In turning such goods as lever handles, basin cocks, valve bonnets, hose nozzles, petcocks, or any other work of similar character, this machine will do more work and better work than any three men can turn with hand tools. After once setting the cutter, the work will be of uniform size and form. With a turret to do the monitor work, where such operations are required, either before or after turning, the piece of work can be finished before taking out of the chuck, which saves handling the work one or more times. We make chucks for holding either smooth or threaded work that will grasp and release the pieces without stopping the lathe. The turret has 6 holes, 1¼ inches in diameter, with steel bushings with ⅞ inch hole. End of spindle is 2 inches diameter, 7 threads per inch. The holes in turret and end of spindle can be made of different dimensions at slight extra expense. The turret is automatic or self-revolving, with adjustable stop. We furnish friction countershaft.

Without turret, weight, 1,500 lbs., price $400.00
With " " 1,600 " " 500.00

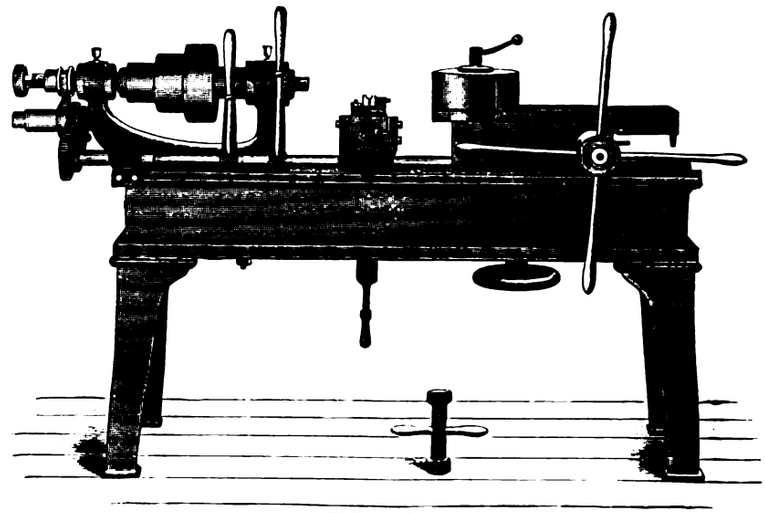


FIG. 3616.

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VALVE MILLERS.

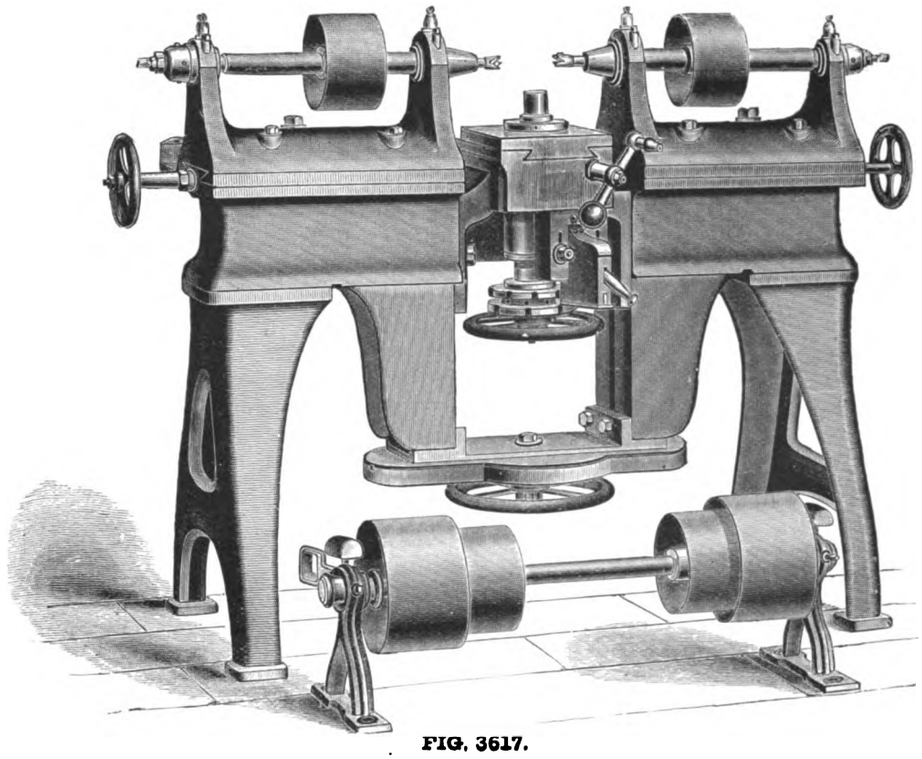


FIG. 3617.

This machine is 9 inches between cutters, and 10 inches from top of elevating spindle to cutter.

Pulleys on spindles, 7 inch diameter, 4 inch face.

Speed of countershaft, 500 revolutions per minute.

Tight and loose pulleys on countershaft, 8 inch diameter, 4 inch face.

Driving pulley on countershaft, 12 inch diameter, 10 inch face.

WEIGHT, 1,350 LBS. PRICE, $425.00.

SMALLER SIZE, MADE TO ORDER ONLY, PRICE, $325.00.

DESCRIPTION, FIG. 3618.

For grinding cocks, stops and valves. Simple, strong and durable. Almost noiseless in operation.

No. 1.—4 foot bed. Size of spiral spindle, 1⅛ inches. For grinding work from ¼ to 1 inch.

WEIGHT, 360 LBS. PRICE, $125.00.

No. 2.—4 foot bed. Size of spiral spindle, 1¾ inches. For grinding work from 1 to 4 inches.

WEIGHT, 700 LBS. PRICE, $200.00.

COCK GRINDER.

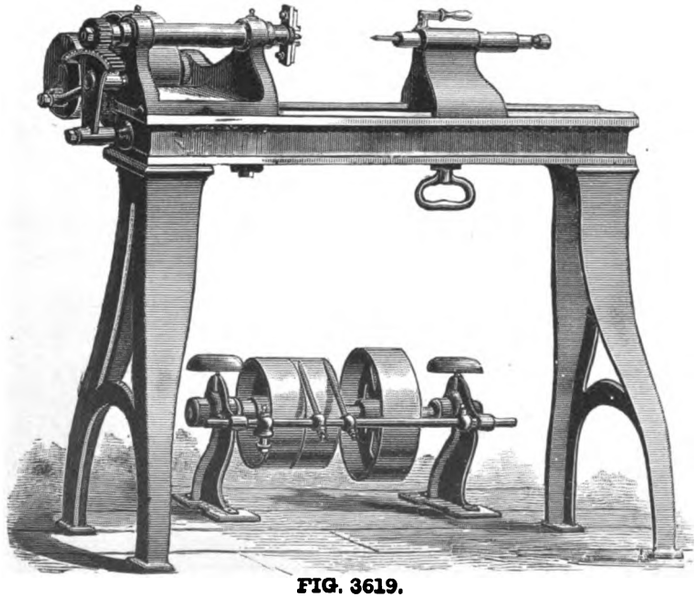


FIG. 3619.

COCK GRINDER.

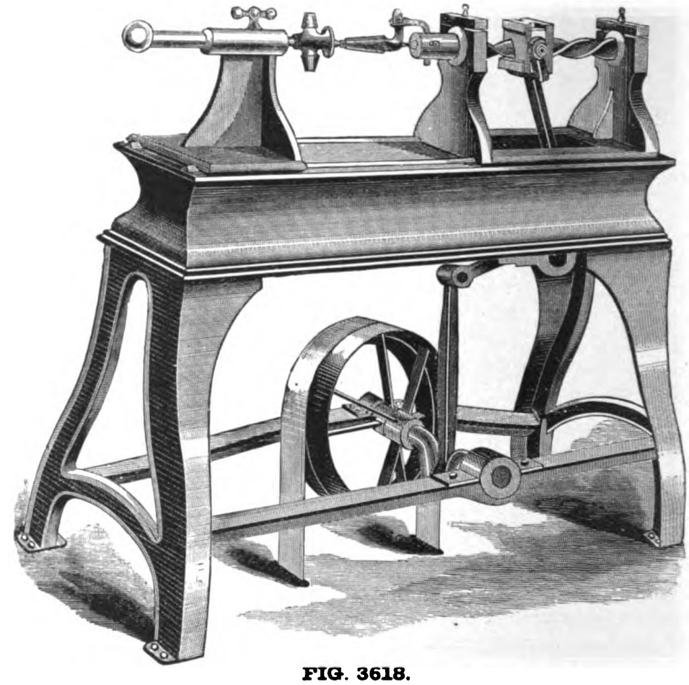


FIG. 3618.

DESCRIPTION, FIG. 3619.

This machine is designed for grinding in the keys for ⅛ to 2 inch cocks.

The spindle is actuated by a reciprocating segment and gives 1¼ revolutions in each direction.

The gears are nicely cut so as to run smoothly.

The bearings are protected from emery.

The countershaft has 10 inch tight and loose pulleys, which should run 125 revolutions per minute.

WEIGHT .....**450 LBS.**

PRICE, with everything shown in cut..... **$112.00.**

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EITHER SINGLE PUNCHES OR SHEARS RIGHT ANGLE DRIVEN.

REPRESENTS
NOS. 6 AND 5, WITH
DEEP THROAT.

SEE TABLE PRICES, PAGE 224.

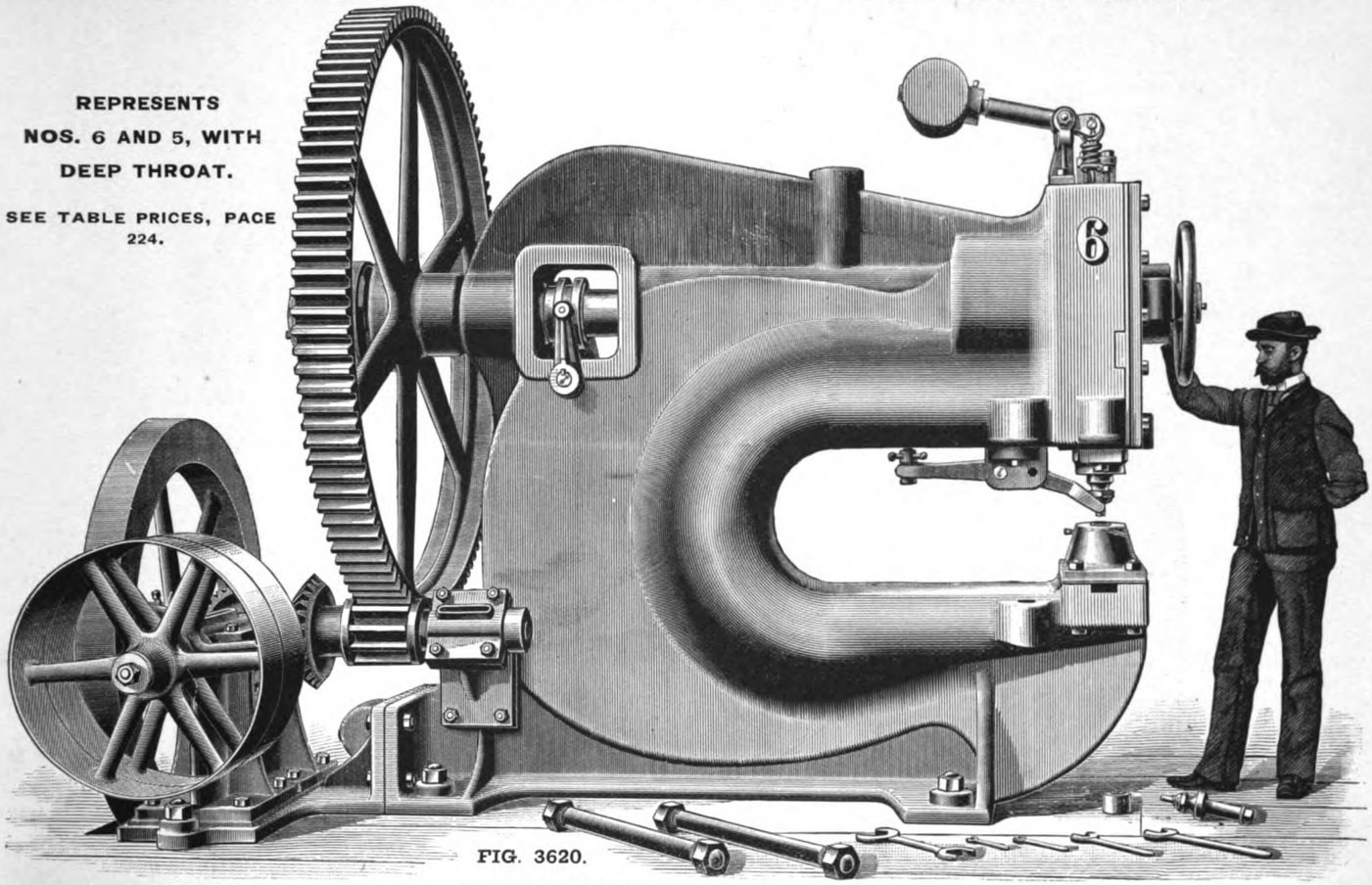


FIG. 3620.

ENGINE DRIVEN MACHINE.

REPRESENTS
NOS. 6 AND 5, WITH
SHALLOW THROAT.

SEE TABLE PRICES, PAGE 224.

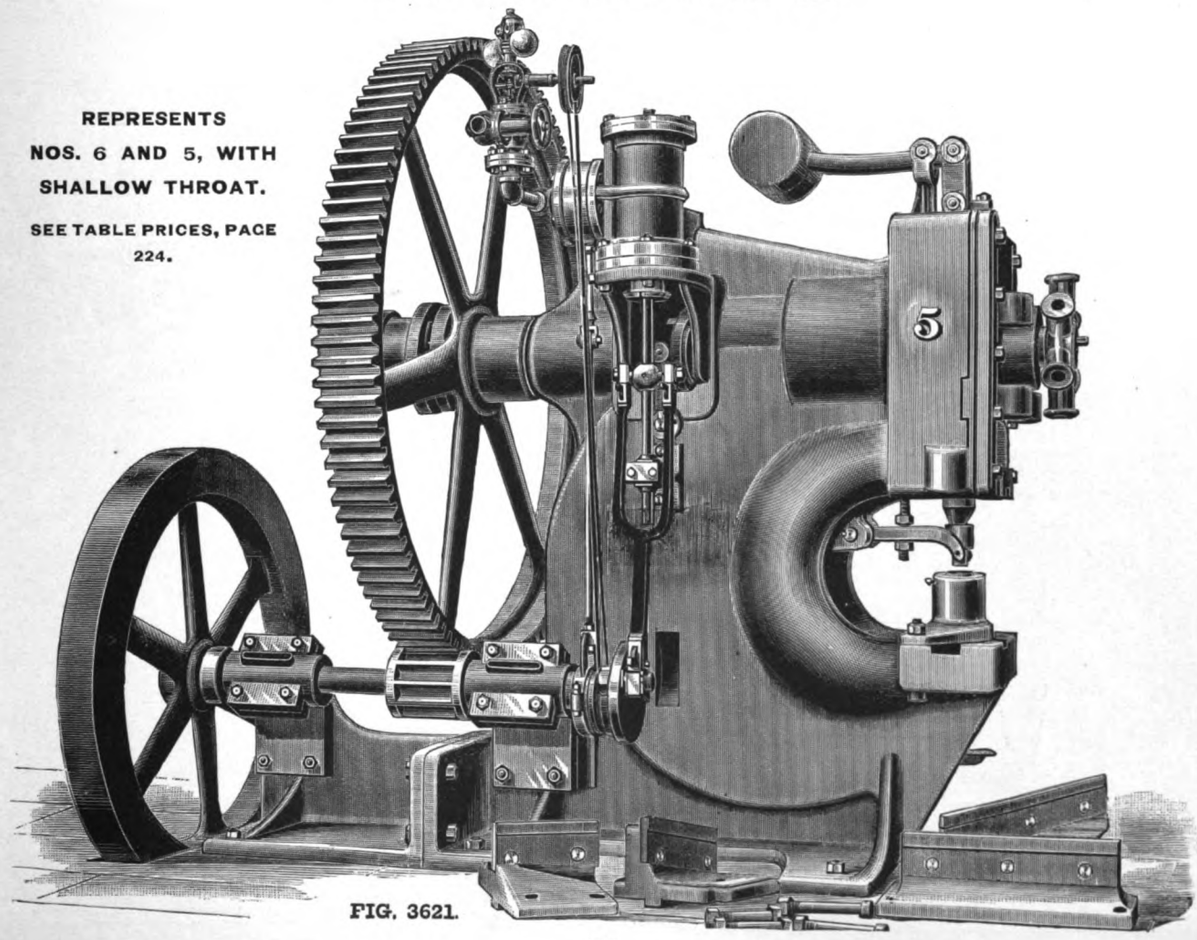


FIG. 3621.

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EITHER SINGLE PUNCHES OR SHEARS PARALLEL DRIVEN AND EXTENSION DIE SEAT.

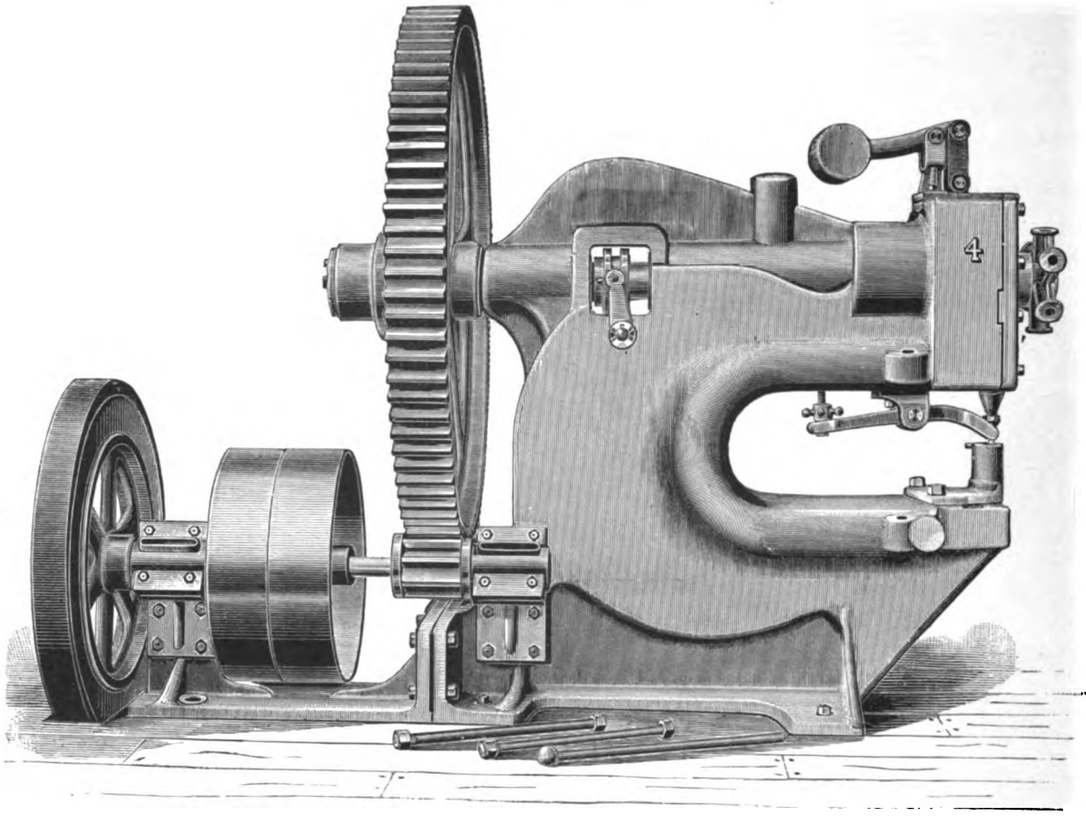


FIG. 3622. REPRESENTS NOS. 4 AND 3, WITH DEEP THROATS.

SEE TABLES, PAGE 224.

EITHER PUNCH OR SHEAR.

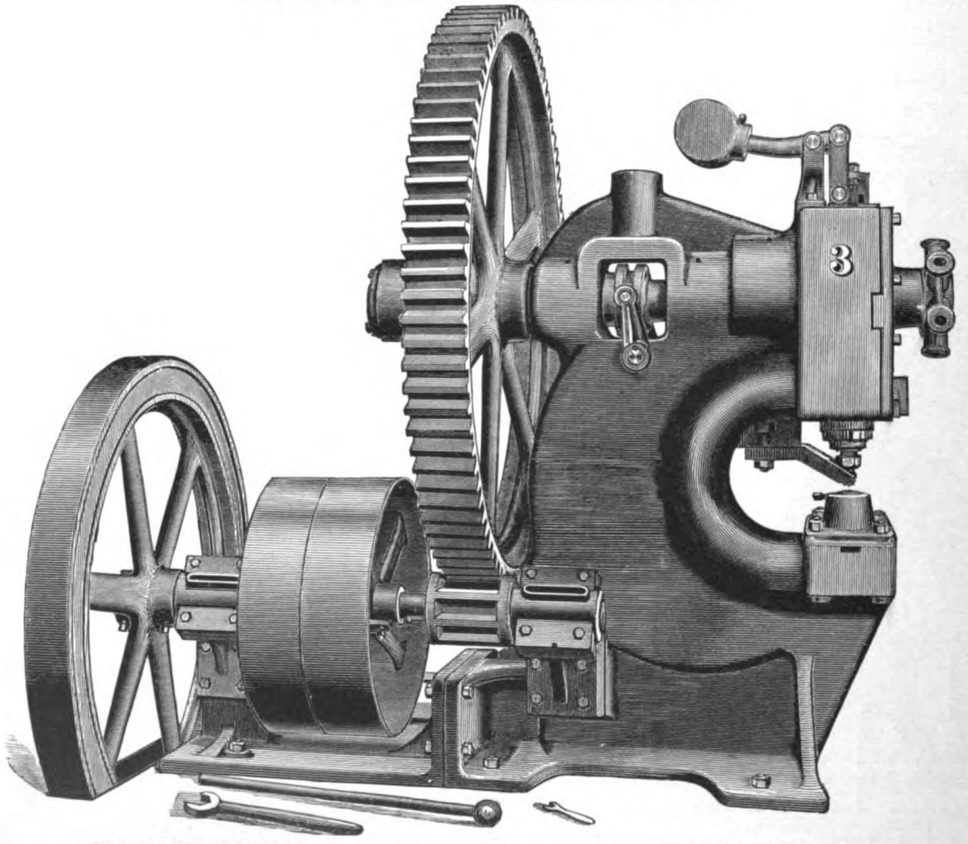


FIG. 3623. REPRESENTS NOS. 4 AND 3, WITH SHALLOW THROATS.

SEE TABLES, PAGE 224.

Re-enforcing bolts must be put in when cutting bar iron on machines of 20 inch throat and over.

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EITHER SINGLE PUNCHES OR SHEARS.

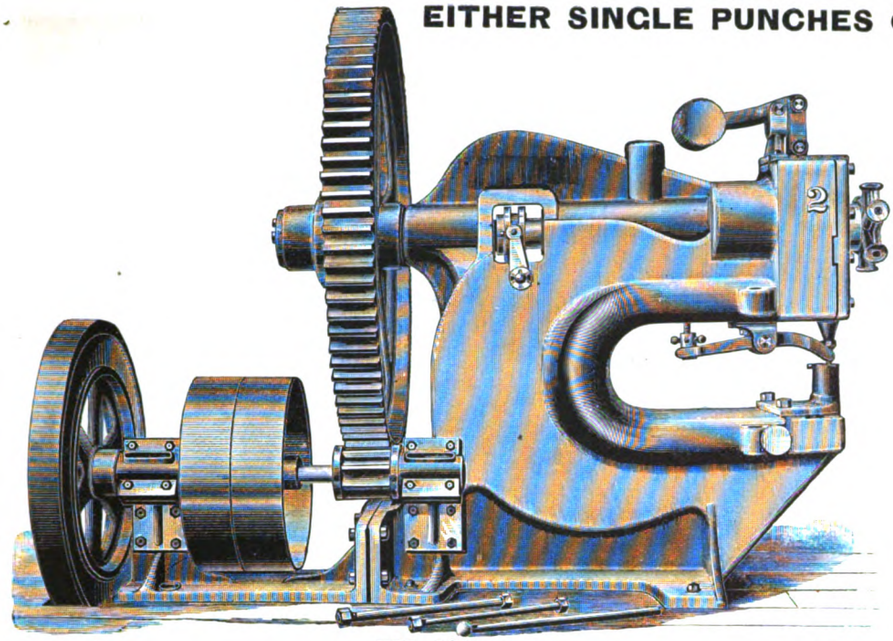


FIG. 3624.

Figs. 3624 and 3625 represent both sides of tools Nos. 2, 1½ and 1, and are shown as punches with the extension punch stock and die seat and with strippers, both with deep throats.

In all numbers of machines an engine can be attached (see Fig. 3621) instead of pulleys.

Re-enforcing bolts must be used in cutting bar iron on deep throats.

Figs. 3626 and 3627 represent Nos. 0, 00, 000, with shallow and deep throats and regular punch stock and die seat.

On Fig. 3629 is shown bar shear blocks and blades, and on Fig. 3628 is shown plate shear blocks and blades.

In all numbers of machines the punching and shearing small tools are interchangeable.

SEE PAGE 225 FOR TABLE OF PRICES.

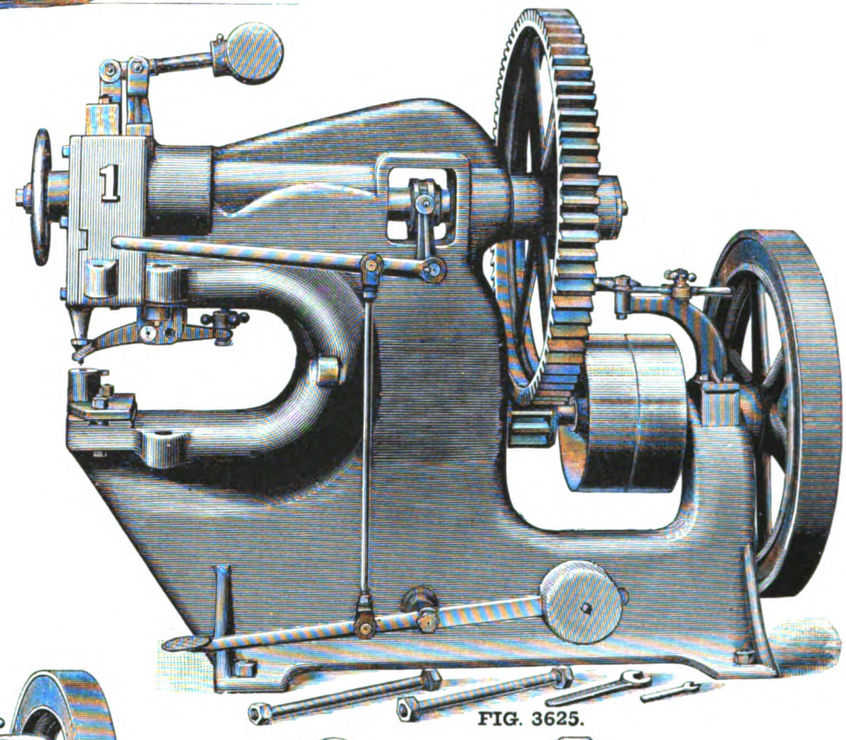


FIG. 3625.

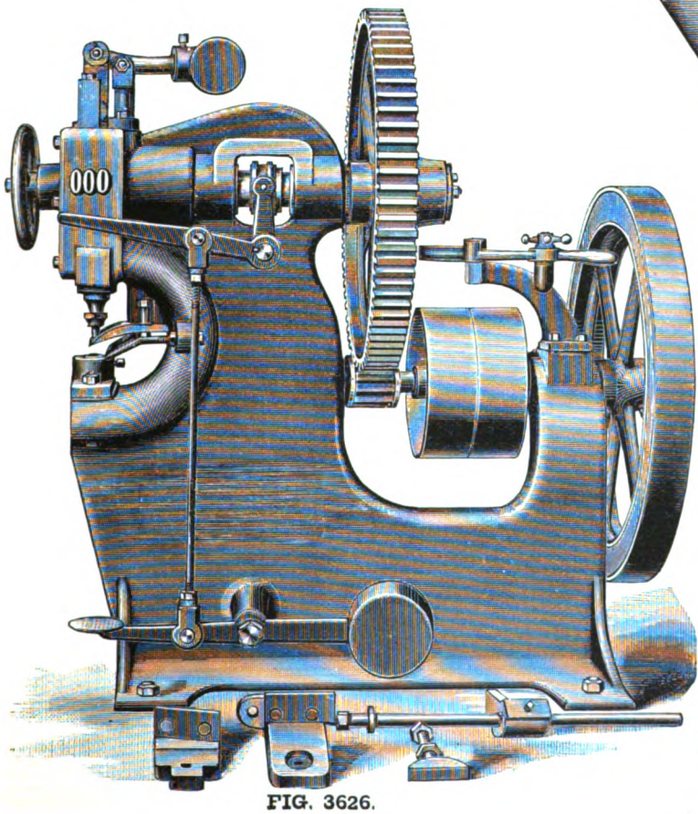


FIG. 3626.

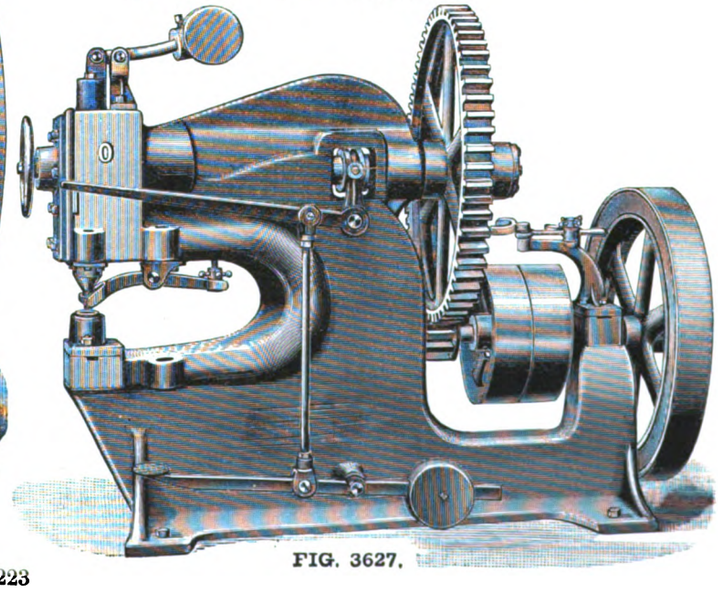


FIG. 3627.

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SINGLE PUNCHES AND SHEARS.

GENERAL DESCRIPTION AND SIZES, FIGS. 3620 TO 3627.

These tools can be furnished either as punches with regular die blocks and punch stocks, or with extension die blocks, increasing the depth of throat but slightly reducing the capacity, but enabling the operator to work on angle iron and flanges.

The machines can be driven by steam engine or by belts, or the right angle arrangement, as shown (see Fig. 3620). Ratio of gearing is about 11 to 1, which enables us to use large fly wheels. We furnish with each machine one set of either punching or shearing tools. Automatic stops, and blocks and blades for round irons, extra.

PRICES, FIG. 3620. NO. 6.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
16 in.	2½ in.	1½ in.	1½ in.	10x2¼ in.	3 in. diam.	lbs.	$	$
25 "	2¼ "	1½ "	1½ "	10x2¼ "	3 " "	"		
30 "	2¼ "	1¼ "	1¼ "	10x2 "	2½ " "	"		
36 "	2 "	1¼ "	1¼ "	10x2 "	2½ " "	"		
42 "	1⅝ "	1¼ "	1¼ "	10x1¾ "	2¼ " "	"		
48 "	1½ "	1¼ "	1¼ "	10x1¾ "	2¼ " "	"		
54 "	1⅜ "	1⅛ "	1⅛ "	10x1½ "	2⅛ " "	"		
60 "	1¼ "	1 1/16 "	1 1/16 "	10x1¼ "	2 " "	"		

This machine will punch 6 inch tube holes, or large hand holes in steel boiler plate ⅝ inch thickness. The opening under the die through the lower jaw is 7 inches in diameter. The extension die seat and punch holder brings the center of the die out to the front of machine, increasing throat 5 inches. For punching up to the capacity given, the punch is to be used in the center of sliding head.

Tight and loose pulleys 36 inches diameter, 10½ inch face. 220 revolutions per minute will give 20 strokes of the punch.

PRICES, FIG. 3621. NO. 5.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
15 in.	2¼ in.	1⅜ in.	1⅜ in.	10x1¾ in.	2½ in. diam.	lbs.	$	$
25 "	2¼ "	1¼ "	1¼ "	10x1¾ "	2½ " "	"		
30 "	2 "	1⅛ "	1⅛ "	10x1⅝ "	2¼ " "	"		
36 "	1⅝ "	1⅛ "	1⅛ "	10x1½ "	2¼ " "	"		
42 "	1⅜ "	1⅛ "	1⅛ "	10x1⅜ "	2⅛ " "	"		
48 "	1¼ "	1⅛ "	1⅛ "	10x1¼ "	2 " "	"		
54 "	1 3/16 "	1 1/16 "	1 1/16 "	10x1⅛ "	1¾ " "	"		
60 "	1 1/16 "	1 "	1 "	10x1 "	1⅝ " "	"		

This machine will punch 6 inch tube holes, or large hand holes in steel boiler plate ⅝ inch thickness. The opening under the die through the lower jaw is 7 inches in diameter. The extension die seat and punch holder brings the center of the die out to the front of machine, increasing throat 5 inches. For punching up to the capacity given, the punch is to be used in the center of sliding head.

Tight and loose pulleys 30 inches diameter, 8½ inch face. 200 revolutions per minute will give 20 strokes of the punch.

PRICES, FIG. 3622. NO. 4.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
14 in.	2⅛ in.	1¼ in.	1¼ in.	8x1½ in.	2¼ in. diam.	lbs.	$	$
20 "	2⅛ "	1¼ "	1¼ "	8x1½ "	2¼ " "	"		
25 "	1¾ "	1⅛ "	1⅛ "	8x1¼ "	2¼ " "	"		
30 "	1½ "	1⅛ "	1⅛ "	8x1¼ "	2 " "	"		
36 "	1½ "	1 "	1 "	8x1⅛ "	2 " "	"		
42 "	1¼ "	1 "	1 "	8x1⅛ "	1¾ " "	"		
48 "	1⅛ "	⅞ "	¾ "	8x1 "	1½ " "	"		

This machine will punch 5 inch tube holes, or large hand holes in steel boiler plate ⅝ inch thickness. The opening under the die through the lower jaw is 6 inches in diameter. The extension die seat and punch holder brings the center of the die out to the front of machine, increasing throat 4 inches. For punching up to the capacity given, the punch is to be used in the center of sliding head.

Tight and loose pulleys 28 inches diameter, 7½ inch face. 200 revolutions per minute will give 20 strokes of the punch.

PRICES, FIG. 3622. NO. 3.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
12 in.	2¼ in.	1 in.	1⅛ in.	6x1¼ in.	2 in. diam.	lbs.	$	$
16 "	2 "	1 "	1⅛ "	6x1¼ "	2 " "	"		
20 "	1¾ "	1 "	1⅛ "	6x1⅛ "	1¾ " "	"		
25 "	1½ "	1 "	1 "	6x1⅛ "	1¾ " "	"		
30 "	1¼ "	1 "	1 "	6x1 "	1½ " "	"		
36 "	1⅛ "	⅞ "	⅞ "	6x ⅞ "	1⅜ " "	"		
42 "	1 1/16 "	¾ "	¾ "	6x ¾ "	1¼ " "	"		

This machine will punch 5 inch tube holes, or hand holes in steel boiler plate up to ½ inch thickness. The opening under the die through the lower jaw is 6 inches in diameter. The extension die seat and punch holder brings the center of the die out to the front of machine, increasing throat 3½ inches. For punching up to the capacity given, the punch is to be used in the center of sliding head.

Tight and loose pulleys 24 inches diameter, 7 inch face. 200 revolutions per minute will give 20 strokes of the punch.

The re-enforcing bolts must be put in when cutting bar iron on machines 30 inches throat and over, on No. 6; 25 inch throats on No. 5, and 20 inch throats on Nos. 4 and 3 machines.

PRICES, EXTRA PARTS.

SIZE NUMBER OF MACHINE.	6	5	4	3	SIZE NUMBER OF MACHINE.	6	5	4	3
One pair shear blocks for plates	$40.00	$33.00	$24.00	$22.00	One pair knives for plates	$36.00	$30.00	$22.00	$20.00
One pair shear blocks for bars	34.00	30.00	22.00	20.00	One pair knives for bar iron	22.00	18.00	16.00	14.00
One standard die block	25.00	20.00	16.00	14.00	One pair knives for round iron	24.00	20.00	18.00	16.00
One extension die block	30.00	24.00	18.00	16.00	One cast steel punch stock	22.00	18.00	15.00	14.00
One stripper	18.00	16.00	15.00	14.00	One steel die bushing	7.00	6.00	5.50	5.00
One automatic stop	65.00	58.00	50.00	42.00					

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SINGLE PUNCHES AND SHEARS.—CONTINUED.

Extension die seat increases throat 3 inches. For punching up to the capacity given, the punch is to be used in the center of sliding head. We furnish with each machine one set of either punching or shearing tools—all others extra.

Tight and loose pulleys 20 inches diameter, 5½ inch face. 225 revolutions per minute will give 25 strokes of the punch.

PRICES, FIG. 3624. NO. 2.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear Plate.	Will shear Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
11 in.	1¼ in.	1 in.	1 in.	6x1⅛ in.	1¾ in. diam.	lbs.	$	$
15 "	1⅛ "	1 "	1 "	6x1⅛ "	1¾ " "	"		
20 "	1 "	1 "	1 "	6x1 "	1½ " "	"		
25 "	1 "	⅞ "	⅞ "	6x ¾ "	1½ " "	"		
30 "	1 "	¾ "	¾ "	6x ¾ "	1⅜ " "	"		
36 "	⅞ "	⅝ "	⅝ "	6x ½ "	1⅜ " "	"		

Tight and loose pulleys 20 inches diameter, 5½ inch face. 190 revolutions per minute will give 25 strokes of the punch.

PRICES, FIG. 3624. NO. 1 1-2.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
9 in.	1¼ in.	⅞ in.	⅞ in.	5x1 in.	1⅝ in. diam	lbs.	$	$
15 "	1⅛ "	⅞ "	⅞ "	5x ⅞ "	1⅝ " "	"		
20 "	1 "	¾ "	¾ "	5x ⅞ "	1⅝ " "	"		
25 "	1 "	⅝ "	¾ "	5x ⅞ "	1⅝ " "	"		

Extension die seat increases throat 2 inches. For punching up to the capacity given, the punch is to be used in the center of sliding head. We furnish with each machine one set of either punching or shearing tools—all others extra.

Tight and loose pulleys 18 inches diameter, 5½ inch face. 165 revolutions per minute will give 26 strokes of the punch.

PRICES, FIG. 3625. NO. 1.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
8 in.	1 in.	⅞ in.	¾ in.	4½x1 in.	1½ in. diam.	lbs.	$	$
12 "	1 "	¾ "	¾ "	4½x ⅞ "	1½ " "	"		
16 "	¾ "	⅝ "	⅝ "	4½x ⅞ "	1½ " "	"		
20 "	¾ "	9/16 "	9/16 "	4½x ⅞ "	1½ " "	"		
25 "	¾ "	½ "	½ "	4½x ⅞ "	1¼ " "	"		
30 "	¾ "	⅜ "	⅜ "	4½x ⅞ "	1¼ " "	"		

Extension die seat increases throat 2 inches. For punching up to the capacity given, the punch is to be used in the center of sliding head. We furnish with each machine one set of either punching or shearing tools—all others extra.

Tight and loose pulleys 16 inches diameter, 5 inch face. 165 revolutions per minute will give 26 strokes of the punch.

PRICES, FIG. 3627. NO. 0.

Depth of throat.	Will punch. Diameter	Will punch. Thick	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
7 in.	⅞ in.	¾ in.	¾ in.	4x¾ in.	1⅜ in. diam.	lbs.	$	$
10 "	⅞ "	¾ "	⅝ "	4x¾ "	1⅜ " "	"		
12 "	¾ "	⅝ "	⅝ "	4x⅝ "	1¼ " "	"		
16 "	⅝ "	½ "	½ "	4x⅝ "	1¼ " "	"		
20 "	⅝ "	⅜ "	⅜ "	4x½ "	1⅛ " "	"		
25 "	⅝ "	⅜ "	⅜ "	4x½ "	1⅛ " "	"		
30 "	⅝ "	¼ "	¼ "	4x⅜ "	1 " "	"		

Extension die seat increases throat 1½ inches. For punching up to the capacity given, the punch is to be used in the center of sliding head. We furnish with each machine one set of either punching or shearing tools—all others extra.

Tight and loose pulleys 14 inches diameter, 4½ inch face. 180 revolutions per minute will give 28 strokes of the punch.

PRICES, FIG. 3627. NO. 00.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
6 in.	⅞ in.	⅝ in.	⅝ in.	3½x⅝ in.	1 3/16 in. diam.	lbs.	$	$
9 "	⅞ "	⅝ "	⅝ "	3½x⅝ "	1 3/16 " "	"		
12 "	¾ "	½ "	½ "	3½x⅝ "	1⅛ " "	"		
16 "	¾ "	⅜ "	⅜ "	3½x½ "	1⅛ " "	"		
20 "	⅝ "	⅜ "	⅜ "	3½x½ "	1 " "	"		
25 "	⅝ "	5/16 "	5/16 "	3½x⅜ "	1 " "	"		

Extension die seat increases throat 1½ inches. For punching up to the capacity given, the punch is to be used in the center of sliding head. We furnish with each machine one set of either punching or shearing tools—all others extra.

Tight and loose pulleys 12 inches diameter, 4 inch face. 190 revolutions per minute will give 30 strokes of the punch.

PRICES, FIG. 3627. NO. 000.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
5 in.	⅝ in.	½ in.	½ in.	3½x½ in.	1⅛ in. diam.	lbs.	$	$
8 "	⅝ "	½ "	⅜ "	3½x½ "	1⅛ " "	"		
12 "	⅝ "	⅜ "	⅜ "	3½x⅜ "	1 " "	"		
16 "	½ "	⅜ "	5/16 "	3½x⅞ "	1 " "	"		
20 "	⅜ "	5/16 "	¼ "	3½x 5/16 "	⅞ " "	"		
25 "	⅜ "	¼ "	3/16 "	3½x¼ "	⅞ " "	"		

The re-enforcing bolts must be put in when cutting bar iron on machines of 20 inches throat and over, on No. 2; 15 inch on No. 1½; 16 inch on No. 1; 12 inch on Nos. 0, 00 and 000.

PRICES, EXTRA PARTS.

SIZE NUMBER OF MACHINE.	2	1½	1	0	00	000
One pair shear blocks for plates	$17.00	$16.00	$14.00	$12.00	$10.00	$8.00
One pair shear blocks for bars	15.00	14.00	12.00	10.00	8.00	7.00
One standard die block	12.00	11.00	11.00	8.00	6.00	5.00
One extension die block	14.00	13 00	12.00	10.00	8.00	7.00
One stripper	12.00	11.00	10.00	8.00	7.00	6.00
One automatic stop	38.00	34.00	32.00	28.00	24.00	20.00

SIZE NUMBER OF MACHINE.	2	1½	1	0	00	000
One pair knives for plates	$17.00	$15.00	$13.00	$10.00	$8.00	$7.00
One pair knives for bar iron	13.00	12.00	10.00	6.00	5.00	4.00
One pair knives for round iron	15.00	14.00	12.00	8.00	7.00	6.00
One cast steel punch stock	10.00	10.00	9.00	6.00	5.00	4.00
One steel die bushing	4.50	4.00	4.00	3.50	3.00	2.50

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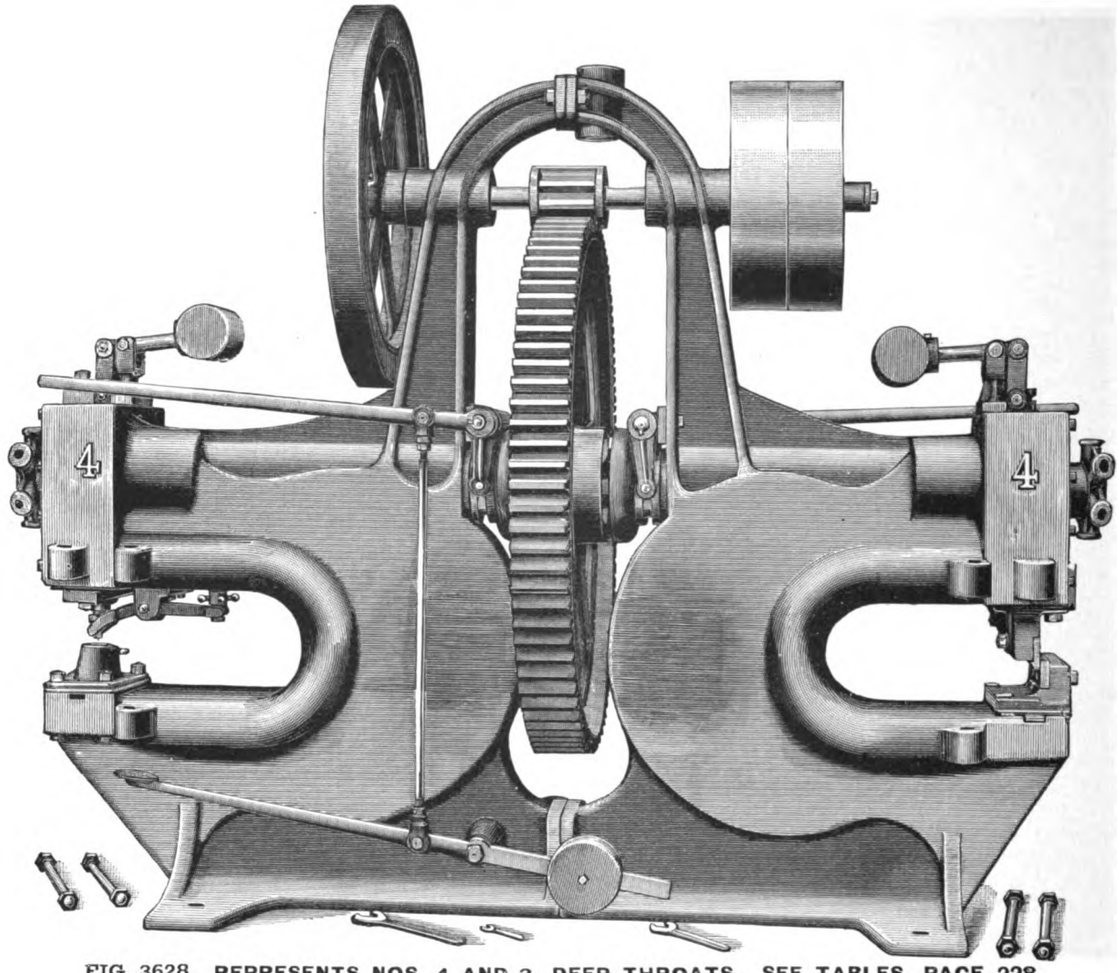


FIG. 3628. REPRESENTS NOS. 4 AND 3, DEEP THROATS. SEE TABLES, PAGE 228.

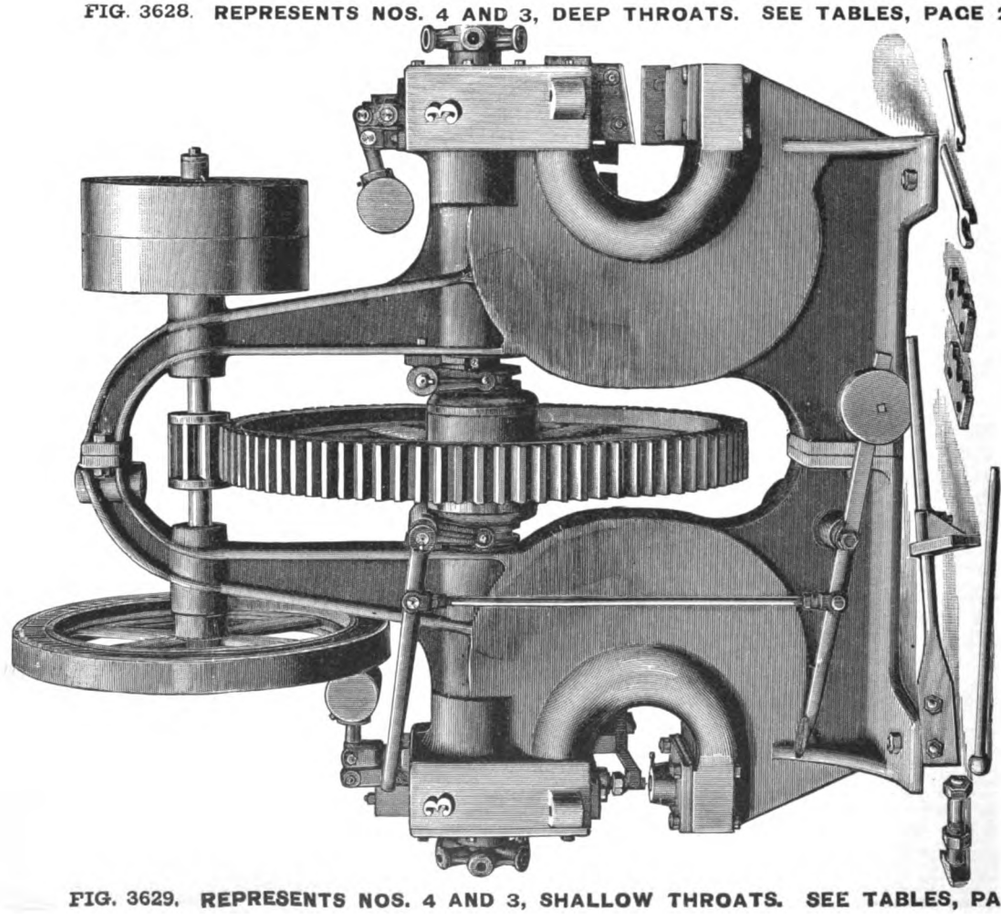


FIG. 3629. REPRESENTS NOS. 4 AND 3, SHALLOW THROATS. SEE TABLES, PAGE 228.

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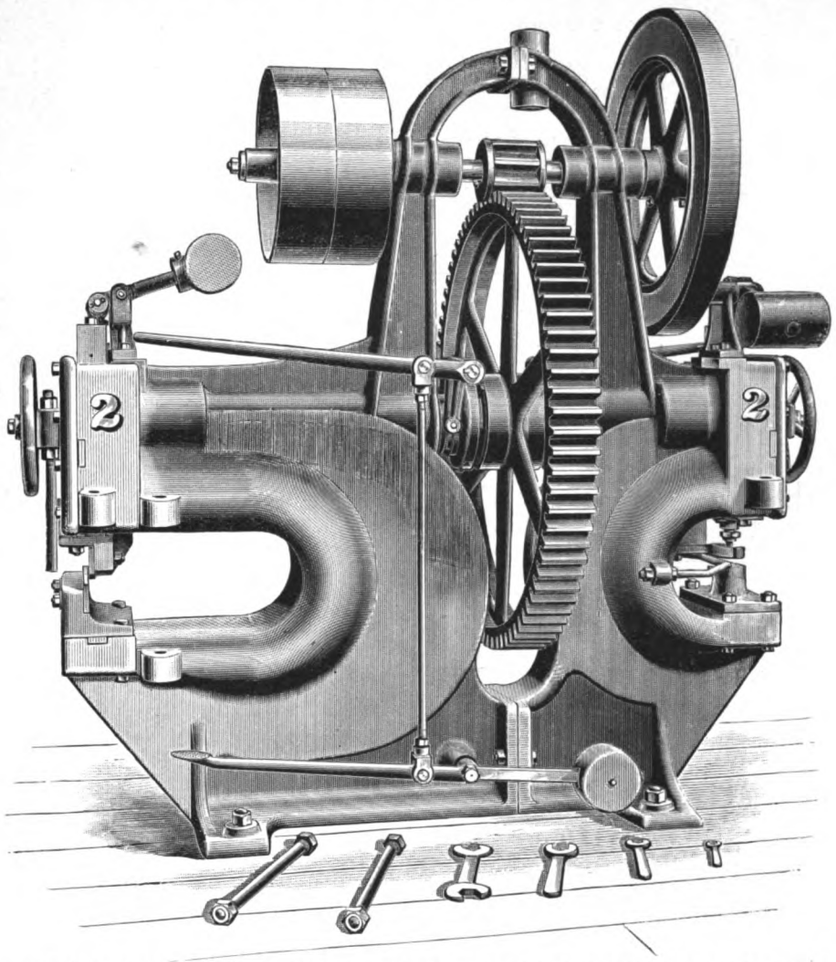


FIG. 3630. REPRESENTS NOS. 2 AND 1, DEEP AND SHALLOW THROATS. SEE TABLES, PAGE 228.

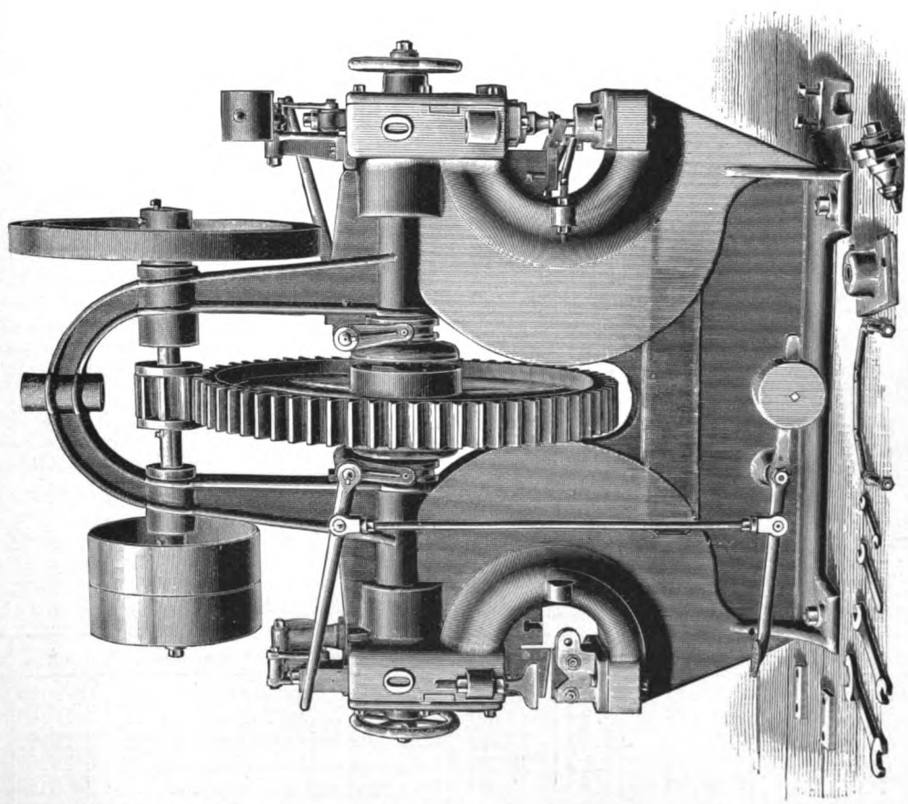


FIG. 3631. REPRESENTS NOS. 0, 00, 000. SEE TABLES, PAGE 229.

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COMBINED PUNCHES AND SHEARS.

GENERAL DESCRIPTION AND SIZES, FIGS. 3628 TO 3631.

These tools are regularly set up with ordinary punching tools on one side and either plate or bar shears on the other side, or both sides can, by taking a few moments, be made either punching or shearing machines. The extension die blocks shown in Fig. 3622 can be used on all sizes of machines, increasing the depth of the throat, but slightly reducing the capacity, enabling the operator to work on angle iron and flanges. The machines can be driven by steam engine, or by belts, or by the right angle arrangement, as shown, Fig. 3620. Ratio of gearing about 11 to 1, which enables us to use large fly wheels. Automatic stops and blocks and blades for round irons extra.

PRICES, FIGS. 3628 AND 3629. NO. 4.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
15 in.	2⅛ in.	1¼ in.	1¼ in.	8x1½ in.	2¼ in. diam.	lbs	$	$
20 "	2⅛ "	1¼ "	1¼ "	8x1½ "	2¼ " "	"		
25 "	1¾ "	1⅛ "	1⅛ "	8x1¼ "	2¼ " "	"		
30 "	1½ "	1⅛ "	1⅛ "	8x1¼ "	2 " "	"		
36 "	1¼ "	1 "	1 "	8x1⅛ "	2 " "	"		
42 "	1⅛ "	1 "	1 "	8x1⅛ "	1¾ " "	"		
48 "	1⅛ "	⅞ "	¾ "	8x1 "	1½ " "	"		

The extension die seat and punch holder brings the center of the die out to the front of machine, increasing throat 4 inches. For punching up to the capacity given, the punch is to be used in the center of sliding head.

Tight and loose pulleys 32 inches diameter, 8 inch face. 200 revolutions per minute will give 20 strokes of the punch.

PRICES, FIGS. 3628 AND 3629. NO. 3.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
12 in.	2¼ in.	1 in.	1⅛ in.	6x1¼ in.	2 in. diam.	lbs.	$	$
16 "	2 "	1 "	1⅛ "	6x1¼ "	2 " "	"		
20 "	1¾ "	1 "	1 "	6x1⅛ "	1¾ " "	"		
25 "	1½ "	1 "	1 "	6x1⅛ "	1¾ " "	"		
30 "	1¼ "	1 "	1 "	6x1 "	1½ " "	"		
36 "	1⅛ "	⅞ "	⅞ "	6x ⅞ "	1⅜ " "	"		
42 "	1 1/16 "	¾ "	¾ "	6x ¾ "	1¼ " "	"		

This machine will punch holes of large diameter, or irregular shaped holes or slots. The opening under the die through the lower jaw is 6 inches in diameter. The extension die seat and punch holder brings the center of the die out to the front of machine, increasing throat 3½ inches. For punching up to the capacity given, the punch is to be used in the center of sliding head.

Tight and loose pulleys 30 inches diameter, 7 inch face. 200 revolutions per minute will give 20 strokes of the punch.

PRICES, FIG. 3630. NO. 2.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
11 in.	1¼ in.	1 in.	1 in.	6x1⅛ in.	1¾ in. diam.	lbs.	$	$
15 "	1⅛ "	1 "	1 "	6x1⅛ "	1¾ " "	"		
20 "	1 "	1 "	1 "	6x1 "	1½ " "	"		
25 "	1 "	⅞ "	⅞ "	6x ¾ "	1½ " "	"		
30 "	1 "	¾ "	¾ "	6x ¾ "	1⅜ " "	"		
36 "	⅞ "	⅝ "	⅝ "	6x ½ "	1⅜ " "	"		

The extension die seat and punch holder brings the center of the die out to the front of machine, increasing throat 3 inches. For punching up to the capacity given, the punch is to be used in the center of sliding head.

Tight and loose pulleys 24 inches diameter, 7 inch face. 180 revolutions per minute will give 20 strokes of the punch.

PRICES, FIG. 3630. NO. 1.

Depth of throat.	Will punch. Diameter	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
8 in.	1 in.	⅞ in.	¾ in.	4½x1 in.	1½ in. diam.	lbs.	$	$
12 "	1 "	¾ "	¾ "	4½x1 "	1½ " "	"		
16 "	¾ "	⅝ "	⅝ "	4½x ⅞ "	1½ " "	"		
20 "	¾ "	9/16 "	9/16 "	4½x ⅝ "	1½ " "	"		
25 "	¾ "	½ "	½ "	4½x ⅝ "	1¼ " "	"		
30 "	¾ "	⅜ "	⅜ "	4½x ½ "	1¼ " "	"		

The extension die seat and punch holder brings the center of the die out to the front of machine, increasing throat 2 inches. For punching up to the capacity given, the punch is to be used in the center of sliding head.

Tight and loose pulleys 20 inches diameter, 5½ inch face. 200 revolutions per minute will give 25 strokes of the punch.

The re-enforcing bolts must be put in when cutting bar iron on machines of 20 inch throat and over, on No. 4 machines; 20 inch throat on Nos. 3 and 2; 16 inch throat on No. 1.

PRICES, EXTRA PARTS.

SIZE NUMBER OF MACHINE.	4	3	2	1	SIZE NUMBER OF MACHINE.	4	3	2	1
One pair shear blocks for plates.	$24.00	$22.00	$17.00	$14.00	One pair knives for plates.....	$22.00	$20.00	$17.00	$13.00
One pair shear blocks for bars..	22.00	20.00	15.00	12.00	One pair knives for bar iron.....	16.00	14.00	13.00	10.00
One standard die block.....	16.00	14.00	12.00	11.00	One pair knives for round iron...	18.00	16.00	15.00	12.00
One extension die block.....	18.00	16.00	14.00	12.00	One cast steel punch stock.....	15.00	14.00	10.00	9.00
One stripper.....	15.00	14.00	12.00	10.00	One steel die bushing.....	5.50	5.00	4.50	4.00
One automatic stop.....	50.00	42.00	38.00	32.00					

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COMBINED PUNCHES AND SHEARS.—CONTINUED.

PRICES, FIG. 3631. NO. 0.

The extension die seat and punch holder brings the center of the die out to the front of machine, increasing throat 2 inches. For punching up to the capacity given, the punch is to be used in the center of sliding head.

Tight and loose pulleys 18 inches diameter, 5 inch face. 188 revolutions per minute will give 25 strokes of the punch.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
7 in.	7/8 in.	3/4 in.	3/4 in.	4x3/4 in.	1 3/8 in. diam.	lbs.	$	$
10 "	7/8 "	3/4 "	5/8 "	4x3/4 "	1 3/8 " "	"		
12 "	3/4 "	5/8 "	5/8 "	4x5/8 "	1 1/4 " "	"		
16 "	5/8 "	1/2 "	1/2 "	4x5/8 "	1 1/4 " "	"		
20 "	5/8 "	3/8 "	3/8 "	4x1/2 "	1 1/8 " "	"		
25 "	5/8 "	3/8 "	3/8 "	4x1/2 "	1 1/8 " "	"		

PRICES, FIG. 3631. NO. 00.

The extension die seat and punch holder brings the center of the die out to the front of machine, increasing throat 2 inches. For punching up to the capacity given, the punch is to be used in the center of sliding head.

Tight and loose pulleys 14 inches diameter, 4½ inch face. 180 revolutions per minute will give 25 strokes of the punch.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
6 in.	7/8 in.	5/8 in.	5/8 in.	3 1/2x5/8 in.	1 3/16 in. diam.	lbs.	$	
9 "	7/8 "	5/8 "	5/8 "	3 1/2x5/8 "	1 3/16 " "	"		
12 "	3/4 "	1/2 "	1/2 "	3 1/2x5/8 "	1 1/8 " "	"		
16 "	3/4 "	3/8 "	3/8 "	3 1/2x "	1 1/8 " "	"		
20 "	5/8 "	3/8 "	3/8 "	3 1/2x "	1 " "	"		
25 "	5/8 "	5/16 "	5/16 "	3 1/2x "	1 " "	"		

PRICES, FIG. 3631. NO. 000.

The extension die seat and punch holder brings the center of the die out to the front of machine, increasing throat 1¼ inches. For punching up to the capacity given, the punch is to be used in the center of sliding head.

Tight and loose pulleys 12 inches diameter, 4 inch face. 180 revolutions per minute will give 30 strokes of the punch.

Depth of throat.	Will punch. Diameter.	Will punch. Thick.	Will shear. Plate.	Will shear. Flat bars.	Will cut. Round bars.	Weight, with pulleys.	PRICES, with pulleys.	PRICES, with engine.
5 in.	5/8 in	1/2 in.	1/2 in.	3 1/2x1/2 in.	1 1/8 in. diam.	lbs.	$	$
8 "	5/8 "	1/2 "	3/8 "	3 1/2x1/2 "	1 1/8 " "	"		
12 "	5/8 "	3/8 "	5/8 "	3 1/2x1/2 "	1 " "	"		
16 "	1/2 "	3/8 "	5/16 "	3 1/2x3/8 "	1 " "	"		
20 "	3/8 "	5/16 "	1/4 "	3 1/2x3/8 "	7/8 " "	"		
25 "	3/8 "	1/4 "	3/16 "	3 1/2x5/16 "	7/8 " "	"		

On sizes 0, 00, 000, the re-enforcing bolts must be put in when cutting bar iron on machines of 12 inch throat and over.

PRICES, EXTRA PARTS.

SIZE NUMBER OF MACHINES.	0	00	000	SIZE NUMBER OF MACHINES.	0	00	000
One pair shear blocks for plates	$12.00	$10.00	$9.00	One pair knives for plates	$10.00	$8.00	$7.00
One pair shear blocks for bars	10.00	8.00	7.00	One pair knives for bar iron	6.00	5.00	4.50
One standard die block	8.00	6.00	5.50	One pair knives for round iron	8.00	7.00	6.00
One extension die block	10.00	8.00	7.00	One cast steel punch stock	6.00	5.00	4.00
One stripper	8.00	7.00	6.00	One steel die bushing	3.50	3.00	2.00
One automatic stop	28.00	24.00	20.00				

SPACING TABLE.

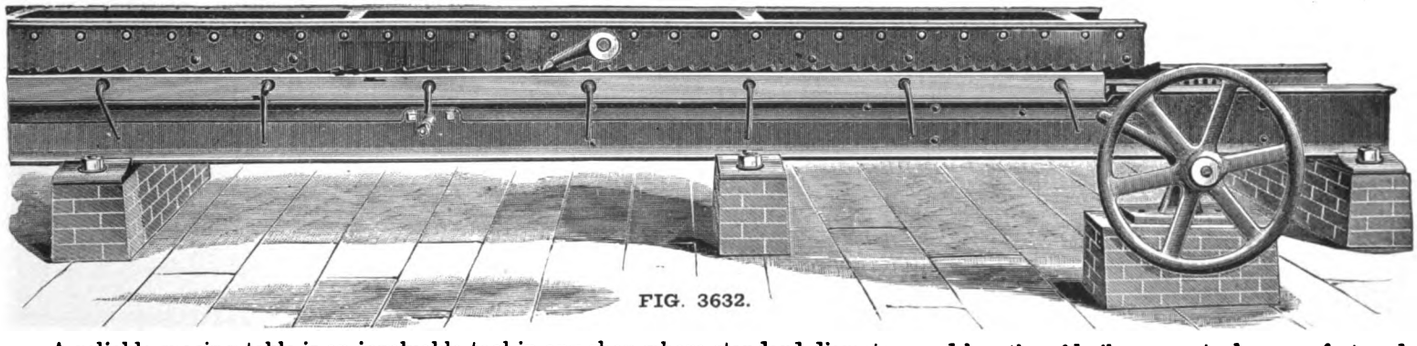


FIG. 3632.

A reliable spacing table is an invaluable tool in any shop where standard diameters and lengths of boilers are to be manufactured; and especially so when the table is worked by a system of racks. It makes holes as true and fair as drilling. It establishes fixed diameter and lengths for boilers. It allows the flanging of heads before the shell is bent. It saves a vast amount of labor, and does perfect work. In offering this table we do not claim anything particularly new in design, but we do in completeness. We make the bed and table of wrought iron beams and channel bars; therefore there can be no danger of breakage or warping, as in the case of cast iron or wood. The edge of the table is planed true with the bed, so that a plate when true on the table must give a true line of holes.

Automatic or self-adjusting spacing tables are generally so complicated or delicate in adjustment that the ordinary workman cannot work it with any certainty, and particularly so when it has to be changed frequently from one size plate to another. Again our racks or saw teeth strips are only 3/16 inch thickness, and are held in a clamp which holds them firmly; and yet they are taken out or changed quickly to suit another plate.

We furnish with each table six racks, as follows, for boilers: 30 inches, 36 inches, 42 inches, 48 inches, 54 inches and 60 inches diameter.

No. 1 will space sheets 17 feet in length, the whole length of bed 26 feet long. **WEIGHT, LBS. PRICE, $**

No. 2 will space sheets 20 feet in length, the whole length of bed 28 feet long. **WEIGHT, LBS. PRICE, $**

Tables, other lengths, made to order. Extra racks, 12 feet length or shorter, 36c. per foot. Lengths over 12 feet long, 30c. per foot.

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BOILER PLATE SHEAR, WITHOUT CLUTCH.

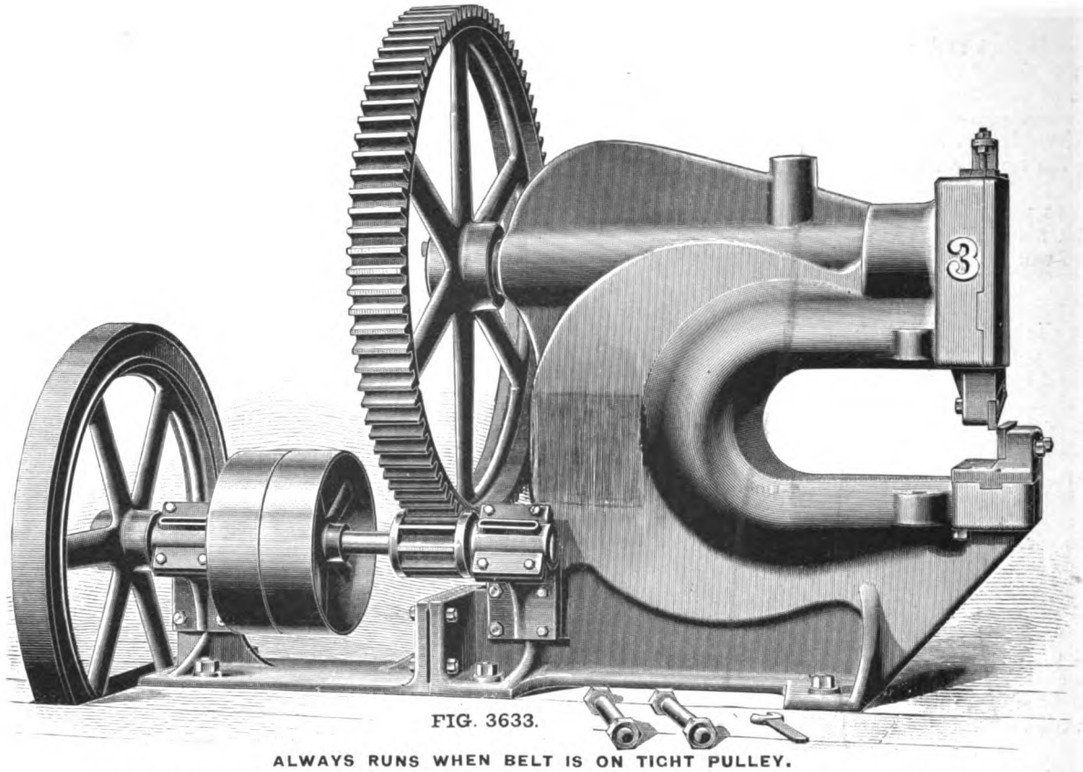


FIG. 3633.

ALWAYS RUNS WHEN BELT IS ON TICHT PULLEY.

MONITOR PLATE SHEAR, WITH ENGINE ATTACHED.

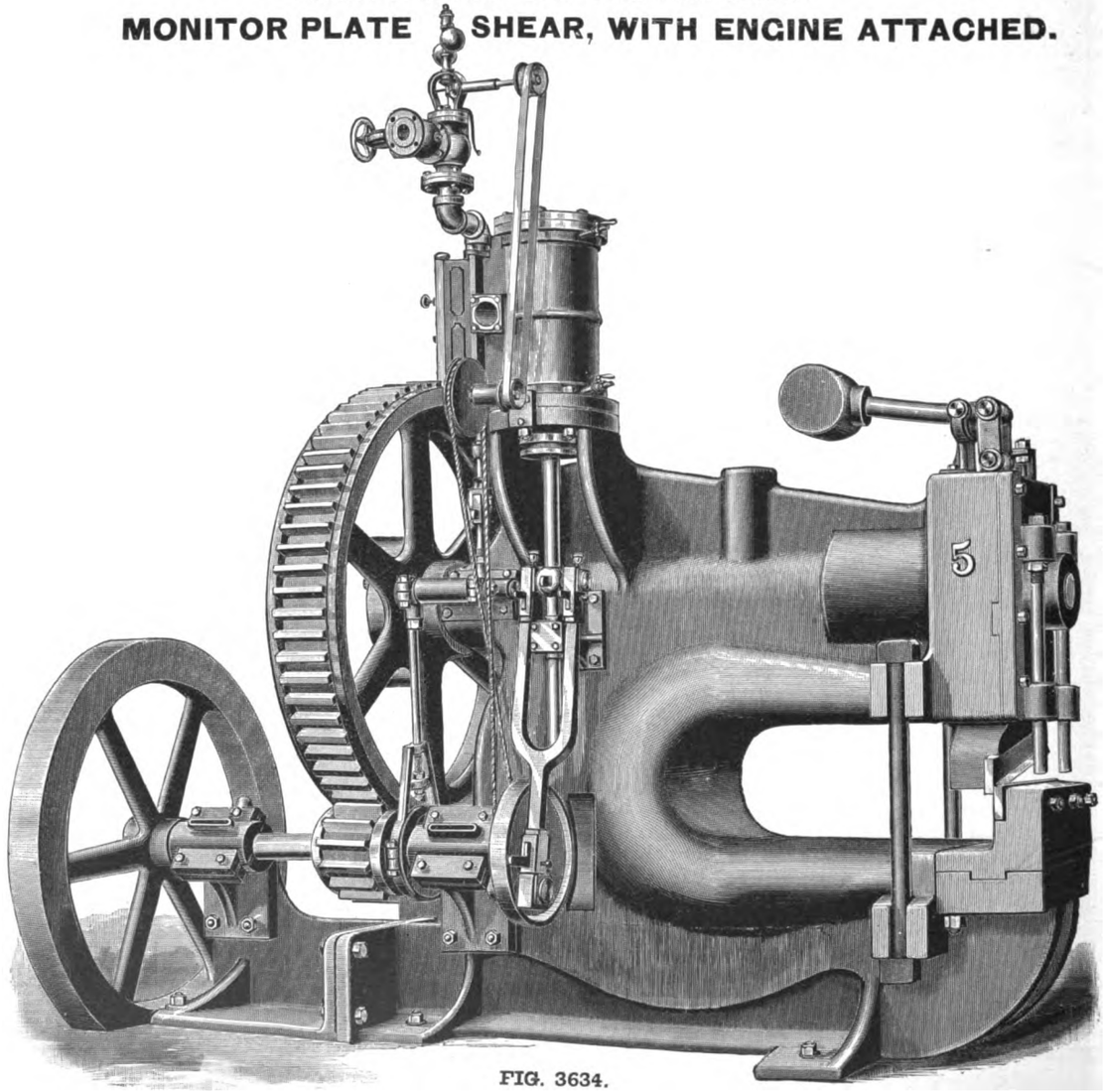


FIG. 3634.

FOR TABLE DIMENSIONS AND PRICES, SEE PAGE 232.

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LEVER SHEARS.



FIG. 3635.

TABLE CAPACITIES, PRICES, ETC., SEE PAGE 232.

UNIVERSAL PLATE OR BAR SHEAR.

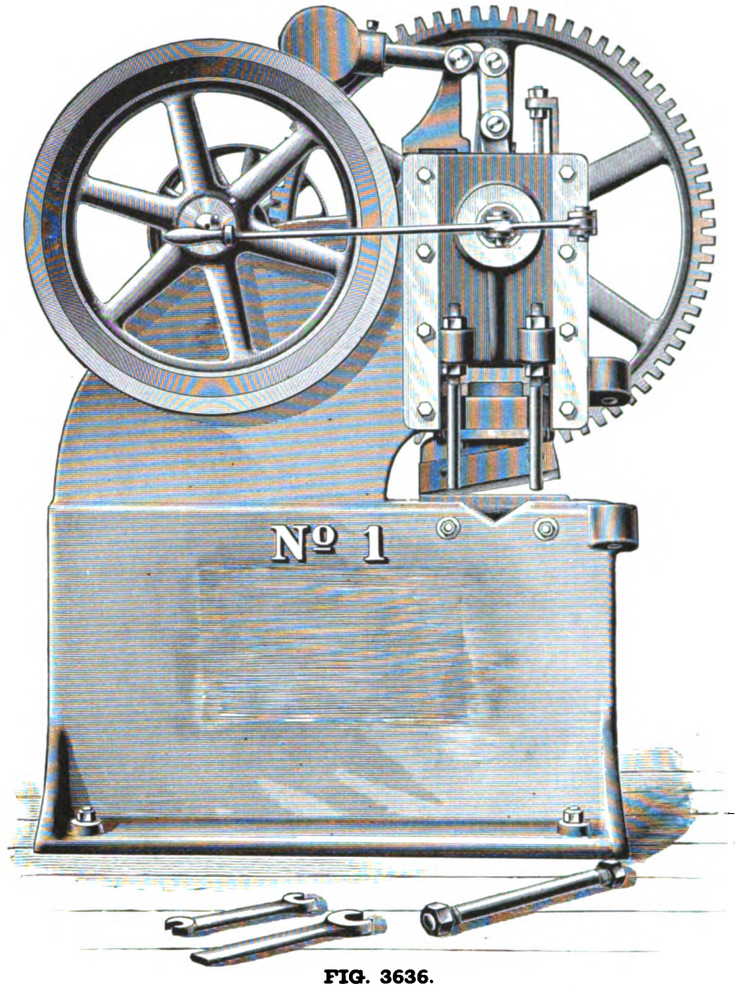


FIG. 3636.

TABLE CAPACITIES, PRICES, ETC., SEE PAGE 232.

BEVELING SHEAR.

DESCRIPTION, FIG. 3637.

This machine is of new design, intended for beveling the edges of boiler plate and angle irons, etc. It is so constructed that the plunger is flush with the face of the head and the shear blade flush with front of plunger, giving a perfectly unobstructed view of the work.

No. 1, for trimming 5/8 inch.

WEIGHT.....5,000 LBS.
PRICE.....$340.00.

No. 2, for trimming 1 inch.

WEIGHT.....7,600 LBS.
PRICE.....$460.00.

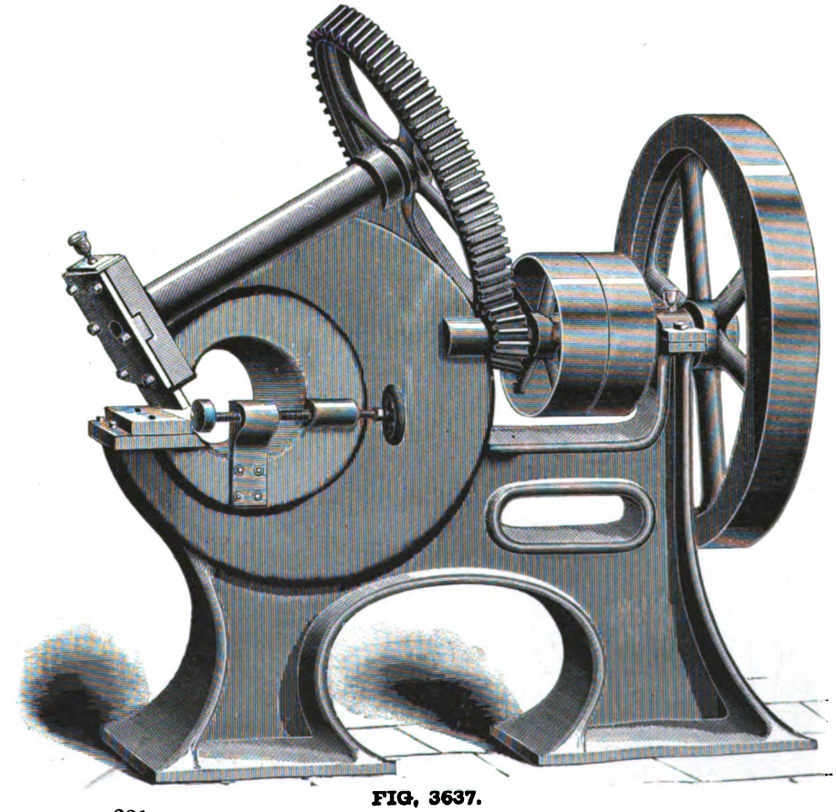


FIG. 3637.

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DESCRIPTION, FIG. 3634.

This tool is especially designed for shearing heavy plates in plate rolling mills or boiler shops where heavy marine work is done.

The machine is made without a clutch for stopping or starting the knives. They, therefore, are in motion whenever the engine is running; or, if pulleys are furnished, whenever the belt is on the tight pulley.

TABLE, FIG. 3633.

Size.	Depth of throat.	Will shear at full depth of throat.	Will shear when re-enforcing bolts are in	Weight	PRICE.
No. 0	16 in.	⅜ in. plate.	½ in. plate, 7 in. from edge.	lbs.	$
" 1	20 "	½ " "	¾ " " 8 " "	"	
" 2	25 "	¾ " "	1 " " 9 " "	"	
" 3	30 "	1 " "	1¼ " " 10 " "	"	
" 4	36 "	1⅛ " "	1½ " " 11 " "	"	
" 5	42 "	1⅛ " "	1½ " " 12 " "	"	
" 5	48 "	1⅛ " "	1½ " " 12 " "	"	
" 6	54 "	1⅛ " "	1½ " " 13 " "	"	
" 6	60 "	1 " "	1½ " " 13 " "	"	

TABLE, FIG. 3634.

Size.	Depth of throat.	Will shear at full depth of throat.	Will shear when reinforcing bolts are in	Weight.	PRICE.
No. 4	36 in.	1 in. plate.	1¼ in. plate, 11 in. from edge.	lbs.	With engine, $
" 4	36 "	1 " "	1¼ " " 11 " "	"	Without "
" 5	42 "	1⅛ " "	1⅜ " " 12 " "	"	With engine,
" 5	42 "	1⅛ " "	1⅜ " " 12 " "	"	Without "
" 6	48 "	1¼ " "	1½ " " 13 " "	"	With engine,
" 6	48 "	1¼ " "	1½ " " 13 " "	"	Without "

DESCRIPTION, FIG. 3635.

This tool is designed for splitting sheets or trimming them. If buildings are strong enough, there will be great economy of floor space by hanging the gearing to overhead timbers.

PRICES, FIG. 3635.

No. 1 will shear ½ inch plates, weight, lbs., without gearing.....$
" " " " " " with " .....
No. 2 " ⅝ inch " " " without " .....
" " " " " " with " .....

DESCRIPTION AND PRICES, FIG. 3636.

This tool is very compact and entirely self-contained, and takes much less room on the floor in the shop than other designs. It will trim, slit or cross cut any size plate, or, by changing the knives, it cuts round, flat or angle iron.

Size.	Will shear plates up to	Will shear bars up to	Will shear angles up to	Weight.	PRICE.
No. 0	¼ inch.	.....	.....	.....	$
" 1	½ "	4 x ¾ inches.	3½ x 3½ inches.	lbs.	
" 2	¾ "	4½ x 1 "	4½ x 4½ "	"	
" 3	1 "	6 x 1¼ "	6 x 6 "	"	

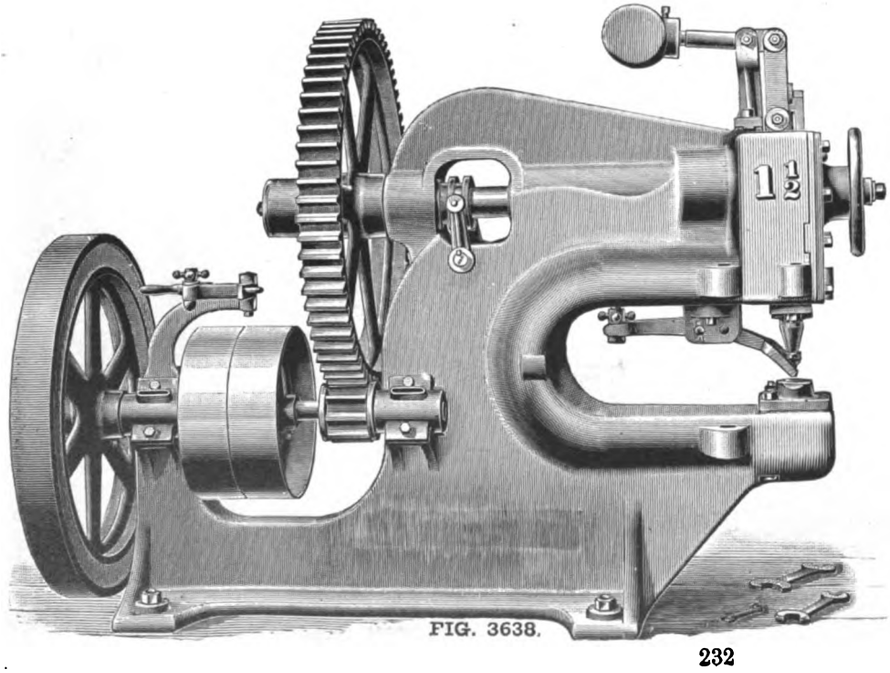


FIG. 3638.

SPECIAL PUNCH WITH JAW FOR PIPE WORK.

Fig. 3638 represents a No. 1½ machine with 25 inch throat, made with special lower jaw, to admit of punching on the end of pipes and other cylindrical work. Any of the tools from page 221 to 234 can be furnished with this jaw or other special jaw.

Figs. 3639, 3640 and 3641 are all special, and can be applied to any size machines as above.

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SPECIAL PUNCHES AND SHEARS.

FOR BRIDGE WORK.

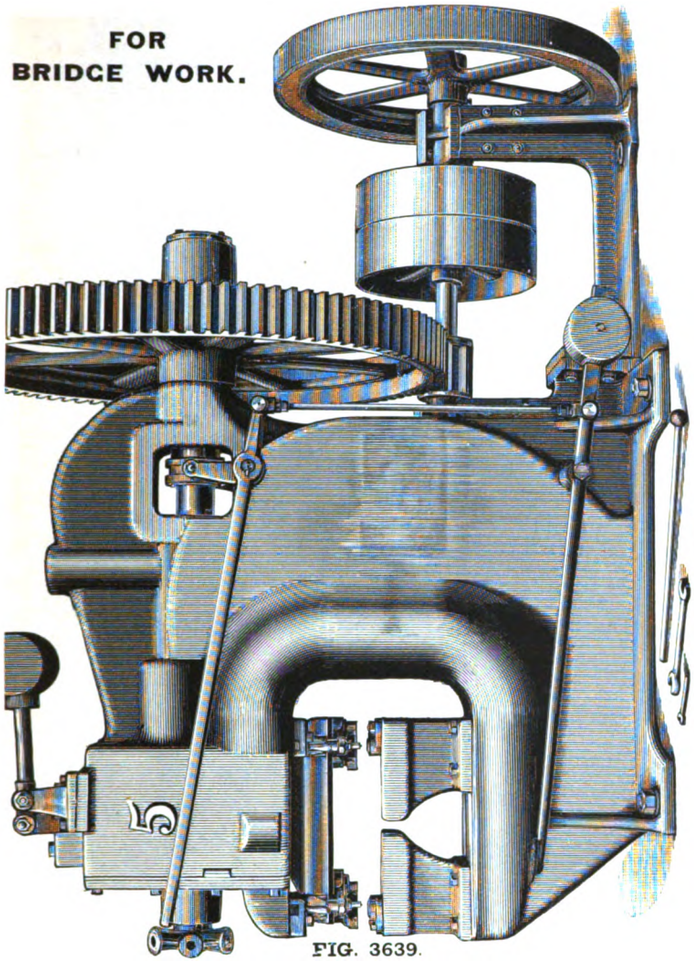


FIG. 3639.

SPECIAL TABLE.

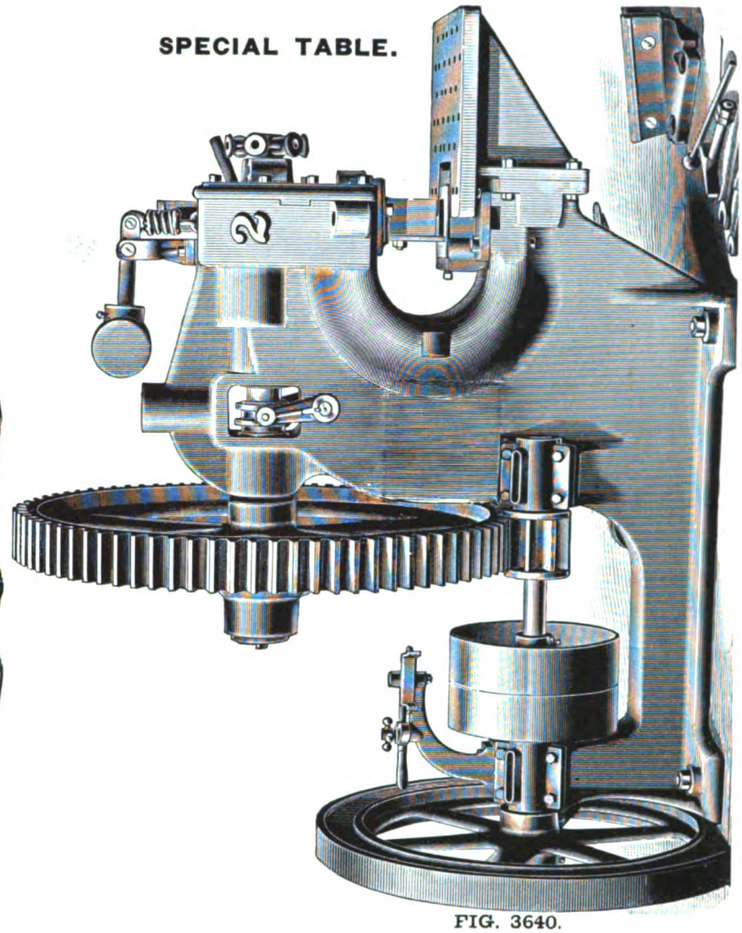


FIG. 3640.

COMBINED PUNCHES AND SHEARS, WITH ENGINE.

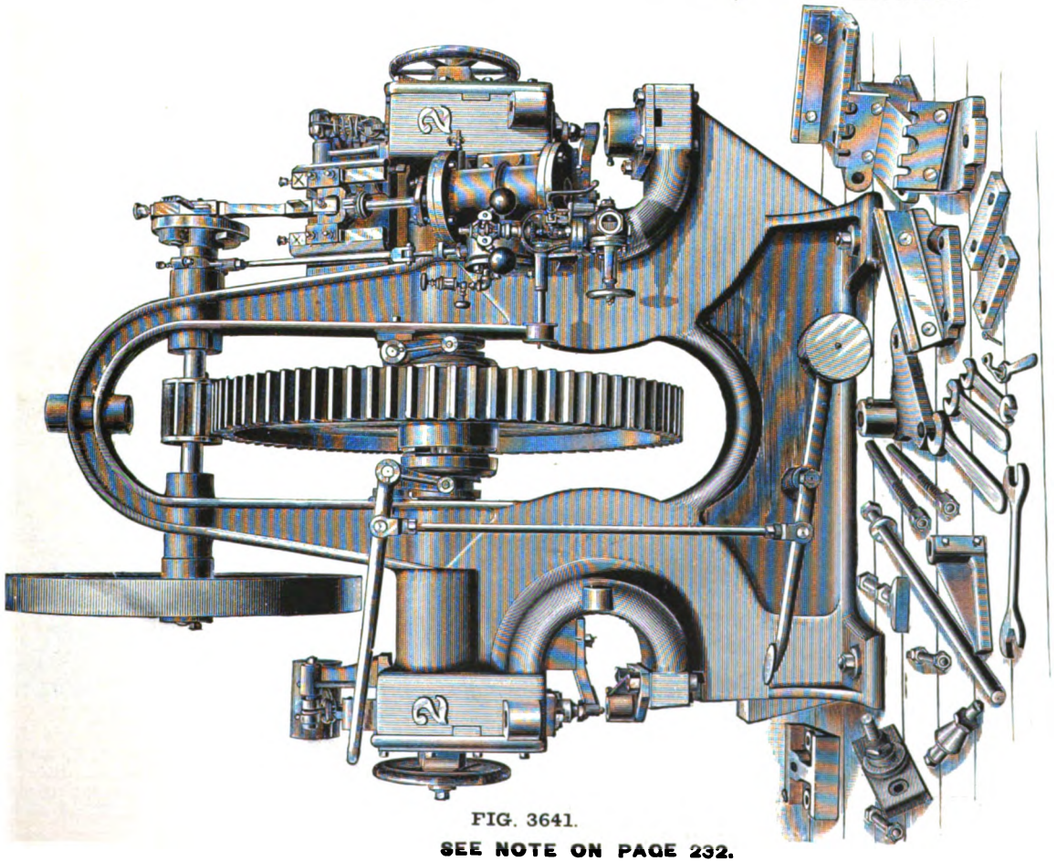


FIG. 3641.

SEE NOTE ON PAGE 232.

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SINGLE AND DOUBLE BOILER-MAKERS' PUNCHES AND SHEARS.

SINGLE PUNCH.

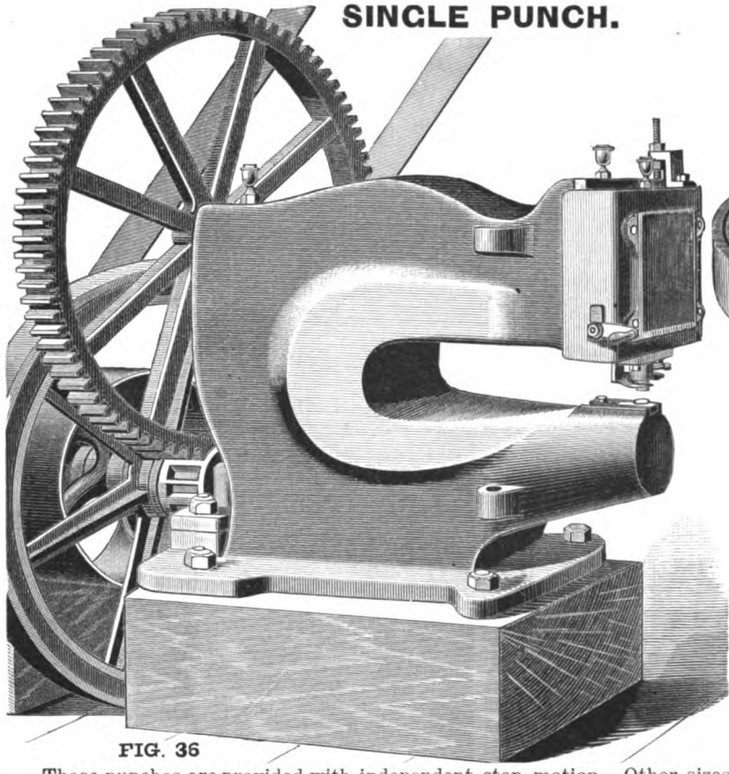


FIG. 36

These punches are provided with independent stop motion. Other sizes than those mentioned below built to order.

Depth of throat.	Capacity.	Floor space.	Weight.	Price.
20 in.	½ in. hole through ½ in. iron.	4 ft. 10 in. x 1 ft. 9 in.	4,000 lbs.	$500.00
24 "	¾ " " " ¾ " "	6 " 6 " x 2 " 0 "	6,000 "	600.00
33 "	1 " " " 1 " "	7 " 6 " x 2 " 2 "	9,000 "	850.00
36 "	1¼ " " " 1 " "	8 " 3 " x 3 " 2 "	12,000 "	1,075.00

DOUBLE PUNCH AND SHEAR.

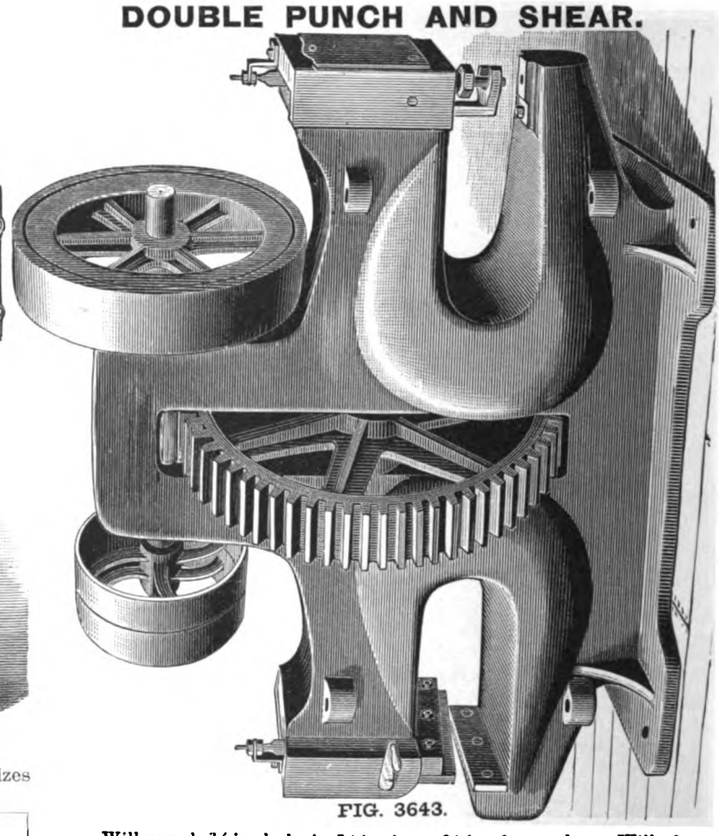


FIG. 3643.

Will punch ¾ in. hole in ¾ in. iron, 24 in. from edge. Will shear ¾ in. iron. Depth of throat, 27 in. Diameter gear, 48 in. Diameter fly wheel, 36 in. Weight, 850 lbs. Heavy steel shaft. Independent stop and start motion. Each side works independently. The frame is made of a single casting. Floor space, 8 ft. x 3 ft.

WEIGHT, 12,000 LBS. PRICE, $1,350.00.

SINGLE SHEAR.

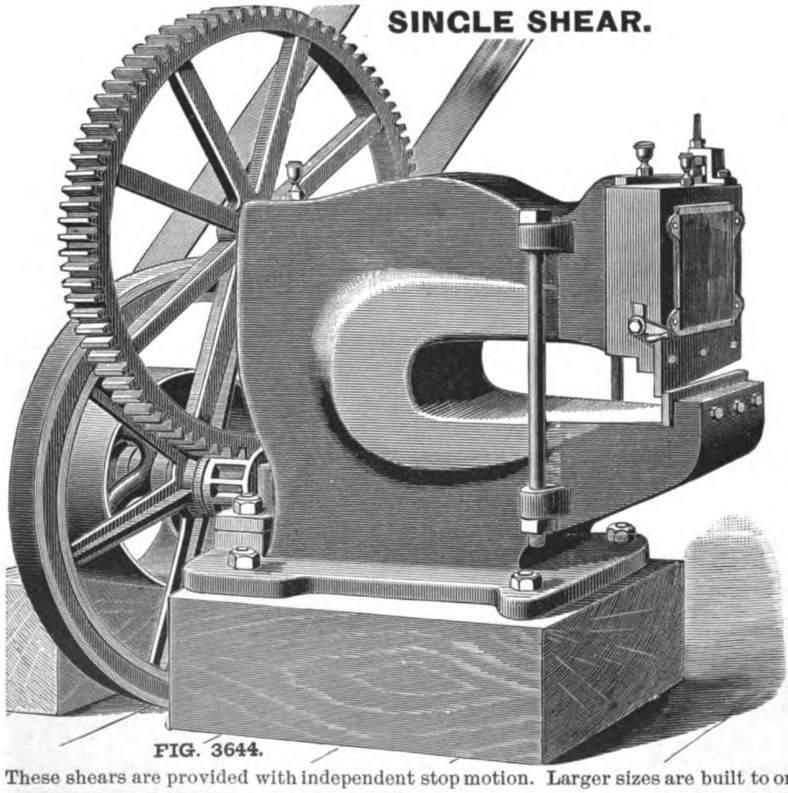


FIG. 3644.

These shears are provided with independent stop motion. Larger sizes are built to order.

Depth of throat.	Capacity.	Floor space.	Weight.	Price.
21 in.	Shears ½ in. plate.	4 ft. 10 in. x 1 ft. 9 in.	4,000 lbs.	$530.00
27 "	" ¾ " "	6 " 6 " x 2 " 0 "	6,000 "	650.00
35 "	" 1 " "	7 " 6 " x 2 " 2 "	9,000 "	900.00
36 "	" 1¼ " "	8 " 3 " x 3 " 2 "	12,000 "	1,125.00

DOUBLE PUNCH AND SHEAR.

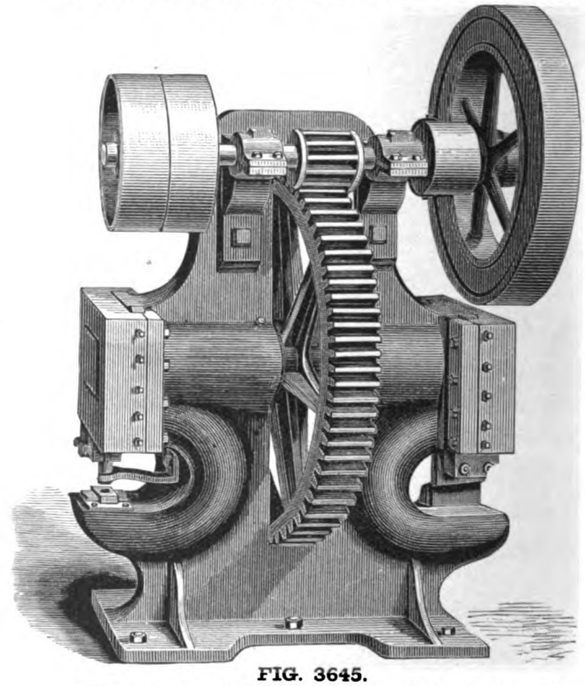


FIG. 3645.

Will punch 1 in. hole in 1 in. iron, and shear 6 in. x 1 in. iron. Throats, 14 in. Gear, 48 in. diameter. Fly wheel, 36 in. diameter. Weight, 850 lbs. Steel shaft, 4¼ in. diameter. Independent stop motion on punch side only; will be put on shear side for $25.00 additional. Floor space, 4 ft. 6 in. x 2 ft. 6 in.

WEIGHT, 8,500 LBS. PRICE, $900.00.

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NO. 5 PUNCH,

MADE WITH THROATS 42, 36 AND 30 INCHES DEEP.

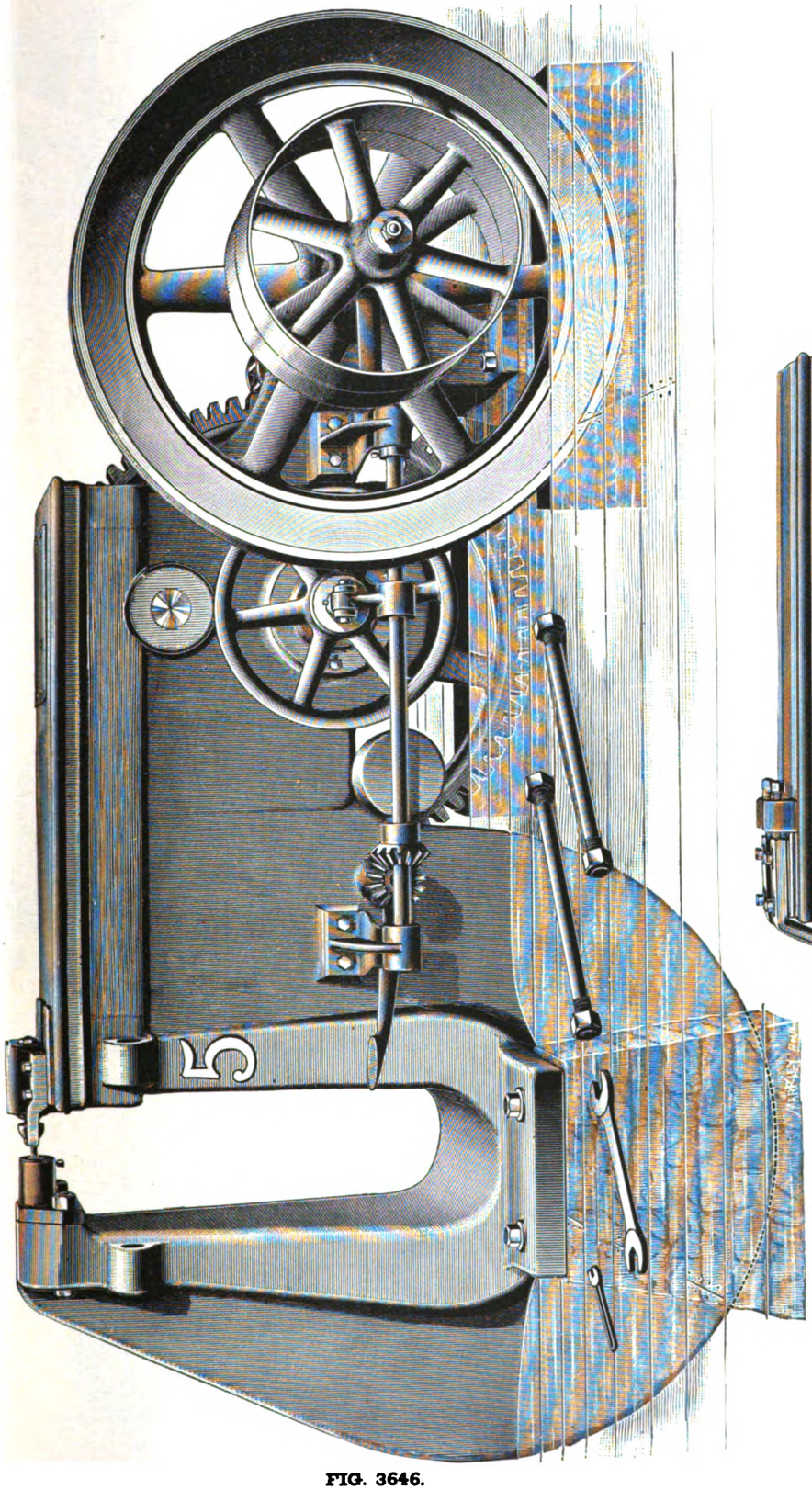


FIG. 3646.

NO. 3 PUNCH.

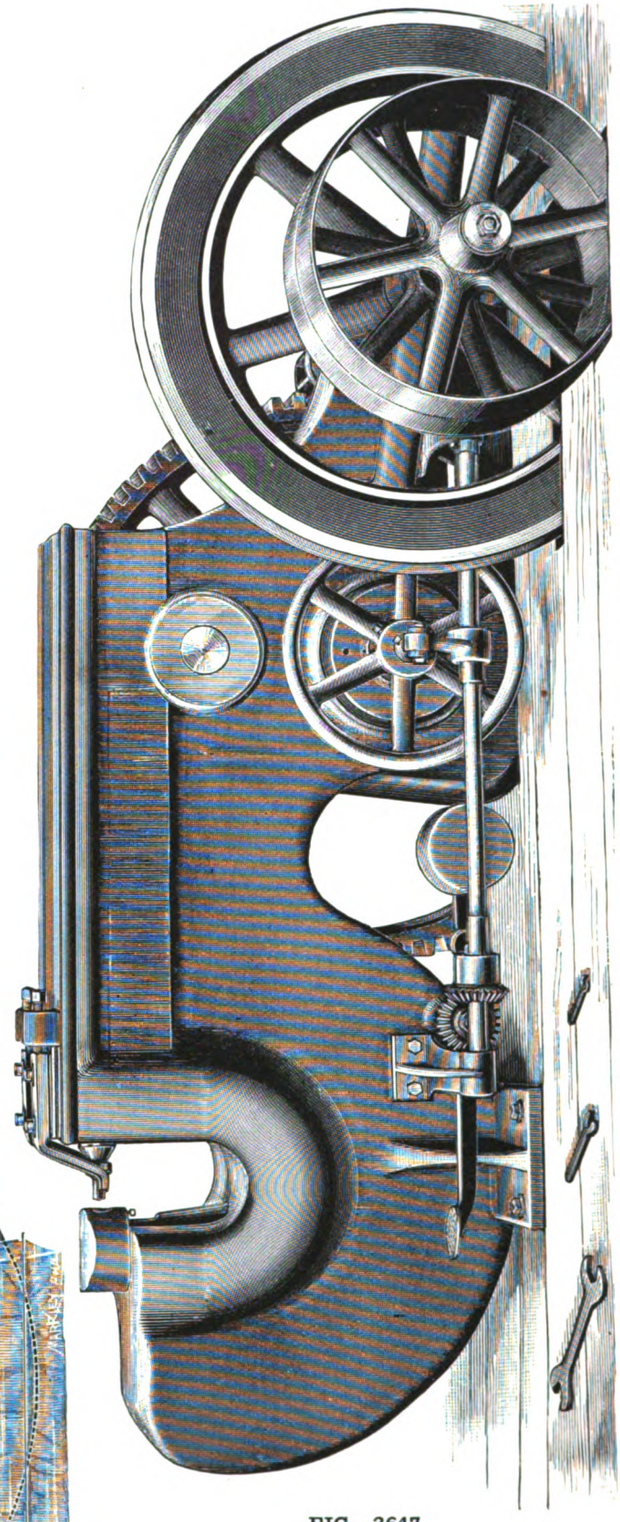


FIG. 3647.

For flanges, angle and channel iron. Will punch $1\frac{3}{16}$ inch hole in $1\frac{1}{8}$ inch iron 12 inches from edge. Steel stake, 8 inches diameter, carries the die.

SEE TABLE CAPACITIES, PAGE 237.

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NO. 2 HORIZONTAL FLANGE PUNCH.

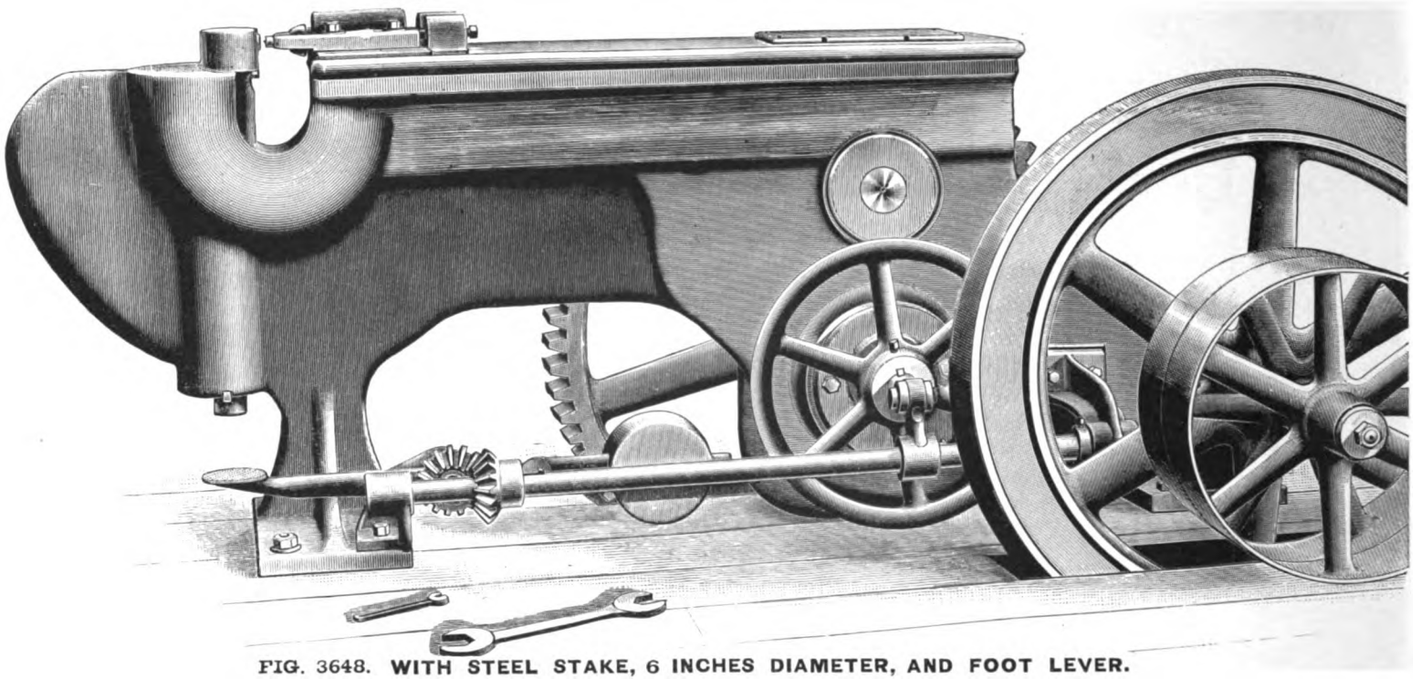


FIG. 3648. WITH STEEL STAKE, 6 INCHES DIAMETER, AND FOOT LEVER.

NO. 2 FLANGE PUNCH, WITH HAND LEVER.

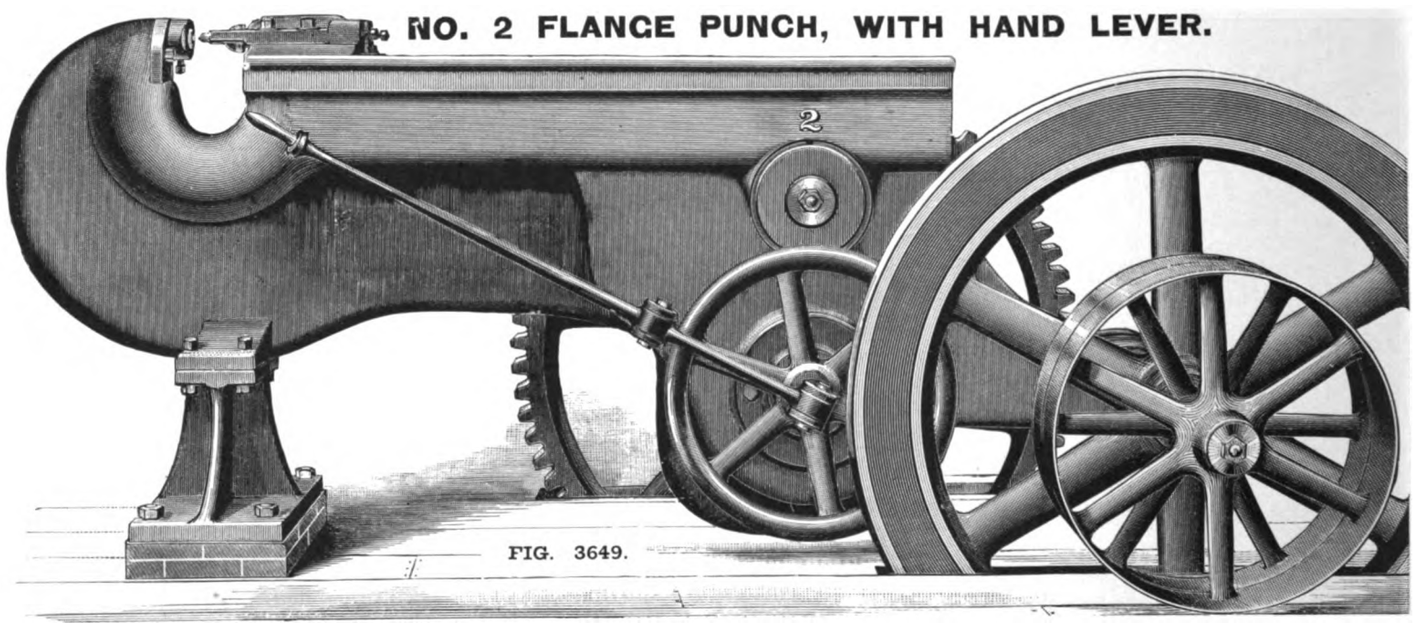


FIG. 3649.

NO. 2 DEEP THROAT AND FOOT LEVER.

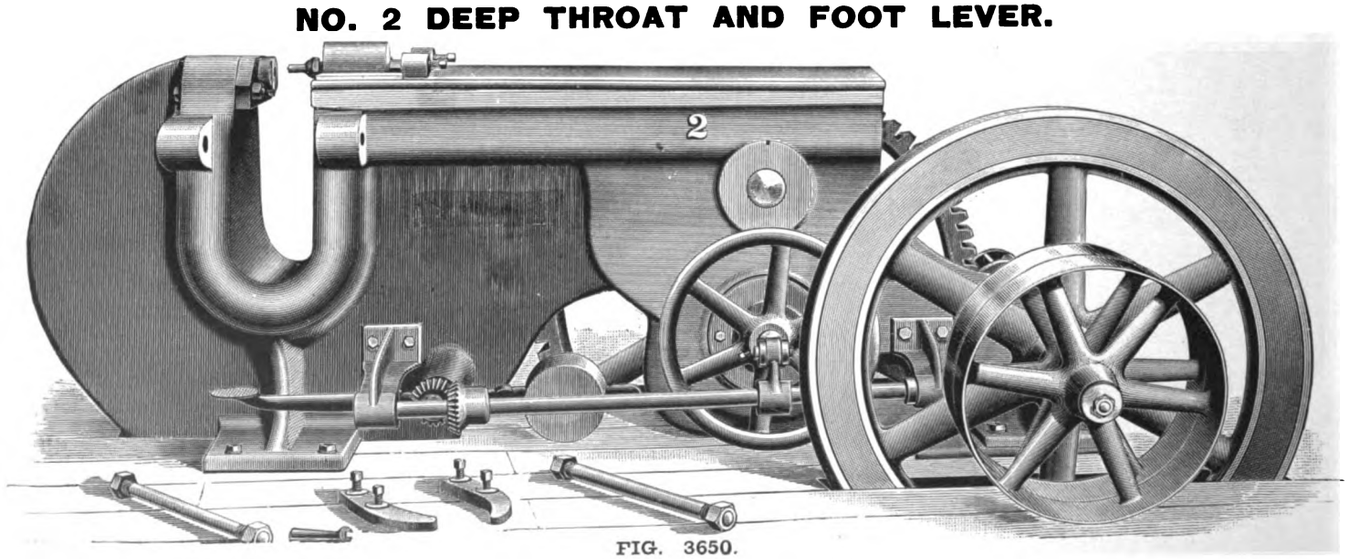


FIG. 3650.

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NO. 1 HORIZONTAL FLANGE PUNCH.

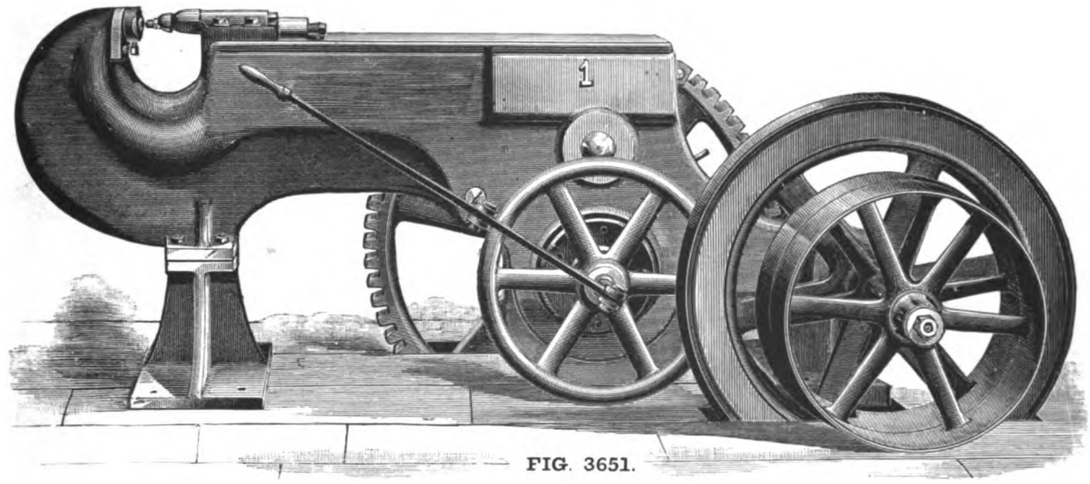


FIG. 3651.

GENERAL DESCRIPTION, FIGS. 3646 TO 3651.

The gearing and fly-wheel being below the top of the machine leaves it perfectly clear, so that flanges, heads or crooked furnace plates, as well as bent angle iron or tee iron, may be punched from either the inside or outside. This is a most convenient tool for punching brace or stay bolt holes in locomotive boilers. Plates that are already bent and fitted up can be taken down and every hole punched, thus saving a vast amount of time that is now spent in drilling or cutting holes by hand.

We would call special attention to the hand-wheel used for placing the center of the punch to the center mark on the work before throwing in the clutch ; in this way punching can be done as true and correctly as drilling. The stripper is adjustable for all thicknesses of iron. Each machine is furnished with one punch and die and a steel stake for die seat. Unless otherwise ordered, a foot lever, as shown (Fig. 3650), is furnished.

CAPACITIES, PRICES, ETC.

Size.	Fig. No.	Will punch		Depth of throat.	Weight.	PRICE.	Size of pulleys.		Speed of pulleys.
		Diameter.	Thickness.				Diameter.	Face.	
No. 1	3651	$\frac{1}{8}$ in.	$\frac{3}{4}$ in.	6 in.	lbs.	$	20 ins.	5½ in.	180
" 2	3648	$1\frac{1}{16}$ "	1 "	8 "	"		24 "	6¼ "	176
" 2	3649	$1\frac{1}{16}$ "	1 "	8 "	"		24 "	6¼ "	176
" 2	3650	$1\frac{1}{16}$ "	$\frac{3}{4}$ "	20 "	"		24 "	6¼ "	176
" 2	"	$1\frac{1}{16}$ "	$\frac{3}{4}$ "	25 "	"		24 "	6¼ "	176
" 3	3647	$1\frac{3}{16}$ "	$1\frac{1}{8}$ "	12 "	"		28 "	7 "	198
" 5	3646	$1\frac{1}{16}$ "	$\frac{3}{4}$ "	30 "	"		24 "	6¼ "	176
" 5	"	$1\frac{1}{16}$ "	$\frac{3}{4}$ "	36 "	"		24 "	6¼ "	176
" 5	"	$1\frac{1}{16}$ "	$\frac{3}{4}$ "	42 "	"		24 "	6¼ "	176

PUNCHES AND DIES FOR TOOLS, PAGES 221 TO 237.

STANDARD DIES.

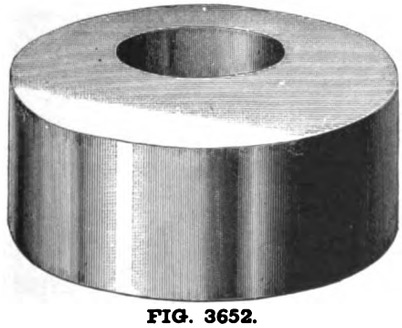


FIG. 3652.

Dies are made of best cast steel and carefully tempered. These dies can be used with either the spiral or standard punches.

PRICES.

No. 1. 2 in. diameter, 1 in. thick, for all holes up to 1⅛ in. diameter, each, ... $2.00

No. 2. 2½ in. diameter, 1¼ in. thick, for all holes up to 1½ in. diameter, each, ... 4.25

No. 3. 3 in. diameter, 1⅜ in. thick, for all holes up to 1⅞ in. diameter, each, ... 6.50

STANDARD PUNCHES AND COUPLINGS.

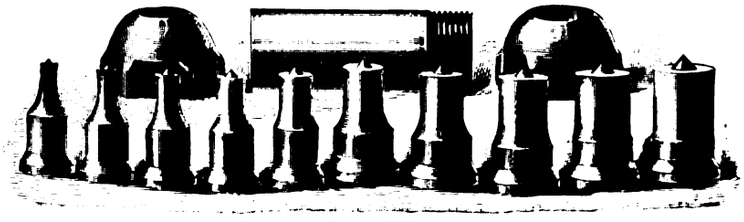


FIG. 3653.

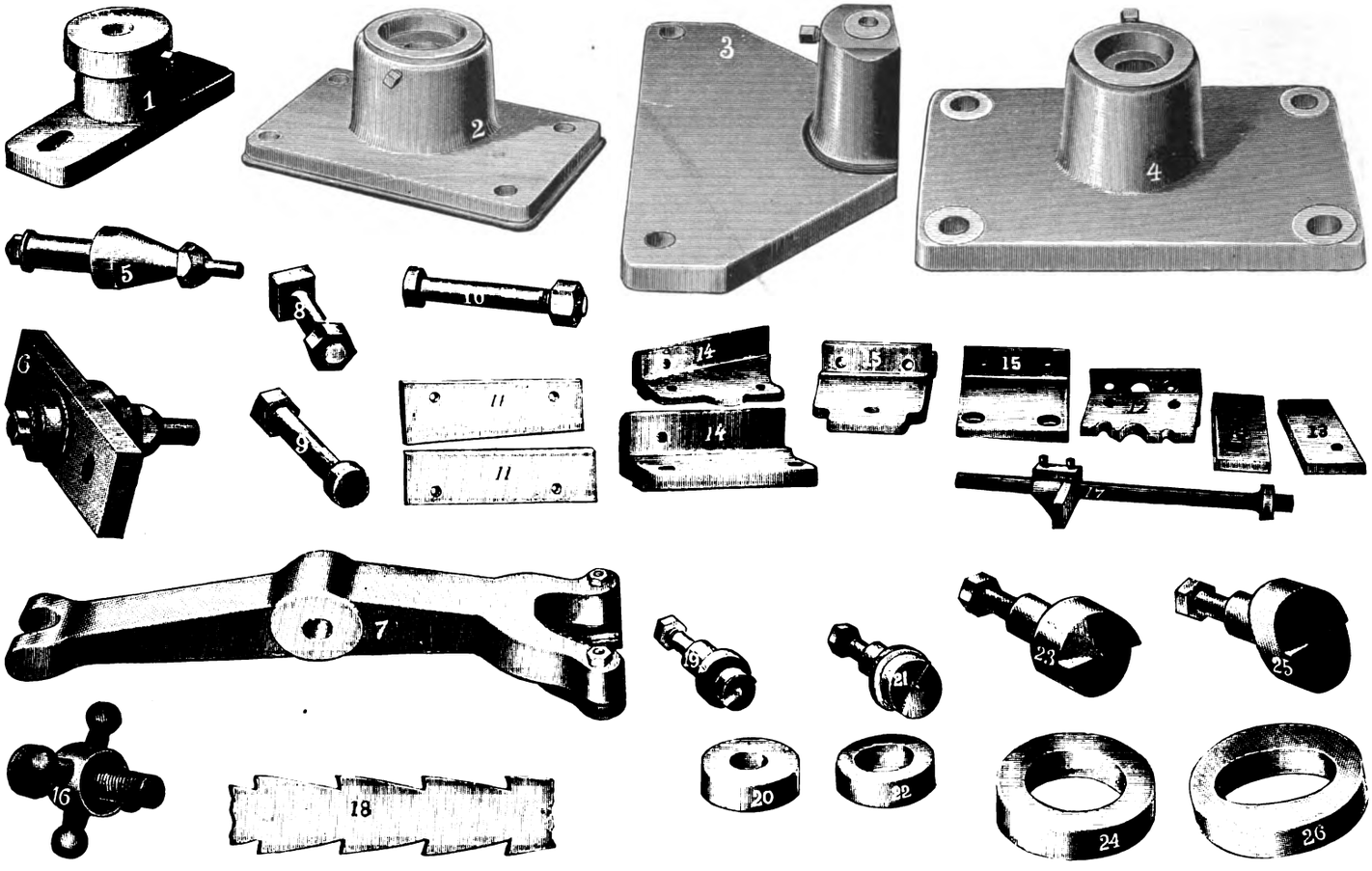
PRICES.

No. of coupling.	Diam. of punches.	Standard length.	Price of punches.	Price of couplings
No. 1	$\frac{9}{32}$ to $\frac{9}{16}$	1½ inch.	$0.40 each.	$1.12 each.
" 2	$\frac{13}{32}$ to $\frac{13}{16}$	1½ "	.57 "	1.40 "
" 3	$\frac{9}{16}$ to $1\frac{1}{16}$	1⅞ "	.85 "	1.68 "
" 4	$\frac{11}{16}$ to $1\frac{5}{16}$	2¼ "	1.12 "	2.00 "
" 5	$\frac{13}{16}$ to $1\frac{9}{16}$	2⅝ "	1.68 "	2.25 "
" 6	$\frac{15}{16}$ to $1\frac{13}{16}$	3 "	2.25 "	2.80 "
" 7	$1\frac{3}{16}$ to $2\frac{1}{16}$	3 "	Price on application.	3.50 "
" 8	$1\frac{7}{16}$ to $2\frac{9}{16}$	3 "		
" 9	$1\frac{13}{16}$ to $3\frac{1}{16}$	3 "		

SQUARE PUNCHES AND DIES DOUBLE THE PRICE OF ROUND.

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DETAILS FOR PUNCHES AND SHEARS, PAGES 221 TO 237.



IN ORDERING, USE NAME OF ARTICLE AND NUMBER OF THIS PAGE.

No. of Article.	Name of Article.	No. 000.	No. 00.	No. 0.	No. 1.	No. 1½.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
1	Large Punch Holder	.....	.....	.....	.....	.....	$16.00	$18.00	$20.00	$24.00	$26.00
2	Large Die Block*	.....	.....	.....	.....	.....	16.00	18.00	20.00	25.00	28.00
3	Extension Die Block	$7.00	$8.00	$10.00	$12.00	$13.00	14.00	16.00	18.00	24.00	30.00
4	Standard Die Block	5.00	6.00	8.00	11.00	11.00	12.00	14.00	16.00	20.00	25.00
5	Steel Punch Stock	4.00	5.00	6.00	9.00	10.00	10.00	14.00	15.00	18.00	22.00
6	Standard Punch Stock	4.00	5.00	6.00	9.00	10.00	10.00	14.00	15.00	18.00	22.00
7	Stripper with Stand	6.00	7.00	8.00	10.00	11.00	12.00	14.00	15.00	16.00	18.00
8	2 Bolts for Punch Holder	1.25	1.25	1.25	1.75	1.75	2.25	2.50	3.00	3.50	4.00
9	4 Bolts for Die Block	3.00	3.00	3.00	3.80	3.80	4.40	4.80	5.20	5.60	6.50
10	4 Bolts for Shear Knives	2.00	2.00	2.00	2.50	2.50	3.00	3.40	3.80	4.40	4.80
11	Shear Knives for Plates	7.00	8.00	10.00	13.00	15.00	17.00	20.00	22.00	30.00	36.00
12	Shear Knives for Round Iron	6.00	7.00	8.00	12.00	14.00	15.00	16.00	18.00	20.00	24.00
13	Shear Knives for Bar Iron	4.00	5.00	6.00	10.00	12.00	13.00	14.00	16.00	18.00	22.00
14	Shear Blocks for Plate	8.00	10.00	12.00	14.00	16.00	17.00	22.00	24.00	33.00	40.00
15	Shear Blocks for Bar Iron	7.00	8.00	10.00	12.00	14.00	15.00	20.00	22.00	30.00	34.00
16	Adjusting Screw for Stripper	2.00	2.50	3.00	3.50	3.50	4.00	5.00	6.00	7.50	9.00
17	Gauge Bar for Bar Iron	3.00	3.50	3.75	4.50	6.00	8.00	9.50	11.00	12.50	14.00
18	Spacing Table Racks per foot. Lengths of 12 feet or shorter, 36 cents per foot. Lengths over 12 feet, 30 cents per foot. See Fig. 3632.										
19	2 inch Tube Hole Punch. Spiral Edge and Receding Center										19.00
	2½ " " " " " " " " " "										21.00
20	2 inch Tube Hole Die. Without Die Block. See No. 2 for price of Block										9.50
	2½ " " " " " " " " " "										10.50
21	3 inch Tube Hole Punch. Spiral Edge and Receding Center										22.50
	3½ " " " " " " " " " "										24.50
22	3 inch Tube Hole Die. Without Die Block. See No. 2 for price of Block										12.00
	3½ " " " " " " " " " "										13.50
23	4 inch Tube Hole Punch. Spiral Edge and Receding Center										28.00
	4½ " " " " " " " " " "										32.00
24	4 inch Tube Hole Die. Without Die Block. See No. 2 for price of Block										15.00
	4½ " " " " " " " " " "										18.00
25	Hand Hole Punch. Spiral Edge. Without Center. Size, 3½ x 4½, or smaller sizes										32.00
26	Hand Hole Die. Without Die Block. See No. 2 for price of Block										28.00

* Die Block No. 2 will hold 2 inch, 2½ and 3 inch dies. Two of these blocks will hold a full set of dies.

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SHEARING PUNCH AND COUPLING.

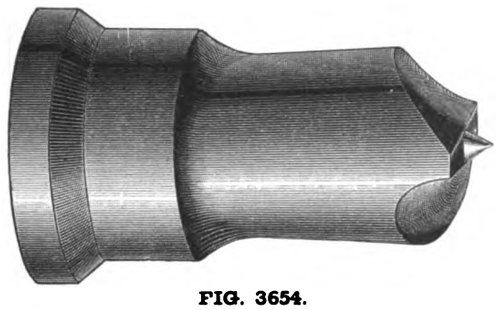


FIG. 3654.

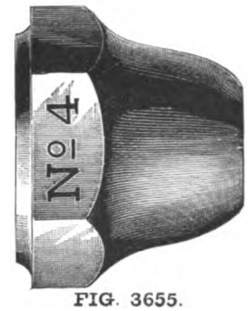


FIG. 3655.

This punch derives its name from the fact, that in its operation it performs its work in a circle, in the same manner that a shear does, in a straight line.

Attention is called to a new patent reducing coupling, by which punches of short lengths and small diameters can be adjusted to stocks made for larger punches.

PRICES.

	Diameter of punch.	Extreme length of punch.	Prices of Punches each, Fig. 3654.	Prices of Couplings each, Fig. 3655.
No. 2	⅛ to ⅜ in.	$1\frac{5}{16}$ in.	$0.38	$1.00
" 3	¼ to $\frac{9}{16}$ "	$1\frac{9}{16}$ "	.50	1.25
" 4	$\frac{7}{16}$ to ¾ "	1⅝ "	.75	1.50
" 5	$\frac{9}{16}$ to 1 "	2⅛ "	1.10	1.75
" 6	¾ to $1\frac{3}{16}$ "	2⅝ "	1.50	2.00
" 7	1 to 1½ "	3 "	2.00	2.50
" 8	1¼ to 1¾ "	Length to suit machine.	Price on application.	3.25
" 9	1½ to 2¼ "			

PRICES, REDUCING COUPLINGS.

	Short.	Long, with steel block.
3–2	$1.25	$1.75
4–3	1.50	2.00
4–2	1.50	2.00
5–4	1.75	2.50
5–3	1.75	2.50
5–2	1.75	2.50
6–5	2.00	2.75
6–4	2.00	3.00

BAR IRON SHEARS.

The machine is designed for heavy work.

We would call particular attention to the mode of attaching the engine, being placed directly upon the main casting or frame of the machine. It is always kept perfectly in line with the machine, even though it should be out of level on its foundation.

This is a most desirable tool for locomotive builders, bridge builders, or bar-iron rolling mills, or for cutting puddle bars in sheet mills. We furnish one pair of knives, as shown in cut; all others extra.

Size.	Will shear flat iron.	Will shear round iron.	Weight.	Price, with engine.	Price, without engine.
No. 2	6x1 in.	1¾ in. diam.	lbs.		
" 3	6x1¼ "	2 " "	"		
" 4	8x1⅜ "	2¼ " "	"		
" 5	10x1¾ "	2½ " "	"		

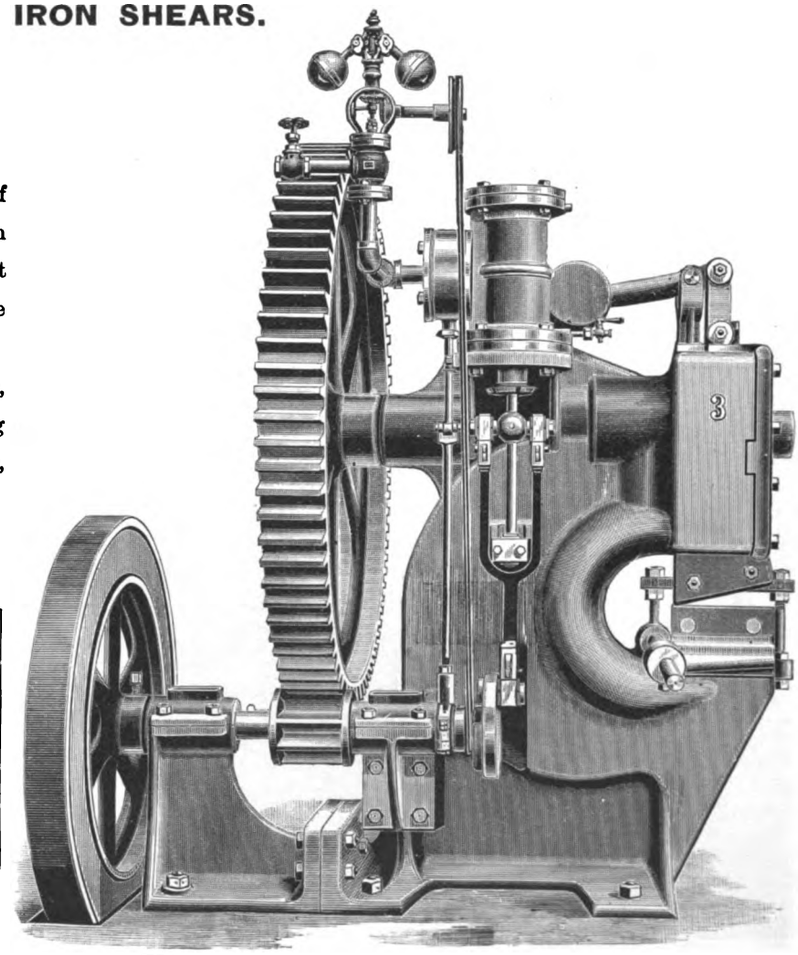


FIG. 3656. WITH ENGINE OR WITH PULLEYS.

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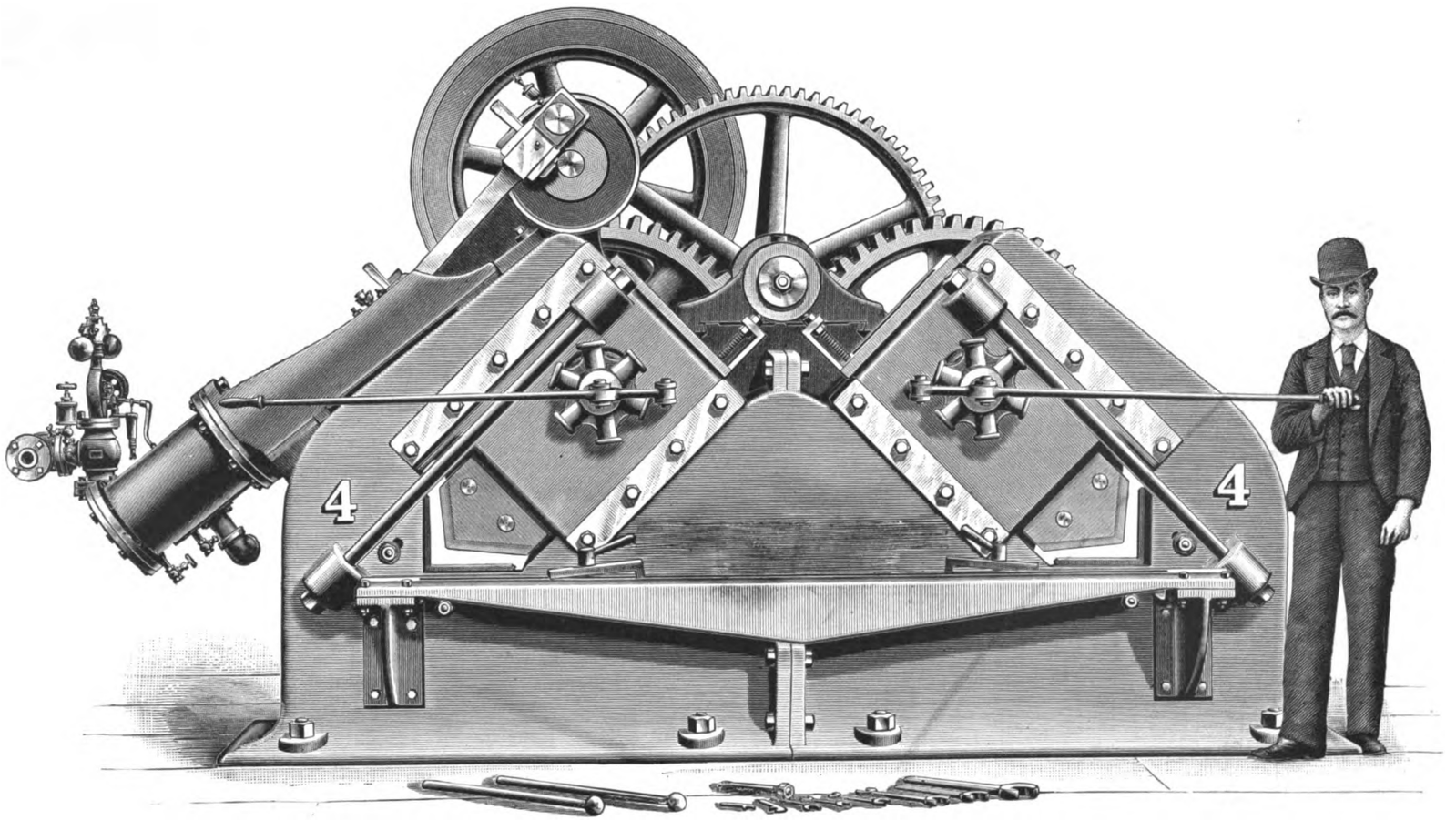


FIG. 3657. REPRESENTS NO. 4, ENGINE-DRIVEN.

Driven by engine or with pulleys—both sides independent—a very massive tool with capacity for working heaviest sections of angles.

Size.	Figure.	Will cut, with Shearing Knives.	Will cut, without Shear.	Weight, with Pulleys.	PRICES, with Pulleys.	Weight, with Engine.	PRICES, with Engine.
No. 1	3659	Angles, 4½x4½	Angles, 4 x 4		$.....		$.....
" 2	3659	" 6 x 6	" 5 x 5		.....		.....
" 3	3658	" 7 x 7	" 6 x 6		.....		.....
" 4	3657	" 8 x 8	" 7 x 7		.....		.....

The sizes of Angles given are for ordinary sections in thickness.

PRICES, KNIVES.

1 Pair of Knives for No. 1 Double Angle Shear, $.....
1 " " " " " 2 " " " .....
1 " " " " " 3 " " " .....
1 " " " " " 4 " " " .....
1 " " " " " 1 Universal Shear..... .....
1 " " " " " 2 " " ....
1 " " " " " 3 " " ....

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DOUBLE ANGLE SHEARS.—ENGINE-DRIVEN.

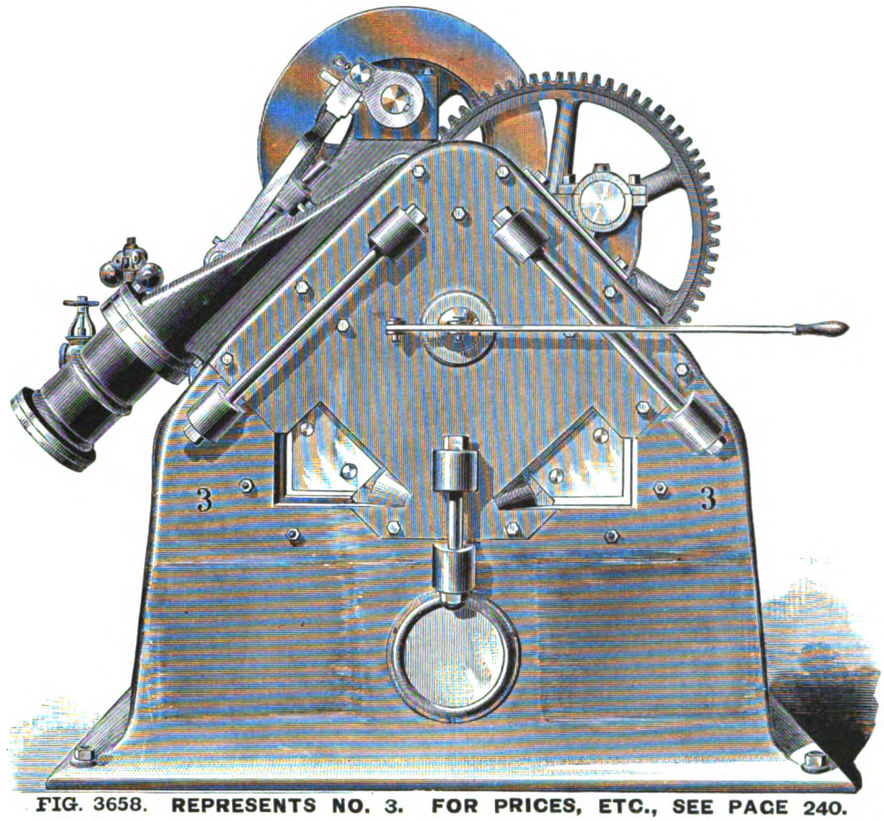


FIG. 3658. REPRESENTS NO. 3. FOR PRICES, ETC., SEE PAGE 240.

DOUBLE ANGLE SHEARS.—BELT-DRIVEN.

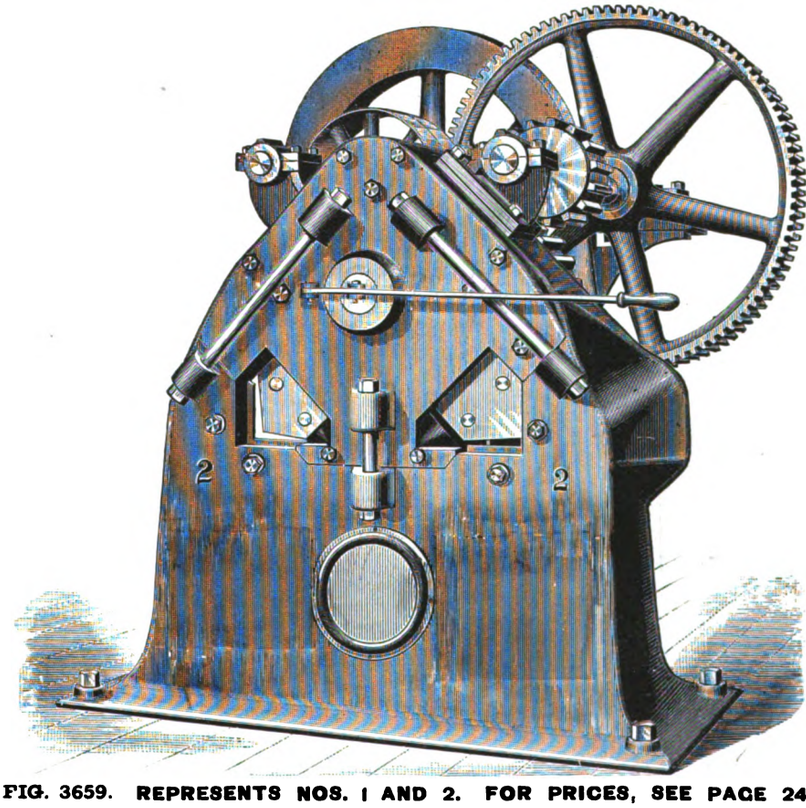


FIG. 3659. REPRESENTS NOS. 1 AND 2. FOR PRICES, SEE PAGE 240.

This design of angle shear has been found to be a most efficient and serviceable tool, and has many advantages over other designs.

First is, that being double, it will cut angles either right or left. Again, its knives are of a proper height for convenience of working. It will cut an angle iron bar square off, or on a bevel, that is, it will miter the ends, as frequently has to be done in bridge work. It makes a perfectly clean cut without destroying the end of the piece cut off, and being supplied with a clutch stop motion, the work can be cut accurately to mark.

We furnish a clamping table, as shown in Fig. 3657, for holding angles in position.

This is a most serviceable tool for bridge work, iron ship building, or any kind of bar iron work, as the knives can be furnished for other shapes, that will cut flat and round iron.

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BAR IRON SHEARS.

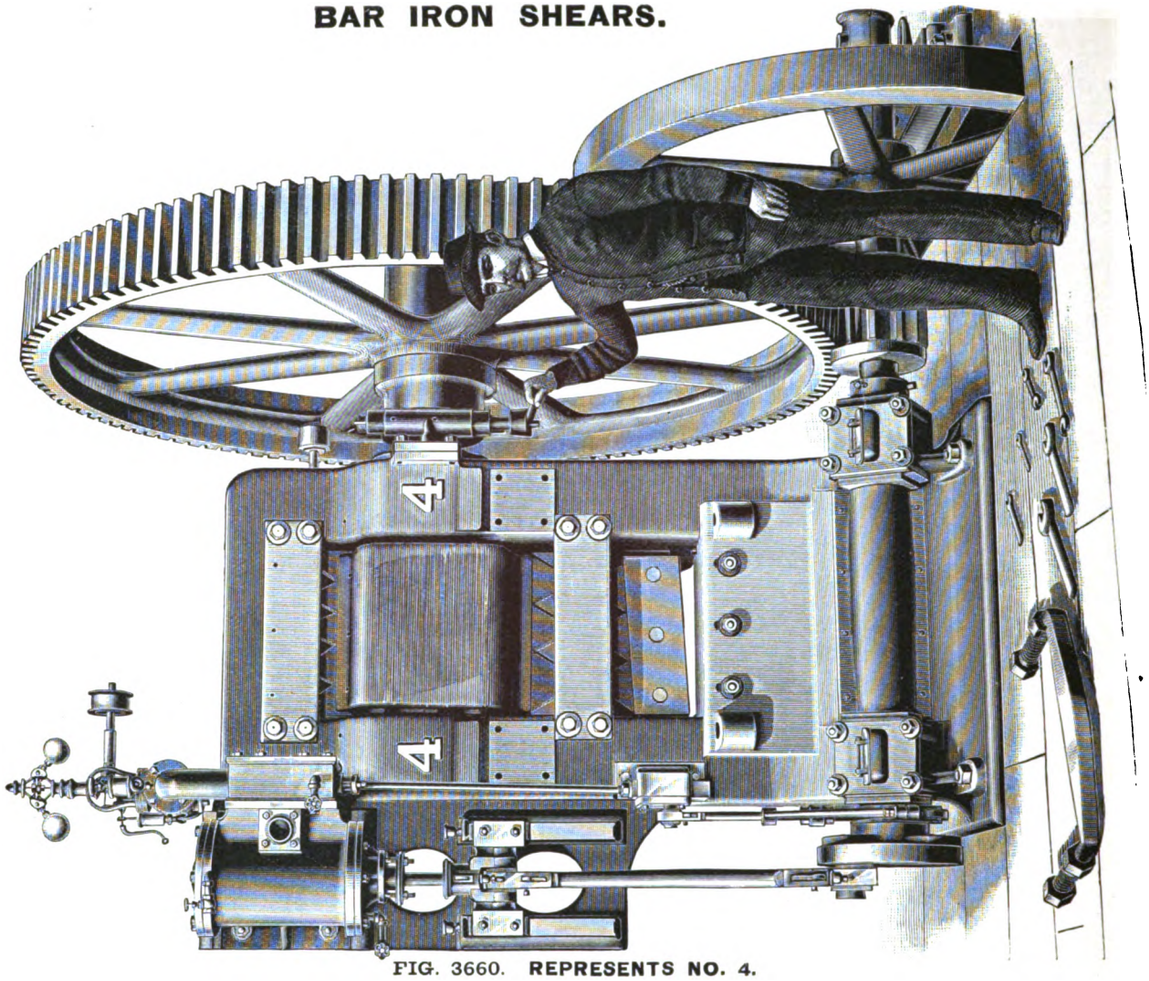


FIG. 3660. REPRESENTS NO. 4.

NO. 3 BELT-DRIVEN.

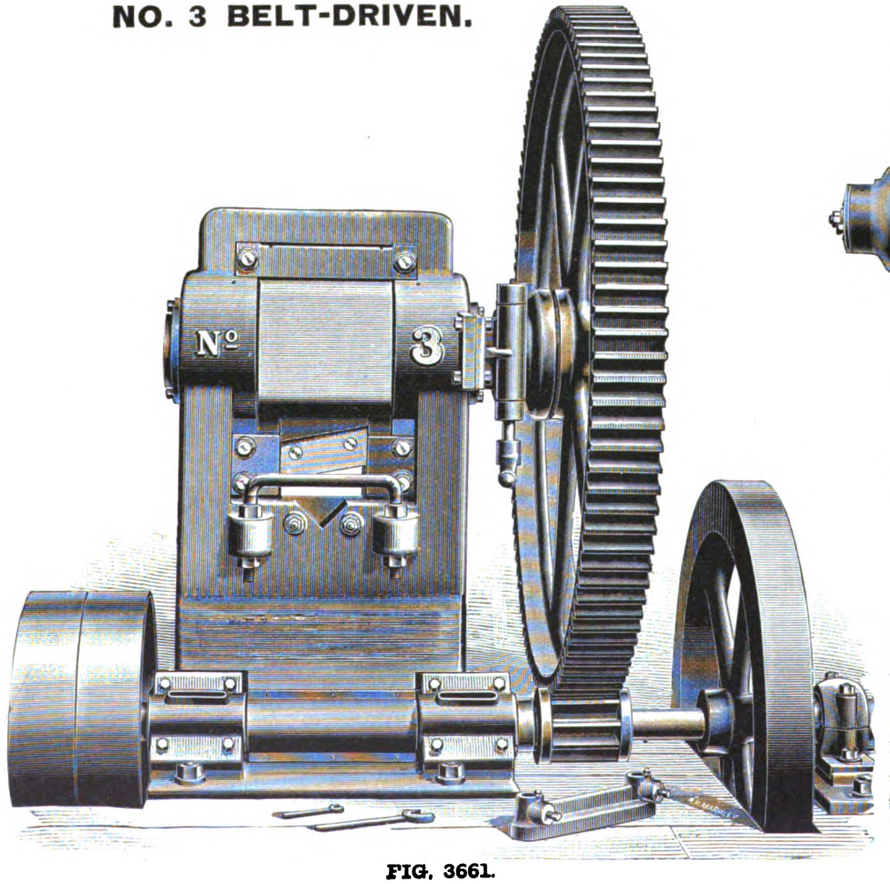


FIG. 3661.

BELT-DRIVEN, NOS. 0 & 1.

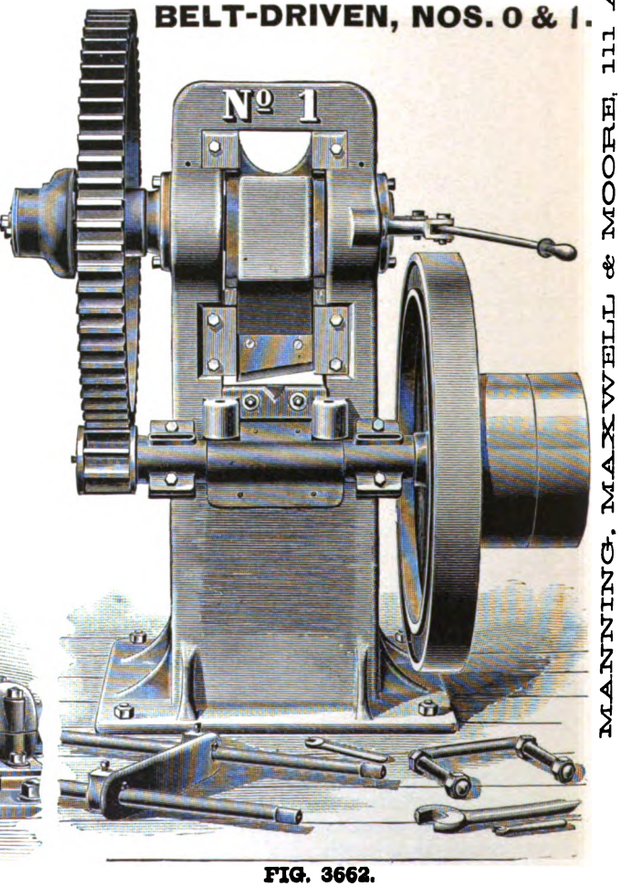


FIG. 3662.

SEE NEXT PAGE FOR PRICES.

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BAR IRON SHEARS.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

PRICES.

No.		Will cut flat iron.	Will cut round iron.	Will cut angle iron.	PRICE, with engine.	PRICE, without engine.	Weight.
0	Fig. 3662	3x ½ in.	½ to 1⅛ in.	2½x2½ in.			
1	" 3662	4x ¾ "	½ " 1½ "	3½x3½ "			
2	" 3663	5x1¼ "	¾ " 2¼ "	5 x5 "			
3	" 3661	6x1¾ "	1¼ " 2¾ "	6 x6 "			
4	" 3660	12x2 "	Steel rails.	8 x8 "			

DESCRIPTION AND PRICES, FIG. 3664.

No. 1 will cut flat iron 4 inches by 1 inch, and round iron up to 1⅝ inch diameter.

WEIGHT, LBS. PRICE, $.....

No. 2 will cut flat iron 5 inches by 1¼ inches, and round iron up to 2 inch diameter.

WEIGHT, LBS. PRICE, $.....

No. 3 will cut flat iron 6 inches by 1½ inches, and round iron up to 2¼ inch diameter.

WEIGHT, LBS. PRICE, $.....

We furnish the knives shown in the machine ; all others are extra.

PRICES OF EXTRAS.

	No. 1.	No. 2.	No. 3.
One pair knives for angles.....	$22.00	$32.00	$42.00
" " " " flat iron....	15.00	20.00	32.00
" " " " round iron...	20.00	28.00	36.00

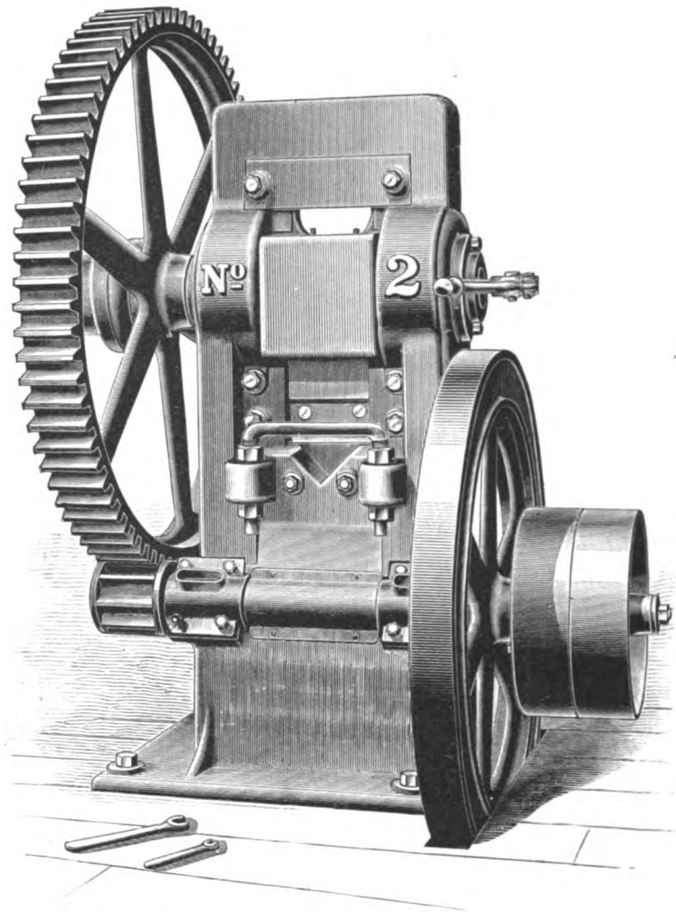


FIG. 3663. REPRESENTS NO. 2.

DOUBLE BAR IRON SHEAR.

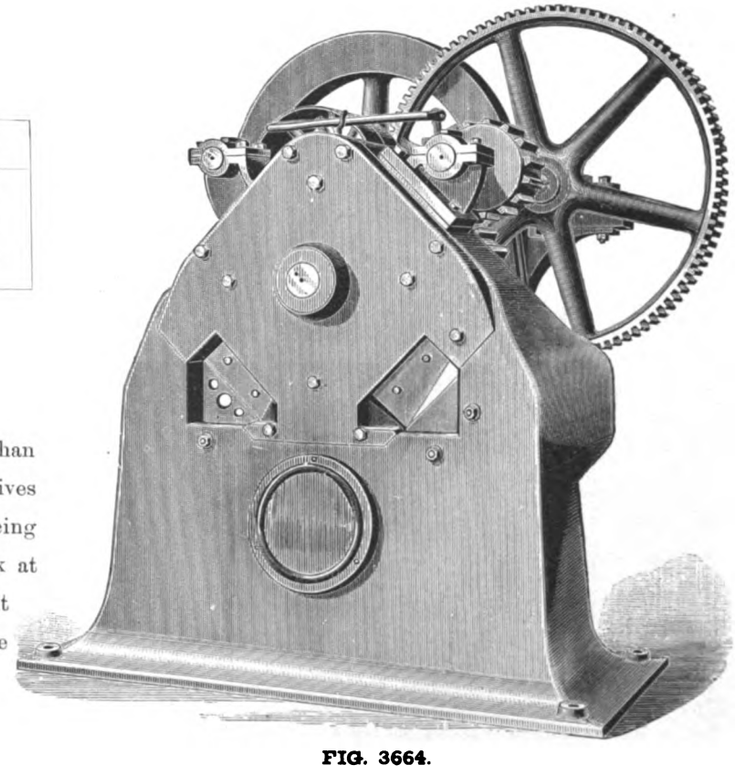


FIG. 3664.

CAN BE FURNISHED WITH AN ENGINE, SEE FIG. 3658.

For a smith shop there is no machine more serviceable than our double bar iron shear. The fact of its being double, the knives are always in position for flat, square or round iron. And being supplied with a clutch stop motion, bars can be cut to the mark at any length, or, by using the gauge, short work can be cut very rapidly. The machine can be changed to a double angle iron shear by simply putting in angle iron knives.

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PLATE PLANERS.

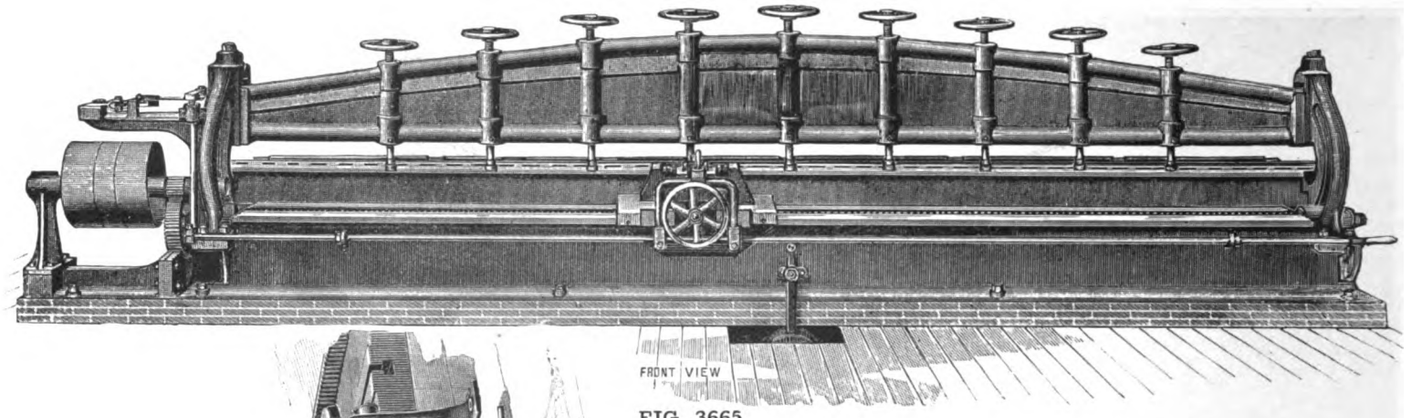


FIG. 3665.

Fig. 3665 represents all sizes plain planers. They will plane any length by resetting the plates the length of cuts given in table.

There are two tools in the tool post—one of which cuts whichever direction the tool post travels. The same automatic movement to shift the belts shifts the cutting tools, which have an easy and independent adjustment.

PRICES.

DRIVEN DIRECT ON THE SCREW.

	Weight.	PRICES.
No. 0 cuts 8 feet each setting, - -	lbs. - -	$.....
" 0 " 10 " " " - -	" - -	.....
" 0 " 12 " " " - -	" - -	.....
" 1 " 14 " " " - -	" - -	.....
" 2 " 16 " " " - -	" - -	.....

PRICES.

WITH GEARING BETWEEN SCREW AND PULLEYS.

	Weight.	PRICES.
No. 1 cuts 14 feet each setting, - -	lbs. - -	$.....
" 2 " 16 " " " - -	" - -	.....
" 3 " 18 " " " - -	" - -	.....
" 4 " 20 " " " - -	" - -	.....

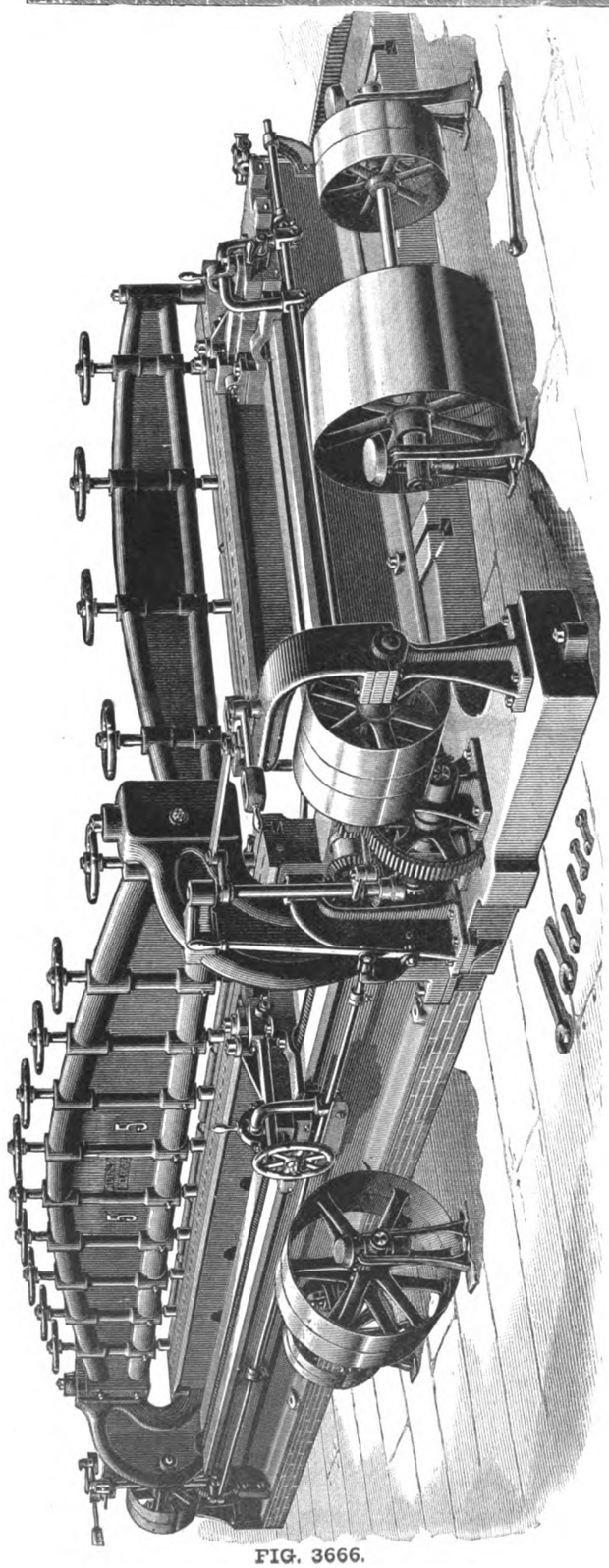


FIG. 3666.

Fig. 3666 represents the duplex plate planer, which is a heavy and substantial machine for planing the side and end of plates at the same setting.

PRICES.

	Weight.	PRICES.
No. 4 cuts 18 feet on sides and 6 feet on end,	lbs.	$.....
" 5 " 20 " " " 8 " "	"	.....
" 6 " 25 " " " 10 " "	"	.....

The end planer has a radial adjustment of 10 degrees on each side of the right angle to the long cut.

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HAND BENDING ROLLS.

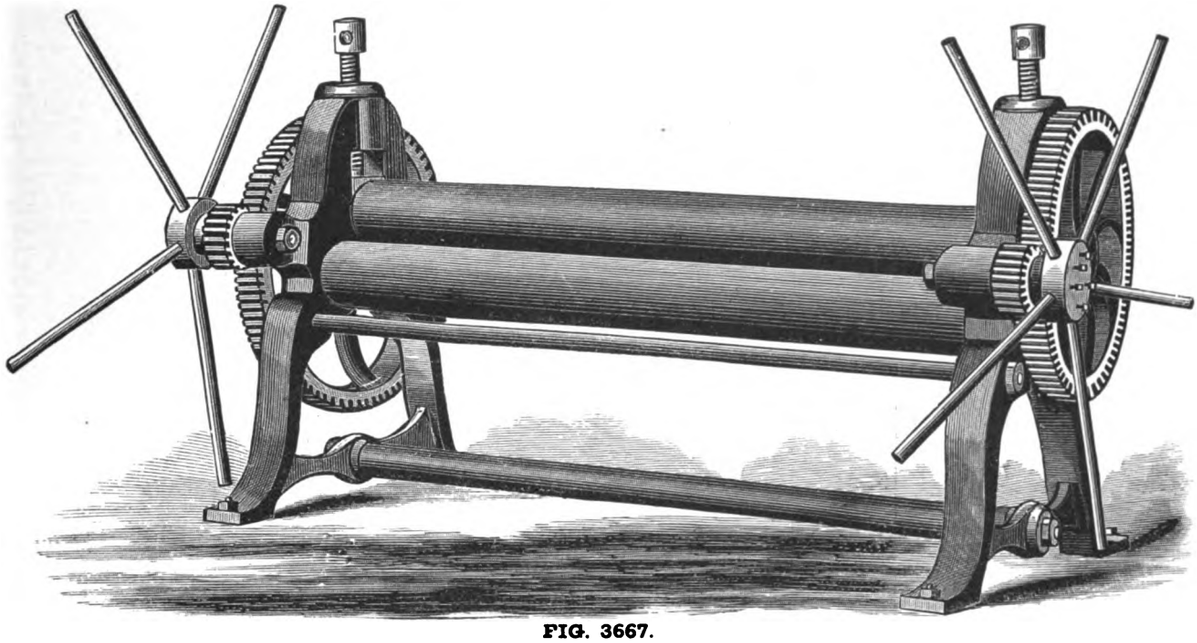


FIG. 3667.

These rolls are used for rolling steel and iron boiler-plate. The upper roll is of wrought iron and is made to slip out endways through the housing, and the two lower rolls are solid cast iron. The machine is worked by hand and is easily operated.

PRICES.

DIAMETER OF ROLLS, 6 IN.			DIAMETER OF ROLLS, 8 IN.		
No. 1.	Rolls 4 ft. long, weight, 3,200 lbs.,	$400.00	No. 6.	Rolls 4 ft. long, weight, lbs.,	$550.00
No. 2.	" 5 " " " 3,600 "	420.00	No. 7.	" 5 " " " "	625.00
No. 3.	" 6 " " " 4,000 "	440.00	No. 8.	" 6 " " " "	700.00
No. 4.	" 7 " " " 4,400 "	460.00	No. 9.	" 7 " " " "	775.00
No. 5.	" 8 " " " 4,800 "	475.00	No. 10.	" 8 " " " "	850.00

EXTRA HEAVY SHEET IRON ROLLS.

NOS. 0000 AND 000 FORMERS.

The No. 000 Former has been constructed especially for forming tubing for hydraulic mining or water works, where the great pressure demands extra heavy iron. It is so made that the roller around which the work is formed is easily removed from its journal, and the formed pipe is taken from the end of the roller. It will form No. 14 iron. Weight, 500 lbs.

No. 0000 is made in the same manner and for the same purposes as the No. 000.

The No. 00 Former is the same, with the exception that it has not the slip-roll; it will form No. 16 iron.

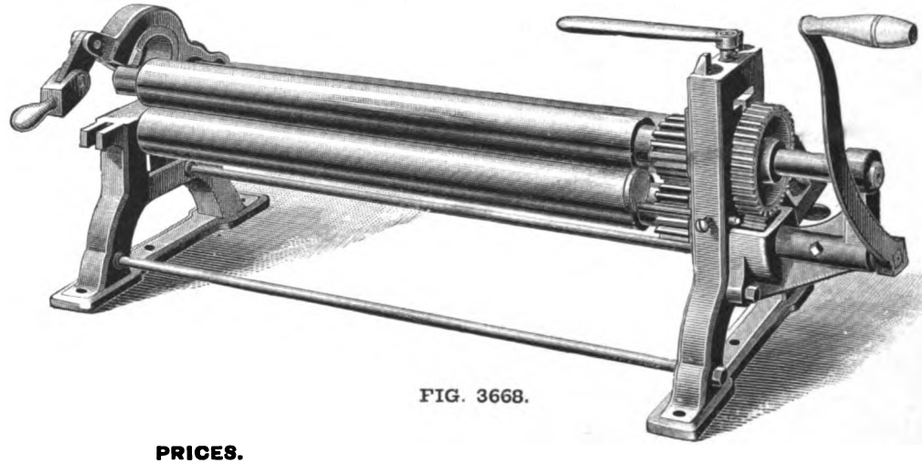


FIG. 3668.

PRICES.

No. 0000.	Extra large, double geared, 4 in. slip rolls, 48 in. long, ...	$175.00
No. 000.	" " " " 3 " " " 37 " "	100.00
No. 00.	Double geared, for heavy plate, 3 in. rolls, 37 " "	85.00

We make to order a very large variety of Formers for special work, from 20 to 72 inches in length.

FORMING MACHINES.

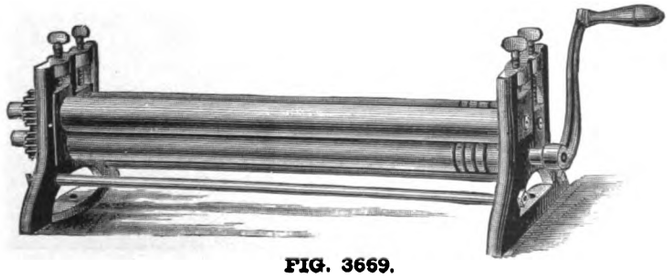


FIG. 3669.

STOVE PIPE FORMER.

These formers are made from the best quality of refined iron; the rolls are turned, finely finished, and are free from indentations and imperfections.

No. 0.	For cans, 2 in. rolls, 37 in. long, ...	$24.00
No. 1.	Stove pipe former, 2 in. rolls, 30 in. long, . .	19.00
No. 2.	Stove pipe former, 1¾ in. rolls, 30 in. long, . .	18.00
No. 1.	Tin pipe former, 1½ in. rolls, 20 in. long, . .	10.00

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PLATE BENDING ROLLS.

DRIVEN BY FRICTION PULLEYS. TOP ROLL RAISED AND LOWERED BY POWER.

These cuts represent the following sizes that are to be driven by belt. It will be seen at once that it is but the work of a moment to balance the top roll and lower the hinged housing to take out the plate when a full circle is bent. The rolls are all made of solid wrought iron; the balance bar being a part or extension of the top roll. There is a cast-iron bed-plate under the entire machine. To save any shifting of belts we put in friction pulleys, which enable the rolls to be started, stopped or reversed instantly.

FIG. 3671.

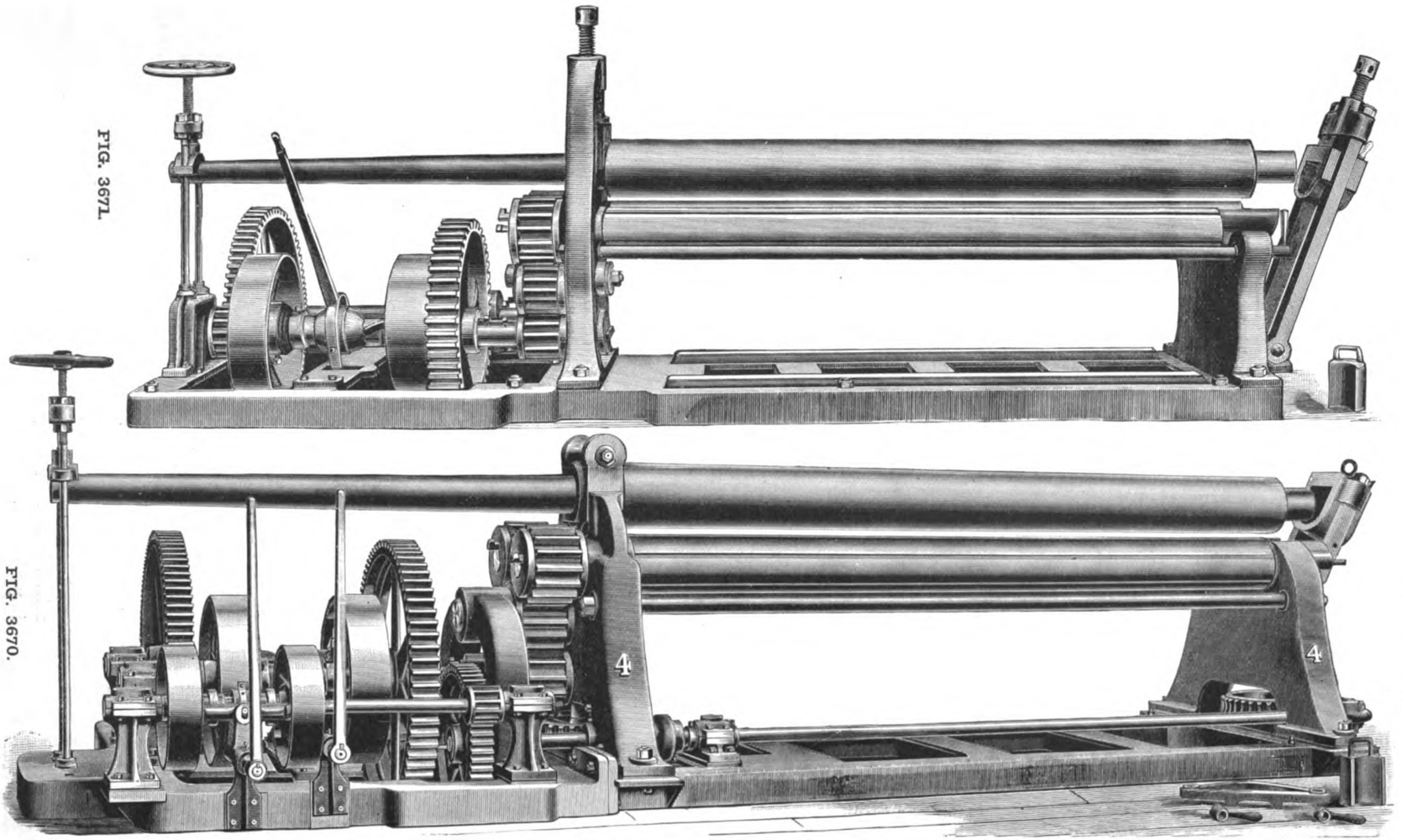


FIG. 3670.

APPROXIMATE THICKNESS AND WIDTHS OF PLATES ROLLS WILL BEND.

Thickness of plate.	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	1 in.
No. 1, 7 ft.	7 ft.	5 ft. 6 in.	4 ft. 6 in.	4 ft.							
" 1, 8 "	8 "	7 "	6 "	5 "							
" 2, 8 " 6 in.		8 " 6 "	7 "	6 "	5 ft. 6 in.	5 ft.	4 ft.				
" 2, 10 " 2 "		10 " 2 "	8 "	7 "	6 " 6 "	6 "	5 "				
" 3, 10 " 6 "					10 " 6 "	9 "	7 " 6 in.	6 ft.	5 ft.		
" 3, 12 " 2 "					12 " 2 "	10 " 6 in.	9 "	7 "	6 "		
" 4, 12 " 2 "					12 " 2 "	10 "	9 "	7 " 6 in.	6 "	5 ft.	
" 4, 14 " 2 "					14 " 2 "	12 "	10 "	8 " 6 "	7 "	5 " 6 in.	
" 5, 14 " 2 "						14 " 2 in.	11 "	9 "	8 "	7 "	6 ft.
" 5, 16 " 2 "						16 " 2 "	12 "	10 "	9 "	8 "	7 "

	Diameter top rolls.	Diameter bottom rolls.	Between housings.	Weight.	PRICES. Top roll by hand.	PRICES. Top roll by power.
No. 1.	7 1/2 in.	6 1/2 in.	7 ft. 2 in.	lbs.	$	
" 1.	8 1/4 "	7 1/4 "	8 " 2 "	"		
" 2.	8 3/4 "	8 "	8 " 6 "	"		
" 2.	9 1/2 "	8 1/4 "	10 " 2 "	"		
" 3.	10 1/2 "	9 "	10 " 6 "	"		$
" 3.	11 1/4 "	9 1/4 "	12 " 2 "	"		
" 4.	12 "	10 1/2 "	12 " 2 "	"		
" 4.	12 3/4 "	11 "	14 " 2 "	"		
" 5.	13 "	11 1/2 "	14 " 2 "	"		
" 5.	13 3/4 "	12 "	16 " 2 "	"		
" 6.	16 "	13 "	18 " 2 "	"		
" 6.	17 "	13 1/2 "	20 " 2 "	"		

DIAMETER AND SPEED OF THE FRICTION PULLEYS.

	Diameter pulleys.	Face.	Revolutions.		Diameter pulleys.	Face.	Revolutions.
No. 1.	20 in.	5 in.	190 per min.	No. 4.	30 in.	7 1/4 in.	200 per min.
" 2.	24 "	5 1/4 "	180 " "	" 5.	28 "	6 1/4 "	300 " "
" 3.	28 "	6 1/4 "	200 " "	" 6.	32 "	8 1/4 "	300 " "

The Nos. 5 and 6 machines are made without the balance bar on top roll; but the housing is hinged, so a full circle can be bent and quickly taken out.

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POWER AND HAND BENDING ROLLS.

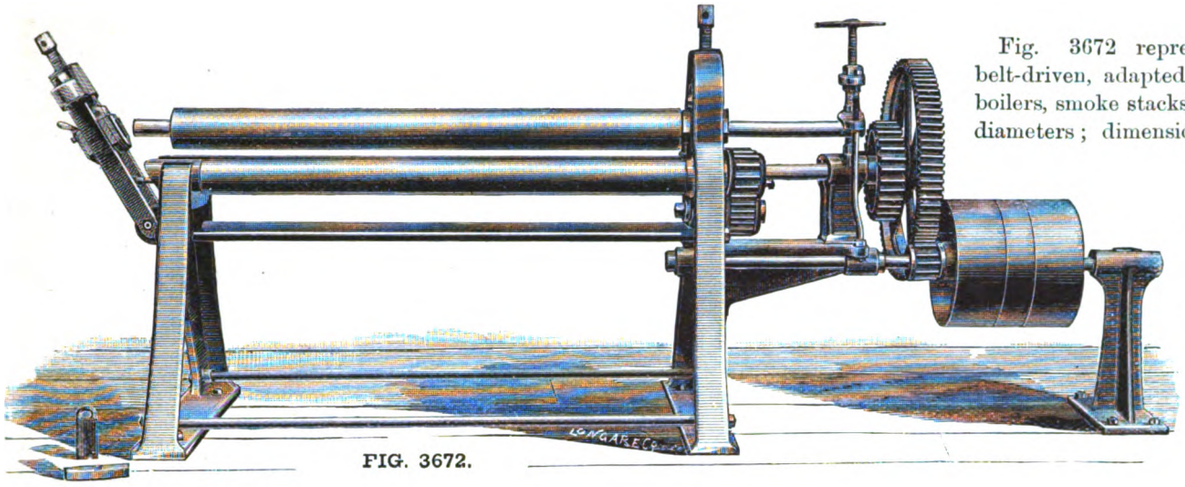


FIG. 3672.

Fig. 3672 represents 3 sizes rolls, belt-driven, adapted for light boilers, bath boilers, smoke stacks or pipe work of small diameters; dimensions same as Fig. 3673.

PRICES.

NO. 000.
WEIGHT, LBS.
$.....

NO. 00.
WEIGHT, LBS.
$.....

NO. 0.
WEIGHT, LBS.
$.....

HAND BENDING ROLLS.

The cut represents the three smallest sizes we make to be worked by hand. It will be seen at once that it is but the work of a moment to balance the top roll and lower the hinge housing to take out the plate when a full circle is bent. The rolls are all made of solid wrought iron, the balance bar being a part or extension of the top roll. The spider and gearing are made so as to give ample power to bend plates with comparative ease.

No. 000. Top roll, 4¾ inches diameter. Bottom rolls, 4 inches diameter, 4 feet between housings.

WEIGHT, 1,860 LBS.

PRICE, $.....

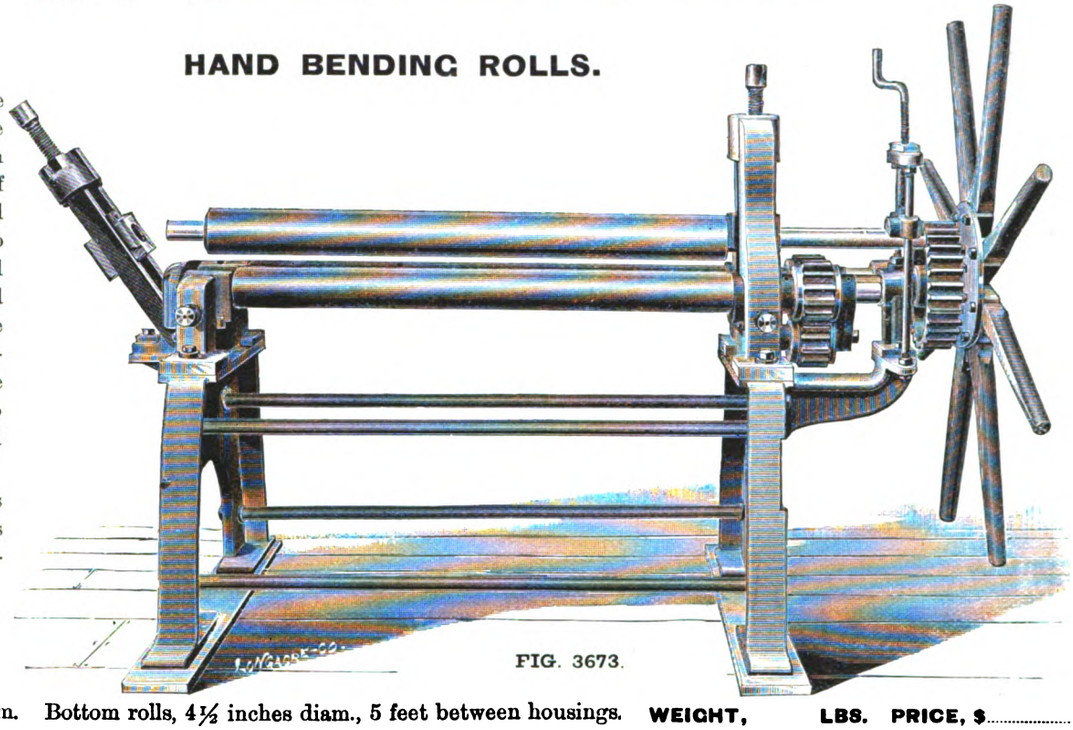


FIG. 3673.

No. 00. Top roll, 5½ inches diam. Bottom rolls, 4½ inches diam., 5 feet between housings. **WEIGHT, LBS. PRICE, $.....**

No. 0. Top roll, 6 inches diam. Bottom rolls, 5¼ inches diam., 6 feet between housings. **WEIGHT, LBS, PRICE, $.....**

HAND BENDING ROLLS.

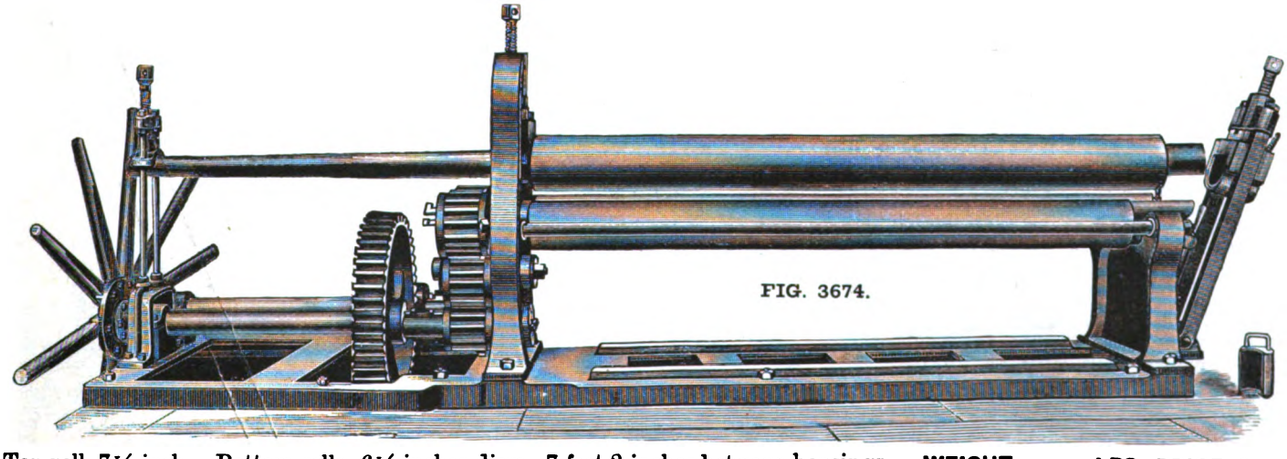


FIG. 3674.

No. 1. Top roll, 7½ inch. Bottom rolls, 6½ inches diam., 7 feet 2 inches between housings. **WEIGHT, LBS. PRICE, $.....**

No. 2. Top roll, 8¾ inch. Bottom rolls, 8 inches diameter, 8 feet 6 inches between housings. **WEIGHT, LBS. PRICE, $.....**

CAPACITY GIVEN IN TABLE ON PAGE 246.

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SHIP PLATE ROLLS.

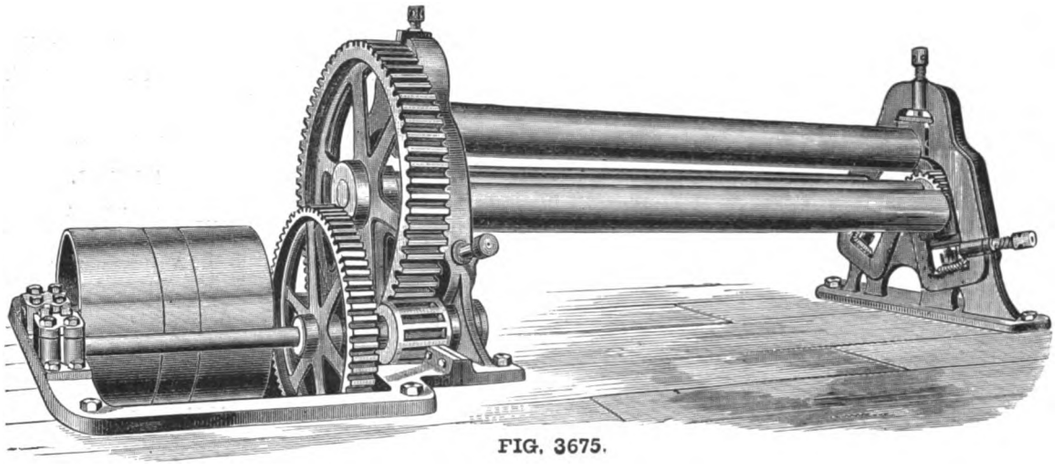


FIG. 3675.

Either engine or belt driven, and to order of any diameters and lengths.

There are three bottom rolls, and one on top. The top roll and the center bottom one are geared together, the two side rolls being used to do the bending or straightening. The machine is very powerfully geared, and all the rolls made of best hammered wrought iron. Rolls geared in this manner are very effective in bending or taking out twist and buckles, and in straightening plates

No. 1. Diameter of top and bottom rolls, 13 inches. Between housings, 12 feet. Diameter of two side rolls, 11 inches.

WEIGHT, LBS.

PRICE, $.....

No. 2. Diameter of top and bottom rolls, 16 inches. Between housings, 16 feet. Diameter of two side rolls, 12½ inches.

WEIGHT, LBS.

PRICE, $.....

No. 3. Diameter of top and bottom rolls, 17 inches. Between housings, 18 feet. Diameter of side rolls, 14 inches.

WEIGHT, 85,400 LBS. **PRICE, $**.....

BOILER SHELL DRILL.

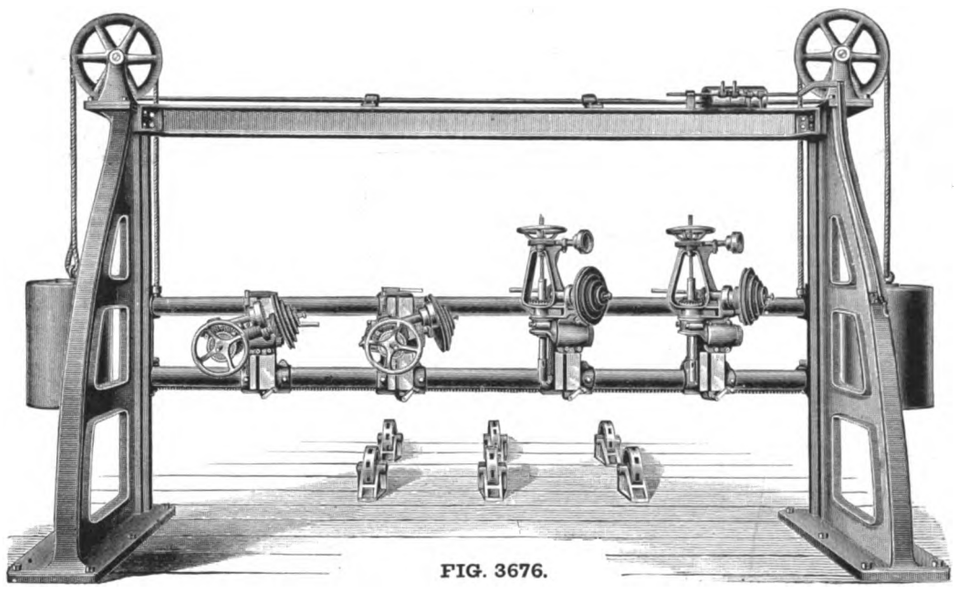


FIG. 3676.

This machine is designed for drilling rivet holes in boiler shells after the plates are bent and bolted together, also for stay bolt holes, cutting flue holes, etc., and is useful as a general machine shop tool.

The drilling heads are mounted on a crosshead which is supported at both ends by uprights, and is counterweighted and furnished with a power-lifting arrangement.

The drilling heads are easily moved horizontally, and have a vertical adjustment between the beams operated by a screw, thus giving a quick and delicate means of setting the drill after the shell has been turned to near the required position.

The head can be turned on a cylindrical bearing, by means of a worm and tangent wheel, to any angle from a horizontal to a vertical position.

Dimensions of machine :—The horizontal range is 12 feet from center to center of spindles when heads are farthest apart; vertical range of crosshead, 7 feet; vertical adjustment of drilling head between beams of crosshead, 12 inches; the spindle has 13 inches traverse, and automatic feed; total height of machine, 11 feet; length over all, 18 feet.

The tight and loose pulleys are 10 inches diameter by 3 inches face, and should run at 200 revolutions, the power-lift should run at 350 revolutions; loose pulleys, 8 inches diameter, $5\frac{1}{4}$ inches face; tight pulley, 8 inches diameter, $2\frac{5}{8}$ inches face; belt, $2\frac{1}{2}$ inches. The drill can be built with from one to four heads as required.

WEIGHT, WITH TWO HEADS, 12,600 LBS. **WEIGHT, ADDITIONAL HEADS, EACH, 950 LBS.**

PLATE RADIAL COUNTERSINKING DRILL.

Extreme length of machine, 15 feet 6 inches. Maximum distance from post to spindle, 14 feet. Minimum distance from post to spindle, 3 feet. Maximum distance from under side of radial arm to end of spindle, 40 inches. Minimum distance from under side of radial arm to end of spindle, 33 inches. Vertical traverse of spindle, 7 inches. Diameter of spindle, $2\frac{3}{8}$ inches. Traverse of head on radial arm, 11 feet. Length of wall plate, 6 feet 10 inches. Width of wall plate, 14 inches. Tight and loose pulleys on driving shaft, 16 inches in diameter by $4\frac{3}{4}$ inch face. Speed of countershaft, 120 revolutions per minute.

WEIGHT, 2,550 LBS.

PRICE, $.....

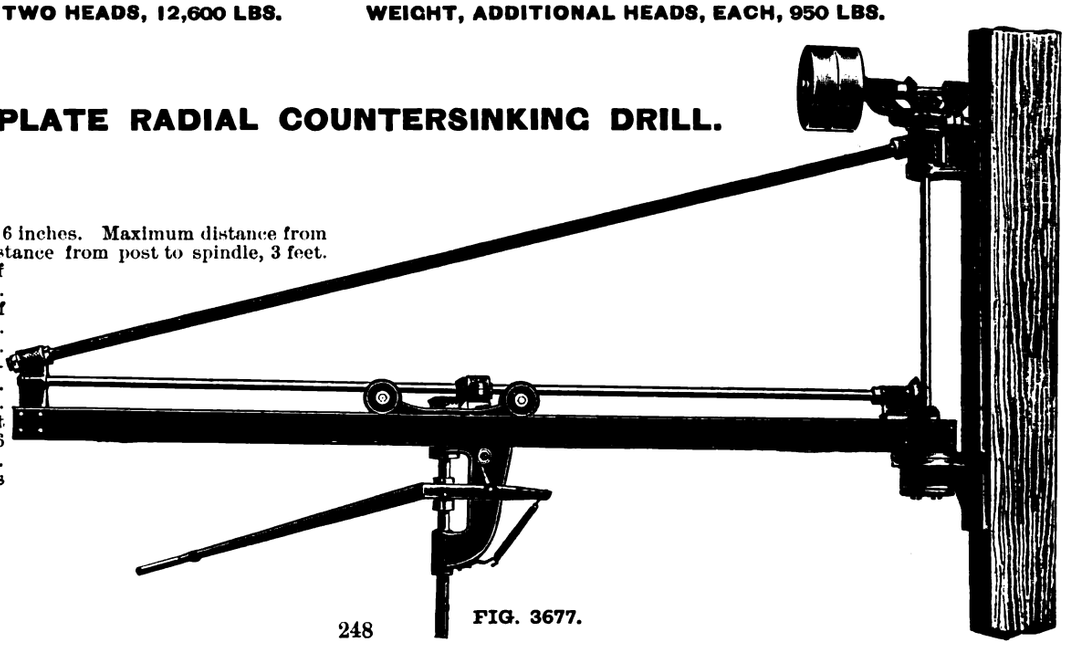


FIG. 3677.

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BOILER HEAD FLANGING MACHINE.

METHOD OF OPERATION.

The plate to be flanged is clamped between two discs, and rotated with its edge projecting over a short vertical roller. A swivelling roller turns the flange down as the plate passes quite rapidly under it. This upper, or swivelling roller, is carried in a housing supported by two parallel levers which are actuated by worm gearing and hand wheel, as shown. The motion obtained by the combined action of the parallel levers is a perfect one for the purpose. The upper roll swivels from a horizontal to a vertical position, directly round the center of the fillet in the head being flanged, giving a smooth easy motion for the flow of the metal into its new form. The saddles carrying the two rollers are adjustable along the bed, thus making heads of varying diameters *without formers*. This mechanism enables heads to be flanged with but little expenditure of power. No hole is necessary in the plate. Perfect heads of exactly uniform diameters are made as rapidly as the furnace can heat them.

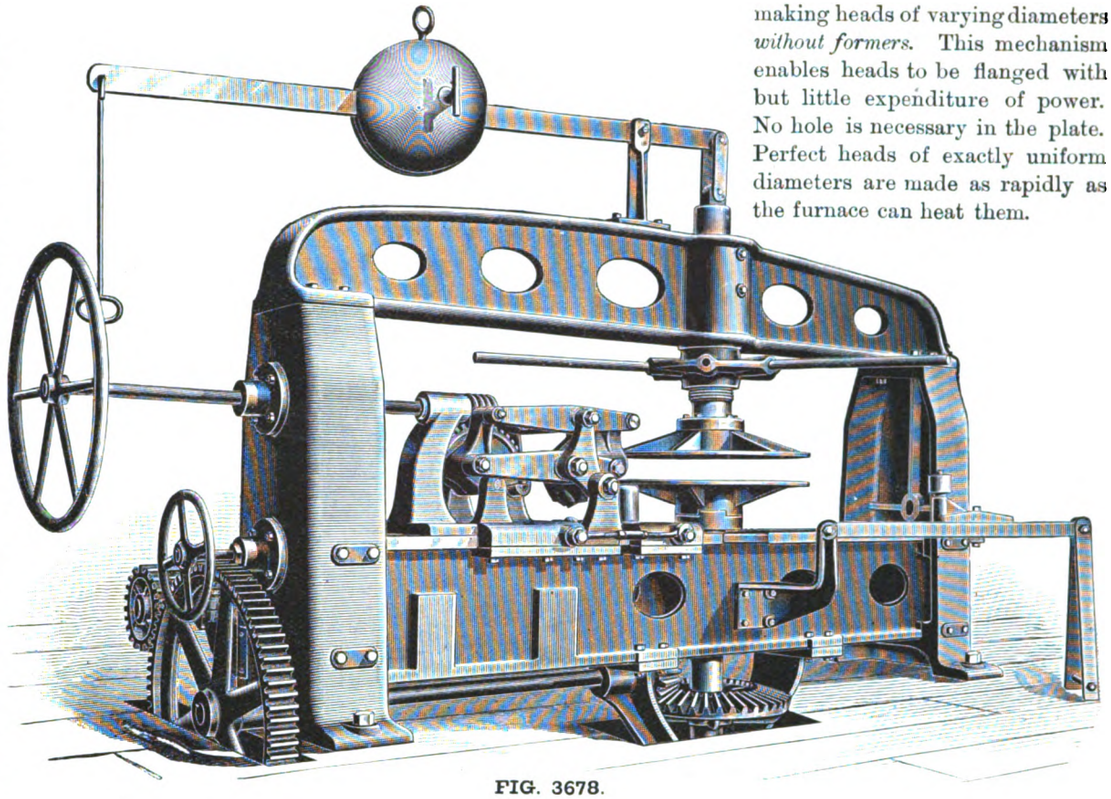
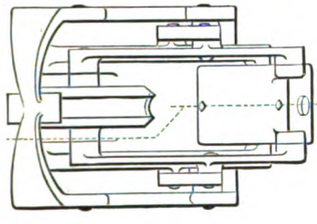
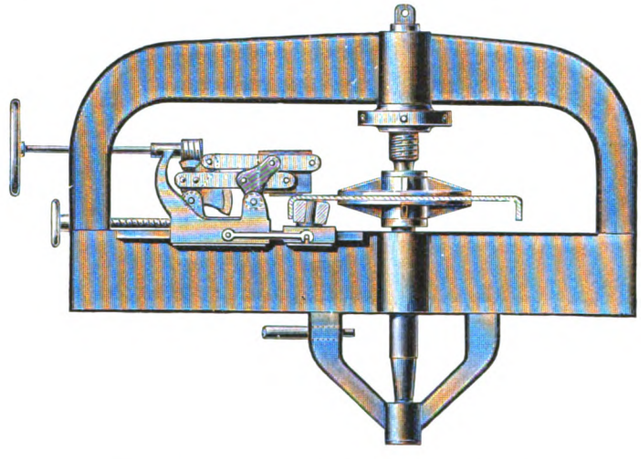


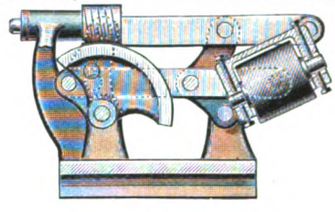
FIG. 3678.

WEIGHT, 14,000 LBS.





PRICE, $.....



BOILER FLANGING CLAMPS.

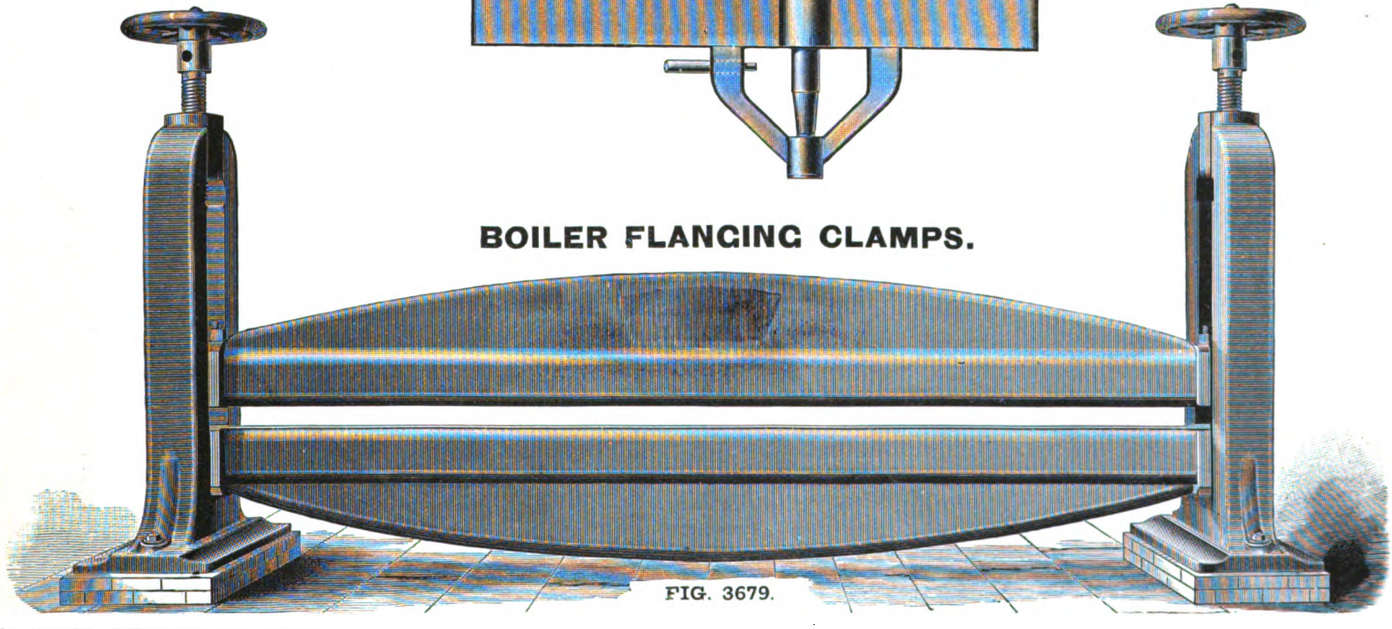


FIG. 3679.

Size.	Between housings.	Weight.	PRICE.	Size.	Between housings.	Weight.	PRICE.
No. 00	4 feet.		$.....	No. 3	8 feet.		$.....
" 0	5 "		.....	" 4	9 "		.....
" 1	6 "		.....	" 5	10 "		.....
" 2	7 "		.....	" 6	12 "		.....

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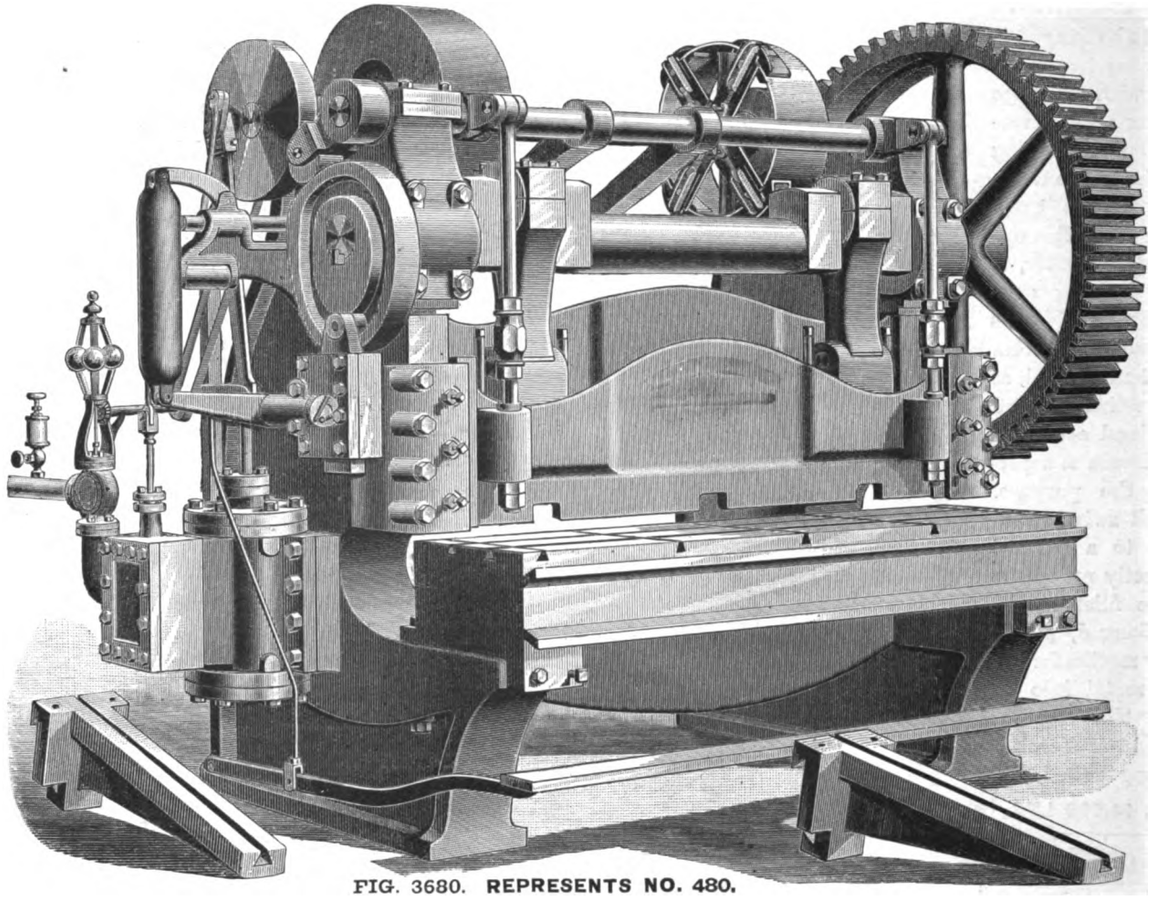


FIG. 3680. REPRESENTS NO. 480.

PLATE SHEAR FOR ROLLING MILLS, NO. 480, TO CUT FROM 1-2 INCH UP TO 1 INCH.

This shear has a new device for starting and stopping, which renders it much more convenient. Instead of the ordinary clutch in the crank shaft connecting it with the gear wheel, the gear is keyed to the crank shaft, and a friction clutch is placed on the fast speed or pinion shaft. The shifting bar operating this clutch is connected with a lever and counterweight, shown in the cut at the left-hand side. On the main crank shaft is a cam operating a slide, working in vertical guides upon the housing. The mechanism is so arranged that when the cranks are in the upper position, so that the knives are open to receive the work, a latch in the slide acts to raise the counterweight and hold the friction clutch out of gear, thus allowing the cutter bar to stand at rest. Depressing the treadle throws the latch out of gear, allowing the weight to drop, which action throws the clutch into operation and starts the machine. When the crank shaft has made one revolution, the cam above referred to depresses the slide, thus lifting the counterweight and stopping the machine. These motions are easy, and accordingly there is no shock or jar in starting. The train of gearing is at rest when the cutter bar is not moving, hence the shaft is held securely with the cranks at their top center, with no tendency to drop back or ahead, even though no counterweight is used to balance the cutter bar.

The cutting blades are eight feet four inches long. The gap in the housings will permit a 36-inch plate to be split through its center. The clamping bar immediately in front of the blades descends automatically when the machine is started, holds the work securely in place while the shearing is in progress, and in turn releases automatically when the work is done.

The machine, No. 480, is driven by a plain slide valve engine 12 x 15 inches, which is attached directly to the housing. The gearing is about 20 to 1. The crank shaft is of hammered steel, with cranks forged solid and slotted out. The lower blade is supported on a long wedge by setting up on which the cutting edge of the blade is kept level with the table. The upper blade is adjusted downwardly by lowering the cutter bar.

No. of shear.	Length of cut.	Depth of throat.	Weight.	Cuts iron.	PRICES.
480	8 ft.	18 in.	45,000 lbs.	3/4 in.	$4,450.00
481	8 "	18 "	60,000 "	1 "	5,560.00
482	10 "	24 "	90,000 "	1 "	8,890.00
479	6 "	18 "	30,000 "	5/8 "	3,350.00

TRIMMING AND SQUARING SHEARS FOR STILL LIGHTER STOCK

ARE DESCRIBED ON THE FOLLOWING TABLE.

No. of shear.	Length of cut.	Width between housings.	Depth of throat.	Weight.	Cuts iron.	Price.	Extra blades, per pair.
440	3 feet.	28 ins.	6 in.	lbs.	1/4 in.		
450	3 "	28 "	12 "	"	1/4 "		
441	4 "	40 "	6 "	"	1/4 "		
451	4 "	40 "	12 "	"	1/4 "		
442	5 "	48 "	6 "	"	1/4 "		
452	5 "	48 "	12 "	"	1/4 "		
443	6 "	60 "	6 "	"	1/4 "		
463	6 "	60 "	18 "	"	1/4 "		
444	7 "	72 "	6 "	"	1/4 "		
464	7 "	72 "	18 "	"	1/4 "		
465	8 "	84 "	18 "	"	1/4 "		
466	9 "	96 "	18 "	"	1/4 "		
467	10 "	108 "	18 "	"	1/4 "		
470	10 "	103 "	18 "	"	3/8 "		

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ROTARY SLITTING SHEARS.

These machines are designed for slitting sheet metals into strips. The steel shafts are so arranged that suitable adjustment can be made to take up the wear in diameter and thickness of cutters. The table is also adjustable as to height to suit the varying thickness of metals and the reduced diameter of cutters. They are sometimes fitted up with ways and carriage, to which the sheets are clamped, to insure a straight cut. Circle attachments may also be fitted when so ordered.

Size of machine.	No. 231.	No. 232.
PRICE, not geared	$125.00	$150.00
" geared, as shown by Fig. 3681	150.00	175.00
" of circle attachment	45.00	75.00
" " table and ways	75.00	100.00
Will cut in width up to	10 in.	13 in.
" " " thickness up to B. W. G.	No. 16	No. 14
Depth of throat	12 in.	16 in.
Geared	4 to 1	4 to 1
Diameter of cutters	4 in.	4½ in.
Size of pulleys	16x3 in.	16x3¼ in.
Weight, about	750 lbs.	900 lbs.

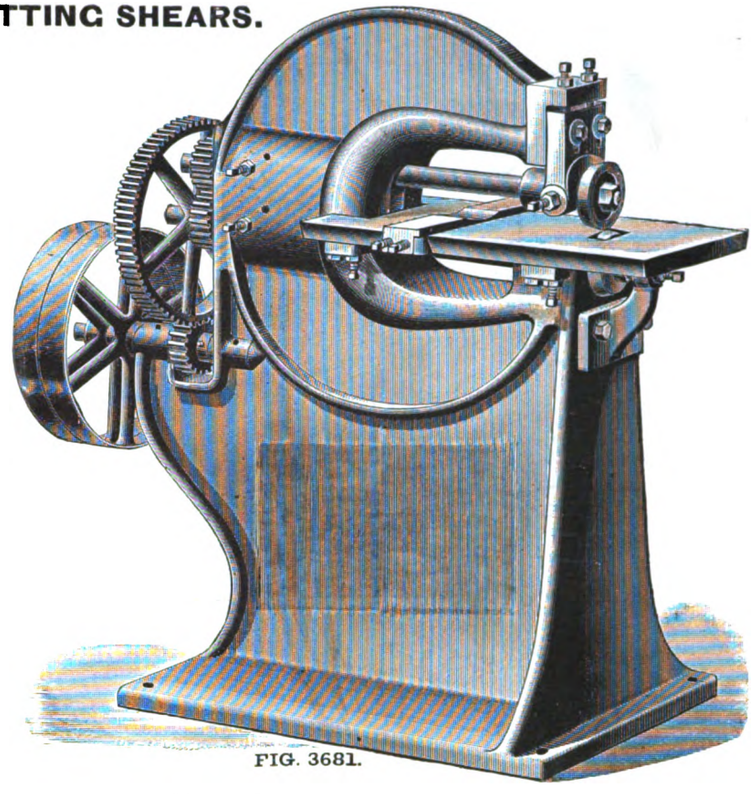


FIG. 3681.

CIRCULAR SHEAR NO. 3.

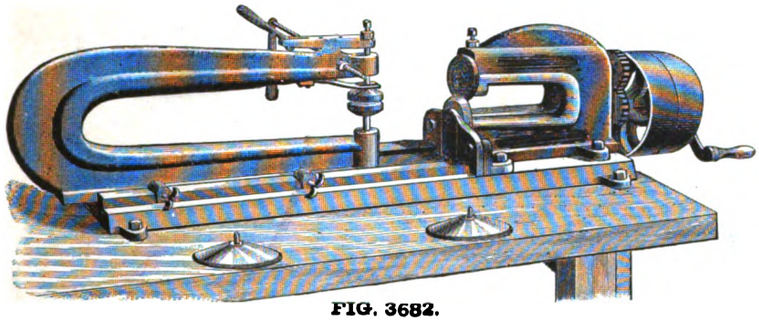


FIG. 3682.

Nos. 1 and 2 machines are regularly fitted to run by hand, but can be made for power at an additional cost. No. 3 machine is made for both hand and power. Nos. 1 and 2 will cut No. 25 gauge brass. No. 3 will cut No. 22 gauge brass.

	No. 1.	No. 2.	No. 3.
PRICE, for cutting circles only	$33.00	$38.00	$75.00
Depth of throat, cutting head	10 in.	10 in.	10 in.
" " sliding head	10 "	15 "	28 "
Smallest circle machine will cut	2½ "	3½ "	4 "
Largest circle machine will cut	14 "	20 "	40 "

ROTARY SHEAR NO. 112.

These machines are designed for slitting sheets of iron and steel of any length, and up to the widths specified in the table. They have large steel shafts; table adjustable as to height; shafts and cutters adjustable to suit different thicknesses of metal and to take up for wear. Circle cutting attachments may be fitted to either size machine, or table and track for clamping sheets to insure a straight cut.

Fig. 3683 shows style of Nos. 106½ and 112. Nos. 105 and 107 machines are of different design, without adjustable table.

Size of machine.	No. 105.	No. 106½.	No. 107.	No. 112.
PRICE, not geared	$75.00	$175.00	$.....	$.....
" geared	100.00	200.00	200.00	650.00
" of circle attach't	35.00	60.00	75.00	
" " table and ways	75.00	75.00	100.00	150.00
Will cut in th'ness B.W.G.	No. 16	No. 12	No. 12	No. 6
" " width	10 in.	16 in.	14 in.	20 in.
Depth of throat on slitter	12 "	18 "	16 "	23 "
" " on circle att.	13 "	20 "	24 "	30 "
Diameter of cutters	4 "	4½ "	6 "	8 "
Ratio of gearing	4 to 1	4 to 1	4 to 1	6 to 1
Size of pulleys	16x3 in.	20x3½ in.	20x3½ in.	20x5 in.
Weight	400 lbs.	800 lbs.	1,100 lbs.	3,500 lbs.

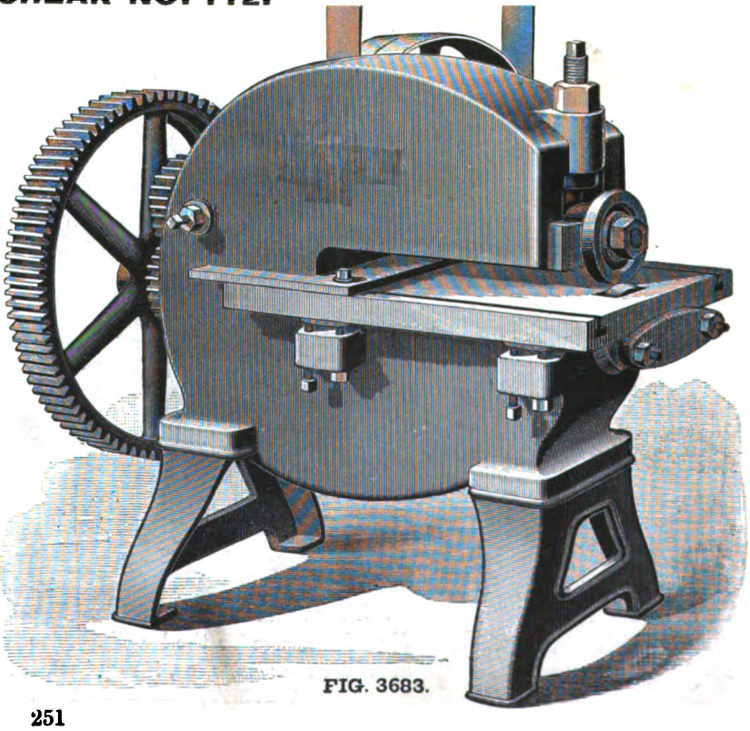


FIG. 3683.

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CIRCULAR SHEAR.

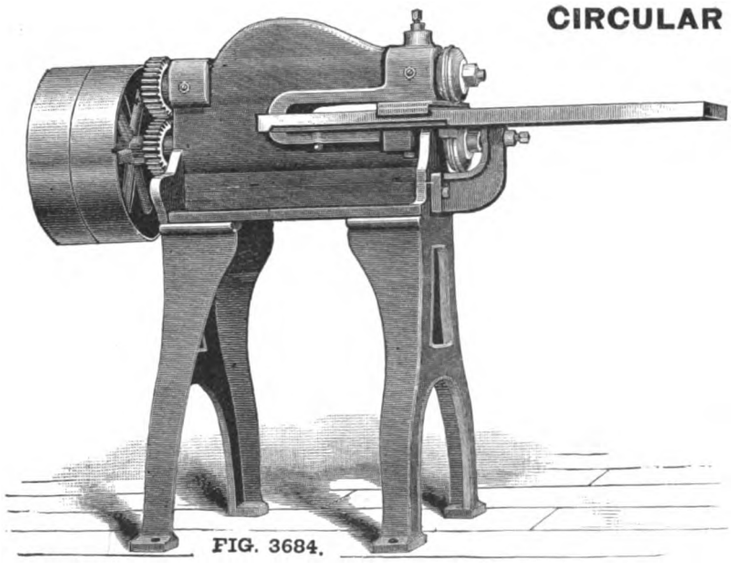


FIG. 3684.

These shears are geared up strong—some are double geared. The gauge is adjustable from right to left on the table. The smaller sizes differ a little in design. All, except 6 inch, stand on legs, and are fitted for power or hand; the latter is made to fasten on the bench or column, and is worked by hand or power. They are made to cut tin, brass, iron, steel, etc.

These sizes can be made with long or short beds, and sizes changed to suit the work.

Winding apparatus extra.

PRICES.

Takes in from cutter to frame.	Gauge of brass will cut.	Weight, about	Price.
6 in. (on column)	No. 20.	75 lbs.	$40.00
10 " (on legs)	" 16.	500 "	95.00
14 " "	" 14.	700 "	160.00
22 " "	" 11.	1,000 "	175.00
30 " "	$\frac{3}{16}$ in.	2,200 "	300.00
30 " "	$\frac{5}{8}$ in. fibre.	2,400 "	350.00

FISH-PLATE PUNCH.

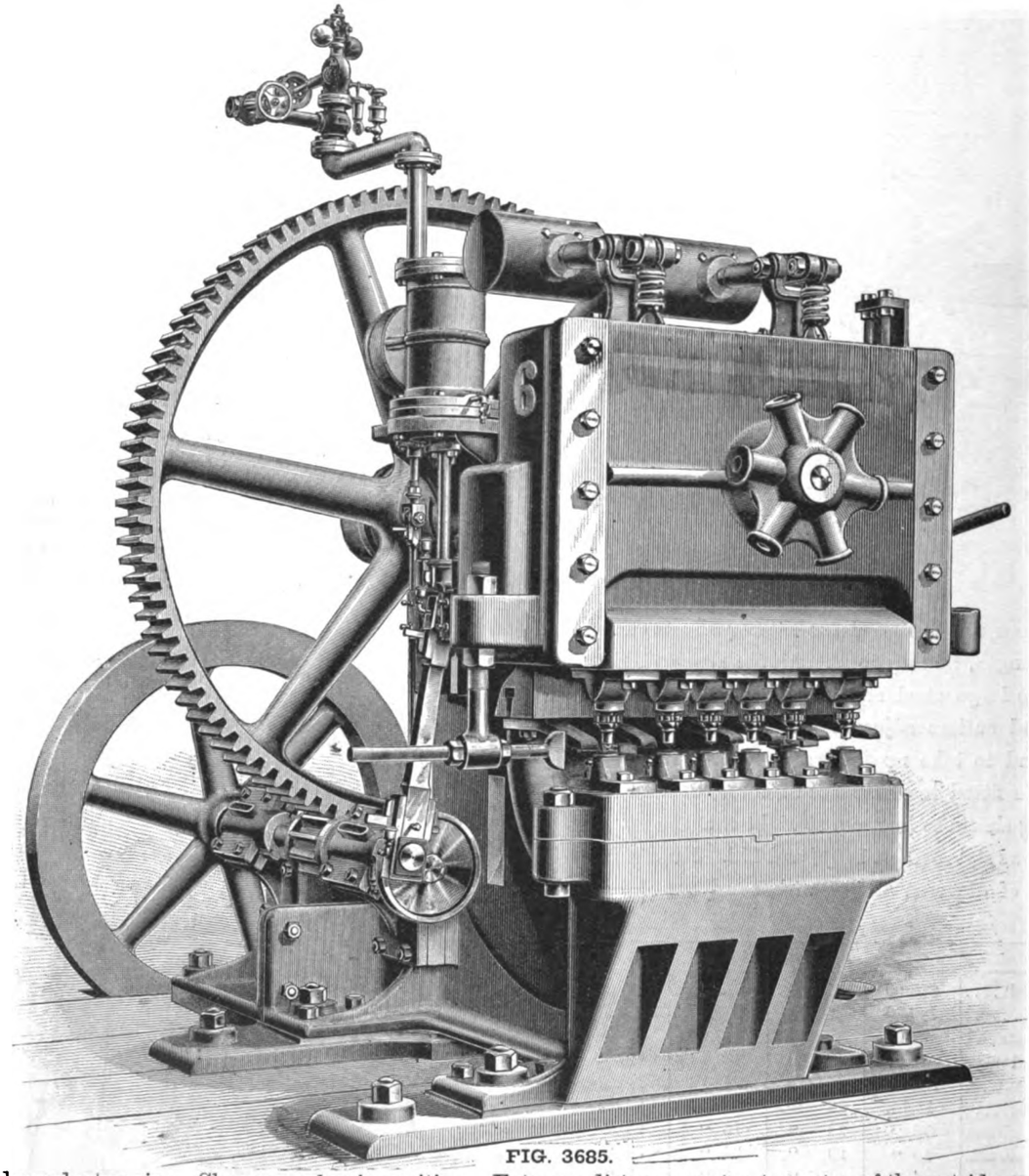


FIG. 3685.

Driven by independent engine. Shows punches in position. Extreme distance, center to center of the outside punches, 36 inches; minimum distance, 3 inches. Adjustable gauge for the length. Also two gauges on the back to keep the holes exactly in a line with the fish-plate. The machine can be made for four holes, or, if required, it is sufficiently powerful to punch eight holes.

WEIGHT, ... **LBS. PRICE, $**.....

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PLATE STRAIGHTENING MACHINES.

ENGINE DRIVEN.

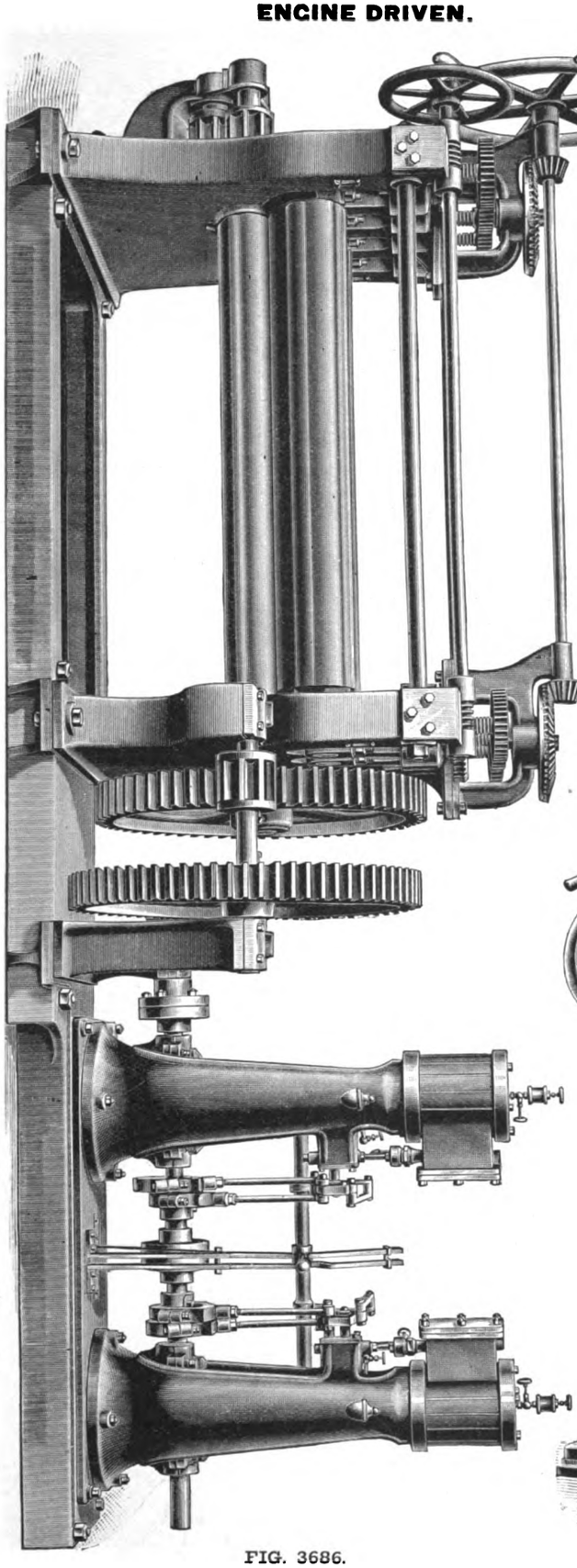


FIG. 3686.

These machines are built either with seven or with six rolls. In the seven roll machine, the four upper rolls are all raised and lowered simultaneously by the large hand wheel. In addition to this the two outside rolls have an independent vertical adjustment. When the tool is built with six rolls, arranged as shown in cut, Fig. 3687, one of the outside top rolls has the same independent vertical adjustment as with the seven roll machine, while the other outside top roll has independent adjustment both horizontally and vertically.

This latter roll, therefore, can be made to bring a compression strain on the plates, and is found very useful in stretching one edge to take out buckles, or to straighten the edge. The machines are usually built according to the table of sizes, but the diameter of the rolls and length between housings can be varied for special work. On the heavier sizes we recommend vertical duplex reversing engines for driving, but the smaller sizes can be conveniently driven by friction clutch pulleys.

BELT DRIVEN.

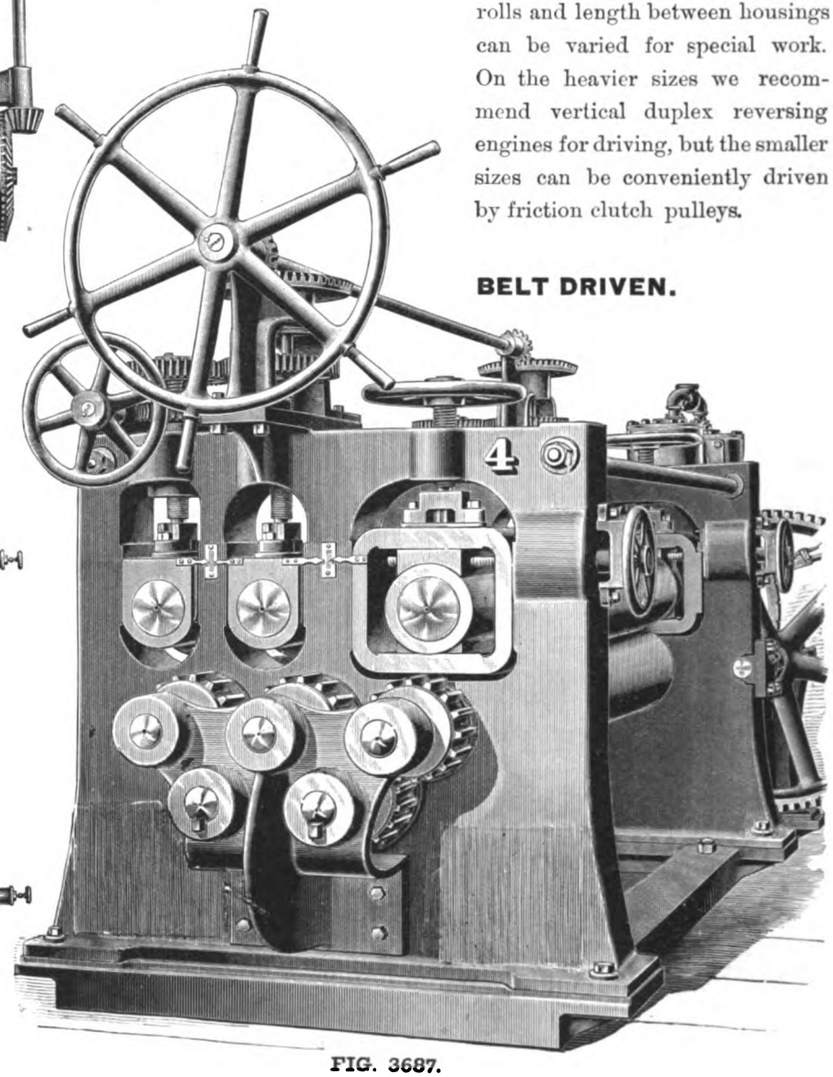


FIG. 3687.

In either arrangement with engines or pulleys, the bed plate is extended under the entire machine, and keeps it firm upon the foundation. The rolls are of best forged wrought iron or steel, and the driving pinions next back housing are of cast steel; the outboard ends of rolls and studs to which they are attached being strongly supported to prevent spring and breakage. We are prepared to build machines similar in design, but specially adapted for straightening sheet iron of various widths and thicknesses.

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BAR IRON SHEARS.

FLAT BAR IRON SHEAR.

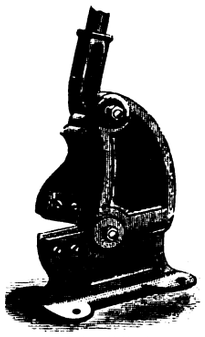


FIG. 3688.

PRICES, FIG. 3688.

No. 0 will cut	¾ x $\frac{1}{16}$	bar, weight	4	lbs.	$6.00
No. 1 "	1¾ x ⅛	" "	30	"	10.00
No. 2 "	1¾ x ¼	" "	68	"	17.00
No. 3 "	2 in. x $\frac{5}{16}$	" "	88	"	22.00
No. 4 "	2 in. x ⅜	" "	155	"	35.00

LEVER WORKS AT THE REAR.

ROUND IRON SHEAR.

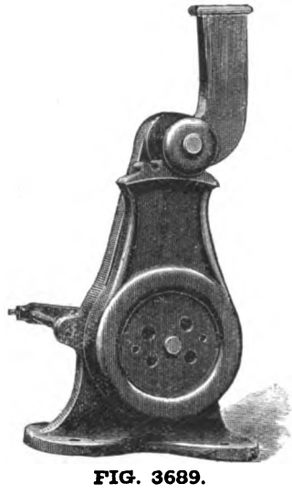


FIG. 3689.

PRICES, FIG. 3689.

No. 0 will cut	¼ inch and smaller,		$6.00
No. 1 "	$\frac{5}{16}$, ¼ and $\frac{3}{16}$		10.00
No. 2 "	⅜, $\frac{5}{16}$ and ¼		14.00
No. 3 "	½, ⅜ and $\frac{5}{16}$		18.00
No. 4 "	⅝, ½ and ⅜		23.00
No. 5 "	¾, ⅝ and ½		35.00
No. 6 "	⅞, ¾, ⅝ and ½		48.00
No. 7 "	1, ⅞, ¾, ⅝ and ½,		60.00
No. 8 "	1⅛, 1, ⅞, ¾, ⅝ & ½,		80.00

We do not guarantee shears to cut steel, except upon special application, stating size and quality of steel.

BAR SHEAR.

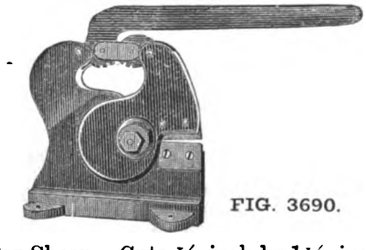


FIG. 3690.

No. 1 Bar Shear.—Cuts ⅛ inch by 1½ inch bar iron, and ¼ inch round rod. **WEIGHT, 15 LBS. PRICE, $9.00.**

No. 2 Bar Shear.—Cuts ¼ inch by 2 inch bar iron, and ⅜ inch round rod. **WEIGHT, 30 LBS. PRICE, $18.00.**

BAR SHEAR.

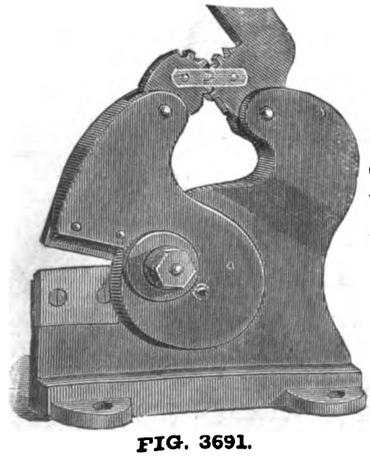


FIG. 3691.

No. 3 Bar Shear.—Cuts ⅜ inch by 4 inch bar iron, and ⅝ inch round rod.

WEIGHT, 175 LBS.

PRICE, $52.00.

ALLIGATOR SHEAR.

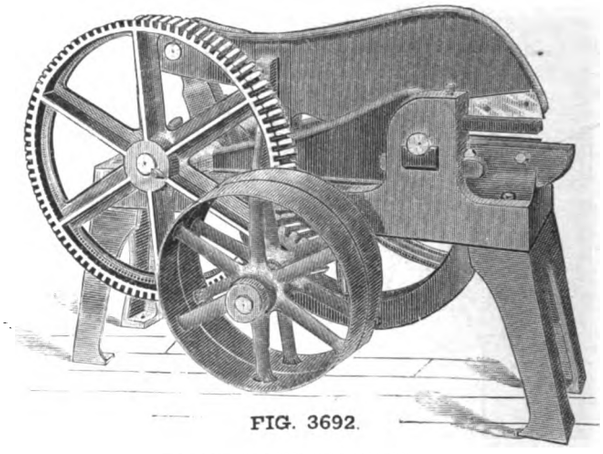


FIG. 3692.

RIGHT-HAND MACHINE.

It will cut 6 x ½ in., 3 x ¾ in. flat bar iron, or 1¼ in. round, cold.

Pulleys, 18 x 6 inches.

Space necessary, about 3 x 5 feet.

We have patterns to build either right or left hand machines. Will fill orders as per cut, unless otherwise ordered.

WEIGHT OF MACHINE, ABOUT 2,500 LBS.

PRICE, $300.00.

ROUND BAR SHEAR.

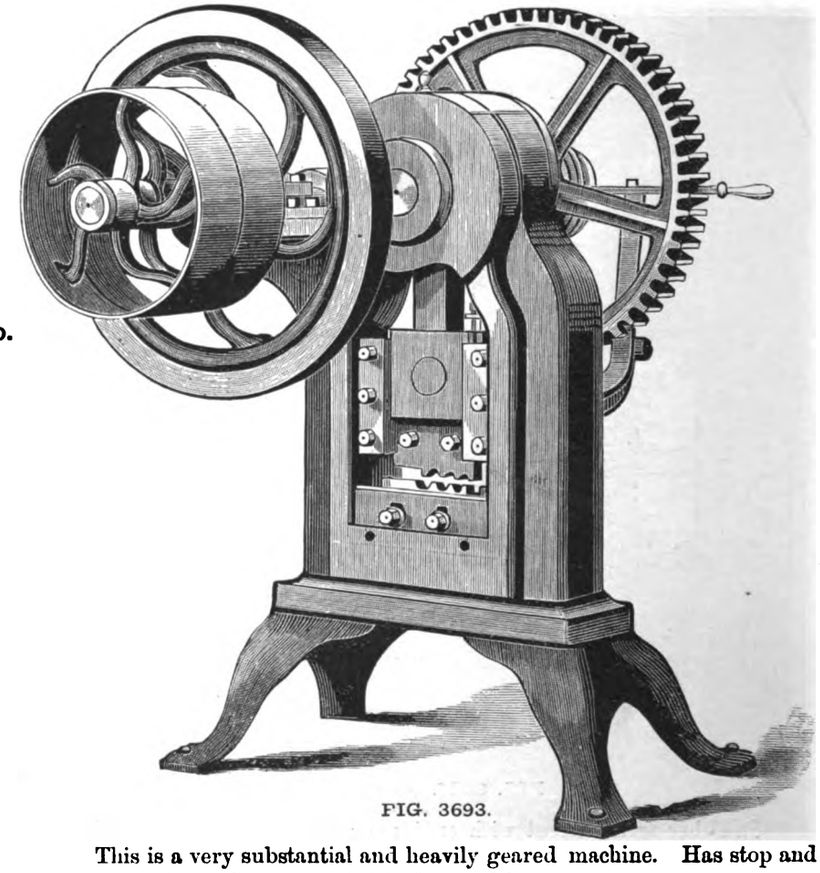


FIG. 3693.

This is a very substantial and heavily geared machine. Has stop and start motion. Cuts up to 1¼ inch round iron.

WEIGHT, 3,600 LBS. PRICE, $550.00.

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BAR IRON SHEARS.

ANGLE IRON SHEAR.

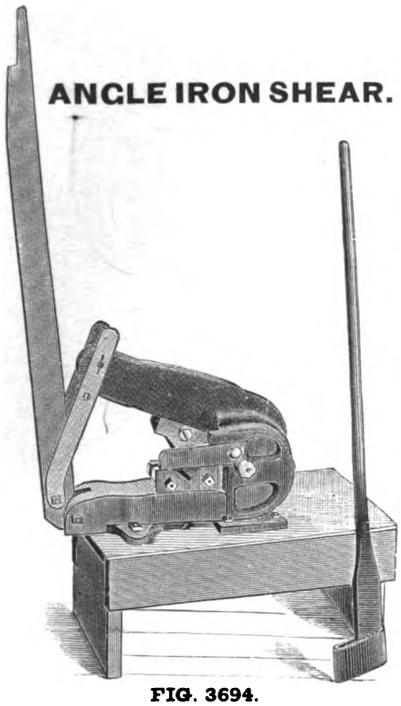


FIG. 3694.

DESCRIPTION, FIG. 3694.

This shear will cut off 3 x 3 inches and smaller sizes of angle iron at one motion of lever.

The bodies of castings are made extra heavy, and the knives are much heavier than in Fig. 3695, and are supported at ends to prevent breaking.

PRICE, $60.00.

DESCRIPTION, FIG. 3695.

These are the most powerful hand lever shears yet placed upon the market, while in price they are very low.

PRICES.

No. 2 weighs 165 lbs. and cuts ½ x 2, ⅜ x 3, or ¾ inch round..... 35.00
No. 3 weighs 375 lbs. and cuts ¾ x 2, ⅝ x 3, ½ x 4, or 1 inch round..... 50.00

Cutters for flat and for round iron go with each machine.

BAR IRON SHEAR.

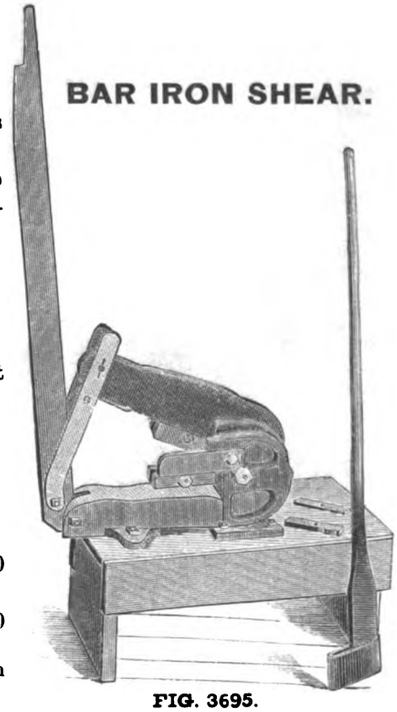


FIG. 3695.

WROUGHT IRON SHEAR.

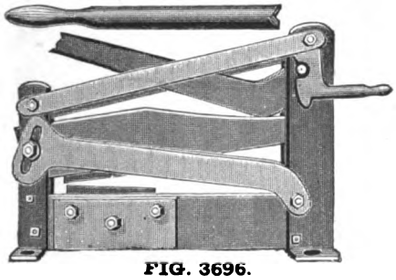


FIG. 3696.

PRICES.

Cuts 4 x ¾ in. flat, 1¼ in. square.. $30.00
" 4 x ⅝ " " 1⅛ " " .. 27.50
" 4 x ¾ " " 1¼ " " and plow steel, 6 to 10 inch wide.. 35.00

COMBINED HAND PUNCH AND SHEAR.

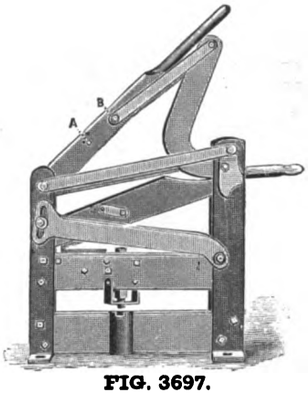


FIG. 3697.

PRICE, FIG. 3697.

This machine will cut 4 x ¾ inch flat iron and 1¼ inch round or square, and punch ½ inch holes through ½ inch iron..... $45.00

PRICE, FIG. 3698.

This machine will cut 4 x ⅝ inch flat iron, and 1⅛ inch round or square, and punch ⅜ inch hole through ⅜ inch iron..... $42.50

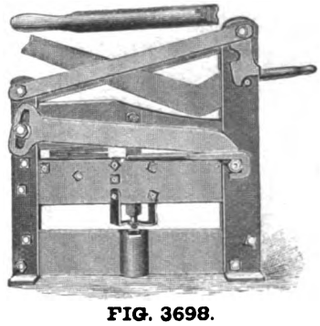


FIG. 3698.

COMBINED HAND LEVER PUNCH AND SHEAR.

PRICES, FIG. 3699.

No. 2 will cut ½, ⅜ and ¼ inch round iron, and 2 x ¼ inch bar iron; will punch ¼ inch holes in ¼ inch iron; 3¾ inches from edge to center of hole. Weight, 200 lbs. $50.00
Extra punches and dies, per pair..... 2.50
No. 3 will cut ¾, ⅝ and ½ inch round iron, and 3½ x ⅜ inch bar iron; will punch ⅜ inch hole in ⅜ inch iron; 4 inches from edge to center of hole. Weight, 450 lbs. 100.00
Extra round punches and dies, per pair..... 4.00
" square " " " " " " 6.00
Punch and die for tenoning in ¼ inch iron..... 10.00
One punch and die only with each machine.

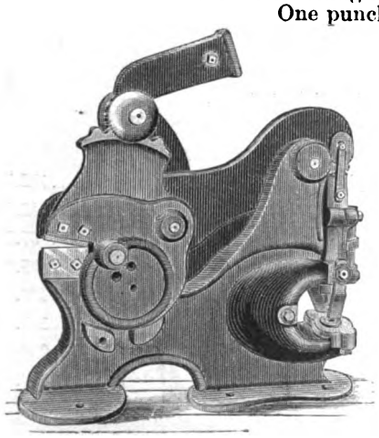


FIG. 3699.

DESCRIPTION, FIG. 3700.

This machine is geared for the application of power by belt. It requires less space and costs less than the two machines separate. It has the tie bolt and the stop and start clutch motion.

PRICES.

No. 43 cuts and punches ¼ inch plate iron..... $195.00
" 44 " " " $\frac{5}{16}$ " " " 280.00
" 45 " " " ⅜ " " " 400.00
" 46 " " " $\frac{7}{16}$ " " " 540.00
" 47 " " " ½ " " " 670.00
" 48 " " " $\frac{9}{16}$ " " " 825.00

COMBINED POWER PUNCH AND SHEAR.

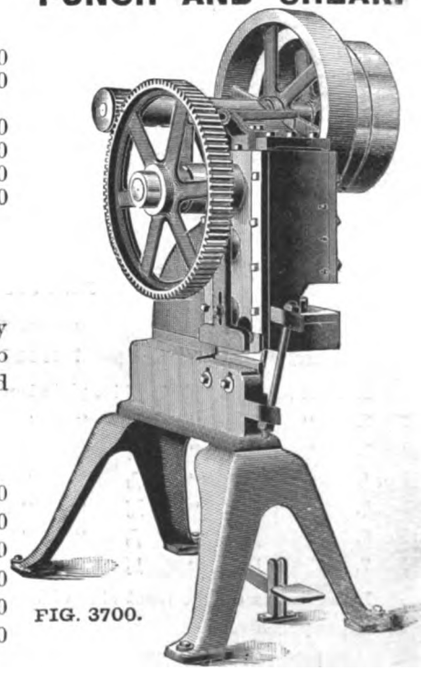


FIG. 3700.

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POWER AND HAND PUNCHES.

GEARED PUNCH.

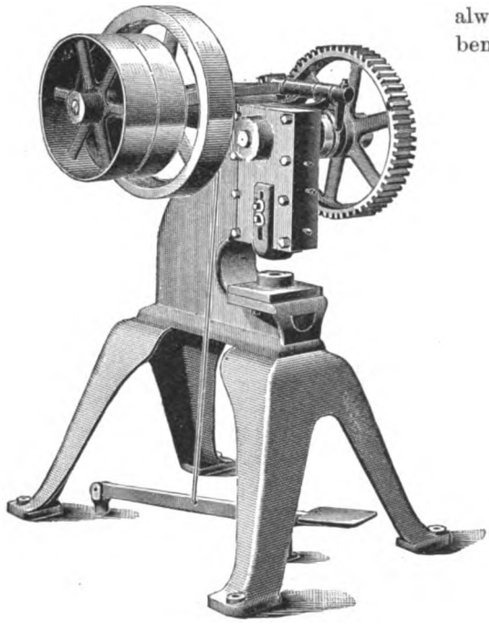


FIG. 3701.

DESCRIPTION, FIGS. 3701 AND 3702.

These punches have a start and stop motion, always having the plunger up. No. 1 sets on a bench and does not have the automatic stop.

PRICES, FIG. 3701.

No.	Size hole and thickness will punch.	PRICES.
81	1/8	$70.00
82	3/16	105.00
83	1/4	155.00
84	5/16	240.00
85	3/8	340.00
86	7/16	470.00
87	1/2	575.00
	9/16	750.00

PRICES, FIG. 3702.

No.	Size hole and thickness will punch.	PRICES.
71	1/8	$30.00
72	3/16	50.00
73	1/4	80.00
74	5/16	110.00
75	3/8	150.00
76	7/16	210.00
77	1/2	260.00
78	9/16	320.00

BELT PUNCH.

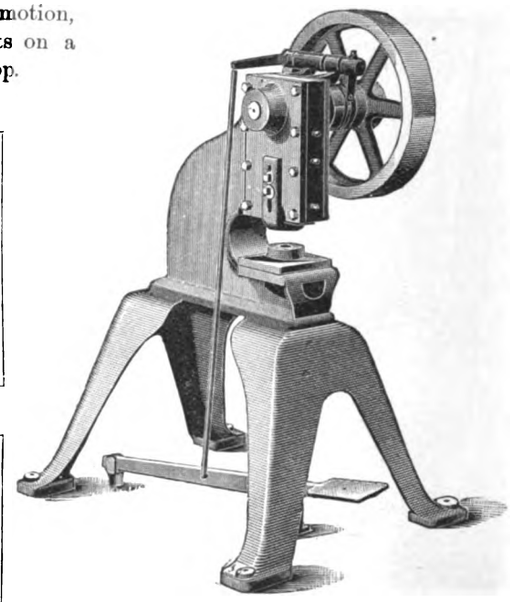


FIG. 3702.

Extra for hand power, Nos. 71, 72 and 73.....$10.50
" " " " 74, 75, 76, 77 and 78, 15.00

TAFT'S PATENT IMPROVED HAND PUNCH,

WITH INCLINED RACK AND ROLLING GEAR.

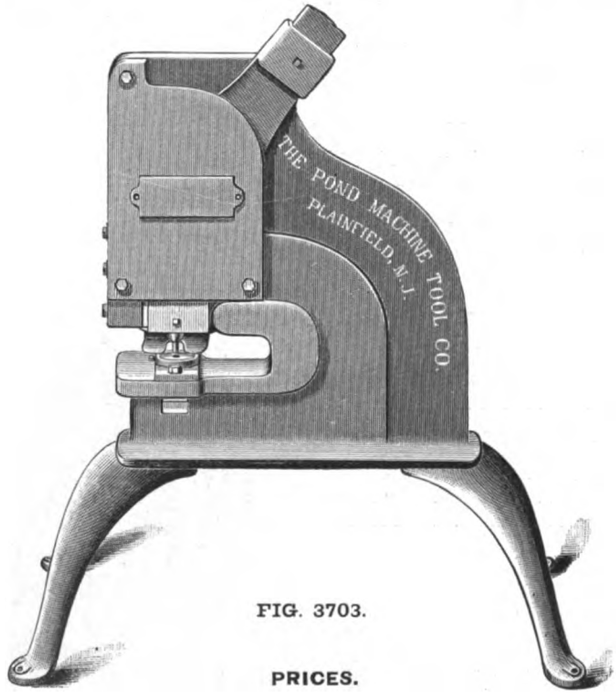


FIG. 3703.

PRICES.

No. 1. Punches 1/8 in. hole in 1/8 in. plate iron, 2 1/2 in. from edge.....$30.00
No. 2. " 3/16 " 3/16 " " 2 1/2 " " 45.00
No. 3. " 1/4 " 1/4 " " 3 " " 75.00
No. 4. " 5/16 " 5/16 " " 4 " " 105.00
No. 5. " 3/8 " 3/8 " " 6 1/2 " " 145.00
No. 6. " 7/16 " 7/16 " " 6 1/2 " " 208.00
No. 7. " 1/2 " 1/2 " " 6 1/2 " " 277.00

Lever works on the front side of Nos. 1 and 2, and on the back side of the larger punches.

NO. 1 IS MOUNTED ON A BENCH WITHOUT LEGS.

TAFT'S HAND PUNCH,

WITH CAM MOTION.

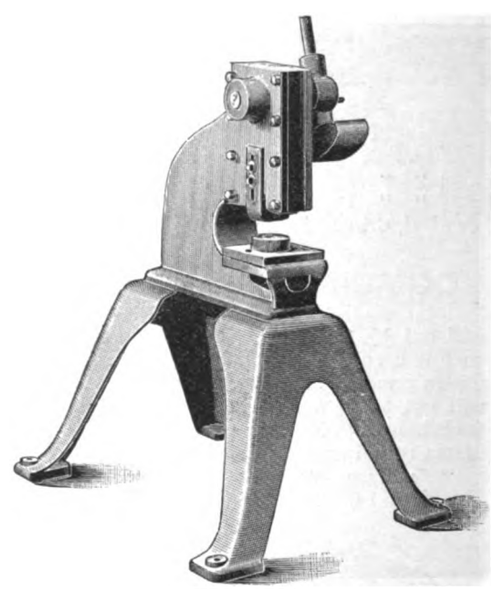


FIG. 3704.

PRICES.

No. 61. Punches 1/8 hole in plate iron, 2 1/2 in. from edge.....$22.50
No. 62. " 3/16 " " " 3 1/2 " " 42.00
No. 63. " 1/4 " " " 4 3/4 " " 67.50
No. 64. " 5/16 " " " 6 " " 95.00
No. 65. " 3/8 " " " 7 1/4 " " 130.00
No. 66. " 7/16 " " " 8 1/2 " " 187.00
No. 67. " 1/2 " " " 9 3/4 " " 250.00
No. 68. " 9/16 " " " 11 1/4 " " 330.00

NO. 61 IS MOUNTED ON A BENCH WITHOUT LEGS.

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HAND PUNCHES.

PRICES.

No. 0 will punch 1/8 inch hole in 1/8 inch iron, or 3/16 inch in 1/16 inch; 2 1/2 inches from edge to center of hole. Weight, 33 lbs. $20.00
Extra punches and dies, per pair 1.25
No. 1 will punch 3/16 inch hole in 3/16 inch iron, 1/4 inch in 1/8 inch, or 3/8 inch in 1/16 inch; 3 1/2 inches from edge to center of hole. Weight, 65 lbs. 26.00
Extra punches and dies, per pair 2.00
No. 2 will punch 1/4 inch hole in 1/4 inch iron, 5/16 inch in 3/16 inch, or 3/8 inch in 1/8 inch; 3 3/4 inches from edge to center of hole. Weight, 115 lbs 40.00
Extra round punches and dies, per pair 2.50
No. 3 will punch 5/16 inch hole in 5/16 inch iron, 3/8 inch in 1/4 inch, 1/2 inch in 3/16 inch, or 9/16 inch in 1/8 inch; 4 inches from edge to center of hole. Weight, 175 lbs. 52.00
Extra round punches and dies, per pair 2.50
No. 3 1/2 will punch 3/8 inch hole in 5/16 inch iron, 7/16 inch in 1/4 inch, or 5/8 inch in 1/8 inch; 4 inches from edge to center of hole. Weight, 200 lbs. 65.00
Extra round punches and dies, per pair 3.00
No. 4 will punch 3/8 inch hole in 3/8 inch iron, or 1/2 inch in 5/16 inch; 4 inches from edge to center of hole. Weight, 360 lbs. 88.00
Extra round punches and dies, per pair 4.00
No. 5 will punch 1/2 inch hole in 1/2 inch iron, 5/8 inch in 3/8 inch, or 3/4 inch in 1/4 inch; 7 1/2 inches from edge to center of hole. Weight, 590 lbs. 115.00
Extra punches and dies, per pair 4.00
One round punch and die furnished with each. Square punches and dies twice the price of round.

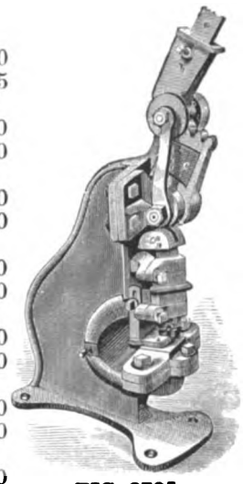


FIG. 3705.



FIG. 3706.

SPECIAL PUNCH.

The opening behind the punch is 7 5/8 inches deep by 6 inches high. The hole in lower jaw is 1 x 1 1/2 inches, which is large enough for iron rail tenoning. Upon special order, the hole in lower jaw is made 1 1/2 x 3 3/4 inches for punching truck rung irons 1 1/8 x 2 1/2 inches. A hole of 3/4 inch in diameter can be punched in 1/2 inch iron. The punch weighs about 1,025 lbs.

PRICES.

Punch, with one size round punch and die $175.00
Extra round punches and dies, per pair 4.00
" square " " " " " " 8.00
Shear attachment for iron 5/8 x 3 inches 10.00
Tenoning attachment 12.00
Angle iron shear for 2 1/2 inch angle or smaller 16.00
1 1/8 x 3 1/2 inch punch and die, per pair 20.00

HAND PUNCH.



FIG. 3707.

No. 2 punches 5/16 inch and smaller holes in 1/8 inch iron; 2 1/2 inches from edge.

PRICE, $22.00.

These machines are easily worked by foot power.

HAND PUNCHES.

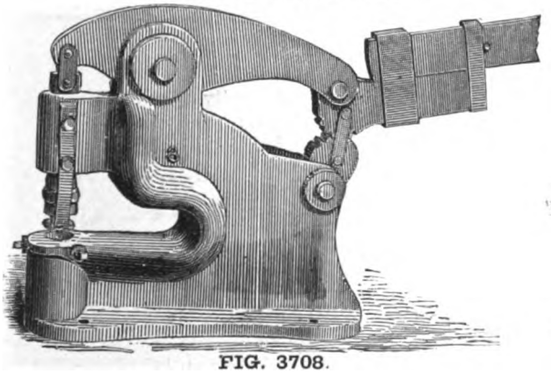


FIG. 3708.

No. 2 1/2 punches are provided with extra large space for dies for stamping thin metal.

PRICES.

No. 2 1/2 Punch.—Punches 5/16 inch and smaller holes in 1/4 inch iron; 4 1/2 inches from edge to center of hole. Weight, 120 lbs. $43.00
No. 3 Punch.—Punches 1/2 inch and smaller holes in 5/16 inch iron; 6 inches from edge to center of hole. Weight, 200 lbs. 65.00
No. 4 Punch.—Punches 3/4 inch holes in 1/2 inch iron; 8 inches from edge to center of hole. Weight, 600 lbs. 130.00

REAR WORKING LEVER PUNCH.

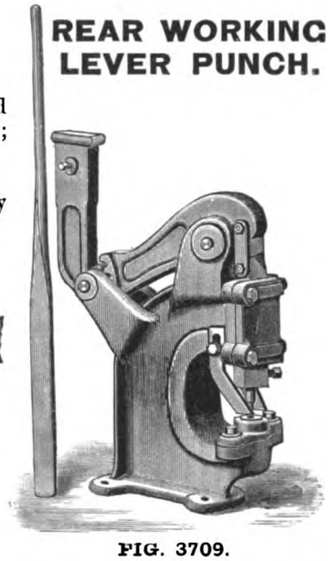


FIG. 3709.

The levers, gears, block and pins are all made of steel.

It will punch 3/8 inch hole in 1/4 inch iron; 3 1/2 inches from edge of plate.

WEIGHT, 164 LBS.
PRICE, $60.00.

One round punch and die furnished with each machine.

Extra punches, each ... $1.25
Extra dies 1.75

Square or oblong punches and dies twice the price of round.

HAND FLANCE PUNCHES.



FIG. 3710. LEVERS REVERSIBLE.

PRICES.

No. 1 Flange Punch.—Punches 1/2 inch hole in 5/16 inch iron; 3 1/4 inches from edge to center of hole. Weight, 250 lbs. $85.00
No. 2 Flange Punch.—Punches 3/4 inch hole in 3/8 inch iron; 4 inches from edge to center of hole. Weight, 325 lbs. 130.00

The punching machines are furnished with patent spiral punch for all work from a 1/4 inch hole upward.

Particular attention is called to the quality of the work done with this punch, as it does not mutilate the iron, as does the common punch; and, in consequence, can be used for a large amount of work that has heretofore required a drill.

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SCREW PUNCHES.

FORGED STEEL.

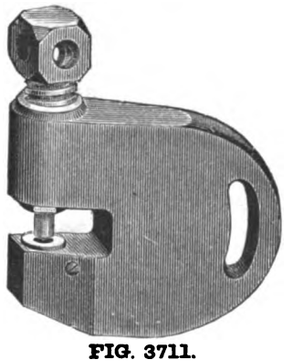


FIG. 3711.

SIZE	No. 1. To punch $\frac{3}{4}$ hole in $\frac{3}{4}$ plate $2\frac{1}{2}$ from edge.	No. 2. To punch $\frac{1}{2}$ hole in $\frac{1}{2}$ plate 2 from edge.	No. 3. To punch $\frac{1}{4}$ hole in $\frac{5}{16}$ plate $1\frac{1}{2}$ from edge.
Punch, with one size punch and die,	$75.00	$40.00	$32.00
Extra punch and die, each pair,	5.00	4.00	3.50

These punches are forged entirely of crucible steel, are well made and proportioned. A full square thread is cut in a lathe both on the screw and in the stock. The punch is held in the end of screw in an improved manner and is easily removed for change of size.

WROUGHT IRON.

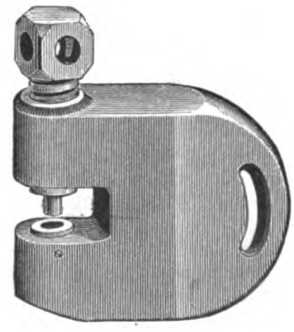


FIG. 3712.

	To punch $\frac{1}{4}$ hole in $\frac{3}{4}$ plate 2 from edge.
Punch, with one size punch and die,	$25.00
Extra punch and die, each pair,	3.00

These punches are forged of the best hammered iron, and are as well made as it is possible for them to be.

A full square thread is cut in a lathe both on the screw and in the stock.

The punches and dies are made to gauge and are interchangeable.

FORGED STEEL.

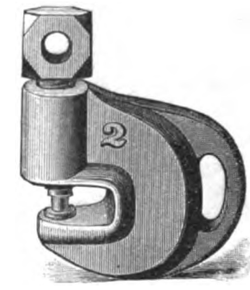


FIG. 3713.

Size,	No. 0.	No. 1.	No. 2.	No. 3.
Size of hole,	$\frac{7}{16}$	$\frac{9}{16}$	$\frac{13}{16}$	$\frac{13}{16}$
Iron,	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$
Center of punch to edge of sheet,	2 in.	$2\frac{1}{2}$ in.	$2\frac{3}{4}$ in.	3 in.
Weight,	21 lbs.	38 lbs.	70 lbs.	96 lbs.
PRICE,	$24.00	$30.00	$40.00	$60.00

One punch and die with each punch.
Extra punches and dies, per pair, $4.00.

GEARED AND DOUBLE-GEARED SHEARS.

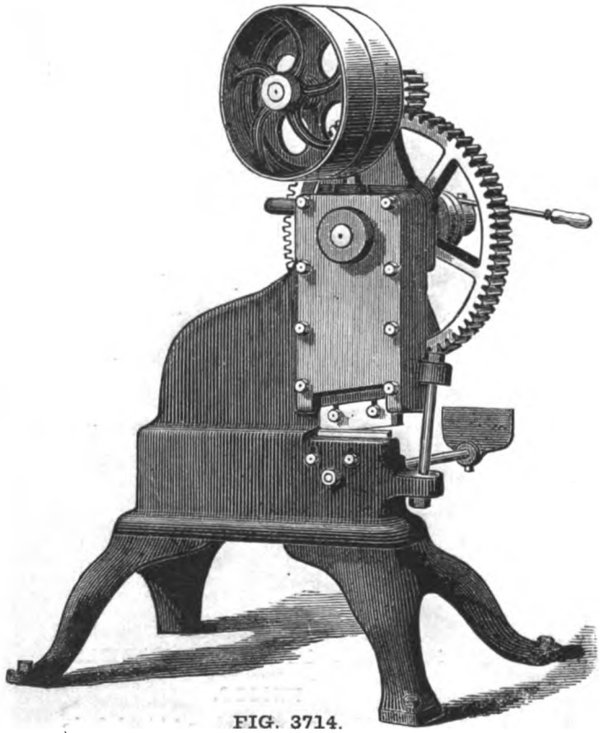


FIG. 3714.

These shears are geared for the application of power by belt, and are made with a stop and start clutch-motion and the patent tie-bolt. The sizes above No. 5 are double-geared, making a very powerful machine.

PRICES.

No. 1	cuts	$\frac{1}{8}$	in.	plate	iron,	blades	3	in.	long.	$75.00
No. 2	"	$\frac{3}{16}$	"	"	"	"	4	"	"	110.00
No. 3	"	$\frac{1}{4}$	"	"	"	"	$5\frac{1}{2}$	"	"	160.00
No. 4	"	$\frac{5}{16}$	"	"	"	"	$7\frac{1}{2}$	"	"	240.00
No. 5	"	$\frac{3}{8}$	"	"	"	"	$8\frac{1}{2}$	"	"	350.00
No. 6	"	$\frac{7}{16}$	"	"	"	"	$9\frac{1}{2}$	"	" double-geared	475.00
No. 7	"	$\frac{1}{2}$	"	"	"	"	$9\frac{1}{2}$	"	"	575.00
No. 8	"	$\frac{5}{8}$	"	"	"	"	10	"	"	750.00
No. 9	"	$\frac{3}{4}$	"	"	"	"	11	"	"	850.00

GEARED SHEARS.

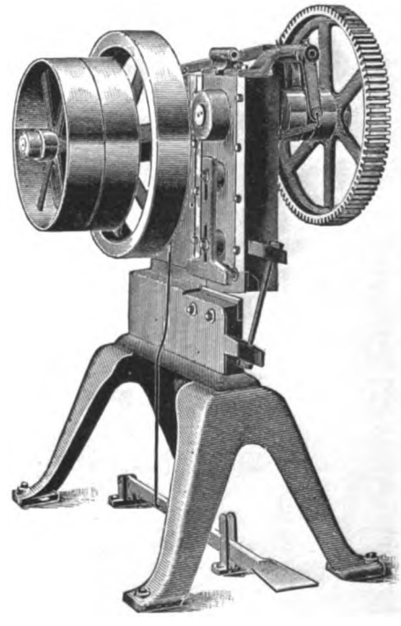


FIG. 3715.

DESCRIPTION, FIG. 3715.

These shears are geared for the application of power by belt. They have the trip stop motion, for stopping and starting the shear at will, always leaving the cutters open. No. 31 is made without legs and does not have the self-acting stop motion.

PRICES.

No. 31	cuts	$\frac{1}{8}$	in.	plate	iron,	blades,	3	in.	$70.00
No. 32	"	$\frac{3}{16}$	"	"	"	"	4	"	105.00
No. 33	"	$\frac{1}{4}$	"	"	"	"	$5\frac{1}{2}$	"	155.00
No. 34	"	$\frac{5}{16}$	"	"	"	"	$7\frac{1}{2}$	"	240.00
No. 35	"	$\frac{3}{8}$	"	"	"	"	$8\frac{1}{2}$	"	340.00
No. 36	"	$\frac{7}{16}$	"	"	"	"	$9\frac{1}{2}$	"	470.00
No. 37	"	$\frac{1}{2}$	"	"	"	"	$9\frac{1}{2}$	"	575.00
No. 38	"	$\frac{9}{16}$	"	"	"	"	10	"	750.00

Extra blades always on hand, 25 cts. per inch.

WIRE ROPE SHEARS.

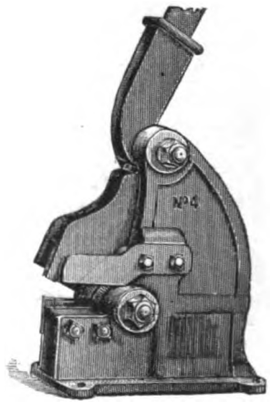


FIG. 3716.

Capacity up to $1\frac{1}{8}$ diameter.
Steel wire rope.
Weight, 125 lbs.

PRICE, $45.00.

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POWER AND HAND PLATE SHEARS.

POWER SHEARS.

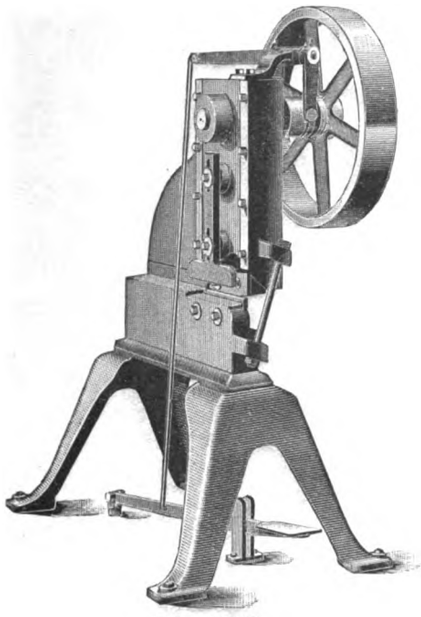


FIG. 3717.

These machines can be made to operate by hand and power, at an extra expense for Nos. 21, 22 and 23, of $10.00, and for Nos. 24, 25, 26, 27 and 28, of $15.00. They do not have the self-acting stop motion.

No. 21 is made without legs, to be used on a bench.

PRICES.

No. 21	cuts	1/8	in.	plate iron	$30.00
No. 22	"	3/16	"	"	50.00
No. 23	"	1/4	"	"	80.00
No. 24	"	5/16	"	"	110.00
No. 25	"	3/8	"	"	150.00
No. 26	"	7/16	"	"	210.00
No. 27	"	1/2	"	"	260.00
No. 28	"	9/16	"	"	320.00

HAND SHEARS.

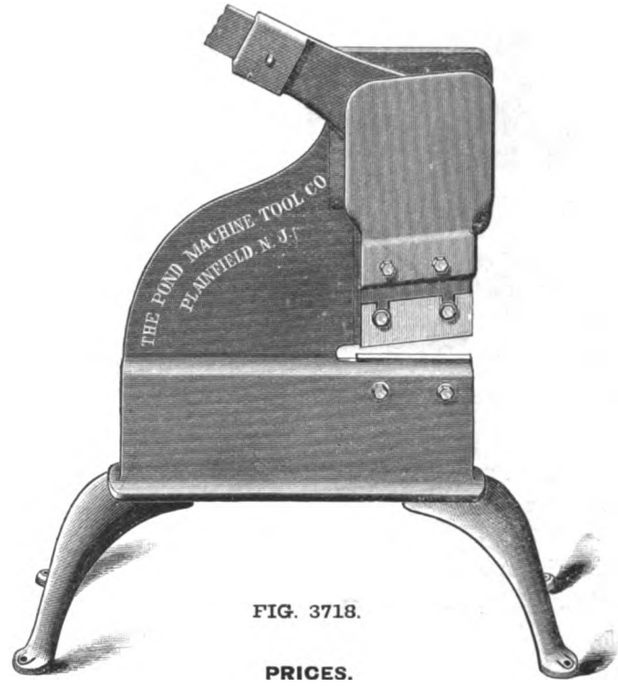


FIG. 3718.

PRICES.

No. 1	cuts	1/8	in.	plate iron,	blades,	3	in. long $30.00
No. 2	"	3/16	"	"	"	4	" 45.00
No. 3	"	1/4	"	"	"	5	" 75.00
No. 4	"	5/16	"	"	"	7	" 105.00
No. 5	"	3/8	"	"	"	8	" 145.00
No. 6	"	7/16	"	"	"	9	" 208.00

Lever works on the front side of Nos. 1, 2, 3 and 4, and on the back side of the larger shears.

These shears will split up sheets of any width or length.

No. 1 is mounted on wooden bench with no legs.

HAND PLATE SHEARS.

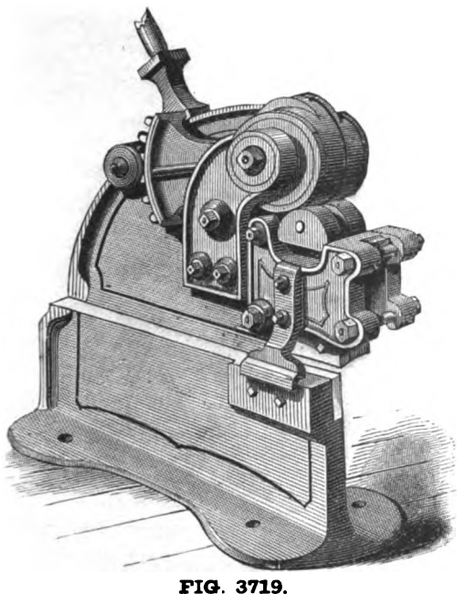


FIG. 3719.

No. 5 will cut 7/16 plate iron, and by the use of a ratchet and pinion, as shown in the cut, the lever is made to work from the back of the machine.

WEIGHT, 750 LBS. PRICE, $150.00.

HAND PLATE SHEARS.

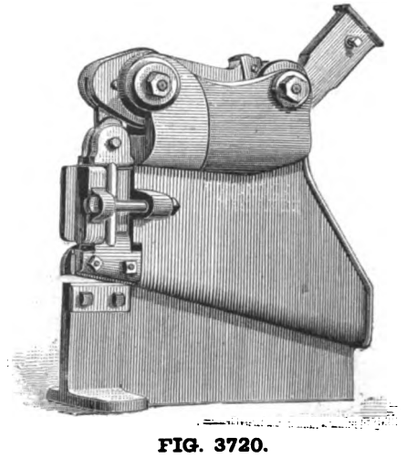


FIG. 3720.

The bearing pins are firmly held at each end, and the lever working at the rear by means of the pinion gives great power. The link bears both on steel pin and on its ends. The front plunger-guide is planed to go between supports on the body of machine, making it very firm, while it is adjustable by the bolt shown in front. Cuts 3/8 in. plate iron.

WEIGHT, 450 LBS. PRICE, $110.00.

HAND PLATE SHEARS.

FOR CUTTING PLATE IRON OF ANY WIDTH.

Lever works at the front.

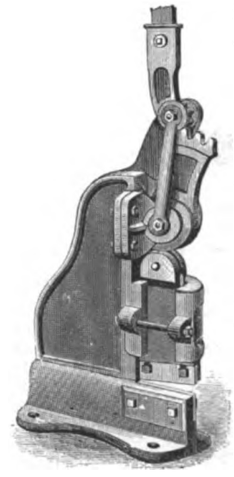


FIG. 3721.

No. 1 will cut 3/16 in. plate iron.

WEIGHT, 115 LBS. PRICE, $40.00.

No. 2 will cut 1/4 in. plate iron.

WEIGHT, 210 LBS. PRICE, $50.00.

No. 3 will cut 5/16 in. plate iron.

WEIGHT, 275 LBS. PRICE, $66.00.

No. 4 will cut 3/8 in. plate iron.

WEIGHT, 475 LBS. PRICE, $90.00.

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HAND PLATE SHEARS.

LEVER SHEAR.

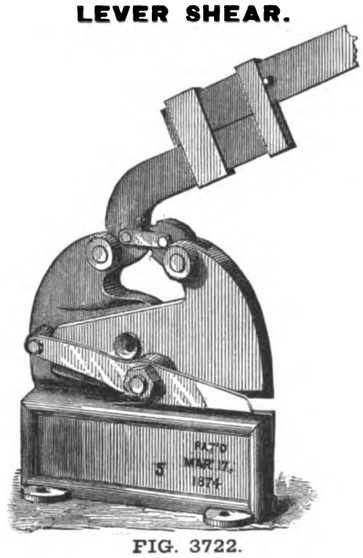


FIG. 3722.

ALL THE ABOVE LEVERS ARE REVERSIBLE.

PRICES, FIG. 3722.

No. 4 Plate Shear.—Cuts ¼ inch sheet metal any width, and ½ inch round rod.

WEIGHT, 165 POUNDS. PRICE, $43.00.

No. 5 Plate Shear.—Cuts $\frac{5}{16}$ inch sheet metal any width, and ⅝ inch round rod.

WEIGHT, 300 POUNDS. PRICE, $65.00.

No. 6 Plate Shear.—Cuts ⅜ inch sheet metal any width, and ¾ inch round rod.

WEIGHT, 600 POUNDS. PRICE, $100.00.

PRICES, FIG. 3723.

No. 1	cuts	⅛	in.	plate	iron,	blades,	3 in.....	$22.50
No. 2	"	$\frac{3}{16}$	"	"	"	"	4 "	42.00
No. 3	"	¼	"	"	"	"	5½ "	67.50
No. 4	"	$\frac{5}{16}$	"	"	"	"	7½ "	95.00
No. 5	"	⅜	"	"	"	"	8½ "	130.00
No. 6	"	$\frac{7}{16}$	"	"	"	"	9½ "	187.00
No. 7	"	½	"	"	"	"	9½ "	250.00
No. 8	"	$\frac{9}{16}$	"	"	"	"	10 "	330.00

CAM ACTION.

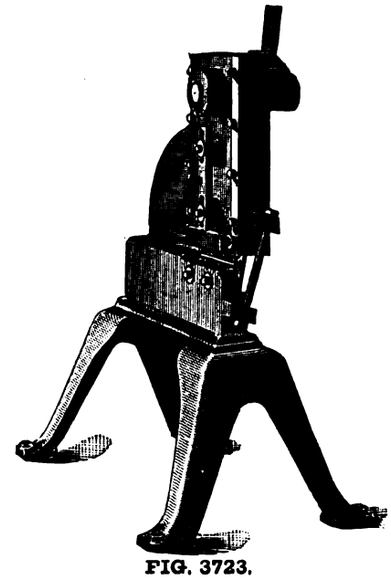


FIG. 3723.

These shears will cut or slit plate iron any length and width. The tie bolt greatly strengthens the machine, and is found very useful when cutting off bars of iron, etc. No. 1 is made to be used on a bench and without the legs.

PORTABLE HYDRAULIC BEAM PUNCH.

This punch is operated by a pump worked by a lever inserted in the socket shown on the side of head.

The parts are all easy of access and reliable, and the head may be turned to operate the lever from any position. The body of the punch is steel. The throat is 9 inches deep by 6½ inches, allows a beam to be punched close to the flange or 9 inches from edge.

It also allows angle or T iron to be punched without pushing lengthwise through the punch.

Capacity of punch, 1 inch hole in 1 inch iron.

One movement of the lever shown withdraws the punch entirely from the iron.

The punches are prevented from turning, thus allowing the use of irregular shaped dies without danger of the punch coming down on the die. The hand ring is put on for lifting or suspending the punch. Larger sizes to order.

WEIGHT, 525 POUNDS. PRICE, $225.00.

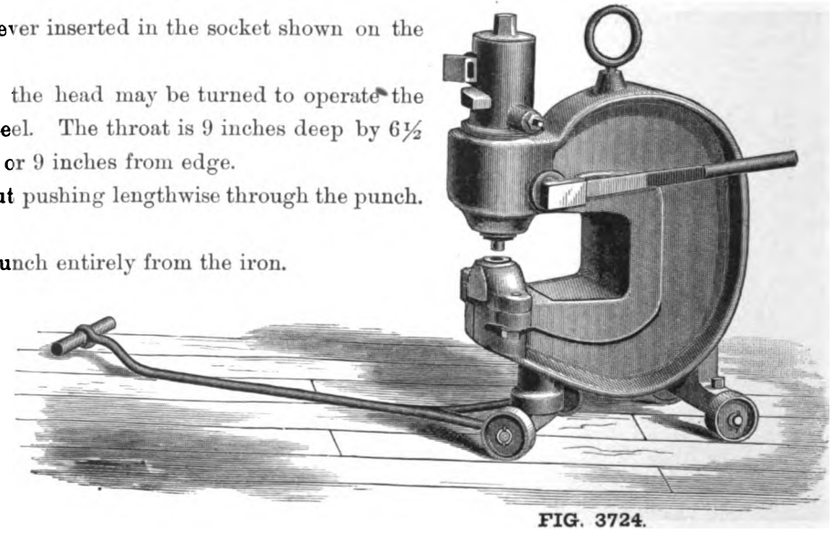


FIG. 3724.

HYDRAULIC BEAM PUNCH.

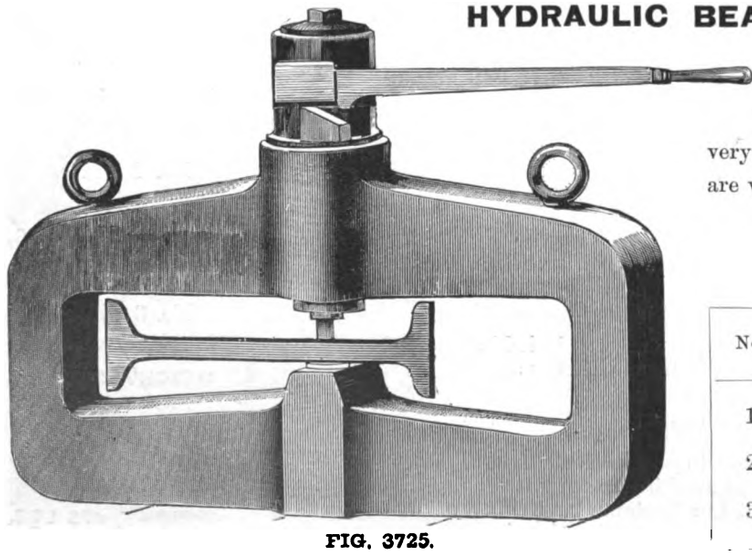


FIG. 3725.

FOR PUNCHING BEAMS FROM 12 TO 20 INCHES.

These punches are made of forged steel, and consequently very strong. They are worked the same as the hydraulic jack, and are very rapid compared with any other hand power punch.

Punches for angle and T irons made to order.

PRICES.

No.	Beam.	Thickness.	Rivet.	From center of punch to side.	Weight.	PRICE.
1	12	½	¾	9¼	450	$225.00
2	15	1	1	12¼	575	275.00
3	20	1	1	17¼	750	325.00

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FOR FISH-PLATES.

HYDRAULIC PUNCHES.

FOR SPIKE HOLES.

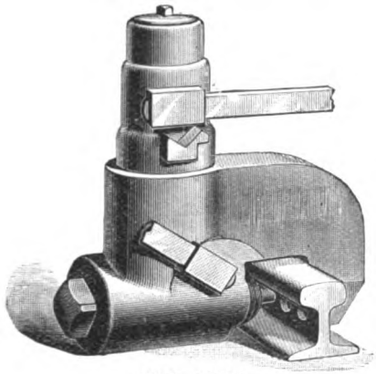


FIG. 3726.
PRICE, $250.00

Figs. 3726 and 3727 are for punching rails, either loose or in place, on the ties.

Special punches and designs made to order from samples of work to be done.

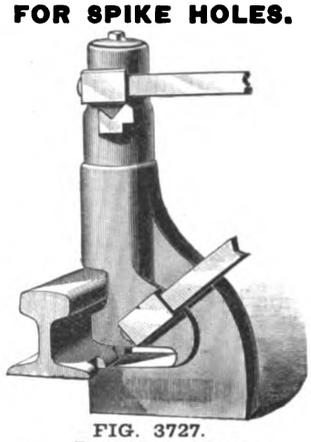


FIG. 3727.
PRICE, $150.00.

SPECIAL FORMS MADE TO ORDER.

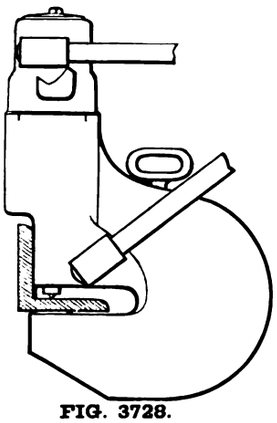


FIG. 3728.

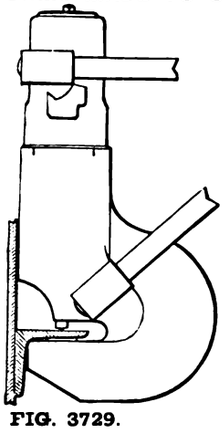


FIG. 3729.

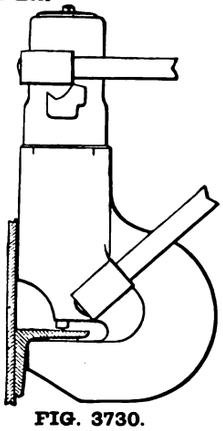


FIG. 3730.

HYDRAULIC SCREW PUNCH.

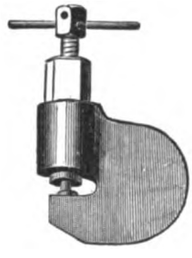


FIG. 3731.

HYDRAULIC HEAD PUNCH.

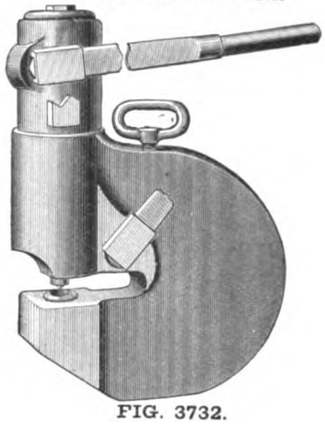


FIG. 3732.

The head punch is a great improvement over the screw punch; it will do double the work in the same time, will keep in repair longer, and is more easily packed. It is fitted with a pinion meshing into a rack cut on the ram to withdraw punch from metal after punching. This has overcome a great objection to this style of tool. All punches, Figs. 3728 to 3732, are made from solid steel forgings.

PRICES, EITHER FIGS. 3731 OR 3732.

No.	Thickness.	Rivet.	* Gap.	Weight.	PRICE.	* Gap.	PRICE.	PRICE,
0	1/4	5/8	2	40	$70.00	3½	$80.00	FIG. 3733,
1	5/8	5/8	2	50	80.00	3½	90 00	
2	1/2	5/8	2	60	100 00	3½	110.00	$5.00
3	1/2	3/4	2	70	120.00	3½	130.00	FOR LEGS.
4	5/8	3/4	2	90	150.00	3½	170.00	
5	3/4	7/8	2	120	200.00	3½	220.00	
7	1	1	2	280	250.00	4	275.00	

* Gap refers to distance from edge of sheet to center of hole. Greater distance to order.

MOUNTED HEAD PUNCH.

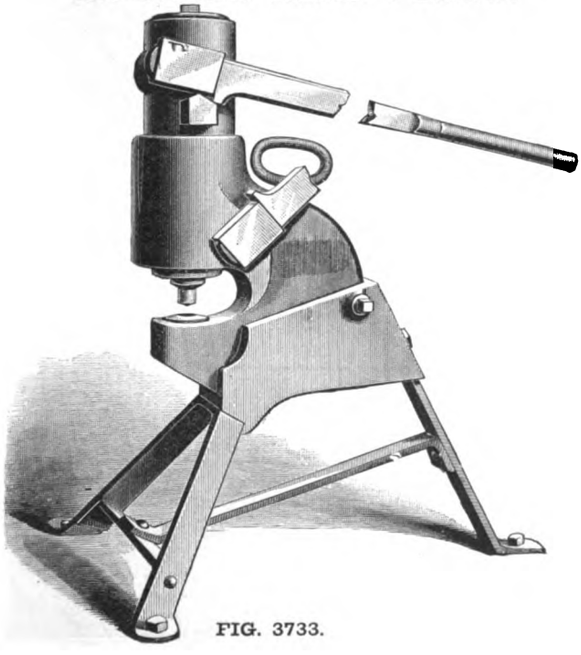


FIG. 3733.

HYDRAULIC SCREW PUNCH.

These punches are very simple in construction, being made without either valves or force pump, and have screw in rear. The strain in working does not have to be resisted, as in the screw punch, by a cross strain on the punch, and the working lever is a ¾ in. steel rod, 3 ft. long, instead of 1½ in. bar, six or more feet long. They are made of an extra quality steel. Turning the screw into the interior chamber forces the punch ram down. The withdrawal of the screw allows the punch to be forced back. This form is especially useful in punching angles and braces which are attached to plates, and where horizontal holes are desired.

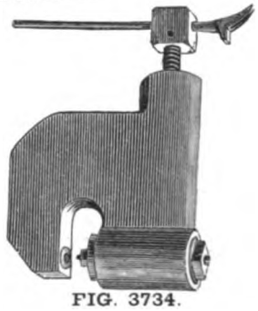


FIG. 3734.

No.	Size of hole.	Iron.	Center of punch to edge of iron.	Weight.	PRICE.
1	11/16	5/8	2 inch.	32 lbs.	$64.00
2	13/16	1/2	2 5/8 "	60 "	96.00
3	15/16	3/4	3 1/8 "	90 "	120.00
4	1 1/8	7/8	4 "	140 "	150.00

One punch and die with each tool.

Extra punches and dies, per pair, $4.00.

We can make them with screw above the ram if so desired, but this style goes into more small, cramped places than the other.

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HYDRAULIC PUNCHES.

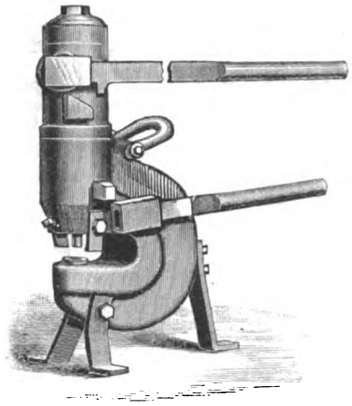


FIG. 3735.

A much improved pump and lowering device have been added to the punch. It is made very much lighter, and a new raising device has been put in, by which the punch can be pushed down to the work without the labor of pumping.

The punch is driven down by operating the pump inside the head or reservoir, the piston of which is connected to the socket in which the lever is shown, and is raised by bringing the socket down against the lug on head and turning the lower socket by a second lever, which does not interfere with that of the pump.

PRICES.

No.	Jaw.	Hole.	Iron.	Weight.	PRICE.
1	2½ in.	¾ in.	½ in.	105 lbs.	$110.00
1x	6 "	¾ "	½ "	140 "	150.00
2	2½ "	1 "	⅝ "	130 "	140.00
3	3 "	1¼ "	¾ "	175 "	175.00
3x	4 "	1¼ "	¾ "	225 "	200.00
4	2½ "	1¼ "	1 "	240 "	225.00

DUPLEX LEVER SCREW PUNCHES.

OPEN MOUTH.

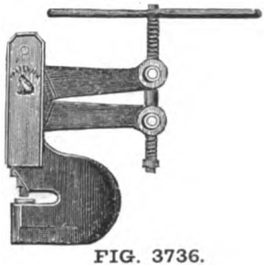


FIG. 3736.

They possess great power, and will punch the heaviest boiler and ship plates, angle and other iron, with ease and great rapidity.

These punches require no skilled labor to use them, nor are they liable to easily break or get out of repair.

PRICE.

No. 1. To punch ½ inch through ¼ inch iron, 1⅛ inch from edge. Weight 18 lbs., 2½ in. heel, - $33.00

No. 2. To punch ¾ inch through ⅜ inch iron, 1½ inch from edge. Weight 36 lbs., 2½ in. heel, - 44.00

No. 3. To punch ⅞ inch through ⅝ inch iron, 2 inches from edge. Weight 81 lbs., 3 in. heel, - - 72.00

No. 4. To punch ⅞ inch through ⅝ inch iron, 2⅛ inches from edge. Weight 120 lbs., 4½ in. heel, - 110.00

Price includes one round punch and die. Extra round ones, $4.00 per set. Extra depths of jaw made to order at 15% advance for each inch.

The above will also punch the average quality of steel as follows:

No. 1, ⅜ through ¼. 2, ⅝ through ¼. 3, ⅞ through ⅜. 4, ⅞ through ⅜.

FOR IRON AND STEEL RAILS, GIRDERS, ETC.

Size No. 5, punches 1½ inch through ¾ inch iron, $185.00.

Size No. 6, punches 1¼ inch through ½ inch steel, $185.00.

Price includes one round punch and die. In ordering, it is necessary to send a sectional drawing of rail or girder. Will take girders or rails up to 7 in. x 4 in., or can be made to suit any larger section at extra cost of metal.

CLOSE MOUTH.

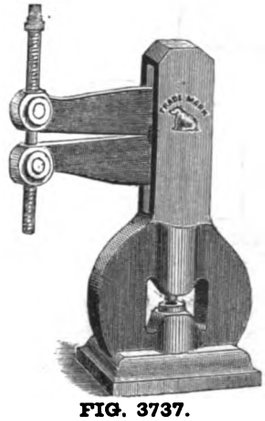


FIG. 3737.

HARTZ FLUE JOINING AND WELDING MACHINE.

The machine is especially designed for welding and joining locomotive flues. It will cut off and scarf new pieces; cut off fag end of old flues and make smooth and thorough welds. It does not require any specially skilled labor to operate it. Has capacity to handle from ninety to one hundred 2 inch flues in ten hours. The process consists of three operations, as shown below, figures 1, 2 and 3.

F. & L. pulleys, 16x4, 425 revolutions.

WEIGHT, 2,500 LBS. PRICE, $500.00.

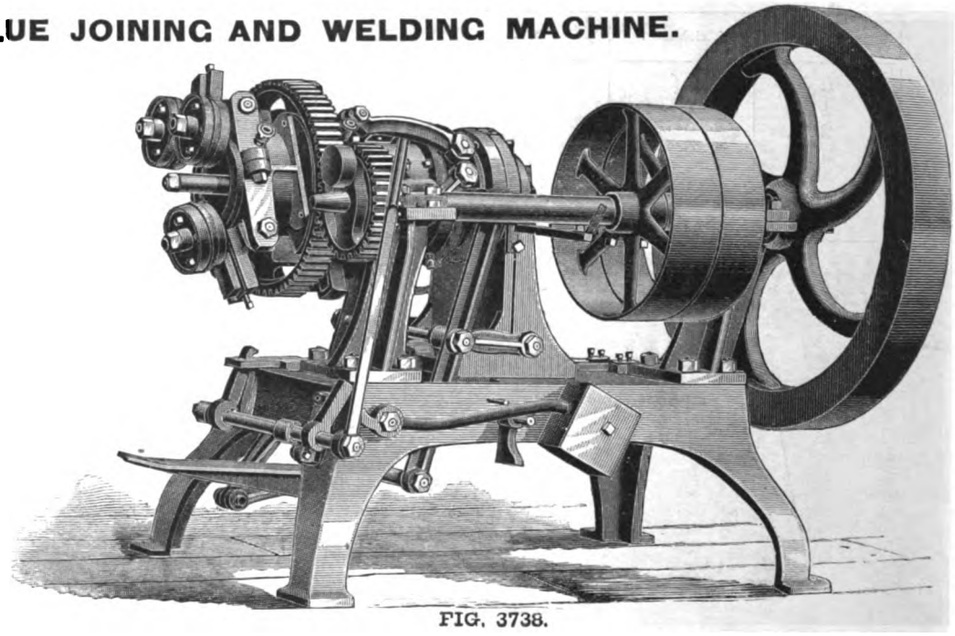
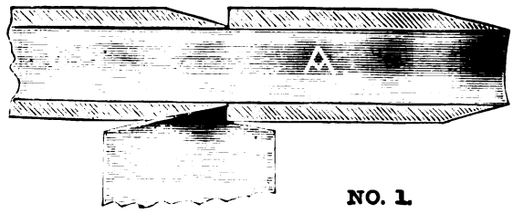


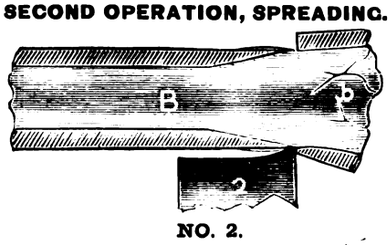
FIG. 3738.

FIRST OPERATION, SCARFING.



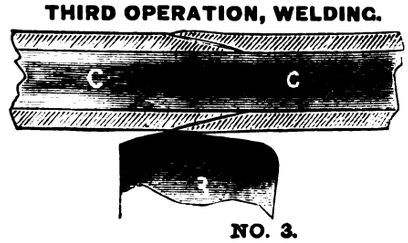
NO. 1.

SECOND OPERATION, SPREADING.



NO. 2.

THIRD OPERATION, WELDING.



NO. 3.

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THE NEW YORK PATENT FLUE WELDING MACHINE.

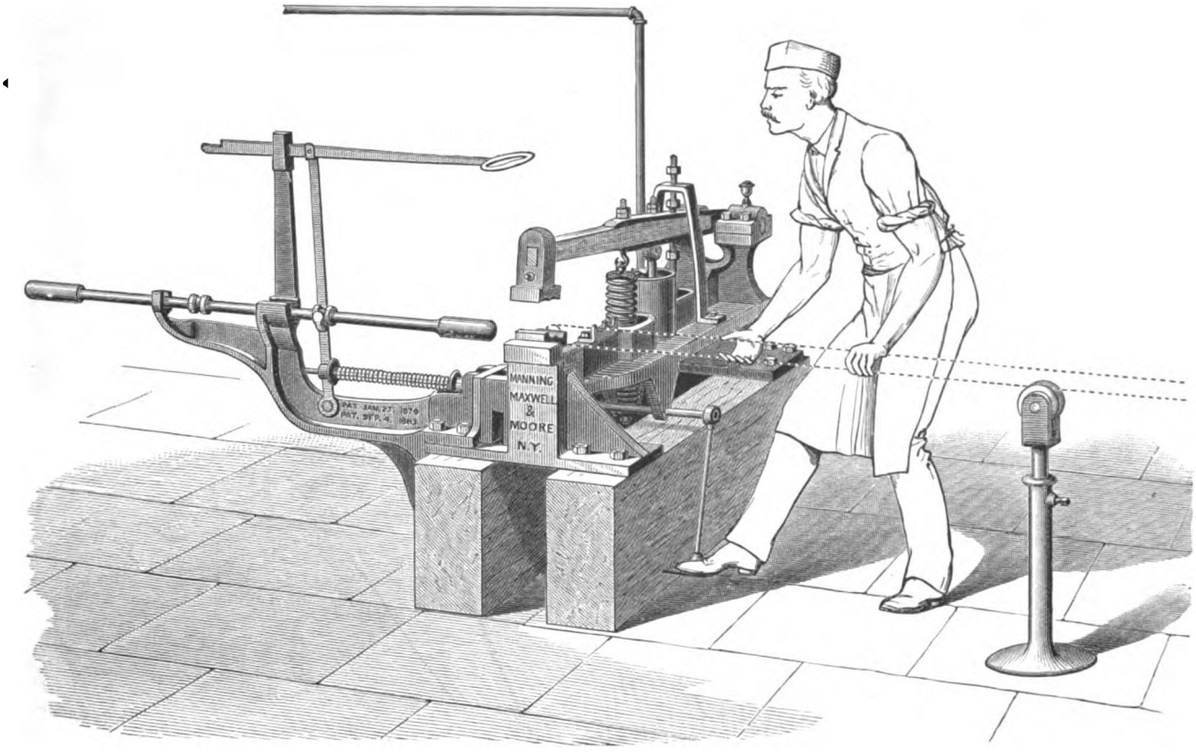


FIG. 3739.

This machine welds the tubes by a succession of sharp trip hammer blows, regulated by a foot connection with the valve, as shown. The automatic mandrel, which is quickly withdrawn, in connection with the foot gear (see cut) enables the machine to be rapidly operated by an ordinary smith. It swages down the end of long flue, scrapes same off clean, ready to receive copper ferrule for brazing, if required; expands the end of one flue, and reduces the end of the other so perfectly that when driven together the joint is nearly steam-tight before welding.

It has no equal for welding steel motion bushes, split pins, and all work of similar character used on locomotives, and does the same at one heat, with lightning rapidity and much better than can he done by hand.

Machine complete, with one set of double dies, beck horn, mandrel and expanding tool. **PRICE, $450.00.**

DIRECTIONS FOR OPERATING.

Place the machine as shown in cut, with hammer head close to the hearth; connect ¾ in. steam pipe to steam cylinder. The foot motion regulates the supply of steam and rapidity of the blows. Place the tube support about 8 feet from the end of the die in the machine in such position that the tube will be in perfect line with the die.

If more than 14 inches are to be added it will be best to make two welds, although more length can be added at one heat if necessary. All tubes when taken out of boilers must be thoroughly cleaned before welding, by being rattled in a tube cleaning machine for about eight hours. The damaged portion on each end of the tubes is then cut off and a short piece about 6 inches long is welded on one end, making the tube its original length, or more, as may be required, in the following manner:

A clean fire is requisite to make a good weld.

To prepare the short piece, square off and bevel one end before heating; remove the long mandrel and insert the beck horn in the square hole, with its point facing the smith, then heat beveled end and scarf under welding die of hammer on the beck horn for that purpose, which will enlarge it. Afterward, while still hot, insert the expanding mandrel, and with three or four blows of a hand hammer, open the tube enough to fit the outside of the beveled end of the long tube to which it will be welded. One end of the long tube must be squared and beveled as the short end was before heating and scarfing. The short piece may now be driven on to the beveled end of the long tube about one inch, and is then ready for welding. Stack the flues so prepared until one or more sets are ready, then remove the beck horn and replace the mandrel, which must be brought forward so as to go below the dies. When the heat is ready, the smith, with the tube in both hands, as shown in cut, places his foot lightly on the foot gear, which will raise the hammer sufficiently to admit the tube into the dies and be ready for the welding. The harder the foot pressure the faster the hammer will operate. A little practice will familiarize the smith with the motion and enable him to work very quickly and perfectly.

When the welding is done, release the catch overhead by motion of the hand, and the mandrel will be withdrawn automatically, after which a few more blows will reduce it to the required size. Now scrape the flue rapidly on the scraper to the right of the die, after which immediately place the flue under the hammer in the adjoining die, which is formed to reduce the end to the size required for copper ferrule. The tube is now finished, ready to be placed in boiler, and the workmanship will bear any amount of criticism for beauty of shape and solidity of weld, and the speed with which it has been done will not fail to commend it to any railroad master mechanic in the country.

OTTO FLUE CLEANER.

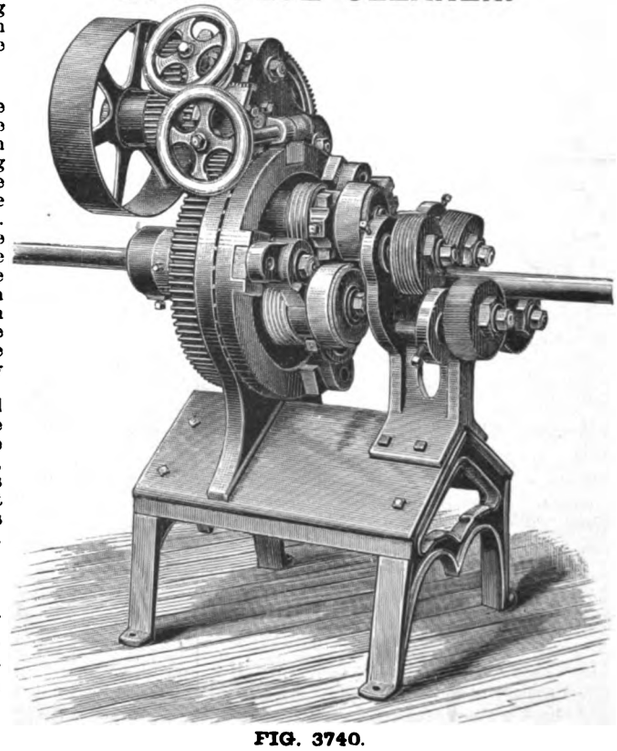


FIG. 3740.

DESCRIPTION, FIG. 3740.

Will take off the thickest crust of lime from outside surface of boiler flues by passing once through. Very little power is required to run it. Noiseless, self-feeding, adjustable and reversible and needs no countershaft. The speed of the machine is optional with user; the pulley can be run as high as 400 revolutions per minute, when about six feet per minute will be cleaned. At 80 revolutions, it feeds and cleans, on two-inch tubes, two feet per minute. **PRICE, $300.00.**

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ADJUSTABLE POWER PRESSES.

NOS. 18 TO 22.

NOS. 12 AND 12 1-2.

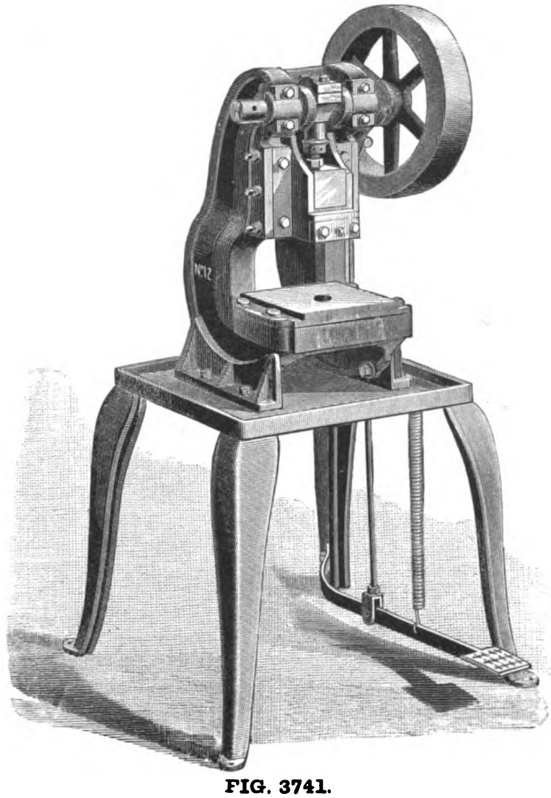


FIG. 3741.

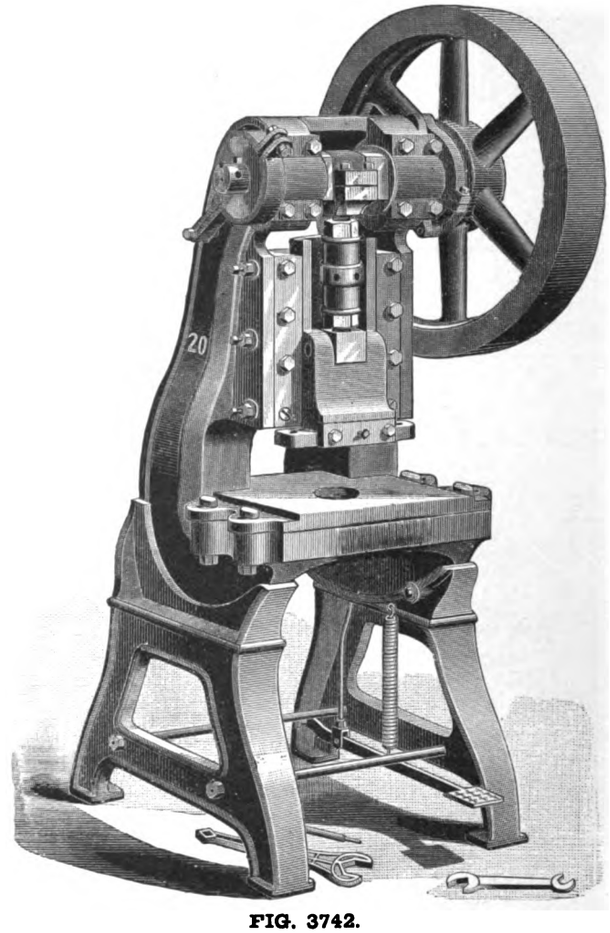


FIG. 3742.

These presses are used in the manufacture of sheet metal goods of every description, from tin, zinc, brass, iron, steel, etc. The openings in beds and motion of slides can be varied somewhat when so ordered. Fig. 3741 represents Nos. 12 and 12½ presses, and Fig. 3742, Nos. 18 to 22 presses. Special knock-out attachments are provided in slides of Nos. 18 to 21 presses without extra charge. When so ordered, Nos. 21 and 22 can be made with a plate cast solid on the slide to give proper support for large dies. Owing to its size and weight it is impracticable to make the No. 22 press adjustable on the same legs. One set of legs is therefore furnished, either upright or inclined, as ordered. When both positions are required, it is necessary to have an extra set of legs. An automatic clutch is provided on all presses, and the wheel used with same is provided with four locking points.

PRICES.

No. of press.	No. 12.	No. 12½.	No. 18.	No. 19.	No. 19 C.	No. 20.	No. 20 C.	No. 21.	No. 22.
Price	$115.00	$130.00	$130.00	$200.00	$225.00	$300.00	$335.00	$375.00	$600.00
Weight, complete, about	625 lbs.	800 lbs.	650 lbs.	1,150 lbs.	1,450 lbs.	1,850 lbs.	2,200 lbs.	3,000 lbs.	6,500 lbs.
Size of opening in bed, round	5x5 in.	6x6 in.	6 in.	7 in.	8 in.	10 in.	12 in.	14 in.	26 in.
Distance back from center to slide	4 "	6 "	4 "	4 "	6 "	6 "	9 "	9 "	15 "
Width of opening in back	7 "	7 "	7 "	8 "	9 "	9 "	12 "	13 "	23 "
Distance from bed to bottom of slide, when slide is up	7 "	7½ "	7 "	7 "	7½ "	8 "	9 "	10 "	11 "
Motion of slide, as desired	1 to 2 in.	1 to 2 in.	1 to 2 in.	1 to 2½ in.	1 to 3 in.	1 to 3 in.	1 to 3 in.	1 to 3½ in.	1 to 4 in.
Adjustment of slide	1 in.	1 in.	1½ in.	1½ in.	1½ in.	1½ in.	1½ in.	2 in.	2 in.
Diameter of balance wheel	20 "	20 "	20 "	26 "	26 "	34 "	34 "	36 "	45 "
Width " " "	3 "	3 "	3 "	4 "	4 "	5 "	5 "	5 "	6 "
Weight " " "	150 lbs.	150 lbs.	150 lbs.	250 lbs.	250 lbs.	lbs.	500 lbs.	750 lbs.	1,100 lbs.
Speed " " " per minute	100 to 150	100 to 150	100 to 150	100 to 150	100 to 150	100 to 150	100 to 150	75 to 125	75 to 100
Area top of bolster plate, front and back x right and left	9x10 in.	x in.	8x9 in.	9x12 in.	12x13 in.	12x16 in.	17x20 in.	17x20 in.	33x33 in.
Thickness of bolster plate	1¼ "	1¼ "	1¼ "	1½ "	1½ "	1¾ "	2 "	2½ "	3¼ "
Height to center of shaft	48 "	50 "	51 "	56 "	60 "	61 "	61 "	61 "	68 "
Floor space over all, front and back x right and left	32x32 "	39x32 "	30x25 "	34x27 "	36x30 "	41x30 "	46x34 "	48x34 "	56x48 "

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ADJUSTABLE POWER PRESSES.

NO. 30 POWER PRESS.

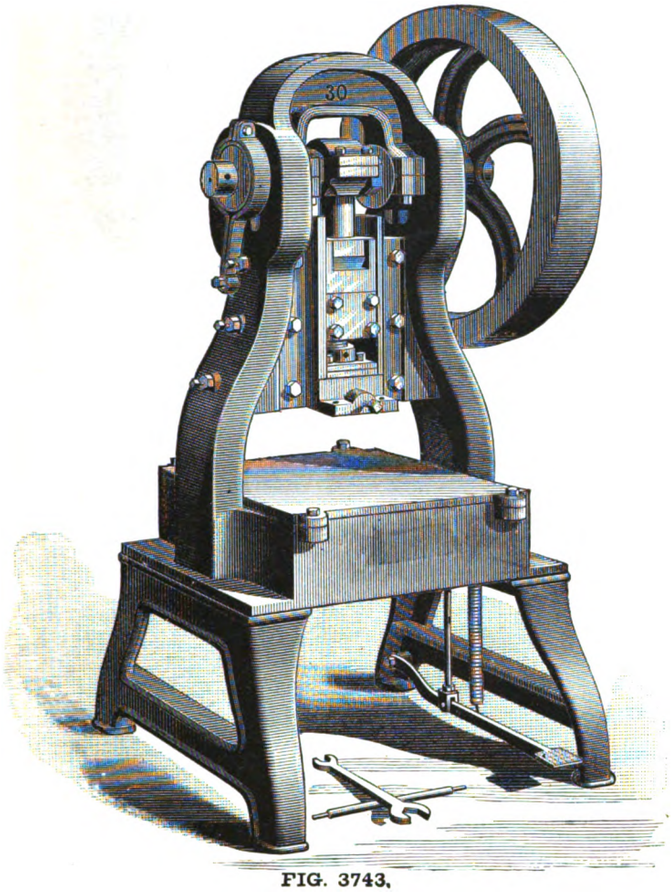


FIG. 3743.

NO. 37 1-2 POWER PRESS.

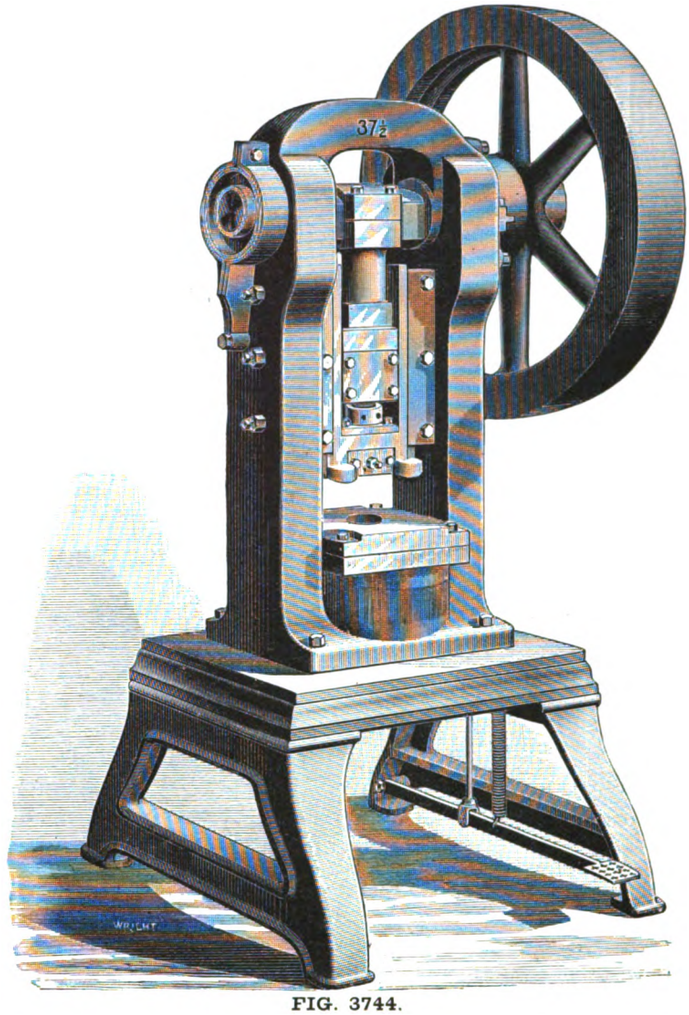


FIG. 3744.

The above cuts represent a class of single action presses extensively used in the manufacture of sewing machine attachments, typewriters, general hardware, locks, electrical goods, and a large variety of other articles of sheet iron, steel, brass, etc.

Fig. 3743 shows general style of Nos. 34, 30 and 63 presses, described in table below. The screw adjustment in slides of Nos. 34 and 63 are, however, different from that shown in cut. The front of bed on Nos. 34 and 30 are made removable to suit work requiring an open front to the press.

Fig. 3744 represents style of Nos. 50, 51, 52, 37½ and 40 presses, except in some details here referred to. Nos. 50 and 51, as regularly made, have right and left screw adjustment to slide. A wedge adjustment is supplied with No. 51, where required, at an extra charge of $25.00. Nos. 52 and 37½ are made as shown in Fig. 3744. No. 40 is only made with wedge adjustment in slide, and the shaft is made with eccentric instead of crank. All shafts are of forged steel, are supplied with an automatic clutch, and the wheel may be provided with four locking points, insuring rapid work.

PRICES.

Specifications of presses.	No. 34.	No. 30.	No. 63.	No. 50.	No. 51.	No. 52.	No. 37½.	No. 40.
Price, not geared	$325.00	$450.00	$1,000.00	$215.00	$275.00	$400.00	$600.00	$
Price, geared			1,100.00		350.00	475.00	700.00	$1,200.00
Weight, not geared	3,000 lbs.	4,200 lbs.	9,000 lbs.	1,000 lbs.	1,300 lbs.	2,900 lbs.	5,300 lbs.	
Weight, geared			10,500 lbs.		1,500 lbs.	3,500 lbs.	6,800 lbs.	10,000 lbs.
Opening in bed	16 x 22 in.	16 x 22 in.	14 x 18 in.	4 in. rd.	6 in. rd.	6 in. rd.	6 in. rd.	6 in. rd.
Width between uprights	28½ in.	30 in.	32 in.	10 in.	12½ in.	14 in.	13 in.	16 in.
Distance bed (not bolster) to slide, when up	10 in.	10 in.	11 in.	8 in.	9 in.	9 in.	8 in.	11 in.
Motion of slide	1 to 3 in.	1 to 4 in.	1 to 6 in.	½ to 2½ in.	½ to 3 in.	½ to 3 in.	1 to 4 in.	1 to 2 in.
Adjustment of slide	2 in.	2 in.	2 in.	1½ in.	1½ in.	1½ in.	1½ in.	⅞ in.
Thickness of bolster plate	1½ in.	1½ in.	2 in.	1½ in.	1½ in.	2 in.	2 in.	2 in.
Area top of bolster plate, F. & B. × R. & L.	26 x 27 in.	26 x 27 in.	23 x 30 in.	8 x 10 in.	18 x 12½ in.	14 x 14 in.	18 x 12 in.	20 x 15 in.
Diameter of balance wheel	34 in.	36 in.	60 in.	26 in.	30 in.	36 in.	45 in.	60 in.
Face of balance wheel	5 in.	5 in.	7 in.	4 in.	4 in.	5 in.	6 in.	7 in.
Weight of balance wheel	500 lbs.	750 lbs.	1,800 lbs.	250 lbs.	300 lbs.	750 lbs.	1,100 lbs.	1,800 lbs.
Speed of balance wheel per minute, not geared	100 to 150 r'vs	75 to 125 r'vs	60 to 90 revs.	100 to 150 r'vs	100 to 150 r'vs	75 to 125 r'vs.	75 to 100 r'vs.	
Speed of balance wheel per minute, geared			225 revs.		300 revs.	300 revs.	300 revs.	225 revs.
Diameter of large gear			60 in.		24 in.	36 in.	60 in.	60 in.
Proportion of gearing			7½ to 1		4 to 1	6 to 1	7½ to 1	7½ to 1
Number of strokes per minute			30		75	50	40	30
Diameter and width, pulleys on back shaft			24 x 6 in.		16 x 3 in.	20 x 4 in.	24 x 6 in.	24 x 6 in.

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PITMAN PRESSES.

OVERHANGING DOUBLE.

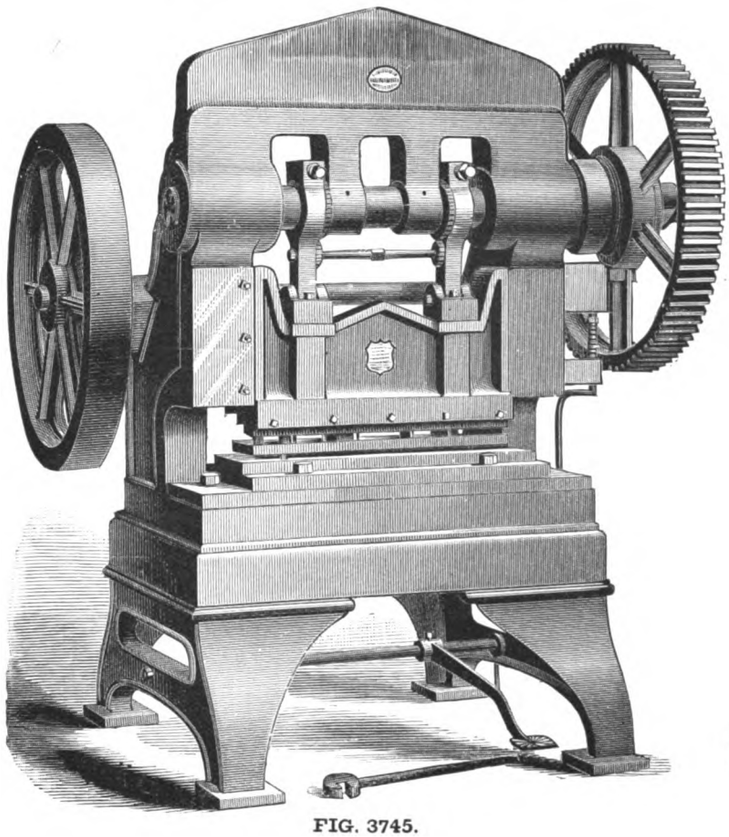


FIG. 3745.

Fig. 3745 shows the general style and appearance of our geared overhanging double Pitman presses, Nos. 101, 102, 103, 104, 105 and 106.

STRAIGHT-SIDED DOUBLE.

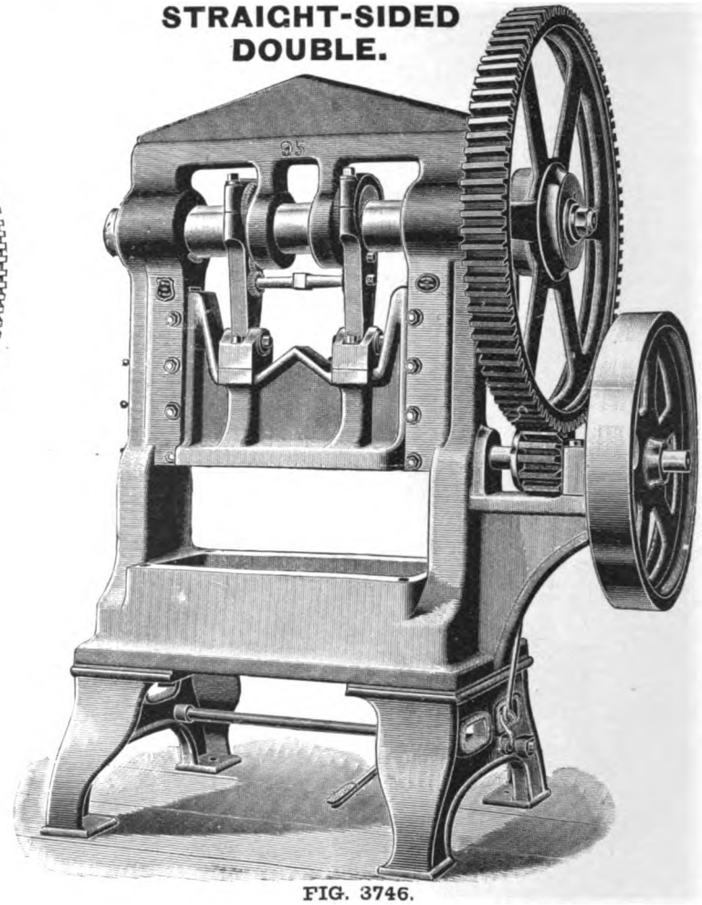


FIG. 3746.

Fig. 3746 represents the style and general appearance of the geared double Pitman presses, Nos. 91, 92, 93, 94, 95 and 96.

These presses are used where large blanks are to be cut, or long strips perforated or formed from sheet metal, such as armature plates for dynamos, shovels and scoops, coal hods, perforated sheets for screens, metallic ceiling and shingles, etc. The double pitmen serve to bring equal pressure on both ends of cross-head, insuring good results and keeping the dies in good condition. Both ends are so connected as to be adjusted up and down equally at the same time. These presses are made in various sizes and styles up to 10 feet in width, some of the larger sizes being adapted to forging axes, hammers, etc., for making steel railroad ties, etc.

The prices and dimensions given in table below can be varied to suit special requirements, with a corresponding change in price. Where dimensions are omitted from the table on overhanging presses, Fig. 3745, they correspond with those given in list of straight-sided presses, Fig. 3746.

PRICES, OVERHANGING DOUBLE PITMAN PRESSES, FIG. 3745.

SIZE.	No. 101.	No. 102.	No. 103.	No. 104.	No. 105.	No. 106.
Price, with standard distance between uprights	$360.00	$485.00	$575.00	$750.00	$1,000.00	$1,250.00
" geared	425.00	560.00	675.00	875.00	1,150.00	1,425.00
Opening in bed	As desired.					
Distance back from center of slide	6 in.	7 in.	8 in.	6½ in.	10½ in.	12 in.
Distance from bed to bottom of slide, when up	6¾ in.	7¾ in.	9 in.	9 in.	10 in.	11 in.
Floor space, about	42 x 38 in.	46 x 43 in.	50 x 47 in.	57 x 50 in.	62 x 56 in.	72 x 62 in.

PRICES, STRAIGHT-SIDED DOUBLE PITMAN PRESSES, FIG. 3746.

SIZE.	No. 91.	No. 92.	No. 93.	No. 94.	No. 95.	No. 96.
Price, with standard distance between uprights	$325.00	$435.00	$525.00	$675.00	$900.00	$1,100.00
Weight, " " " " "	1,600 lbs.	2,400 lbs.	3,750 lbs.	6,000 lbs.	8,000 lbs.	11,000 lbs.
Standard distance between the uprights	20 in.	26 in.	30 in.	36 in.	40 in.	48 in.
The distance between uprights can be varied from	16 to 26 in.	16 to 30 in.	20 to 40 in.	20 to 50 in.	20 to 64 in.	20 to 70 in.
Extra for more distance between uprights, per 6 inches above standard	$	$	$	$	$	$
Standard opening in bed (can be varied as desired)	6 x 16 in.	8 x 22 in.	10 x 26 in.	12 x 32 in.	16 x 36 in.	18 x 42 in.
Distance from bed to bottom of slide, when up	9 in.	10 in.	11 in.	12 in.	13½ in.	13½ in.
Motion of slide	1½ in.	1¾ in.	2 in.	2¼ in.	2½ in.	2¾ in.
Weight of fly wheel	225 lbs.	350 lbs.	725 lbs.	900 lbs.	1,300 lbs.	1,800 lbs.
Diameter of fly wheel	24 in.	30 in.	38 in.	42 in.	50 in.	60 in.
Width " "	3⅛ in.	4¼ in.	5¼ in.	6¼ in.	7¼ in.	7¼ in.
Average speed per minute, about	125 rev.	100 rev.	90 rev.	80 rev.	75 rev.	70 rev.
Diameter of shaft in bearings	3⅝ in.	3⅞ in.	4⅞ in.	5⅝ in.	6⅛ in.	6⅞ in.
Price, geared	$400.00	$510.00	$625.00	$800.00	$1,050.00	$1,300.00
Weight, geared, about	1,900 lbs.	2,800 lbs.	4,250 lbs.	6,500 lbs.	9,000 lbs.	13,000 lbs.
Proportion of gearing	1 to 4	1 to 4	1 to 5	1 to 6	1 to 7	1 to 10
Average number of strokes of geared press per minute	40	35	30	25	25	25
Floor space, about	32 x 30 in.	38 x 38 in.	38 x 44 in.	44 x 52 in.	46 x 58 in.	50 x 70 in.

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HAND SCREW PRESSES.

SCREW PRESS NO. 1.

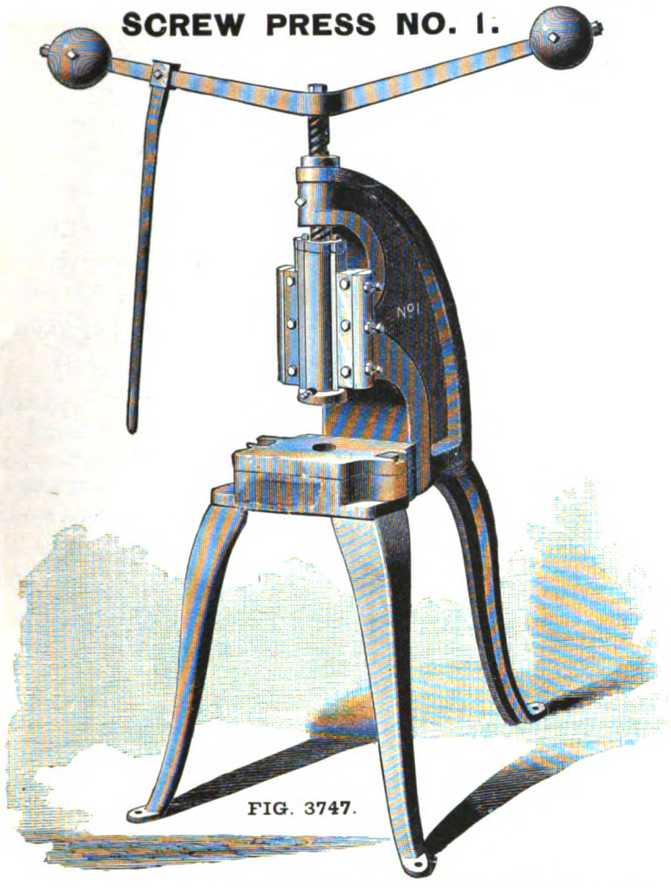


FIG. 3747.

ARCH SCREW PRESS.

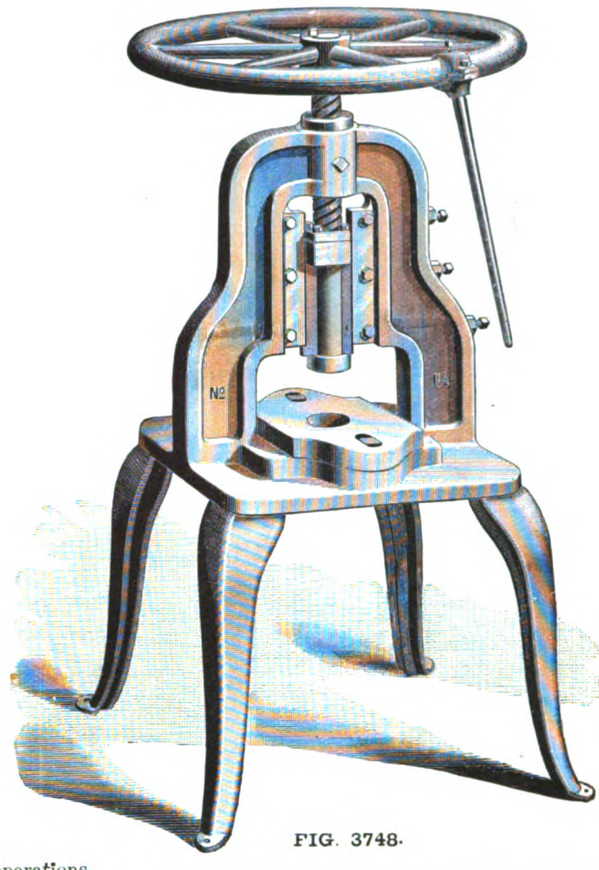


FIG. 3748.

DESCRIPTION AND PRICES, FIG. 3747.

Where steam power is not available, screw presses are found very useful for those operations requiring more power than can be developed in foot presses. They may be fitted with a balance wheel or lever with weight balls, as desired, but they will be fitted with lever unless specially ordered with wheel.

No. of Press.	No. 1.	No. 1½.	No. 2.	No. 3.
Price	$60.00	$100.00	$140.00	$260.00
Weight	400 lbs.	700 lbs.	1,200 lbs.	1,700 lbs.
Opening in bed, largest	5 x 5 ins.	5 x 5 ins.	8 x 8 ins.	15 x 16 ins.
Bed to slide, when up	7 "	7 "	8 "	8 "
Distance back from center of slide	5 "	5 "	7½ "	12 "
Thickness of bolster plate	1¼ "	1¼ "	1½ "	1¼ "
Diameter of steel screw	1⅜ "	2 "	2⅝ "	3 "
Triple thread with pitch of	2 "	2 "	2⅝ "	2½ "
Diameter of balance wheel	32 "	32 "	30 "	36 "
Weight " " "	65 lbs.	75 lbs.	125 lbs.	260 lbs.

PRICES, FIG. 3748.

No. of Press.	No. 1.	No. 1½.	No. 2.	No. 3.
Price	$85.00	$125.00	$175.00	$300.00
Weight	500 lbs.	900 lbs.	1,450 lbs.	2,500 lbs.
Width of opening in frame	10¼ ins.	12 ins.	15 ins.	23 ins.
Opening in bed, largest	6 x 6 "	7 x 7 "	8 x 8 "	10 x 10 "
Bed to slide, when up	6 "	6½ "	10 "	10 to 12 "
Thickness of bolster plate	1¼ "	1½ "	2 "	2 "
Diameter of steel screw	2 "	2 "	2½ "	3 "
Triple thread, pitch	2 "	2 "	2½ "	2½ "
Diameter of balance wheel	32 "	30 "	36 "	8 ft. lever.
Weight " " "	65 lbs.	125 lbs.	260 lbs.	

DESCRIPTION AND PRICES, FIG. 3749.

The presses represented by Fig. 3749 and described below are used extensively in the manufacture of silver and plated ware, electrical work, brass, iron and steel goods of every description. The shafts are of best quality of forged steel, and are provided with a graduated eccentric adjustment which admits of the most accurate setting. The eccentric bush as well as the Pitman are made of steel, the inside bush that surrounds the crank pin being of phosphor bronze. An automatic clutch locks the wheel to the shaft, and stops the slide at the highest point of the stroke.

No. of Press.	No. 0.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Weight, not geared ..... lbs.	525	900	1,550	3,000	4,800	7,300
Size of opening in bed ..... ins.	3 x 5	4 x 6	5 x 8	7 x 10	9 x 12	11 x 14
Distance back from center of slide ... ins.	4	4½	6	7½	9	10½
Distance from bed to bottom of slide when stroke and adjustment are up } ins.	5	5	6	7	8	9
Motion of slide ..... ins.	1	1	1¼	1½	1½	1½
Adjustment of slide ..... ins.	1	1	1	1	1	1
Will receive punch stem rd. or sqr. ... ins.	⅛ x 2	1⅛ x 2	1⅛ x 2¾	1⅛ x 3	1⅛ x 3	1⅛ x 3
Diameter of shaft ..... ins.	2⅜	2⅝	3½	4⅜	5	5⅝
Diameter and width of fly wheel ..... ins.	18 x 2½	24 x 3½	30 x 4¼	38 x 5¼	42 x 6¼	50 x 7¼
Weight of fly wheel ..... lbs.	115	225	350	725	900	1,300
Speed of fly wheel, per minute ..... rev.	100 to 150	100 to 150	100 to 135	80 to 110	75 to 95	75 to 85
Price, not geared	$120.00	$150.00	$225.00	$375.00	$500.00	$700.00
Price, geared	$.....	$240.00	$345.00	$475.00	$730.00	$910.00
Weight, geared ..... lbs.	.....	1,200	2,000	3,400	6,000	8,600
Proportion of gearing	.....	1 to 4	1 to 4	1 to 5	1 to 6	1 to 7
Average strokes, geared, per min ..... rev.	.....	40	35	30	25	25

POWER PUNCHING PRESSES.

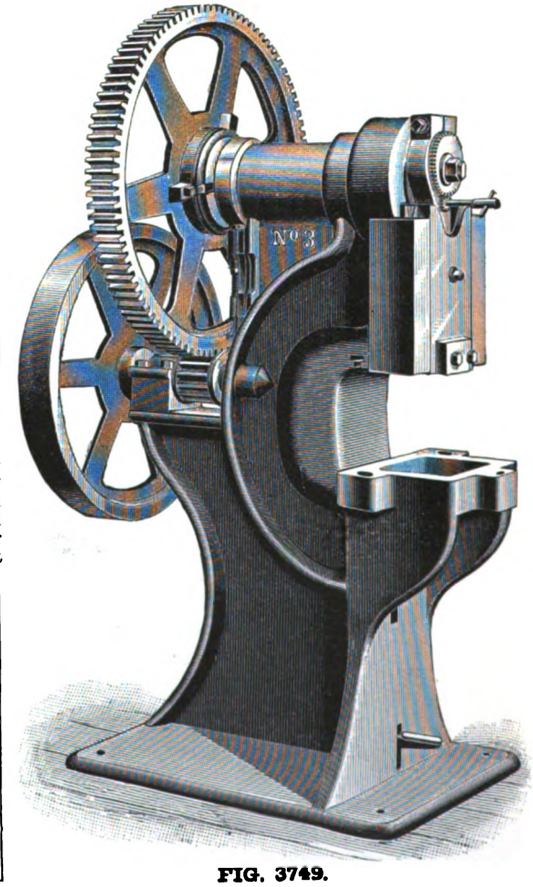


FIG. 3749.

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BRASS FOUNDERS' SPRUE CUTTER.

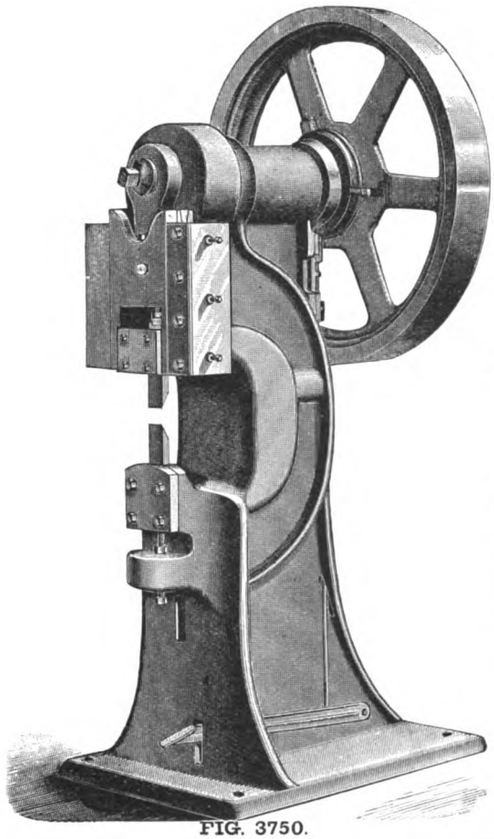


FIG. 3750.

These machines are designed with special reference to making it convenient for the operator to hold his castings in any position that he may find most desirable. The press is strong, roomy, and easily accessible in all its parts. The cutters are made of bar tool steel, without any forging or machining, but are ground to cutting bevel on an ordinary grindstone. They are both adjustable, so that they can be used up very close, and can always be kept so as to cut off the gate without touching each other, which preserves the keenness of their edges. The automatic clutch, operated by the foot treadle, always causes the slide to stop at the top of the stroke, leaving the largest possible space for getting the gate into position for the next cut. When the operator is ready, a light pressure on treadle will cause another stroke almost instantaneously.

Number of Cutter.	No. 120.	No. 121.	No. 122.	No. 123.
PRICES	**$135.00**	**$165.00**	**$250.00**	**$375.00**
Will cut off gates equal to	3/8 in. round	5/8 in. round	7/8 in. round	1 1/8 in. round
Distance from edge of cutter to frame	4 in.	4 1/2 in.	6 in.	7 1/2 in.
Weight, complete, about	525 lbs.	900 lbs.	1,500 lbs.	3,000 lbs.
Size of fly wheel	18 x 2 1/2 in.	24 x 3 1/8 in.	30 x 4 1/4 in.	38 x 5 1/4 in.
Speed of fly wheel per minute	120 revs.	115 revs.	110 revs.	100 revs.

COLD SAW FOR STEEL CASTINGS.

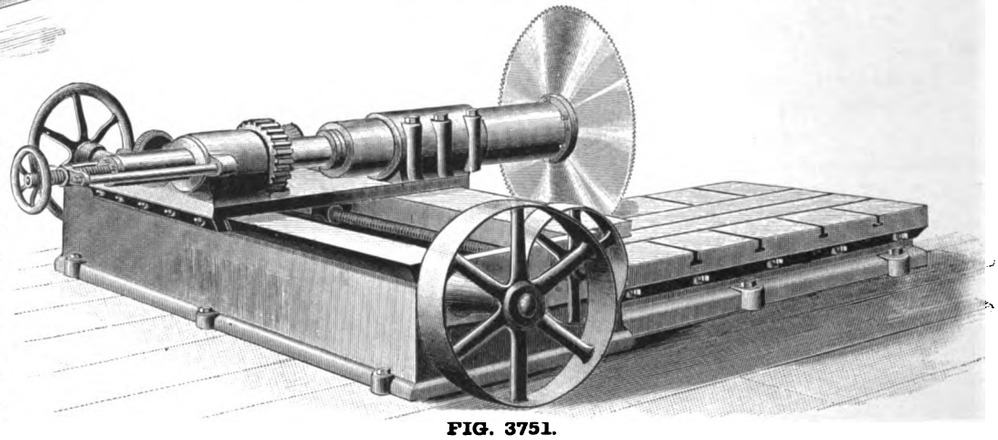


FIG. 3751.

This machine is designed for steel foundries, to cut off the heads and sprues of very large steel castings, and is especially adapted to cutting off the heads of roll castings. Machine can be used with a 48 inch or smaller saw. Spindle of machine, which is adjusted in and out from the frame, has an adjustment of 30 inches, and when at its extreme point will extend 48 inches beyond the bed of the machine. The spindle, which is very heavy, is of hammered steel and is carried in an adjustable sleeve which has a taper bronze bearing in the front end for taking up the wear. The adjustment of the spindle is through hand wheel in rear of saddle, and when set the sleeve is securely clamped with six bolts on the cap. Spindle saddle has an automatic feed with five changes; work table is supplied with "T" slots running in both directions for convenience in clamping work, is independent of the bed of machine and can be set in any position. With the machine are provided one 48 inch saw, grinding machine, countershaft and wrenches.

WEIGHT, 24,000 LBS. PRICE, WITH WORK TABLE, 6 FT. LONG, $..... EXTRA, PER FT., LONGER BED, $.....

COLD SAW, WITH COMPOUND TABLE.

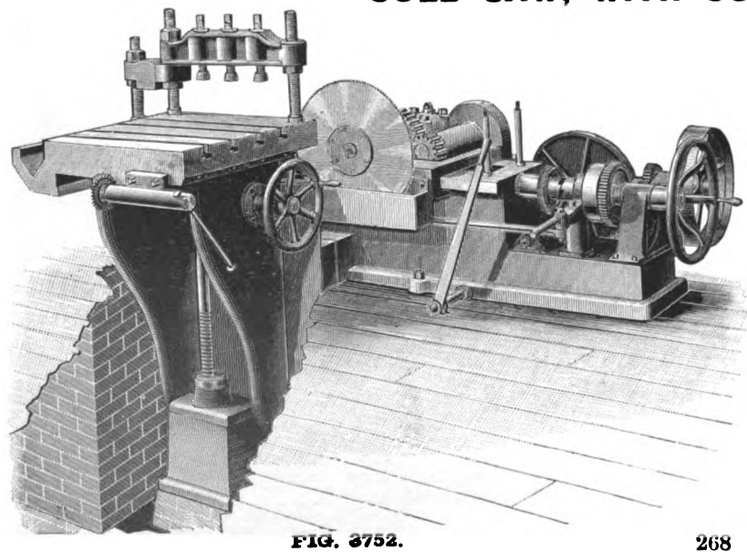


FIG. 3752.

It has the in and out and vertical adjustments. Where the work to be cut off is in such shape that it cannot be reached with the saw, the work can be clamped on this work table and the table raised and lowered to bring it in a suitable position to be cut off, and where it is necessary to cut partially through a piece of work for frog and switch and crossing manufacturers it is not necessary to block the work up. Machines have an automatic feed from 1/2 inch to 2 inches per minute, controlled by a lever. The power quick return is through a friction and can be operated without stopping the machine. The automatic feed and quick return have stops which can be set any desired position. Each machine is furnished with one saw, independent saw sharpening machine and countershaft, clamping apparatus, cover plate and wrenches.

PRICES.

No.	Cuts off.	Saw.	Weight.	
0.	10 in. x 2 1/2 in.,	12 1/2 in. diam.,	3,500 lbs.,	$.....
1.	16 " x 4 1/2 "	18 3/4 " "	6,000 "	.....
2.	24 " x 6 "	24 " "	10,000 "	.....
3.	32 " x 8 "	30 " "	18,000 "	.....

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PORTABLE HAND COLD SAWING MACHINE.

These cuts represent a machine for cutting steel rails, beams, channels, angles, and other shapes, round, square, octagon iron and steel, etc.

One saw blade will, as a rule, cut from 200 to 250 steel rails before resetting is required.

The sharpening of saw blades is done by a saw gummer, which we can furnish at $15.00. (See Fig. 4038.)

This machine will be furnished with two saws of 18 inches diameter cutting about 6 inches deep and 6 inches wide.

Split plates are platens with cored holes for bolt heads used in holding work.

PRICES.

With cross slide rest, . . . $280.00

WEIGHT, 1,400 LBS.

With split plate, ... $200.00

WEIGHT, 1,100 LBS.

Extra with drill press, . . . $30.00
Extra on truck with 4 iron wheels, 40.00
Extra with automatic drill press, 50.00

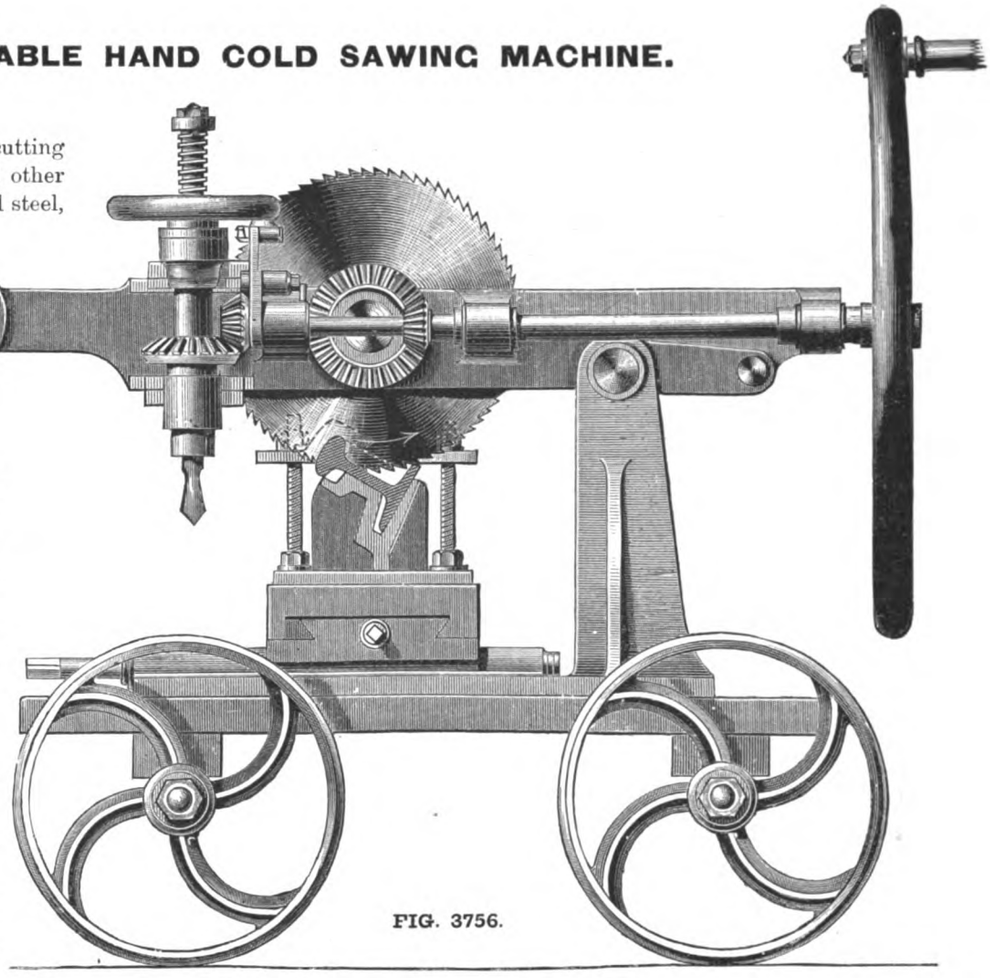


FIG. 3756.

STATIONARY POWER COLD SAW.

This cut shows at a glance the advantages of this design of machine in two points:

First, in regard to the ease with which the object intended for cutting can be placed upon the table, lying free below the saw and giving the workman a chance to operate in every direction and to cut any angle desired.

Secondly, these machines cut faster in the weak parts of the object than in stronger parts, on account of their forward motion by means of a weighted lever, as plainly represented in above cut of a rail, sawed by this machine, by narrow and wide lines.

The swinging lever may be adjusted as desired, high or low.

The machine is furnished with two saws 20 inches diameter, cutting about 6 inches deep and 6 inches long.

Pulleys, 22 x 4¾ inch. 100 revs. per minute.

A lifting apparatus is furnished for raising the lever.

PRICES.

With split plate, $500.00

WEIGHT, 3,000 LBS.

With cross slide rest, $600.00

WEIGHT, 3,500 LBS.

Automatic drill press, extra, $60.00

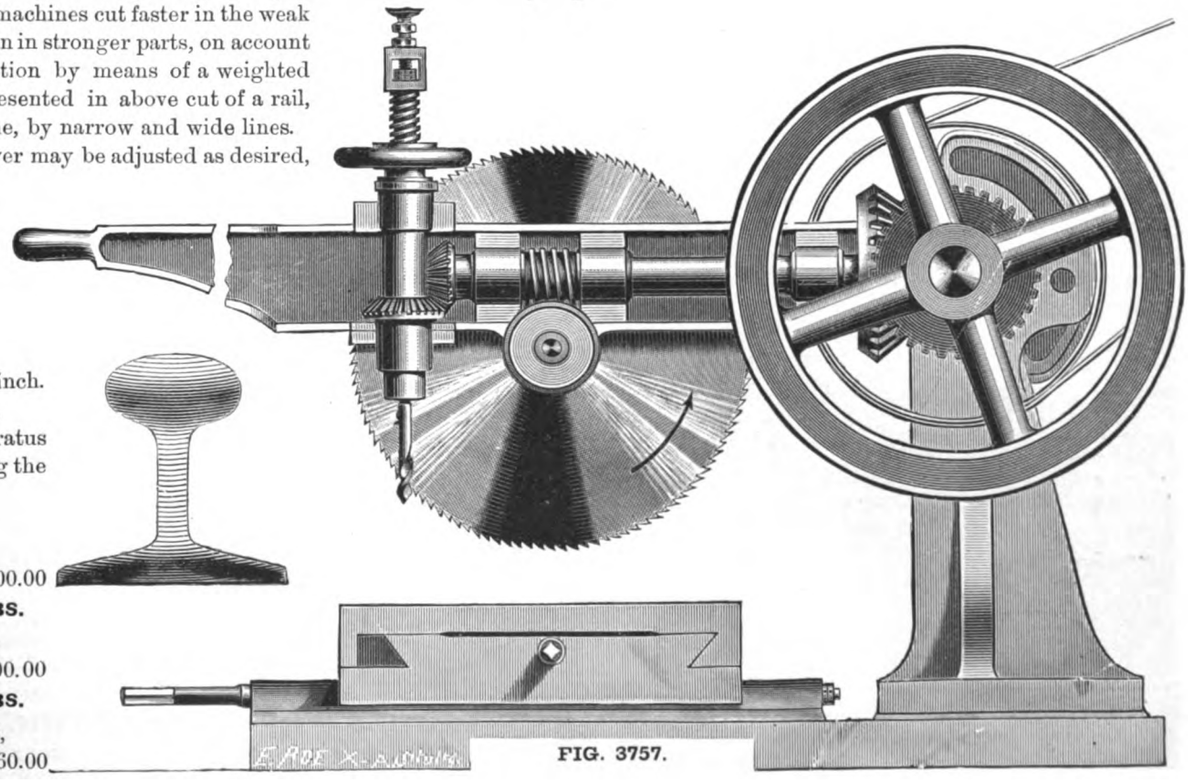


FIG. 3757.

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HAND OR POWER COLD SAWS.

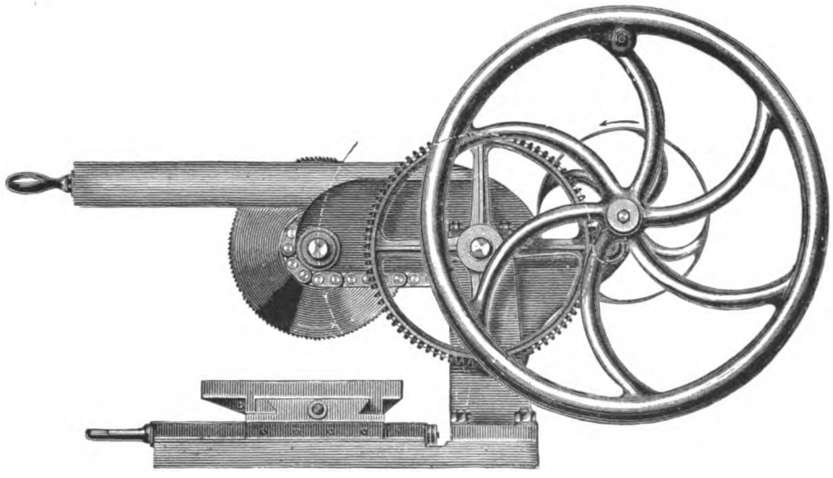


FIG. 3758.

The saw blades on Nos. 1 and 2 are 16 inches diameter and will cut 5 inches deep; on No. 3 they are 8 inches deep and will cut 2½ inches.

PRICES.

No. 1.	With split plate,	$320.00.	Weight,	1,200 lbs.
" 1.	" slide rest,	400.00.	"	1,700 "
" 2.	" split plate,	250.00.	"	900 "
" 2.	" slide rest,	320.00.	"	1,400 "
" 3.	" vise,	120.00.	"	300 "

Truck wheels extra for Nos. 1 or 2, $40.00.

These saws are operated by a chain from the power shaft.

F. & L. pulleys for Nos. 1 and 2, 15 x 3½ in., 70 revolutions per minute.

F. & L. pulleys for Nos. 3, 7½ x 2¼ in., 70 revolutions per minute.

HAND SAW AND VISE COMBINED.

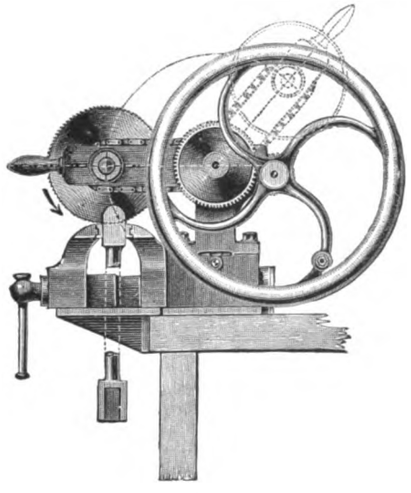


FIG. 3759.

This arrangement is attached to a bench. The saw can be pushed to one side or lifted upward and backward out of the way, and will cut iron or steel of 3½ inches diameter. The vise has 6 inch jaws and opens 8 inches. Weight, 750 lbs. Fast and loose pulleys, 10½ by 3 inches. 70 revolutions per minute.

PRICES.

Either hand or power, with vise and one 12 inch saw....$150.00
Both hand and power, with vise and one 12 inch saw..... 165.00

Cuts 3½ deep by 5 inches long.

POWER HACK SAW.

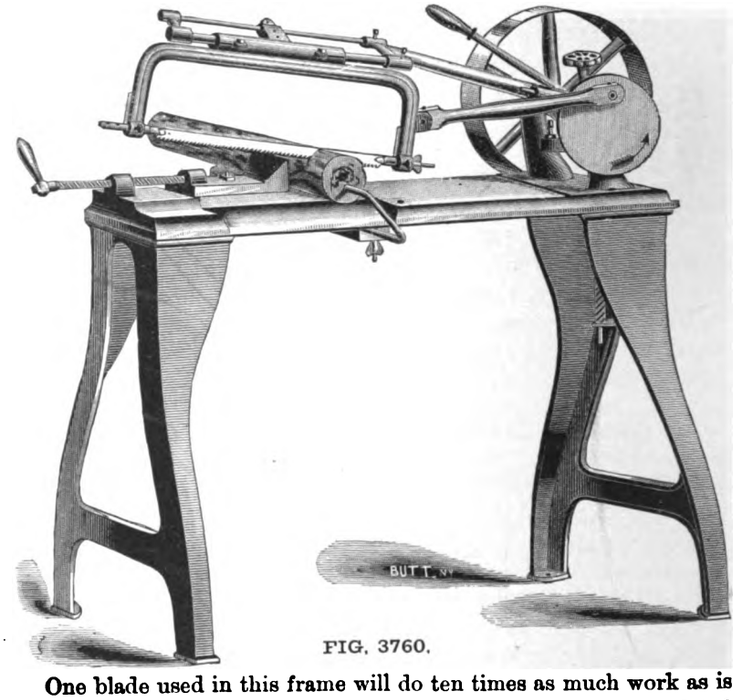


FIG. 3760.

One blade used in this frame will do ten times as much work as is usually done with it by hand, as the speed and pressure are regulated and uniform. One blade will cut off several steel shafts 5 inches in diameter. It runs 40 strokes per minute and does its work without attention. Pulleys, 13½ inches diameter; 40 revolutions.

WEIGHT, 144 LBS. PRICE, $25.00.

CIRCULAR SAW BLADES FOR IRON, STEEL AND METAL.



FIG. 3761.

These cold saws cut the strongest and hardest cast steel, iron and metals of every kind. They are ground hollowing inside of the teeth.

PRICES.

Diam. inches,	8	10	12	14	16	18	20	22	24	28	32
Price,	....	....	$8.00	$9.00	$10.00	$11.00	$12.00	$15.00	$18.00	$22.00	$28.00
Resetting,	....	....	1.75	2.00	2.00	2.25	2.50	2.75	3.00	4.00	5.00

Larger blades made to order.

BAND SAW BLADES FOR IRON, STEEL AND METAL.

PRICES.

Width of the blade about ⅝ inches..... .....$18.00
" " " " 1¼ " 24.00
" " " " 1¾ " 30.00

Length of the blade about 260 inches.

SCROLL SAW BLADES FOR OSCILLATING SAWS.

PRICE, $1.50.

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COLD SAW CUTTING-OFF MACHINES.

NO. 0 MACHINE.

The No. 0 machine is used for light work and has a saw or milling-cutter 12½ inches in diameter, and cuts round and square bars up to 2½ inches, section of beams 2½ inches up to 10 inches. This machine can be used to great advantage for cutting off keys, small shafts and other work within the range of the tool. The tool is provided with one saw, independent saw-sharpening machine, countershaft, clamping apparatus, cover plate, countershafts and wrenches. The machine has variable automatic feed, ranging from ½ inch to 2 inches per minute, with automatic stop; has quick return to spindle carriage by hand. The machine weighs 2,500 lbs.; diameter of tight and loose pulleys on countershaft, 12 inches; speed of countershaft, 420 revolutions per minute.

WEIGHT, 2,500 LBS. PRICE, $.....

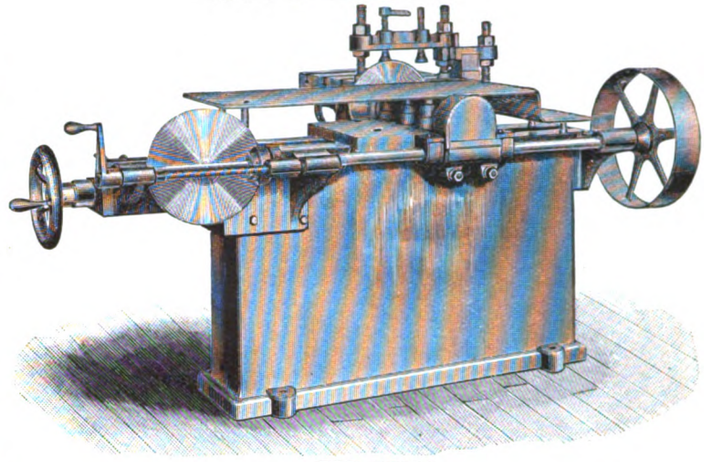


FIG. 3761A.

NO. 1 MACHINE.

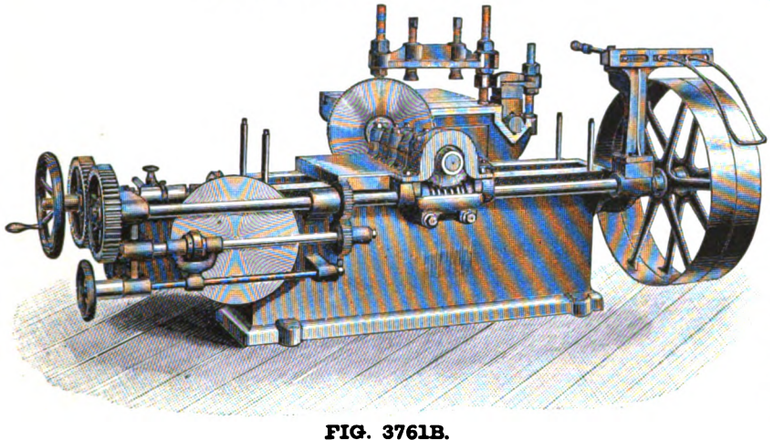


FIG. 3761B.

The No. 1 machine has a capacity to cut off round and square bars up to 4 inches, sections of beams 4½ inches up to 16 inches, saw or mill cutter, 18¾ inches in diameter, has variable automatic feed, ranging from ½ inch to 1½ inches per minute, with power quick return, with automatic stop in both directions. Machine will be furnished with tight and loose pulleys, as shown in cut, or with countershaft, as desired. Accompanying the machine is one saw, independent saw-sharpening machine, cover plate, clamping apparatus, wrenches and countershafts. The illustration shows machine with cover plate left off and shows the working parts of the machine to better advantage, and also illustrates the 3 inch round bar clamped in chuck on side work table. Weight of machine, 4,500 lbs.; diameter of tight and loose pulleys on countershaft, 12 inches; speed of countershaft, 450 revolutions per minute. **WEIGHT, 4,500 LBS. PRICE, $.....**

This machine is also made to cut stock 4½ inches high by 8 feet long. **WEIGHT, 8,000 LBS. PRICE, $.....**

The No. 2 machine has a saw or milling-cutter 24 inches in diameter, and cuts round and square bars up to 5½ inches, sections of beams 6 inches by 24 inches; machine is calculated for heavy work and especially adapted to railroad shops, frog and switch works, besides numerous other shops for work of the capacity of the tool. The cut of the machine illustrates the working side of the tool showing the work table and clamping apparatus. The machine is driven with heavy spur gearing and a worm-wheel giving great power, has a variable automatic feed and power quick return, with automatic stop in both directions. The machine is provided with a countershaft or tight and loose pulleys on machine, so that it may be driven direct from line if desired. The weight of tool is 7,500 lbs. Tight and loose pulleys on countershaft, 20 inches diameter, should run at 390 revolutions per minute. Accompanying the machine is one saw, independent saw-sharpening machine, clamping apparatus, cover plate, countershafts and wrenches.

WEIGHT, 7,500 LBS. PRICE, $.....

This machine is also made to cut stock 6 inches high by 48 inches long.

WEIGHT,.....LBS. PRICE, $.....

The No. 3 machine is adapted to various works, heavy beam or other work to be cut off, is used extensively in bridge shops and rolling mills. The tool carries the saw or milling-cutter 30 inches in diameter, and cuts round and square bars up to 7 inches, sections of beams 8 inches by 32 inches. It is a very powerful tool and strong enough to cut off any work within the range of the tool. Weight of tool, 9,500 lbs.; tight and loose pulleys on countershaft, 16 inches in diameter, and should run at 330 revolutions per minute. Included with this machine is one saw, independent saw-sharpening machine, cover plate, clamping apparatus, countershafts and wrenches.

WEIGHT, 9,500 LBS. PRICE, $.....

NOS. 2, 3, 4 AND 5 MACHINES.

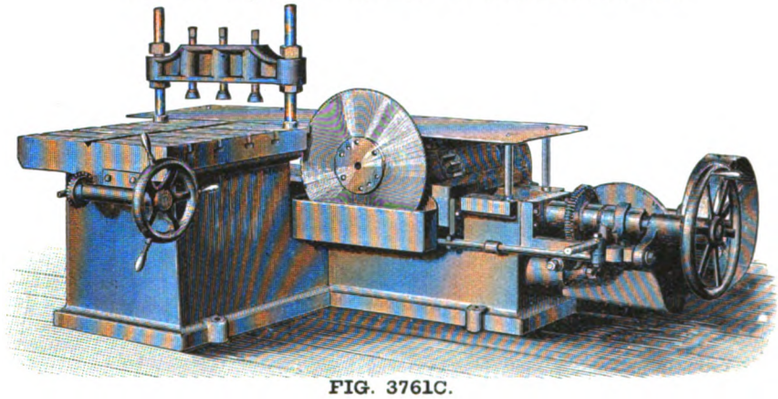


FIG. 3761C.

The No. 4 machine is adapted to large and heavy work, having the capacity to cut round and square bars up to 10 inches, sections of beams 11 inches by 38 inches and carries a saw 36 inches in diameter. Weight of tool, 14,000 lbs.; tight and loose pulleys on countershaft, 20 inches diameter, should run at 440 revolutions per minute. This machine can be used for cutting large beams, columns or any work within the range of the tool. Accompanying this machine is one saw, independent saw-sharpening machine, clamping apparatus, cover plate, countershafts and wrenches. **WEIGHT, 14,000 LBS. PRICE, $.....**

The No. 5 machine is a very heavy tool adapted for large and heavy work within the capacity of the machine. The machine has a saw 48 inches in diameter and will cut off round and square bars up to 12 inches, beams 15 inches by 56 inches, tool weighs 20,000 lbs.; tight and loose pulleys on countershaft, 26 inches diameter, and should run at 500 revolutions per minute. The tool is of the same general design as the No. 3, provided with a variable automatic feed power of quick return, with an automatic stop in both directions. This tool can be built for various special work, and the design can be altered to suit the work if necessary. **WEIGHT, 20,000 LBS. PRICE, $.....**

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COLD SAW CUTTING-OFF MACHINES.

REVOLVING BED MACHINES.

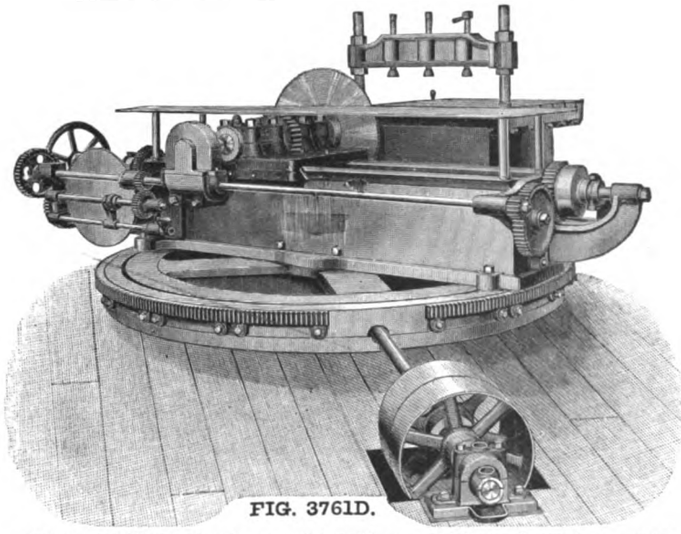


FIG. 3761D.

Above cut illustrates the special cold saw cutting-off machine, which is built on the same general principles as the regular machines, with the exception that it is set on a turn-table and driven from the central point underneath the bed, allowing the machine to be swung around at any angle. The advantage of this tool for heavy work is the economy of shop space, as instead of swinging the work, which would require a large space to be left for the beams to swing in, the beams are always in one position and the machine can be swung at whatever angle it is desired to cut off the work. It is especially adapted for bridge, ship-building and structural work. We build this machine in four sizes.

No. 2	machine	cuts	off	work,	24 x 6	inches.	Saw,	24	inches diameter.
No. 3	"	"	"		32 x 8	"	"	30	" "
No. 4	"	"	"		38 x 12	"	"	36	" "
No. 5	"	"	"		56 x 15	"	"	48	" "

PRICES.

No. 2.	Weight,	11,000 lbs.	$.....
No. 3.	"	15,000 "	.....
No. 4.	"	20,000 "	.....
No. 5.	"	26,000 "	.....

STOCK YARD MACHINE.

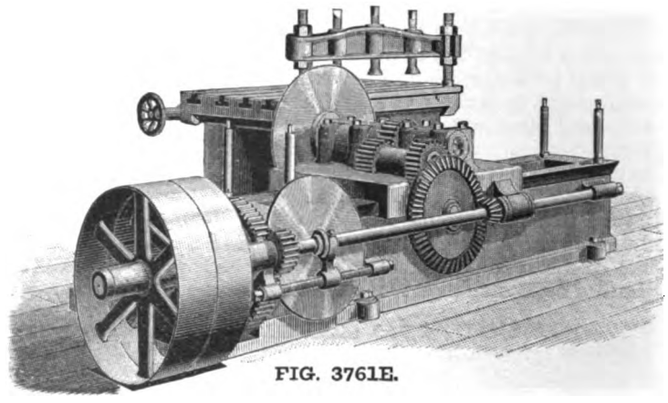


FIG. 3761E.

The above illustration shows a machine designed for stock yard work at the works of iron and steel manufacturers to take the place of the high speed or friction cold saws which are in use in most of the steel and iron works in the country, but give very little satisfaction. There is no tool used by the iron and steel mill that there is as much discussion about and so little advancement in, as with the friction saw, remaining in almost the same condition as it was a number of years ago. The saw requires a great amount of power, the life of the saw is very short and requires to be constantly dressed. The belts running at a high speed wear out very quickly; they are very broad, consequently they add a great item to the cost account. To compete with this machine we have placed the above machine on the market, not claiming that it will do work as fast as the friction saw, but that it will do it much cheaper, requiring, of course, more of these machines to do a certain amount of work than would be required with the friction saw. The friction saw will require from 40 to 75 horse-power to drive it. The above machine will require not more than 5 horse-power; the cost of the saws is much less and they are very little trouble to keep in order, as a grinding machine is furnished with each machine, grinding the saw is very quickly done, and if an extra saw or two is kept on hand, it takes but a very few minutes to sharpen the saw. The saws can be either sharpened in the tool room where the grinding machine is kept or the machine can be set in a convenient position where the operator can sharpen his saw at any spare time he may have. By actual test in one of the largest steel works in the country it required seven minutes to cut off a 10 x 2½ inch channel bar; with our machine it would require about ten minutes to do the same amount of work. The machine is designed for rough and heavy work, all the gearing being cut. The machine has a capacity to cut off work 8½ inches high and 24 inches broad; the saw is 30 inches in diameter, has a variable automatic feed from ½ to 2 inches, with power quick return with automatic stop in either direction.

The friction saw produces a very disagreeable noise, and the saws are liable to break. With this machine the saw is almost noiseless. The work can be cut off to absolute lengths, cutting off square or at any angle, requiring no dressing after it comes from the machine, while the friction saw leaves the work very irregular and glazes the end of the beam.

WEIGHT, 9,000 LBS.

PRICE, $.....

COMBINED COLD SAW CUTTING-OFF MACHINE AND ROTARY PLANER.

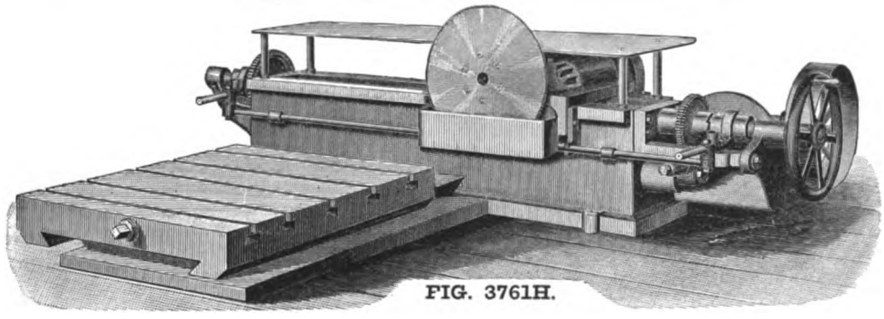


FIG. 3761H.

This machine shows a tool which can be used as our regular cold saw cutting-off machine or as a rotary planer. There has been a demand for a machine which can be used to advantage as a combined machine. The machine is specially adapted to the work of steel-casting foundries, or other places where they may have work to be cut off from large castings, such as sinker heads, risers, etc., that are liable to come in the center, or where they could not be reached with our ordinary cutting-off machine. With the above machine the work can be set on jigs or parallels and raised up so that the sinker head of the diameter within the range of the tool can be cut off from very large castings, as there is nothing in the way to prevent it from being lowered down below the center of the saw. The saw is made with the flush side so that the sinker heads can be cut off close to the castings. For ordinary work we can furnish a cast iron box, which can be set on the adjustable bed plate, the box having a set of clamps the same as shown on all of our cold saw cutting-off machines. The machine can then be used the same as the standard tool. The saw is fastened to a collar which is screwed to the nose of the spindle, and when necessary can be taken off and ordinary face cutter put on. The machine can then be used as a rotary planer. We build these machines in three sizes. The general design of the tool is the same as our standard machine, with the exception of the clamping apparatus, and of the same range.

No. 1	will	cut	off	gates	up	to	4½	inches.	The sections	4½	x	16	inches.	The saw is 18¾ inches in diameter. ...Weight, 4,600 lbs., Price, $.....
No. 2	"	"	"	6	"	in	diam.	"	6	x	24	"	"	" 24 " " ..... " 8,000 " " .....
No. 3	"	"	"	9	"	"	"	"	9	x	32	"	"	" 30 " " ..... " 10,000 " " .....

We can build the No. 4 and 5 standard machines in the same way if desired. The cut illustrates the machine without the box and clamping machine. If these fixtures are desired, we will be pleased to mail you photograph showing the attachments.

EXTRA SAWS.

We carry a full line of saws in stock and can ship upon receipt of order, unless the saw is required to have special number and size of teeth, when they will have to be made to order.

Saw for size of machine.	Diameter.	Thickness at outside.	PRICE.	Saw for size of machine.	Diameter.	Thickness at outside.	PRICE.
0	12½ in.	5/32 in.	$.....	5	48 in.	3/8 in.	$.....
1	18¾ "	3/16 "	.....	Special No. 1.	18¾ "	3/16 "	.....
2	24 "	7/32 "	.....	Special No. 2.	24 "	7/32 "	.....
3	30 "	1/4 "	.....	Armor plate mach.	36 "	5/32 "	.....
4	36 "	9/32 "	.....	Stock yard mach.	30 "	1/4 "	.....

A LUBRICANT for milling cutters, cold saws, band saws, screw cutting, nut tapping, drilling, etc.: 10 lbs. whale-oil soap; 15 lbs. sal. soda; 2 gals. best lard oil. Shave the soap so that it will dissolve readily, put the whole in a clean forty gallon cask and fill with water, introduce a steam pipe into the water so that it may be boiled; when thoroughly dissolved it is ready for use. Keep warm in winter.

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BAR COLD AND METAL BAND SAWS.

COLD BAR CUTTING-OFF MACHINE.

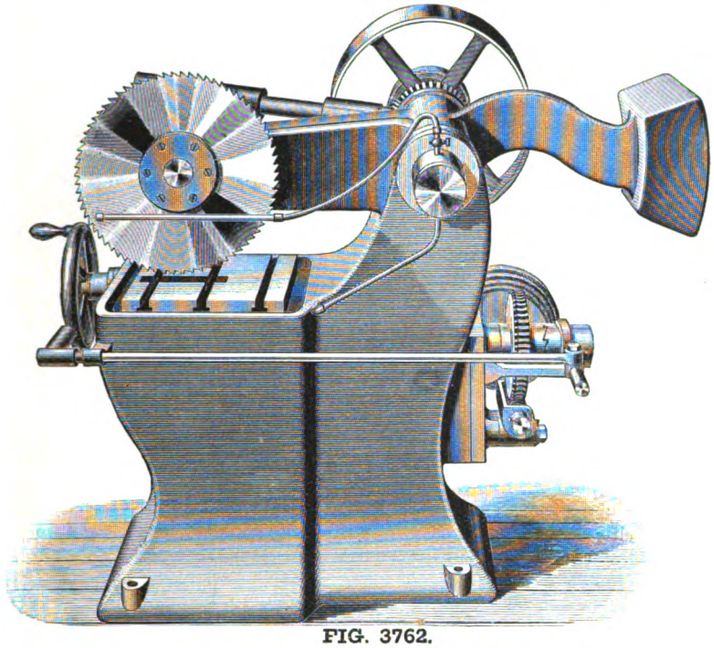


FIG. 3762.

PRICES.

No. 1. Cuts off round and square bars up to 2½ inches.
WEIGHT, 1,800 LBS. PRICE, $.....

No. 2. Cuts off round and square bars up to 4 inches.
WEIGHT, 2,200 LBS. PRICE, $.....

No. 3. Cuts off round and square bars up to 6 inches.
WEIGHT, 4,000 LBS. PRICE, $.....

METAL BAND SAW.

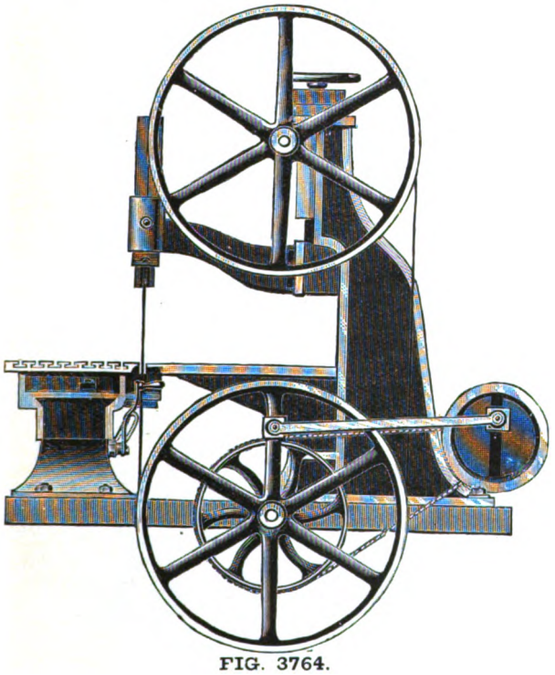


FIG. 3764.

This machine will take in 12 inches in height and will cut 42 inches long at one setting; has compound table and automatic feed with safety trip. The machine is so constructed that an up and down motion may be imparted to the saw, thus converting it into a jig saw.

The band wheels are 50 inches in diameter. It is driven with a three step cone so that various speeds may be used according to the work to be done.

Countershaft pulleys are 27 inches in diameter by 4 inch face, and should make 60 revolutions per minute.

WEIGHT, 10,000 LBS. PRICE, $1,800.00.

FOR PRICES EX. BAND SAWS, SEE PAGE 272.

COLD METAL BAND SAW.

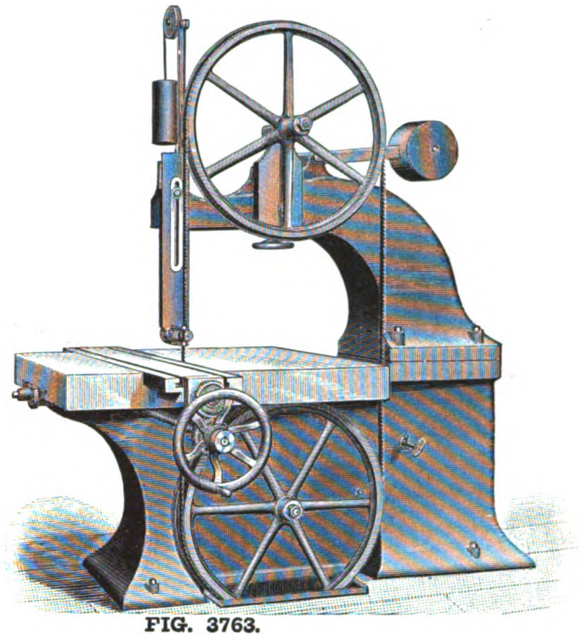


FIG. 3763.

PRICES.

No. 1 will cut to the center of 80 inches, and will cut up to 12 inches thick; automatic feed carriage, 12 inches wide, 72 inches long, has an automatic feed of 28 inches; stationary table, 48 inches wide, 54 inches long.

WEIGHT, 6,000 LBS. PRICE, $.....

No. 2 will cut to the center of 108 inches, and work up to 15 inches high; automatic feed carriage is 18 inches wide, 84 inches long, has an automatic feed of 36 inches; stationary table, 60 inches wide, 72 inches long.

WEIGHT, 9,000 LBS. PRICE, $.....

METAL BAND SAW.

This machine is useful in machine and jobbing shops and brass foundries for cutting off bars, pipes, or plates of steel, iron, brass or other metals, horn, ivory, or other materials requiring a harder saw and slower speed than wood. It will cut off pieces 27 inches long or shorter, making the ends of any required angle.

The saw descends in the center of the table, which is 24 inches square and stands 39 inches above the floor. The tension of saw is self-adjusting by means of a weighted lever, and the guides for the saw are furnished with hardened steel rolls. The upper guide is adjustable for different thicknesses of work up to eight inches. The slide for moving the work up to the saw is operated by a screw having a travel of six inches, without uncovering its guides, and the screw can be quickly removed in order that the slide may be moved by hand for light work.

The upper saw wheel is adjustable from side to side, and the bearing is carried on pivots, so that the saw can be made to run well and pass perpendicularly through the table. The saws used are 16 feet long, specially tempered, the backs being soft while the teeth are hard enough to cut steel; when dull they are replaced by new saws, on account of the low price at which they are furnished and the difficulty in filing them.

The machine has a countershaft with a three grade cone and 13¾ x 2¼ tight and loose pulleys, which should make 80 revolutions per minute for cutting steel and general work, or 200 revolutions per minute for brass and soft metals.

WEIGHT, 925 LBS. PRICE, $.....

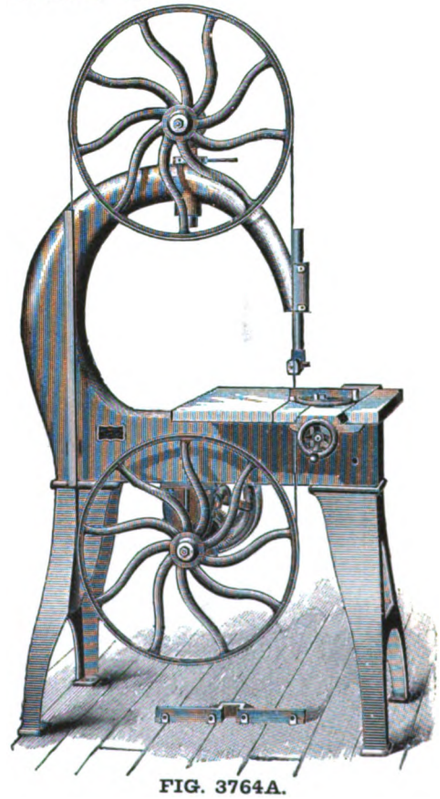


FIG. 3764A.

Extra saws are furnished in the coil at $1.75 per pound. They weigh, when cut to proper length, about 1 pound. The price of a single saw. ½ inch wide, unbrazed, is $1.75; brazed, $2.10.

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HYDRAULIC RIVETING MACHINES.

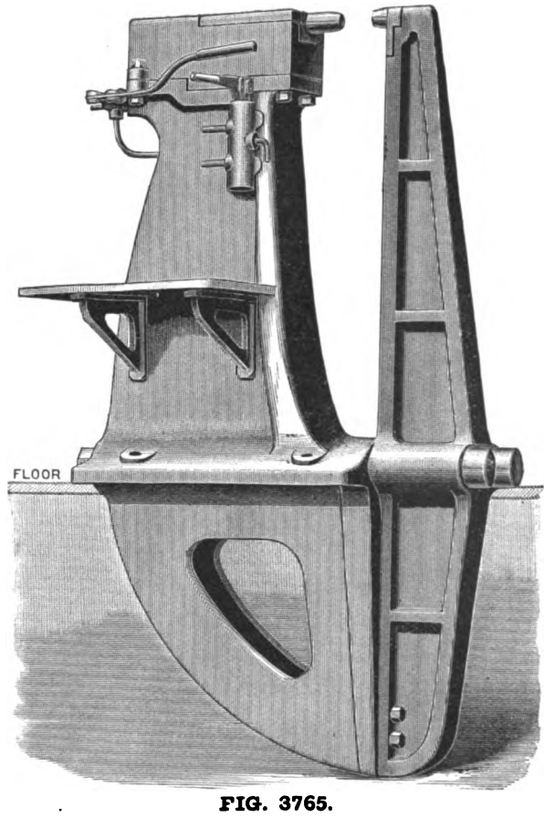


FIG. 3765.

8 FOOT GAP FOR 1 INCH RIVETS.

This machine has a large steel stake, held in tension strain by the two steel bolts shown, one upon each side of the machine. The other part of the jaw is cast iron, and has, attached to the upper end of it, a removable, interchangeable head, with 8½ inch hydraulic cylinder, giving a pressure of about 40 tons, at 1,500 lbs. to the square inch. Angle pieces are placed upon the side of the machine at the proper height for a platform. The platform weighs, for this capacity, about 22,500 lbs., and is operated entirely by a single lever, shown in the side view; the sliding head being flush with the side of the machine, and sliding in large guides, allowing two angle irons to be riveted back to back in the middle of a sheet, if such a job was desired; the depth of the jaw being nearly 8 feet 2 inches for the machine sold for 8 foot gap. If a clamp is desired in addition to the riveter, then we place upon the machine a different kind of head, having two concentric rams, one of them operating the clamp, and the other for heading the rivet; both operated independently of each other, and returning to position automatically. **PRICE, $2,250.00. CLAMP EXTRA, $250.00.**

6 FOOT GAP FOR 3-4 INCH RIVETS.

This machine has a large steel stake, held in tension strain by the two steel bolts shown, one upon each side of the machine. The other part of the jaw is cast iron, and has, attached to the upper end of it, a removable, interchangeable head, with a 7 inch hydraulic cylinder, giving a pressure of about 28 tons, at 1,500 lbs. to the square inch. Angle pieces are placed upon the side of the machine at the proper height for a platform. The machine weighs, for this capacity, about 14,000 lbs., and is operated entirely by a single lever, shown in the side view; the sliding head being flush with the top of the machine, and sliding in large guides, allowing two angle irons to be riveted back to back in the middle of a sheet, if such a job was desired; the depth of the jaw being nearly 6 feet 2 inches for the machine sold for 6 foot gap. If a clamp is desired in addition to the riveter, then we place upon the machine a different kind of head, having two concentric rams, one of them operating the clamp, and the other for heading the rivet; both operated independently of each other, and returning to position automatically. **PRICE, $1,750.00. CLAMP EXTRA, $150.00.**

HYDRAULIC BROACHING PRESS.

DESCRIPTION, FIG. 3766.

This press has a variable delivery belt pump attached, the shaft and eccentrics being placed at the top of the press and one side of the cylinder; the pumps upon the shelf at the side of the lower platen. The main tension rods are 3 7/16 inches in diameter, placed in line with the center of the ram. In the bed a square block is inserted, which is bored to suit the size of shaft on which work is to be done, so that the resistance may come close to the shaft and not create any bending action upon the work, and cramping the shaft as it is forced into the hole. The opening in the bed beneath the block is carried through the base, so that in case it was desired to force long shafts out, it may be done, provided a hole is made in the floor underneath. A small handle, which is convenient, shuts off the action of the large pump, and a small lever, operating an improved form of release valve, releases the pressure from the ram, and allows it to be drawn back. In case there is any great variety of work, a special block is made, which can be easily attached to the ram proper, and this, when placed in the press, shortens the clear space available. As the strain of driving the pump lies outside of the main tension rods, small ones are placed outside of the bearings of the shaft. One third of the base lies in front of the center line of the main bolts in the 100 ton size. One of our safety couplings protects the gauge from injury by the sudden releasing of the pressure.

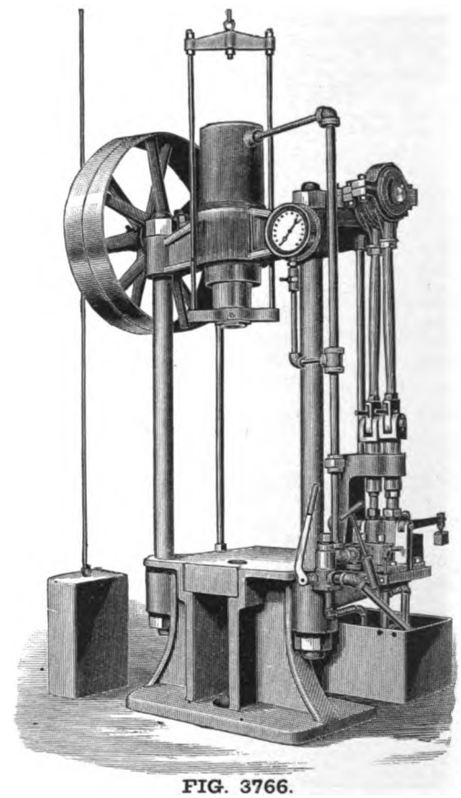


FIG. 3766.

PRICES.

Ram.	Power.	Motion.	Table.	Opening.	Jaw.	Price.
5 in.	60 tons.	12 in.	24 x 25 in.	30 in.	5 in.	$550
7½ "	100 "	18 "	36 x 38 "	48 "	6 "	700

ACCUMULATOR.

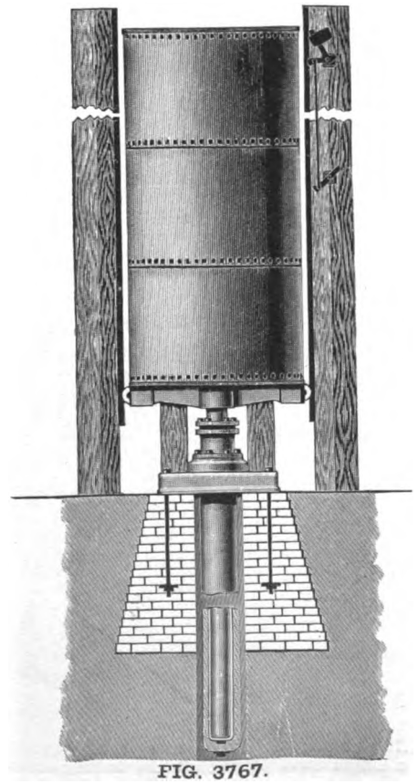


FIG. 3767.

WITH YOKE CYLINDER.

DESCRIPTION, FIG. 3767.

This accumulator is 6 inches diameter by 12 feet high, and has a heavy cast iron cylinder with steel ram, the packing being placed beneath a gland at the top of the cylinder, where it may be easily reached for repacking, if desired. The weight case rests upon a platform 4 feet 6 inches square, in which are placed the guide rolls, and which, when in its lowest position, rests upon buffer blocks, which are supported at the lower end in pockets in the baseplate. The guide rolls in the platform are adjustable for wear and position, so that the machine will line and balance properly. The wrought iron weight case is 54 inches in diameter and 8 feet high. This tool is tested for a working strain of 2,000 lbs. per square inch, though the most common working pressure, where any portable tools are to be used in connection with it, is about 1,500 lbs. per square inch. In case portable machinery is not likely to be used in connection with it, higher pressures are advisable, as less water has to be driven through the pipe, and quicker operation is possible. The trip levers for stopping and starting the pump, and the guide irons are furnished with the accumulator. About 27 tons of scrap are required for a pressure of 2,000 lbs. per square inch, and about 27 feet vertical space is necessary above foundation. **PRICE, $**.....

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6 IN. X 12 FT. ACCUMULATOR,

WITH FIXED CYLINDER RESTING UPON ITS BASE.

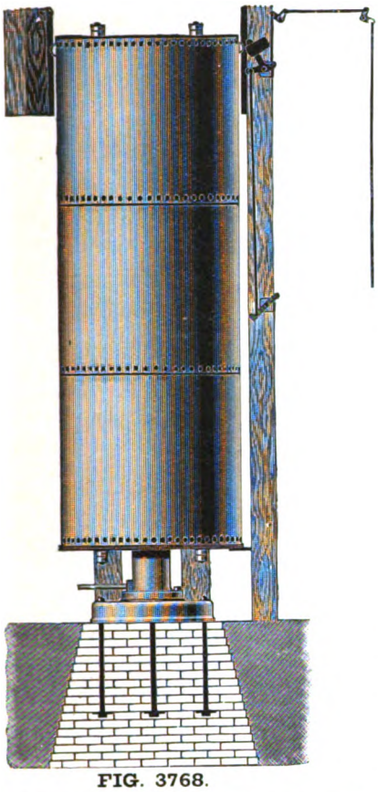


FIG. 3768.

This machine has a heavy cast iron cylinder, with steel ram; the packing being placed beneath a gland at the top of the cylinder, where it may be easily reached for repacking, if desired. The weight-case surrounds the cylinder and is double; the interior tube being slightly larger than the cylinder, and is prevented from coming in contact with it by the stay-bolts extending from the outside to inside cylinder, the outside cylinder having guide-rolls upon the posts. The guide-rolls in the head are adjustable for wear or for position, so that the machine will line accurately, and stay-bolts from the cross at the top of the weight-case to the bottom carry the weight. The wrought iron cases have diameter of 54 inches and 16 inches. These machines are tested for a working strain of 2,500 lbs. per square inch, though the usual working limit for this line of tools is between 1,500 and 2,000 lbs., if portable machines are likely to be brought into use. In case portable machinery is not to be used, then higher pressures can be used to advantage. The proper trip levers for stopping and starting the pump and the guide irons are furnished with the accumulator. About 27 tons of scrap iron are required for 2,000 lbs. to square inch, and about 27 feet vertical space is necessary and about 5 feet square outside of posts.

PRICE, $.....

DOUBLE-ACTING HYDRAULIC RIVETER.

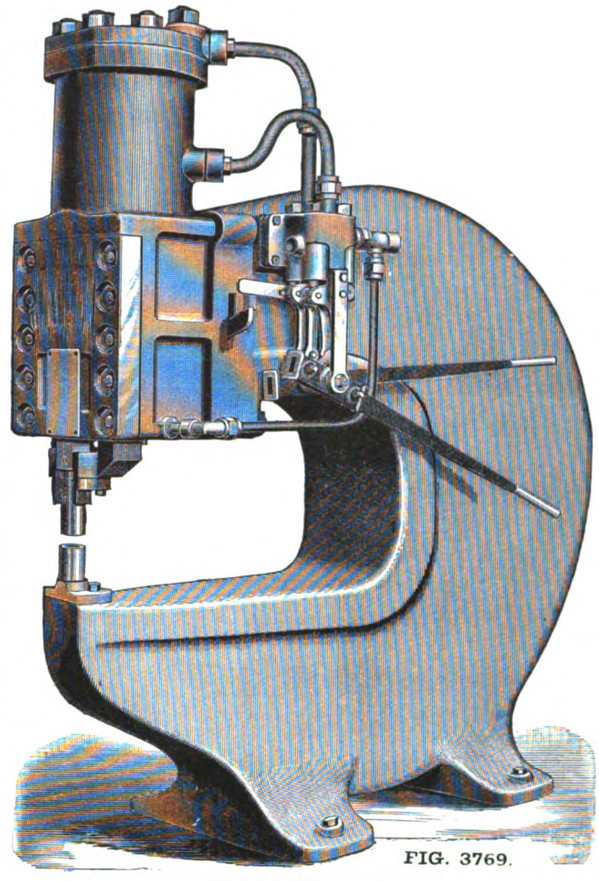


FIG. 3769.

36 INCH GAP FOR 3-4 RIVETS.

DESCRIPTION, FIG. 3769.

This machine was made originally for riveting up ship frames, and for that purpose has a double-acting cylinder, one ram connected with a compressor for tightening the plates and the other for setting the rivet. The upper pipe connects with the cylinder at a point above the riveting ram. The lower pipe, which is connected up to the piping outside of the governing valve, and in direct connection with the accumulator, connects with small cylinders, three in number, situated in a small block at the lower end of the guide, one of which returns the riveting ram, the other two returning the compressor ram. The small lever shown projecting from the side of the machine is connected with the riveting ram in such a way that the dies, in case nothing is interposed, will not come together and mar them. The machine has a stroke of 5 inches for each of the rams, and the rivet die is inclosed by the compressor, instead of being open as shown in the cut for illustration. Two levers are used for the complete manipulation of the tool, one of them throwing the accumulator pressure on the compressor ram, the other on the riveting ram, and each of them working under a pressure of about 20 tons, under accumulator pressure of 1,500 lbs. to square inch. The release of the accumulator pressure upon the compressor ram allows that much additional pressure to be exerted upon the riveting ram, or making a total of about 40 tons for finishing the head of the rivet. In operation it is found that the two levers may be brought down together, and that the compressor ram will travel sufficiently fast to get the plates close before rivet dies strike the end of the rivet. The hydraulic cylinders of this tool are made to be taken off from the body of the machine, so that there will be a certain interchangeability of heads upon different size machines of the same capacity. The front face of the machine is made almost flush with the rivet dies, so that any work may be placed directly in front of it, and riveting done on the angle iron which is backed by a flat plate, and there is no trouble in closing and riveting 3 inch angle irons. Special pumps furnished to order.

WEIGHT, 5,800 LBS. PRICE, $.....

STEAM RIVETER.

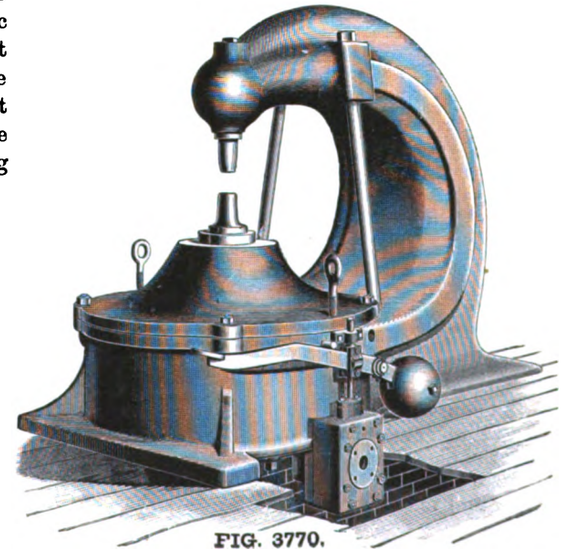


FIG. 3770.

DESCRIPTION, FIG. 3770.

This steam riveter is an excellent machine, in very general use among ship and bridge builders, specially adapted to the riveting of frames for iron vessels, doing the work of twelve gangs of riveters. Also well suited to the riveting of architectural iron work, bridge work, etc. The distance between center line of dies and center of re-enforce bolts is 18 inches; whole reach when bolts are out, 36 inches. The length of die spindles is something made adjustable, to suit the character of the work to be done, say a long one above and a short one below or the reverse, as may suit best. We furnish one set with each machine; they are easily made, and inexpensive.

PRICE, $1,000.00.

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PNEUMATIC BRIDGE RIVETING MACHINES.

34 1-2 INCH JAW.

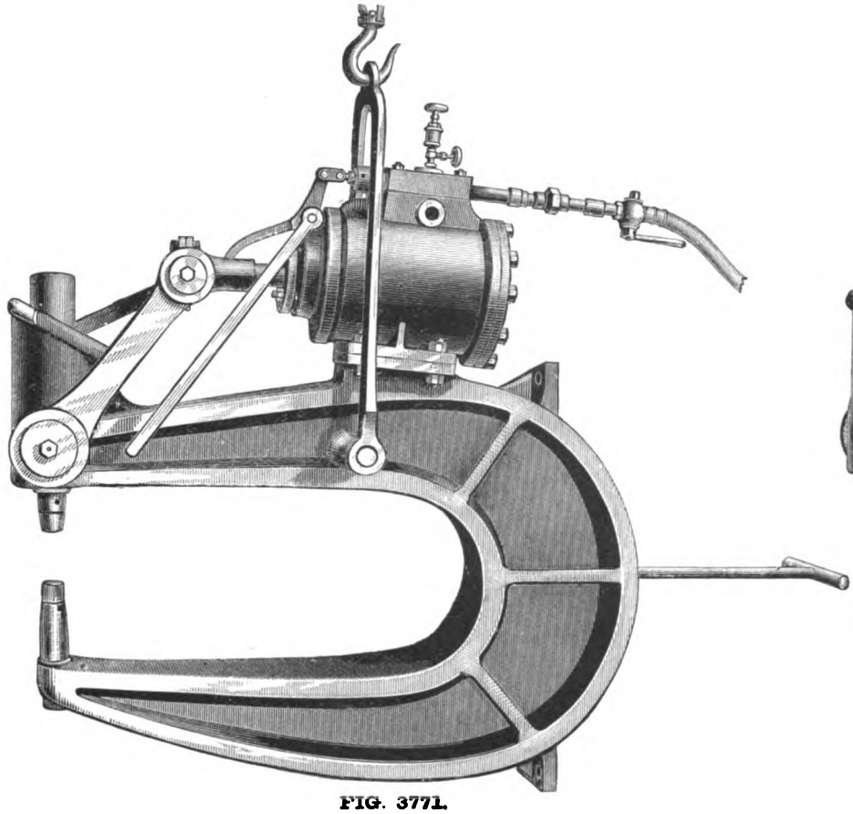


FIG. 3771.

PRICES.

FOR DRIVING 1 INCH AND SMALLER RIVETS.

10½	in.	reach,	15	in.	gap,	10	in.	working cylinder,	$
17	"	"	15	"	"	10	"	"	$
25	"	"	15	"	"	10	"	"	$
34½	"	"	15	"	"	10	"	"	$
36	"	"	20	"	"	12	"	"	$
55	"	"	15	"	"	10	"	"	$

JAW RIVETER.

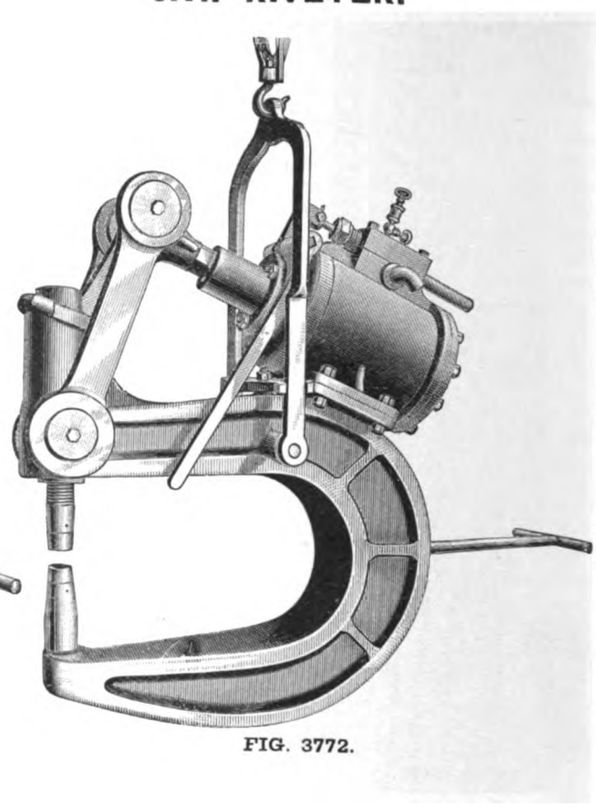


FIG. 3772.

PRICES.

FOR DRIVING 1-2 INCH AND SMALLER RIVETS.

5½	in.	reach,	8	in.	gap,	8	in.	working cylinder,	$
16	"	"	9	"	"	8	"	"	$
19	"	"	10	"	"	8	"	"	$
48	"	"	9	"	"	8	"	"	$

The larger machines are made with suitable lugs, and may be fixed as a stationary machine, if desired.

These machines are operated by an air or steam pressure of from 60 to 70 pounds. The piston rod connects two levers of different lengths, forming a reversed toggle joint. The lower ends of the larger links are attached to fixed centers on the frame; the end of the central short link or strut is attached to the ram, into the lower end of which the head die is secured. By this latter arrangement any desired change in the distance between the dies is easily effected. The ram has a stroke of 3½ inches, and acts in a direct line with the axis of the rivet. The machines are of sufficient strength to operate on 1-inch rivets. The machines are balanced, so that when suspended they may be operated either vertically or horizontally, as may be found most convenient. All the machines are of sufficient width to straddle girders or braces having 6 inch angle irons on each side, in which case the small machine will reach 20 inches, and the large machine 50 inches. These machines are therefore particularly adapted for plate girders. By changing the lower die, these machines can operate in 5 inch channel iron. The 36 and 55 inch will drive 1⅛ rivets. The advantages of these riveting machines are:

1st. The facility of taking the machine to the work to be operated upon, instead of carrying the work to the machine, as is required with all other riveting machines heretofore made.

2d. The great saving of labor and expense, as by riveting by hand, one holder-on, two riveters and a boy are required, while by the use of this machine only one man (who need not be a skilled riveter) and a boy will be necessary.

3d. Rapidity of work. Nearly all makers agree that to drive 35 pounds, or about 250 rivets, is considered a good day's work for one holder-on and two riveters, while by the employment of this machine one man and two boys have driven from 6,800 to 7,000 rivets a day, allowing for all necessary detention.

COMPRESSION LEVER RIVETERS.

DESCRIPTION, FIGS. 3773 AND 3774.

The riveter is principally intended for beams and girders for bridge building, and forms the rivet head by compressing the end of the rivet into a suitable die. The levers, turning on a fulcrum, contain at one end the dies, and are connected at the other end to a toggle joint, to the center of which the piston rod of a pressure cylinder is attached. The arms, C and D, are made interchangeable, so that the machine with arm, C, as represented in Fig. 3773, will straddle the edge of girders or beams having 6-inch angle irons on each side, and when arranged with lever, D, as represented in Fig. 3774, plates may be riveted on to 5-inch channel iron.

The pressure used in this machine is from 60 to 75 pounds, and the arms are made of sufficient strength to operate on 1-inch rivets. The weight of the machine complete is about 850 pounds. It is operated by air for the convenience of handling the machine.

In consequence of the peculiar construction and arrangement of the elbow or toggle joint, between the power employed for operating the machine, and the hinged or pivoted arms which carry the dies, a small 10-inch cylinder will produce, at the end of the stroke, or when the dies are nearly closed, a pressure upon the rivet of about fifty tons.

The simplicity and lightness of the machine will readily recommend it, where a reach of only nine inches is required. We have a large number of these riveters in operation.

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PNEUMATIC COMPRESSION LEVER RIVETERS.

RECULAR ARM C.

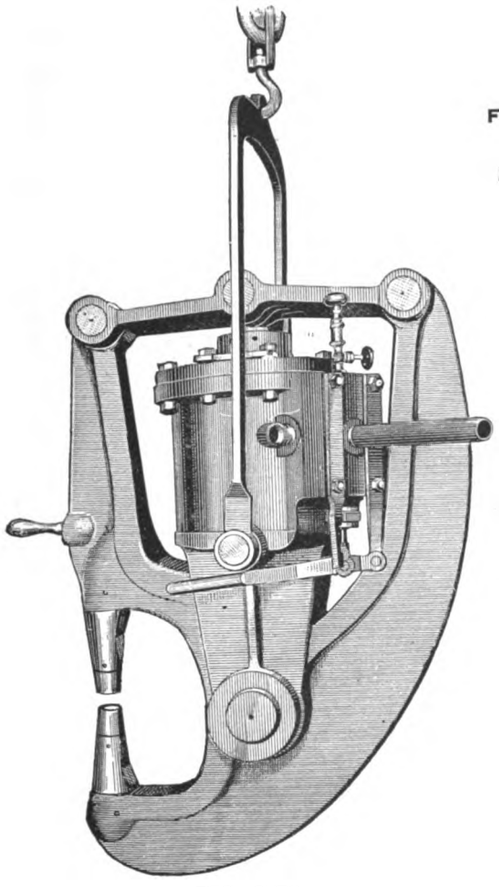


FIG. 3773.

Riveter with 10 inch cylinder,
WEIGHT, 835 LBS., PRICE, $.....

Riveter with 11½ inch cylinder,
WEIGHT, 925 LBS., PRICE, $.....

FOR COMPRESSORS, SEE PAGES 279 AND 280.

EXTRA ARM D FOR CHANNELS.

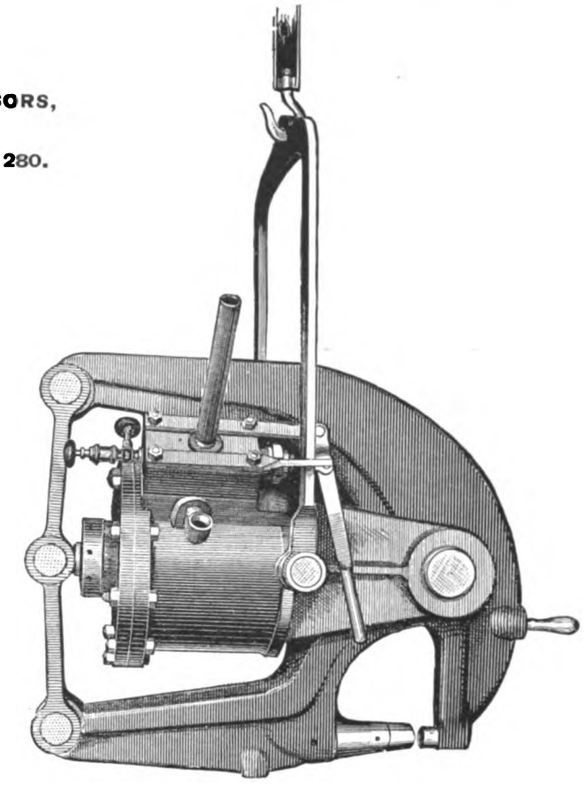


FIG 3774.

Weight of arm, 210 and 225 lbs.

PRICE OF ARM.

Made interchangeable and to fit riveter, shown in Fig. 3773.

$.....

BOILER SADDLES.

Fig. 3775 represents boiler, saddles and riveter in position operating on side of boiler, but the same being supported in a turning ring is equally applicable to operate on the top or at any angle to the shell.

Saddles to support and turn boiler shell.
WEIGHT, 545 LBS., PRICE, $75.00.

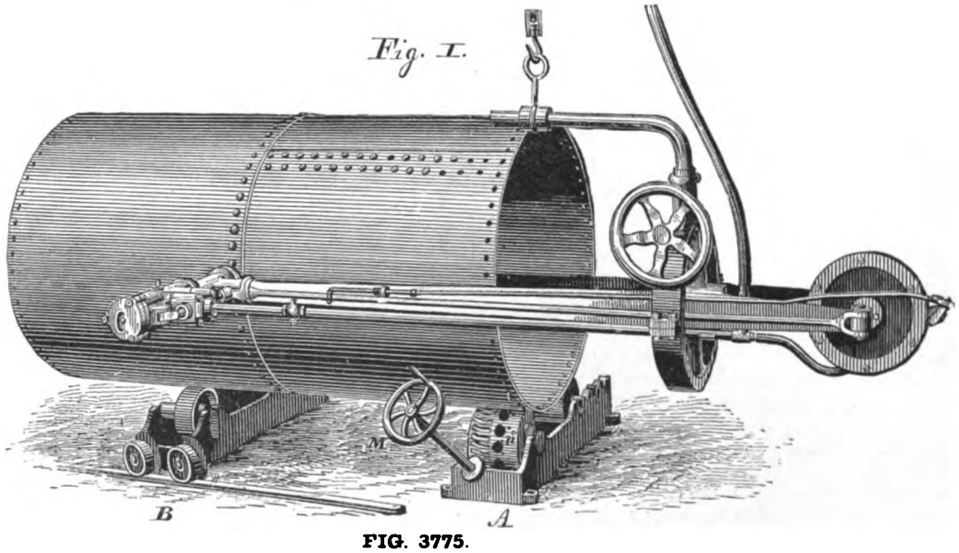


FIG. 3775.

When operating on a circular joint, the boiler must be turned so as to bring the rivet in a line with the riveting cylinder. For this purpose we have devised a boiler saddle, whereby the largest boiler, whether out of balance or not, can easily be turned by the operator as may be desired, and firmly held in position without any extra manual labor.

The front saddle, *A*, should be firmly attached to the floor. The after saddle, *B*, is provided with wheels to run upon suitable rails, so that the boiler shell can easily be moved backward while resting upon the saddle, *B*, for the purpose of joining an additional course to the front of the shell.

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PNEUMATIC BOILER RIVETING MACHINE.

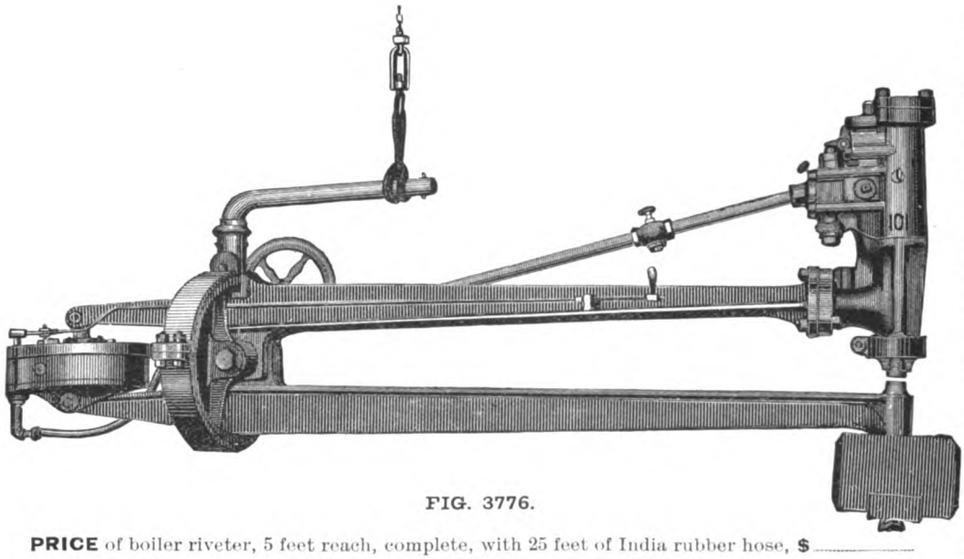


FIG. 3776.

PRICE of boiler riveter, 5 feet reach, complete, with 25 feet of India rubber hose, $.....

WEIGHT OF RIVETER, 900 LBS.

PRICE of boiler riveter, reaching 72 inches, ... $.....

WEIGHT, 1,100 LBS.

This riveter possesses all the features of hand work, and is capable of driving rivets with as great rapidity as the large and expensive steam or hydraulic stationary riveters. We have recently improved the Pneumatic Hammer Boiler Riveter, strengthening the arms, making them more rigid and reducing the number of the working parts of the percussion cylinder to two, consisting of the hammer and valve. By thus dispensing with the tappits and valve gear, we remove all difficulties resulting from the wearing of those parts. The valves are now opened by the air pressure.

Fig. 3775 represents the riveter as operating on the side of a boiler shell ; but, being supported in a turning ring, is equally applicable to operate on the outside, on the top or at any angle to the shell.

One of the chief objects of the inventor has been to produce a perfect machine at a moderate cost, with a view of placing it within the reach of all engaged in the manufacture of boilers or tanks, and to be able to take the machine to the work to be operated upon instead of carrying the work to the machine, as is required in all other boiler riveting machines heretofore made.

OVERHEAD CARRIAGE WITH RIVETER IN POSITION.

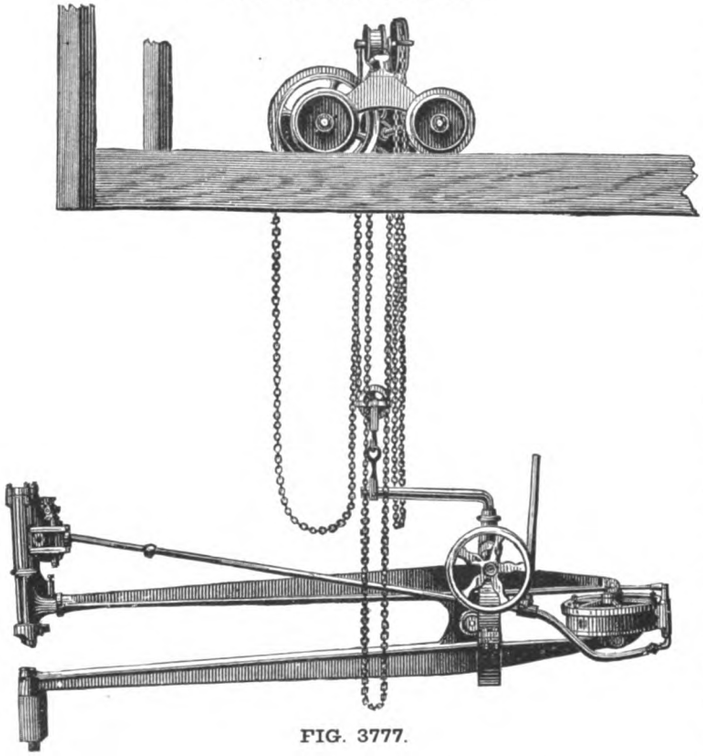


FIG. 3777.

PRICE of overhead traveling carriage, complete, fitted about 9 feet wide, with chains, ... **$75.00**

Castings for carriages only, to be fitted up by purchaser, drawing to be furnished by us, ... **$17.50**

WEIGHT COMPLETE, 495 LBS. CASTINGS, 233 LBS.

The riveter works on the principle of hand work, forming the head of the rivet by a succession of rapid blows around the rivet until the desired shape of the head is obtained.

Fig. 3776 represents the riveter detached from the shell.

It consists of two levers, having at one end a pressure cylinder to open and close the levers, and at the other end the riveting machine on one arm, and a suitable die with counterweight attached on the other arm.

The long arms of the levers are made 63 and 76 inches from center of joint pin to the center of riveter, capable of reaching a rivet 60 or 72 inches, respectively, from the edge of the plate, so as to operate upon the circular seams of a boiler. The levers are supported in a turning ring operated by a worm wheel, to enable the machine to be placed at any desired angle and position to the boiler shell.

The riveting machine proper consists of a cylinder, with the hammer head or die attached to the end of the piston rod, capable of being easily changed to adopt the machine for different sizes of rivets and heads.

The valve is operated directly by the pressure in the cylinder without extra gearing, and so arranged that the length of the stroke regulates itself automatically to correspond with the gradual reduction of the end of the rivet as the head is formed.

The machine is operated with an atmospheric pressure of from 25 to 30 pounds to the square inch, and makes from 150 to 200 strokes per minute. The time required to form the head of a ¾ inch rivet is about six seconds, and at steady, straight work, allowing for ordinary detention and loss of time, two or three rivets can readily be finished in one minute.

The machine may be suspended from a bar arranged overhead, to allow a longitudinal motion to the riveter when operating on straight seams, but we advise fitting up a traveling carriage, as represented in Fig. 3777, capable of a longitudinal and side motion, whereby, if operating against the side of the boiler shell, as shown in Fig. 3775 (which will be found the most convenient way of operating with the machine), the machine can easily be regulated for any diameter of shell.

The operation with the machine is as follows :

The rivet boy, after inserting the hot rivet, moves the die and weight over the head of the rivet, when the operator admits pressure into the cylinder, by moving the rod, thereby closing the long ends of the bars and pressing the nozzle of the riveter upon the plates over the rivet, thereby holding the plates together by a pressure of about 2,000 pounds. The operator then presses upon the spring valve, thereby admitting the air pressure into the riveter to operate its hammer, and thus forms the rivet head by a succession of rapid blows.

It will thus be perceived that only one man is required to operate with this machine, dispensing with one riveter and the man to hold on.

By suspending the machine from a horizontal bar or traveling carriage it is easily moved from one rivet hole to the next when operating on a horizontal seam.

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AIR COMPRESSOR.

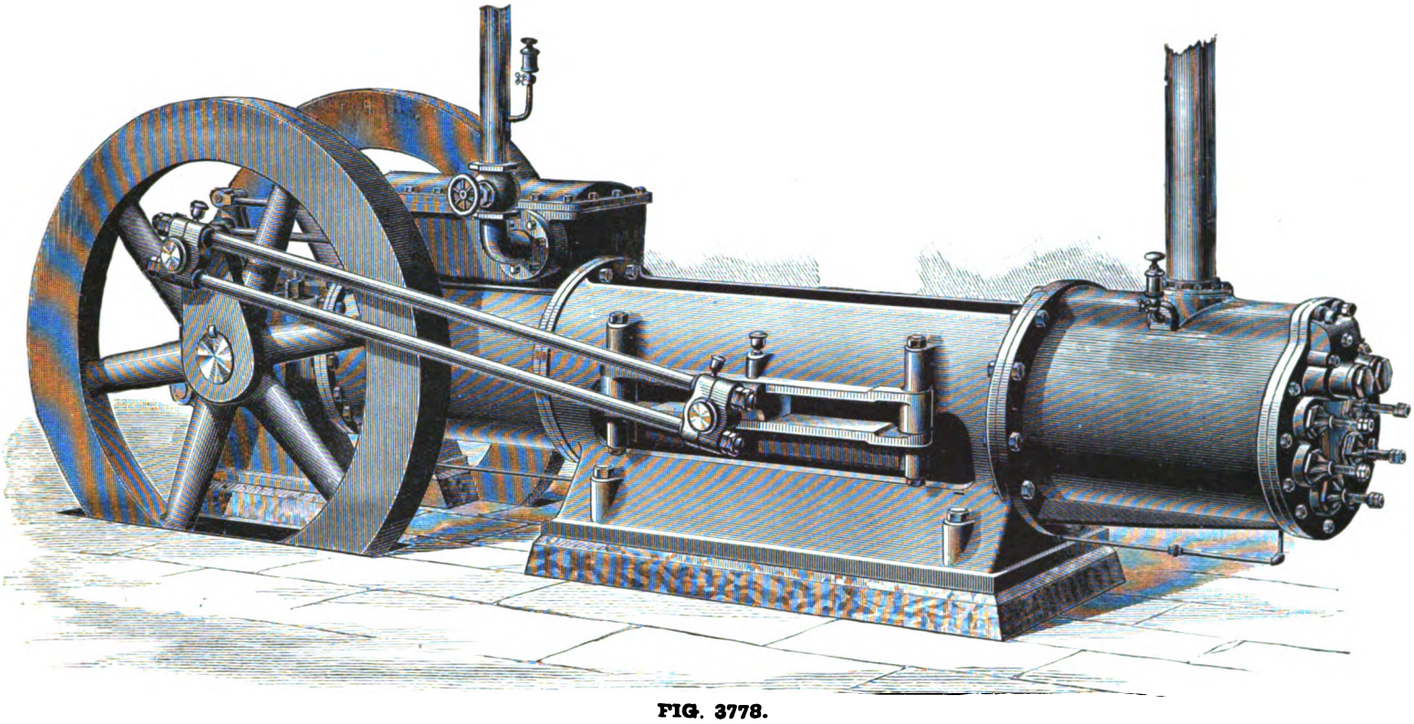


FIG. 3778.

SIZE OF AIR CYLINDER. Inches.	Revolutions per minute.	CAPACITY IN DRILLS. No. 2.	CAPACITY IN DRILLS. No. 3.	Horse-power of boiler needed.	CLASS C. PRICE.
8 x 12	120	1	1	13	$650.00
10 x 14	110	2	2	25	1,000.00
12 x 16	100	4	3	35	1,200.00
14 x 22	95	6	5	60	2,000.00
16 x 24	90	9	7	80	2,400.00
17½ x 24	90	10	8	90	2,600.00
20 x 30	80	15	12	140	3,500.00

AIR COMPRESSOR.

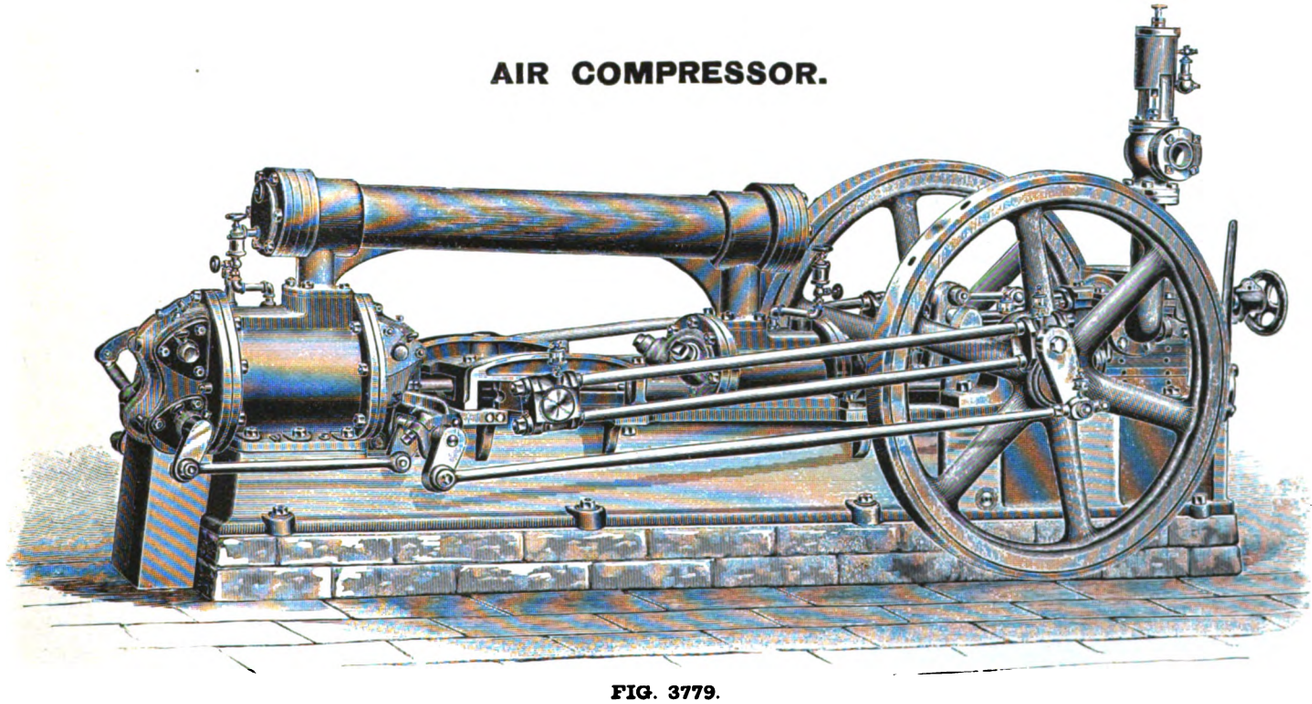


FIG. 3779.

Diameter of air cylinder.	Length of stroke.	Diameter of compressing cylinder.	Diameter of steam cylinder.	Revolutions or double strokes per minute.	Capacity cubic feet per minute.	Steam pipe.	Exhaust pipe.	Air pipe.	Water pipe.	Horse-power.	PRICE.
10	12	6¾	10	190	207	2½	3	2½	¾	28	$.....
14	16	9½	14	150	427	3	4	4	1	55	.....

These compressors are used in connection with pneumatic riveting machines represented on pages 276 and 277.

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DUPLEX AIR COMPRESSOR.

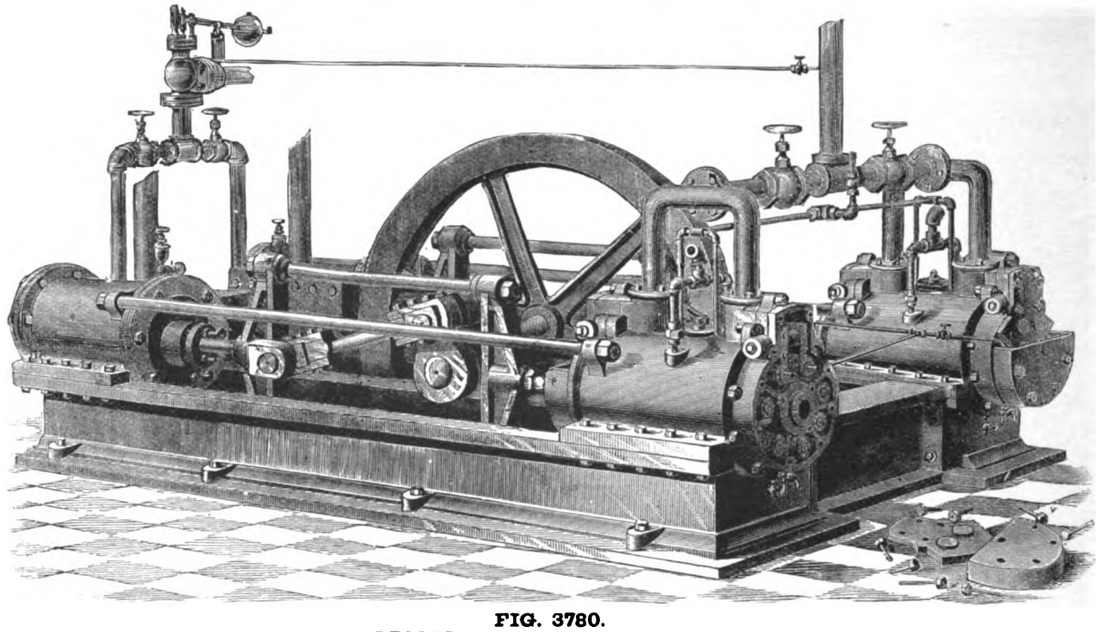


FIG. 3780.

PRICES.

Diameter of steam cylinders in inches.	Diameter of air cylinders in inches.	Length of stroke in inches.	Revolutions per minute.	Cubic feet of air per minute.	Price, duplex, with patent air governor.
4	4	5	150	21	$.....
5	5	6	140	38	.....
6	6	7	130	60	.....
7	7	7	130	80	.....
8	8	7	130	105	.....
9	9	9	120	158	.....
10	10	9	120	195	.....
12	12	9	120	288	.....

Prices on single steam actuated and duplex, or single belt, or geared air compressors, on application.

VERTICAL HAND OR BELT COMPRESSOR AND RECEIVER.

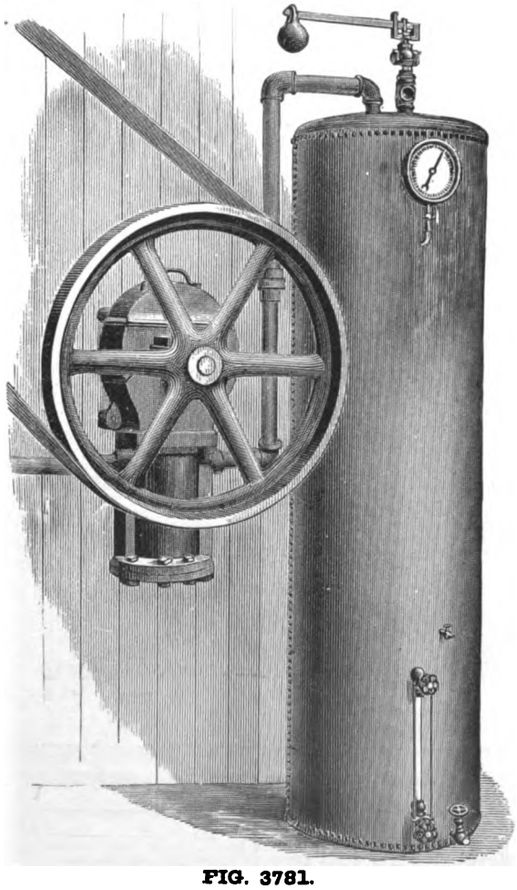


FIG. 3781.

PRICES, VERTICAL BELT OR HAND AIR COMPRESSORS.

Number.	Diameter of air cylinder in inches.	Length of stroke in inches.	Number of revolutions per minute.	Cubic feet measurement of free air compressed per minute.	Attainable air pressure in lbs. per square inch.	Price.	Hand crank, extra.
1	2	6	150	1	300	$50.00	$2.50
2	2¼	6	150	2	300	50.00	2.50
3	3	6	150	3	250	60.00	2.50
4	4	6	140	6	200	70.00	2.50
5	5	6	140	10	150	80.00	2.50
6	6	6	130	13	100	90.00	2 50
7	7	6	130	17	50	110.00	2.50

These compressors are made very strong, with heavy crank box and bearings, steel crank, composition valve box and valves.

They can be bolted against any pillar, wall or strong board, and driven by a heavy pulley wheel of such diameter and width of face necessary to attain the pressure wanted; when required to be worked by hand power, they can be provided with a handle in fly wheel, which can be worked by one or two men to a proportionate pressure.

PRICES, AIR RECEIVERS.

Suitable for any pressure up to 60 lbs. per square inch.

Number.	Height in feet.	Diameter in inches.	Capacity—cubic feet of free air.	Price.
1	5	12	4	$32.00
2	5	14	5	36.00
3	5	16	7	40.00
4	5	20	11	46.00
5	5	22	13	55.00
6	6	24	18	72.00
7	7	24	22	79.00
8	8	24	25	85.00

These air receivers, for holding compressed air, insure a steady, even pressure of air. Any size of air receivers given in list would be suitable to work with any of the seven sizes of air compressors, but the larger the air receiver, the more air can be stored, and the more steady the pressure. They are built of heavy iron, galvanized, and are fitted with brass face pressure gauge, glass water gauge, safety valve and try cock complete. Special estimates will be given on air receivers for higher pressures.

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AIR RECEIVERS AND PRESSURE TANKS.

Made of best 60,000 lbs. t. s. steel, side seams double riveted; strongly braced and stayed and tested up to 165 pounds water pressure, warranted safe and tight under 110 lbs. working pressure. Fixtures will include man-head, safety valve, pressure gauge, drain cocks, and flanges for inlet and discharge pipes.

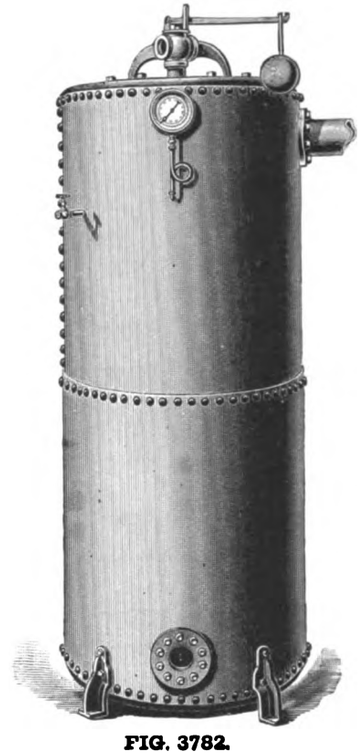


FIG. 3782.

PRICES.

FOR 110 POUNDS WORKING PRESSURE.

Diameter.....in.	30	36	36	42	42	48	54
Height.....ft.	6	6	8	8	10	12	12
Thickness of shell.....in.	1/4	1/4	1/4	1/4	1/4	9/32	5/16
" " heads.....in.	5/16	3/8	3/8	3/8	3/8	7/16	7/16
Weight.....lbs.	1000	1300	1600	1900	2200	3300	4200
Price, complete, with safety valve and gauge	$117	$126	$144	$192	$222	$312	$366

PRICES.

FOR 75 POUNDS WORKING PRESSURE.

Diameter.....in.	30	36	36	42	42	48	54	54	60
Height.....ft.	6	6	8	8	10	12	12	16	16
Thickness of shell.....in.	3/16	3/16	3/16	3/16	3/16	7/32	1/4	1/4	9/32
" " heads.....in.	5/16	5/16	5/16	5/16	5/16	3/8	3/8	3/8	7/16
Weight.....lbs.	725	1000	1200	1475	1900	2640	3450	4100	5700
Price, complete, with safety valve and gauge	$96	$111	$126	$162	$198	$276	$324	$381	$493

PATENT DROP FORCE STEAM HAMMER.

FOR DROP FORGING OF ALL KINDS.

Balanced piston valve. Patent varying slide giving most effective use of valve and steam. Double acting, takes steam above and below piston. Valve motion positive and simple, and not liable to get out of order. Not dependent on springs. Working position of the ram obtained by adjustment of the sleeve nuts on rod from treadle to valve. The throttle valve and motion are connected to the treadle so that when the operator desires to start the hammer the use of the treadle gives position to the valve and opens the throttle at same time.

Single blows or continuous automatic blows at will of the operator. Ram stops at upper working position and remains until operator places his foot on treadle.

Supplied with stop to prevent damage to cylinder in case of rod breaking or careless running. The stop is not shown in the cut of this hammer, but can be seen on top of cylinder of the double standard, Fig. 3784. If specially desired, we place springs under the cylinder, as shown in cut of this hammer.

Piston made of steel; piston rod and ram of best hammered iron.

Diameter of cylinder..... .....inches.

Length of stroke..... .....inches.

Weight, complete..... .....lbs.

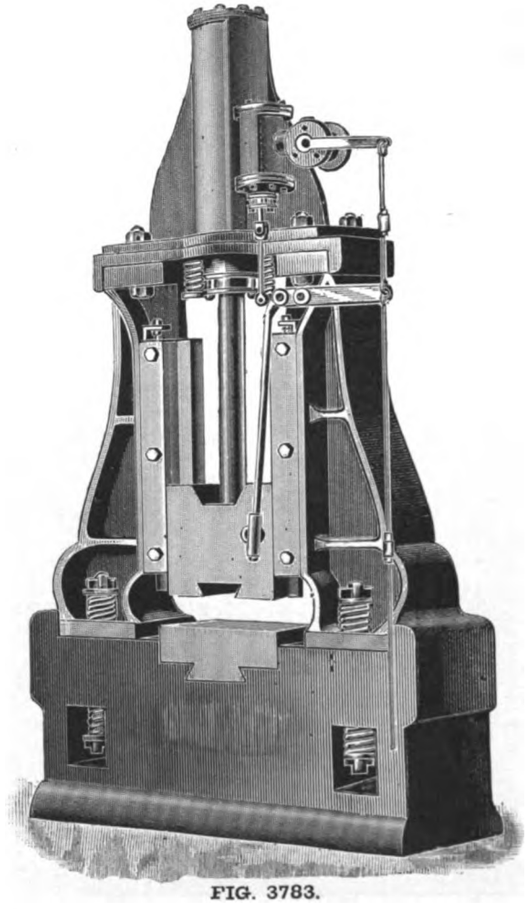


FIG. 3783.

Built to order of any size to suit the varied requirements of this class of tool.

PRICE ON APPLICATION ACCOMPANIED BY FULL INFORMATION AS TO CLASS OF WORK TO BE DONE.

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DOUBLE STANDARD STEAM HAMMERS.

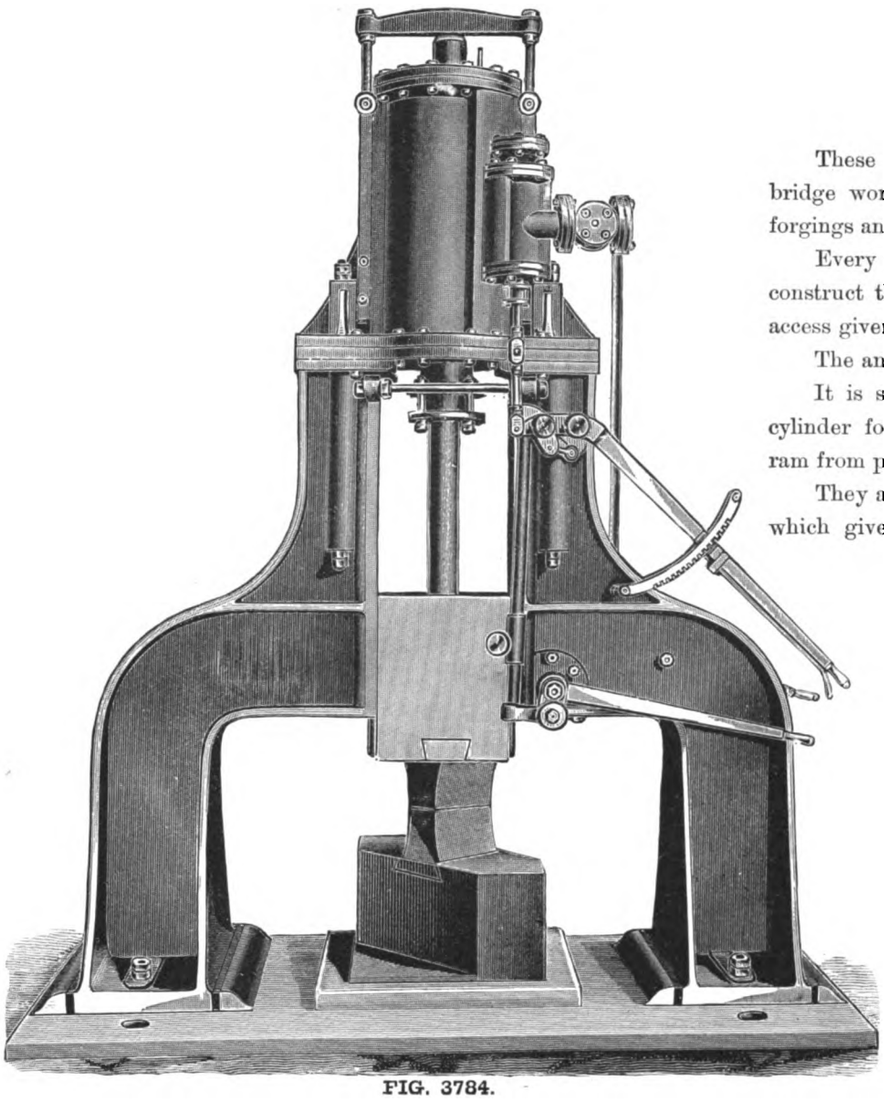


FIG. 3784.

These hammers are designed for locomotive, car and bridge works, forges, rolling mills and all classes of heavy forgings and general steel and iron work.

Every part is strong ; special attention has been paid to construct them so that they can be easily taken apart and access given to examine working parts.

The anvil is detached.

It is so arranged that the piston can be raised above the cylinder for insertion of packing rings without disconnecting ram from piston.

They all have balanced piston valve, patent varying slide, which gives equal motion to the valve, whether hammer is making long or short strokes. Valve motion is simple, but positive and not liable to get out of order.

Automatic continuous blows, or single blow, can be had at will.

Supplied with stop, which prevents damage to cylinder in case of rods breaking.

Piston of steel. Piston rod and ram of best hammered iron.

Every hammer tested under steam before leaving works.

PRICES, FIG. 3784, DOUBLE STANDARD HAMMER.

Size.	Diameter of cylinder.	Stroke.	Weight.	Prices.	Face, sizes of dies ordinarily furnished.	Largest top die that can be used.	Distance from face of lower die to guides.	Width between stands.
1,100 lbs.	10 in.	21 in.	20,000 lbs.	$	5 x 11 in.	16 x 16 in.	8 or 11 in.	4 ft. 2 in.
1,500 "	11 "	26 "	27,000 "		5 x 11 "	18 x 18 "	11 or 14 "	4 " 6 "
2,000 "	13 "	30 "	38,000 "		6 x 13 "	18 x 18 "	16 "	5 " 2 "
3,000 "	14 "	33 "	46,000 "		6½ x 14 "	18 x 18 "	19 or 24 "	6 " 0 "
5,000 "	18 "	48 "	66,000 "		10 x 13 "	21 x 21 "	21 or 27 "	7 " 0 "
2,500 "	14 "	30 "						
4,000 "								

PRICES, FIG. 3785, SEE PAGE 283 FOR CUT, OPEN BACK SINGLE STANDARD HAMMER.

Size.	Diameter of cylinder.	Stroke.	Weight.		Prices.	Face, sizes of dies ordinarily furnished.	Largest top die that can be used.	Distance from face of lower die to guides.	Depth of throat from center of anvil block.
150 lbs.	4½ in.	12 in.	2,000 lbs.	with treadle.	$	2¼ x 4½ in.	5 x 5 in.	6 in.	10 in.
250 "	5 "	14 "	4,000 "			3 x 5½ "	6 x 7½ "	8 "	13½ "
400 "	6 "	16 "	6,500 "			3¼ x 7 "	7 x 9 "	9½ "	15½ "
600 "	7 "	20 "	10,000 "			3½ x 7 "	8 x 10 "	13 "	16½ "
800 "	8 "	23 "	13,000 "			5 x 10 "	9 x 11 "	12 "	20½ "
1,100 "	9 "	26 "	17,000 "	without treadle.		6 x 9 "	11 x 13 "	13 "	21 "
1,250 "	10 "	28 "	19,000 "			6 x 9 "	11 x 13 "	13 "	21 "
1,500 "	12 "	30 "	28,000 "			6 x 12 "	15 x 15 "	19 "	24 "
2,000 "	13 "	33 "	33,000 "			6 x 12 "	15 x 15 "	19 "	24 "
*2,500 "	14 "	36 "	40,000 "			8 x 16 "	18 x 18 "	20 "	27 "

* With adjustable guides.

Special hammers made to order.

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OPEN BACK SINGLE STANDARD STEAM HAMMER.

FOR FORGES, ROLLING MILLS, LOCOMOTIVE, BRIDGE AND CAR WORKS, TUBE WORKS, AGRICULTURAL WORKS, SMITH SHOPS, OIL-WELL TOOLS, AND ALL KINDS OF LIGHT AND MEDIUM WEIGHT FORGINGS IN IRON OR STEEL.

Our arrangement of the stands of this hammer gives an open front and right-of-way between the stands. It is preferable to the single stand hammers which have been heretofore used, having the open front same as a single stand, and the additional advantage of having space between the stands to allow the work to be passed through when desired. Stands are less liable to be broken, and, in case of breaking, far less expensive to repair. All the parts are easily gotten at.

Operated with treadle or lever.

Balanced piston valve. Patent varying slide which gives most effective use of valve and steam. Valve motion positive and simple, not liable to get out of order.

Automatic continuous blows or single blow, of any intensity, can be had at will.

Supplied with our stop, which prevents damage to cylinder in case of rods breaking.

Piston of steel, piston rod and ram of best hammered iron.

FOR PRICES, DIMENSIONS, AND GENERAL DESCRIPTION OF HAMMERS, SEE PAGE 282.

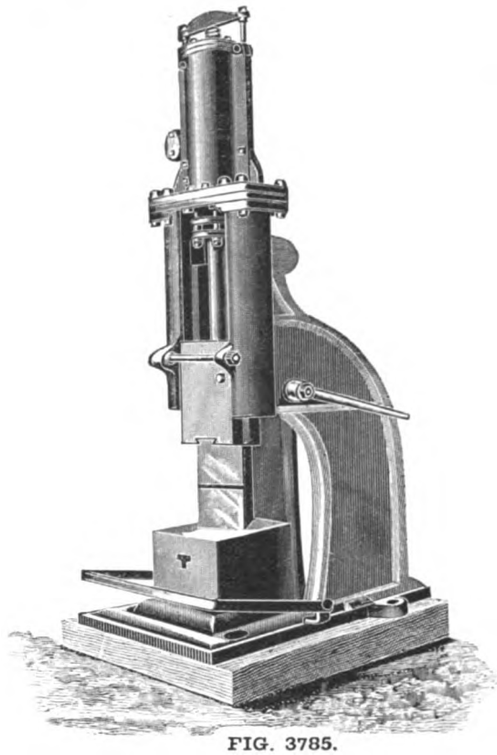


FIG. 3785.

SINGLE AND DOUBLE STANDARD STEAM HAMMERS.

500 LBS. SINGLE.

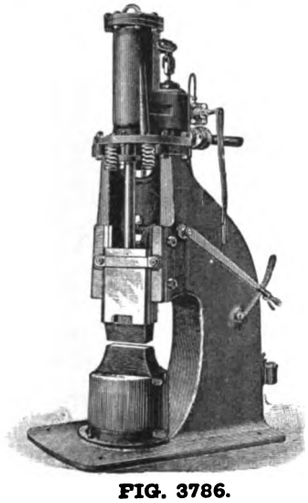


FIG. 3786.

800 LBS. SINGLE.

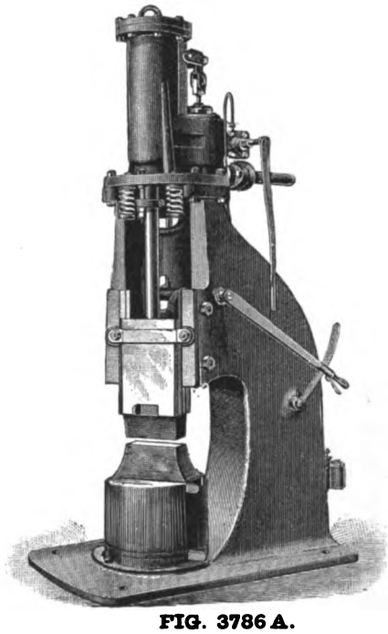


FIG. 3786 A.

1,100 AND 1,500 LBS. SINGLE.

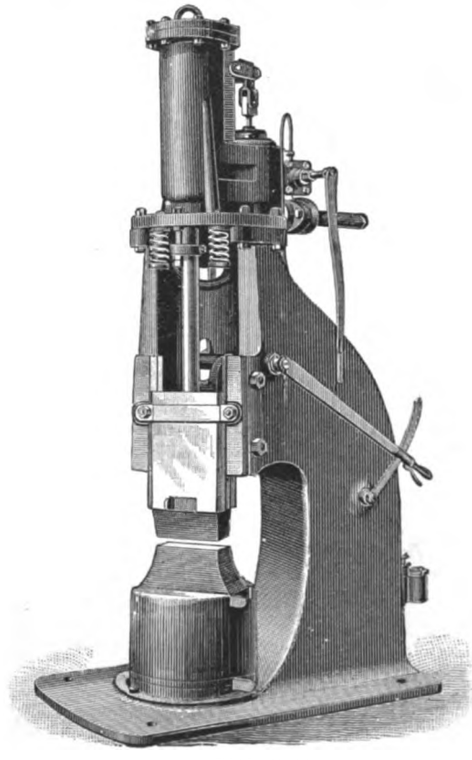


FIG. 3787.

The valve gear with its arrangement for taking up lost motion is very simple, having no connection with the ram, and is therefore free from shocks; it is regulated by a single lever, and will give any variation of blow desired.

The guides are easy of adjustment, making the hammers specially adapted for die work.

The sizes of the hammers are rated at the falling weight of the piston, ram and die, without taking into account the greatly increased force of the blow from the pressure of the steam.

PRICES.

Sizes.	Diameter of cylinders.	Length of stroke.	Die surface.	Weight of hammer with anvil.	Prices.
500 pounds.	6¼ inches.	21 inches.	6½ x 10½	8,000 pounds.	$
800 "	8¼ "	23 "	7¼ x 12¼	12,000 "	
1,100 "	10 "	28 "	9 x 13	18,000 "	
1,500 "	11½ "	30 "	10 x 15	27,700 "	

Double standard steam hammers will be made with or without adjusting guides and in sizes as may be required, from 4,000 pounds upward. The large hammers are usually operated by hand and not automatically, unless specially desired. Propositions and plans for any size with or without anvils submitted on application.

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STEAM HAMMERS.

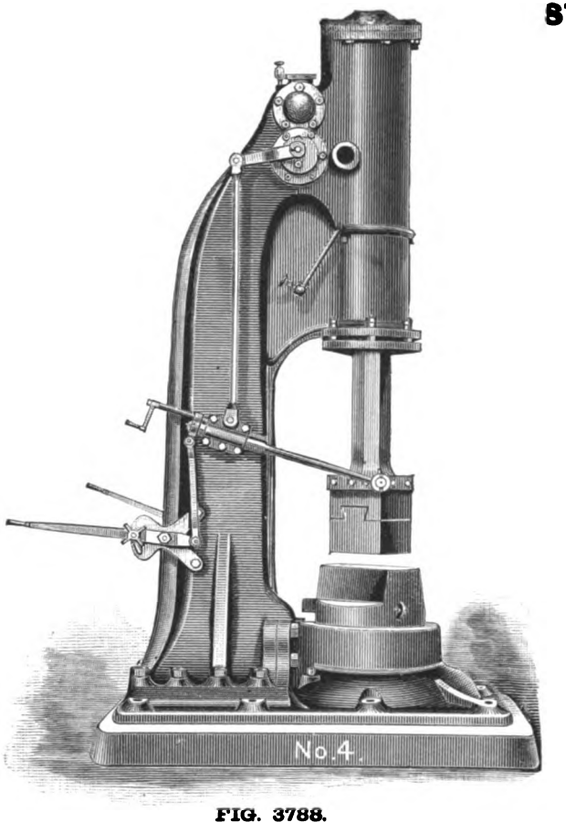


FIG. 3788.

Diameter of cylinder, 12 inches. Stroke, 27 inches.
Will strike a blow of upward of 10,000 lbs.
Diameter of shaft that can be forged, 9 inches.
Total weight of hammer, 14,000 lbs.

PRICE, $.....

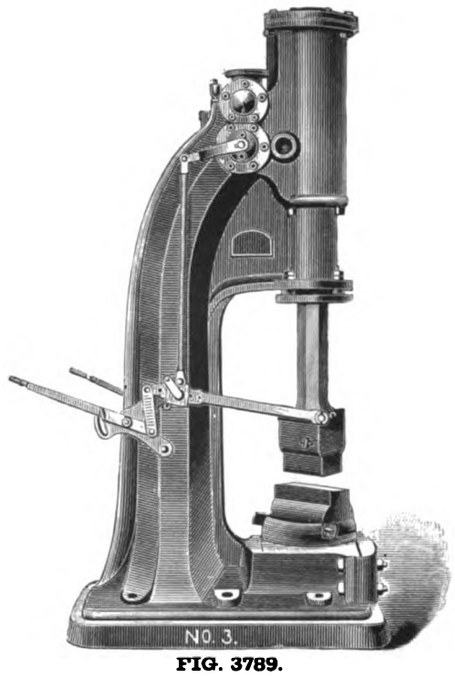


FIG. 3789.

Diameter of cylinder, 10 inches.
Stroke, 22 inches.
Will strike a blow of 6,000 lbs.
Diameter of shaft which can be forged, 7 inches.
Total weight, 6,500 lbs.

PRICE, $.....

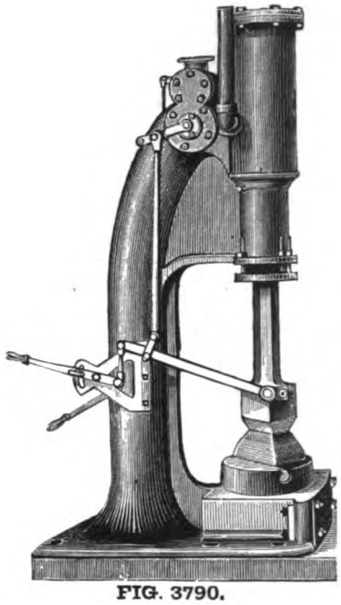


FIG. 3790.

Diameter of cylinder, 8 ins.
Stroke, 18 inches.
Will strike a blow of 4,000 lbs.
Diameter of shaft which can be forged, 6 inches.
Total weight, 4,000 lbs.

PRICE, $.....

CYLINDER POWER HAMMER.

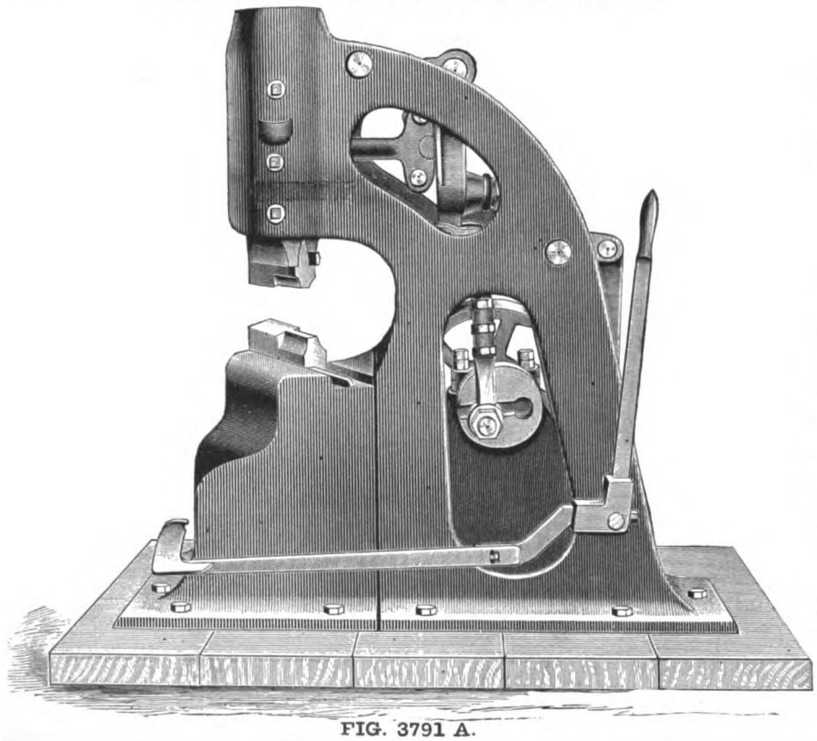


FIG. 3791 A.

DESCRIPTION, FIG. 3791.

Diameter of cylinder, 6 ins.
Stroke, 16 inches.
Will strike a blow of 2,000 lbs.
Diameter of shaft which can be forged, 4 inches.
Total weight, 2,800 lbs.

PRICE, $.....

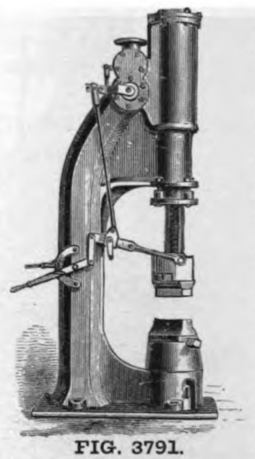


FIG. 3791.

DESCRIPTION, FIG. 3791 A.

The feature of this hammer is the elasticity of the blow it strikes, accomplished by a new device that is both simple and effective, which allows the hammer the greatest freedom of throw on the down stroke, but the instant the blow is struck the hammer is made to rebound so quickly that the work is not cooled in the least. The carrying frame is guided by a new parallel motion which requires no adjusting, and insures smoothness of motion. All parts requiring it are so arranged that they can be adjusted instantly. The hammer always stops at the upper end of the stroke. The anvil is entirely separate from the frame, doing away with all jar and concussion to the frame.

Size of hammer	1	2	3	4	5	6	7	8	9	10	11
Weight of ram	30 lbs.	50	75	100	125	150	200	250	300	350	500
Diameter of driving pulley	14 in.	14	15	16	16	18	18	20	20	24	28
Face of driving pulley	3 in.	3	3¼	3¼	3½	3½	4	4	4½	5	6
Revolutions per minute	375	350	300	290	280	275	270	225	210	200	190
Capacity	Special.	Special.	Special.	2 in. sq.	2¼	2½	3	3¼	3½	3¾	4½
PRICES	$	$	$	$	$	$	$	$	$	$	$

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PNEUMATIC BELT POWER HAMMERS.

PRICES, FIGS. 3792 TO 3794.

SIZES.	50 lb.	100 lb.	150 lb.	200 lb.	Double standard 300 lb.	Double standard 500 lb.
Speed, blows per minute	350 to 380	300 to 320.	250	200 to 220	225 to 250	200 to 250
Distance between dies when at rest	4 in.	4½ in.	6 in.	8 in.	6½ in.	7 in.
Travel of head or ram	7 in.	8 in.	12 in.	15 in.	12 in.	14 in.
Length of dies	5½ in.	6 in.	7 in.	8 in.	10 in.	11 in.
Size of driving pulley	10 in. x 3⅛ in.	12 in x 3½ in.	16 in x 4 in.	18 in. x 4½ in.	20 in. x 4½ in.	24 in. x 5 in.
Diameter of piston rod	1⅝ in.	2⅛ in.	2⅞ in.	2¾ in.	3 in.	3½ in.
Height from floor to top over all	6 ft. 2 in.	6 ft. 9 in	7 ft. 6 in.	8 ft. 2 in.	7 ft. 9 in.	8 ft. 5 in.
Size of bed plate	3 ft. 4 in. x 2 ft	3 ft. 4 in. x 2 ft. 3 in.	4 ft. 2 in. x 2 ft. 10 in.	4 ft. 4 in. x 3 ft.	6 ft. x 4 ft.	6 ft. 6 in. x 4 ft. 6 in.
Weight	2,500 lbs.	4,000 lbs.	5,500 lbs.	7,000 lbs.	11,000 lbs.	14,000 lbs.
Price on skids	$450 00	$600.00	$750.00	$850.00	$1.000.00	$1,200.00

When the belt is thrown on the tight pulley, a uniform vertical reciprocating motion is at once given to the cylinder. But until the treadle is pressed down, the hammer head remains stationary, as it is gripped by a brake block let into the inside of the frame and controlled by the treadle; and an outlet valve in the back of the cylinder, the aperture of which is also controlled by the treadle, is so arranged that no appreciable force is exerted on the piston. When the treadle is pressed down by the foot of the operator, the brake is withdrawn and the aperture of the valve affected, and a more or less heavy blow is delivered, depending on the extent to which the treadle is pressed down. If pressed quite down, the first blow is of the full capacity of the hammer, as the cylinder always travels at full speed. The hammer head stops instantly on withdrawing the pressure from the treadle, so that even drop forging has been done entirely satisfactorily under the hammer without any special preparations. The fly wheel with counterweight insures steady motion and small duty on the belt. All the bearings are carefully fitted, and the travel of the cylinder is very short, as compared to the travel of the hammer head, so that the power required to run the hammer is reduced to the minimum.

At each stroke, air is admitted through the inlet valves in the front of the cylinder, so that the piston is always suspended between two cushions of air, which prevent all undue jar and concussion. This combination of air cushions and frictional brake, both so thoroughly under control, makes the hammer at once the most powerful and perfect tool of its kind in the market.

300 LB. DOUBLE STANDARD HAMMER.

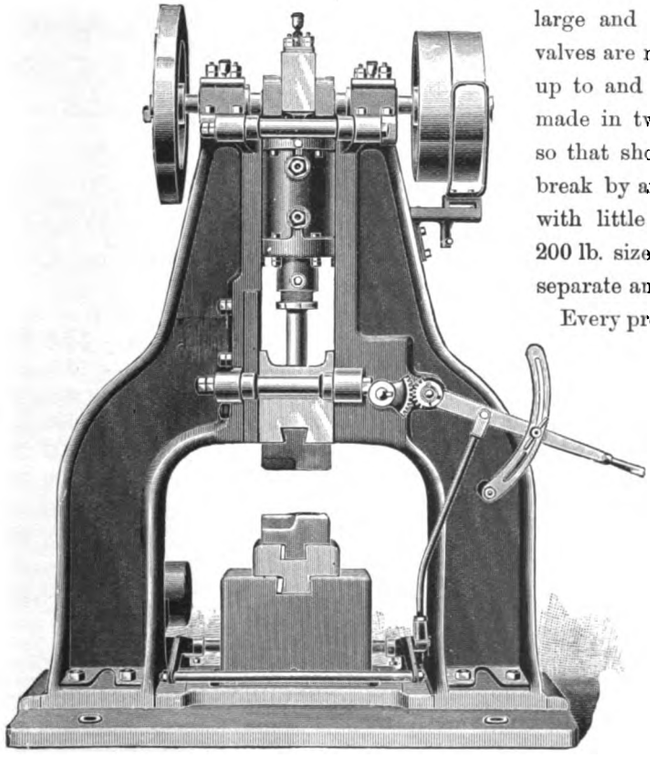


FIG. 3793.

We forge all our crank shafts, pistons and rams. All bearings are made very large and of phosphor bronze. The valves are made of steel. All hammers up to and including 150 lb. size are made in two parts, but are fitted solid, so that should the lower or anvil part break by any means, it can be replaced with little trouble and expense. The 200 lb. size and upward are fitted with separate anvil block.

Every precaution is taken to construct the hammer so that it will be not only effective, but durable, and for this reason means are provided for taking up all wear where it is liable to occur.

The sizes of Hackney hammers are determined by the weight of the falling parts, viz.: piston, rod and ram. Hackney hammers are all fitted with soft steel die blocks.

200 LBS. AND UPWARD CAN BE OPERATED EITHER BY FOOT OR HAND.

50 LB. SINGLE STANDARD.

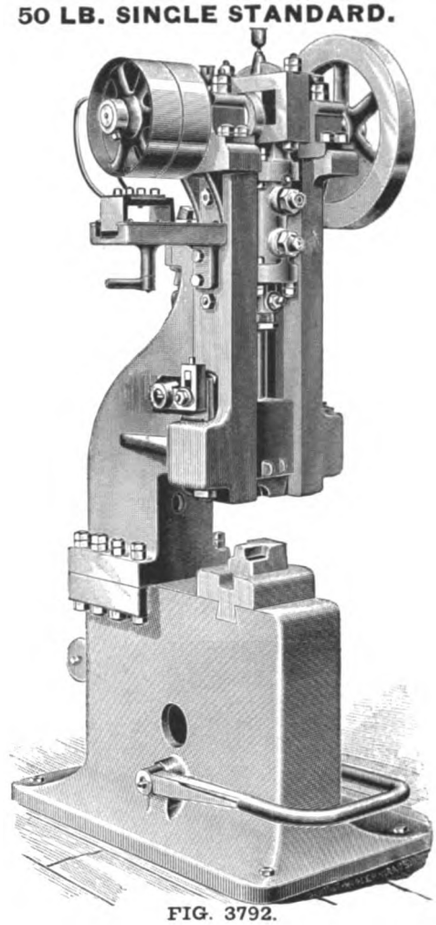


FIG. 3792.

200 LB. SINGLE STANDARD.

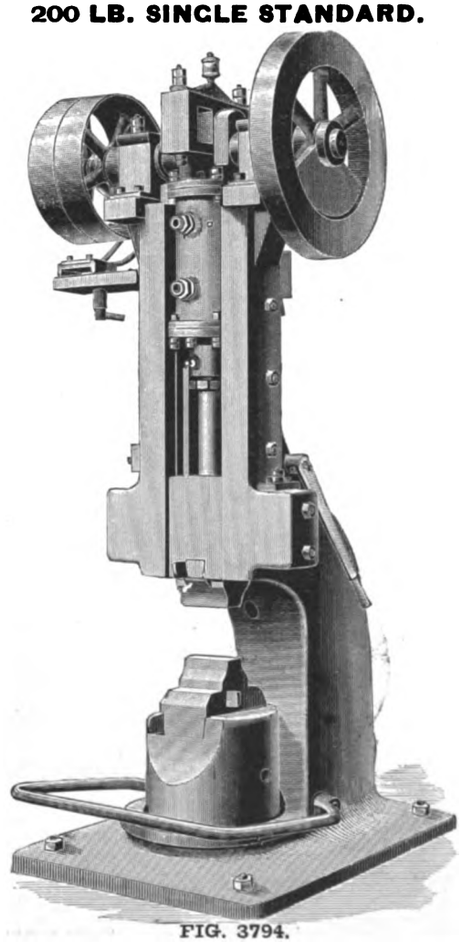


FIG. 3794.

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RUBBER CUSHIONED HELVE HAMMER.

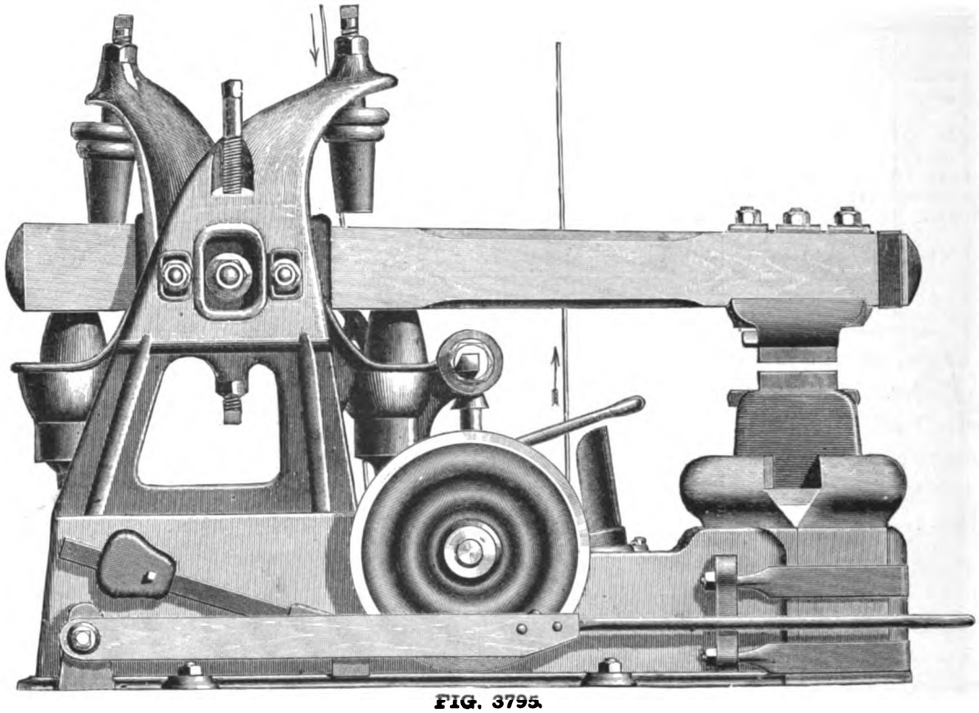


FIG. 3795.

PRICES.

15-pound head,	weight	1,100	lbs.		$225.00
25 "	"	1,800	"		300.00
40 "	"	3,000	"		450.00
60 "	"	4,500	"		600.00
80 "	"	5,600	"		750.00
100 "	"	5,800	"		850.00
200 "	"	9,500	"		1,000.00
40 "	"	for forks			450.00
60 "	"	"	"		600.00
70 "	"	"	"		700.00
70 "	"	for plating			700.00
100 "	"	"	"		800.00

TABLE OF CAPACITIES AND DIMENSIONS.

Size of hammer.	Diameter of driving pulley.	Width of belt.	Estimated horse power required.	Average No. of blows per minute.	Aver. size of iron for which suited*	Floor space.
25 pound.	12 inches.	3 inches.	¾ to 1	400	1 inch.	68 in. x 29 in.
40 "	14 "	4 "	1½ to 2	300 to 315	1¼ "	82 " x 34 "
60 "	18 "	6 "	2 to 2½	290 to 300	1¾ "	91 " x 43 "
80 "	18 "	6 "	2½ to 3	275	2 "	96 " x 48 "
100 "	18 "	6 "	2½ to 3	275	2½ "	96 " x 48 "
200 "	26 "	8 "	3 to 3½	225 to 240	3½ to 4 in.	106" x 54 "

* These estimates are for iron. Reduce the size one-third for steel.

UPRIGHT CUSHIONED STRAP HAMMER.

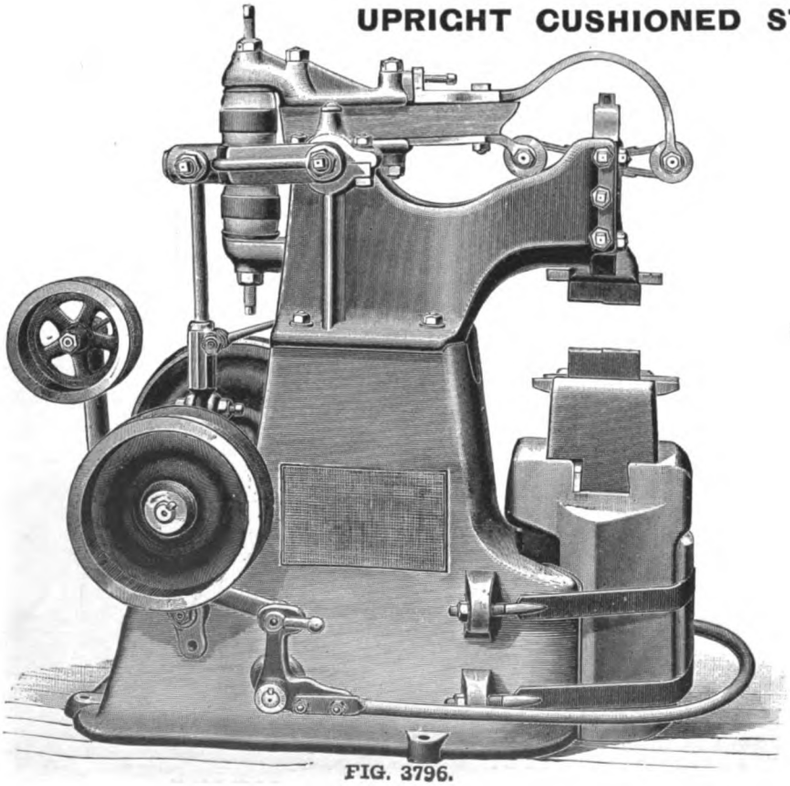


FIG. 3796.

THE SIZE IS INDICATED BY WEIGHT OF HAMMER HEAD.

PRICES.

Size,	15-pound	hammer,	weight,	700 lbs.	$200.00
"	30 "	"	"	1,800 "	300.00
"	50 "	"	"	2,800 "	450.00
"	75 "	"	"	2,800 "	500.00
"	100 "	"	"	4,000 "	600.00
"	125 "	"	"	4,000 "	650.00
"	150 "	"	"	5,200 "	750.00
"	200 "	"	"	6,000 "	850.00
"	300 "	"	"	9,000 "	1,000.00
"	500 "	"	"	12,000 "	1,200.00

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DEAD STROKE POWER HAMMERS.

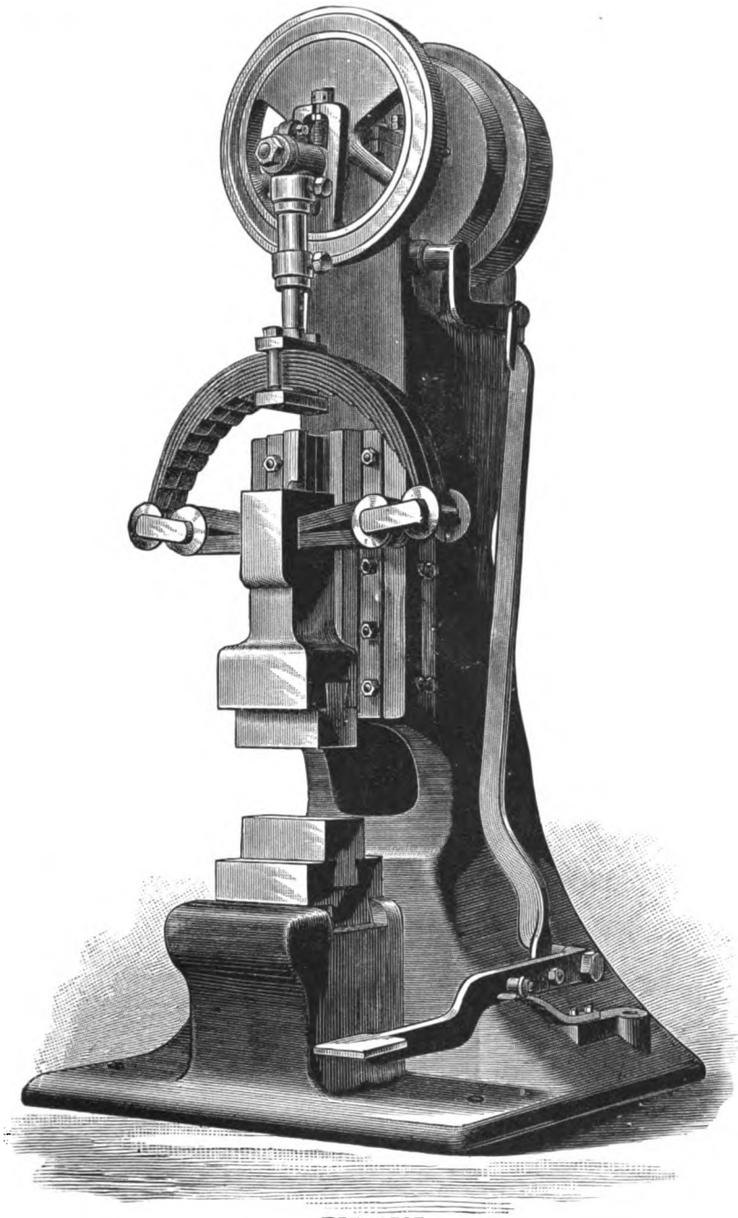


FIG. 3797.
REPRESENTS 250, 100, 75, 25 AND 15 LB. HAMMERS.
THE 50 LB. IS ON A COLUMN WITH ROUND BASE.

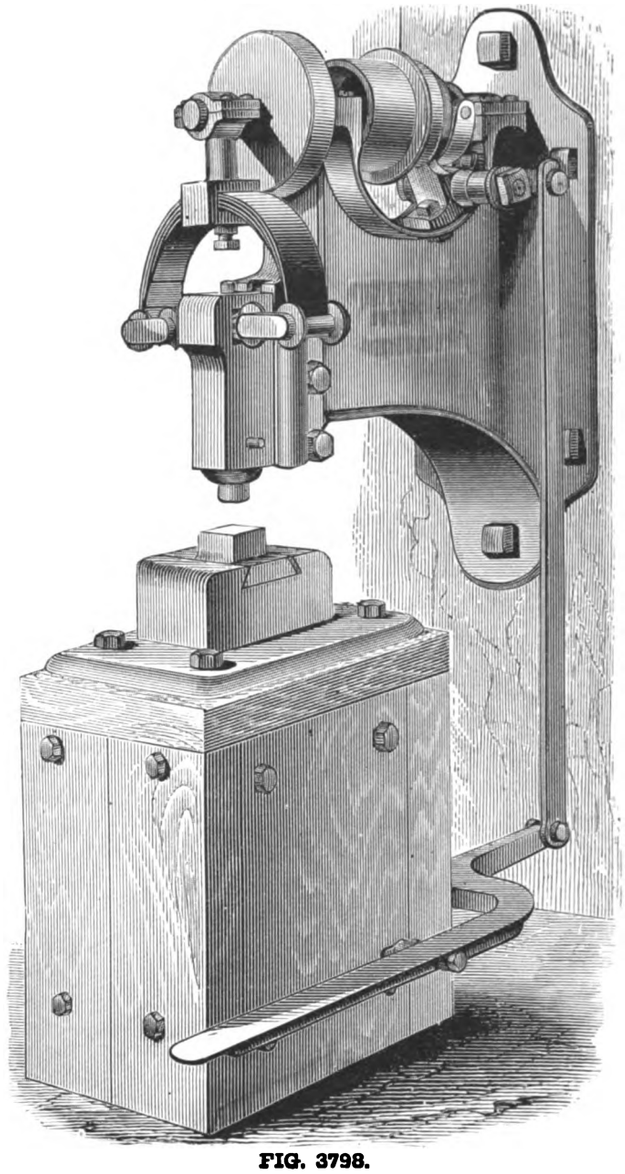


FIG. 3798.

PRICES.

5 lbs.	15 lbs.	25 lbs.	50 lbs.
$85.00.	$190.00.	$230.00.	$400.00.

PRICES, FIG. 3797.

Weight of ram.		Usual revolutions per minute.	Power required to work.	Adapted to work iron.	Will work steel.	PRICES.	REMARKS.
15 lbs.	Standard Patterns.	350 to 400	½ to 1 horse.	1 in. and under.	One-half the size of iron.	$230.00	Adapted to file-makers' uses.
25 "		275 to 300	1 to 2 "	2 "		285.00	
50 "		250 to 275	2½ to 3 "	3 "		380.00	Suitable for all light smith and die work.
75 "		250 to 275	3 to 4 "	3½ "		500.00	
100 "		200 to 250	4 to 5 "	4 "		680.00	" " gen'l forgings " "
250 "		150 to 175	5 to 6 "	5 "		1,100.00	" " steel "

DESCRIPTION.

It strikes a square, true blow at all times and under all circumstances, when in running order. Unlike other forging machines it can be run at a high speed without breaking itself to pieces. The ram, or striking part of the hammer, is suspended on an elastic or flexible belt (generally of leather), which, being attached to the extreme points of a semicircular steel spring, obtains for it the result claimed, to wit; a far more effective blow than given by any other hammer of the same weight and stroke. The upper part of the steel spring is connected by a rod with a crank-pin, which, being set in motion by belting from any convenient line of shafting, gives the reciprocating movement necessary to raise or lower the ram, in its guides with a speed and force entirely regulated by the friction pulley, which is always under control of the operator. These hammers should be set on stone foundations and should have from 8 to 12 inches of timber between the stone and the frame of the hammer. The foundation of base for 100 lb. and 75 lb. hammers should not be less than 5 feet deep; for the 50 lb. hammer, 4 feet deep; for the 25 and 15 lb. hammers, 3 feet and 6 inches. The foundation stones should not be less than 100 lbs. weight, or larger where obtainable. The holding-down bolts should run entirely through the foundations and be secured from turning by a T head at the bottom. The diameters of foundation bolts for 100 lb., 75 lb. and 50 lb. hammers should be 1¼ inches; for 25 lb. and 15 lb. hammers, 1 inch.

PULLEYS.—No pulley for driving the 100 lb. hammer, whether on countershaft or main line, must be less than 20 inches in diameter, and it is desirable to have them even larger, as less power is consumed in bending a wide belt over a large pulley than over a small one. For 50 lb. and 25 lb. hammers, 15 inches and 12 inches respectively are the minimum sizes.

BELTS.—Use only double thick belts, and all belts should be of the best oak-tanned stretched leather.

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POWER HAMMERS.

60 LB. HAMMER.

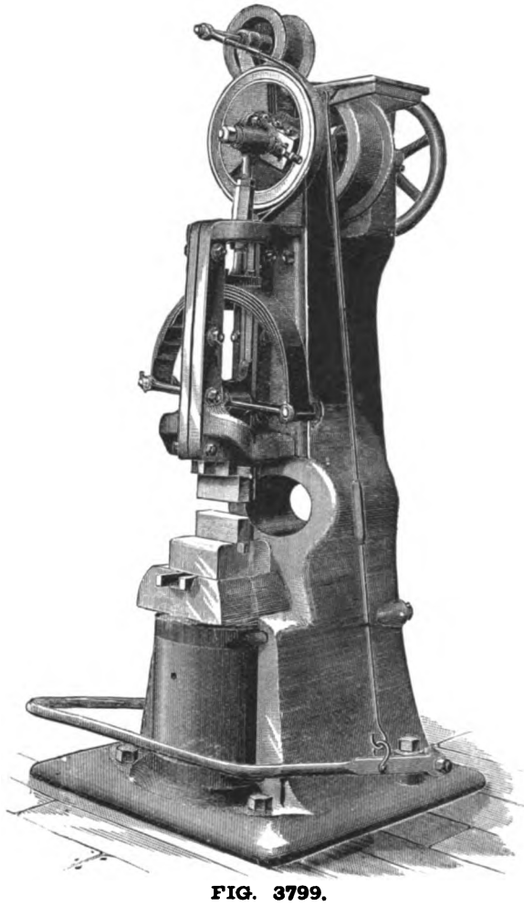


FIG. 3799.

15, 25 AND 50 LB. JUSTICE HAMMER.

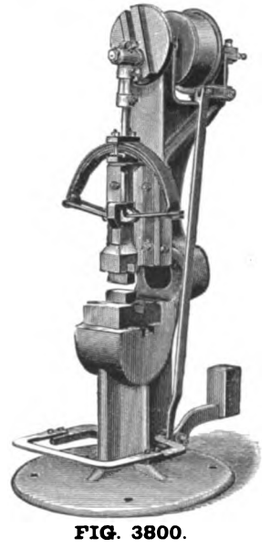


FIG. 3800.

100 LB. JUSTICE HAMMER.

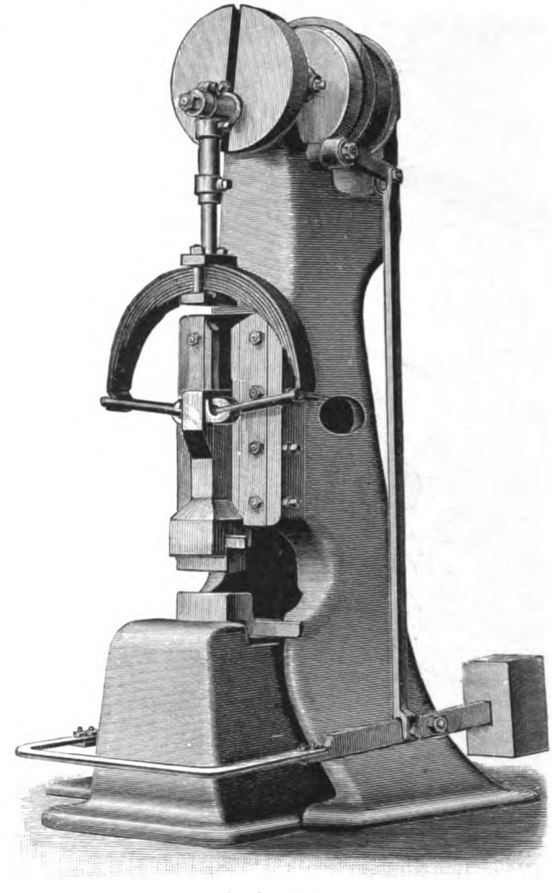


FIG. 3801.

NOTICE ABOUT THE RAM.

The ram must never be lowered so as to touch the die in the anvil block when the hammer is at rest. Many have neglected our instructions in this particular, supposing the machine to give the same kind of blows as other hammers, whereas its blows differ greatly from that of either a steam or trip hammer, being a quick, sharp, lively stroke, resembling that of a hand hammer. Be particular, therefore, that the die of the ram of this hammer SHALL NOT TOUCH THE DIE OF THE ANVIL BLOCK when the crank is as low as it can swing while at rest. The space between the dies should be, for a 100 lb. hammer, from 2½ inches to 3 inches, and for the 50 lb. and 25 lb. hammers, about 2 inches to 2½ inches. The ram can be raised by means of the set screws in the connecting rod when necessary, or by tightening the belt on which it is suspended, should it have stretched so as to allow the links to rattle.

PRICES, FIG. 3799.

Size or weight of ram.	PRICES.	Size of base.	Diameter of driving pulley.	Size of belt.	Average No. of blows per minute.	Adapted to work stock.	Height from the foundation to center of shaft.	Extreme size of dies.	Force of blow when running at average speed estimated
25 lbs.	$285.00	36 in. x 36 in.	10 inch.	3 inch.	500	⅛ to 1 in.	5 ft. 8 in.	4 x 5 in.	200 lbs.
30 "	300.00	36 " x 36 "	10 "	4 "	400	½ " 1½ "	5 " 10 "	6 x 7½ "	240 "
40 "	375.00	38 " x 38 "	11 "	4 "	350	¾ " 2 "	6 " 2 "	6 x 8½ "	300 "
50 "	400.00	40 " x 40 "	12 "	5½ "	350	1 " 3 "	6 " 6 "	6 x 8½ "	400 "
60 "	450.00	40 " x 40 "	14 "	5½ "	300	1¼ " 4 "	6 " 6 "	7 x 9½ "	500 "
80 "	500.00	40 " x 40 "	16 "	6 "	300	1½ " 4½ "	7 " 0 "	7 x 9½ "	560 "
100 "	600.00	48 " x 50 "	18 "	6 "	275	2 " 5 "	7 " 4 "	10 x 12 "	700 "
125 "	675.00	48 " x 50 "	18 "	6 "	250	2½ " 5½ "	7 " 4 "	10 x 12 "	750 "
150 "	800.00	48 " x 50 "	20 "	6 "	200	3 " 6 "	7 " 4 "	10 x 12 "	850 "

PRICES, FIGS. 3800 AND 3801.

Weight of ram.	Revolutions per minute.	Size of iron adapted to work.	PRICES.	Size of driving pulley.	Horse-power required to run.	Weight complete.
15 lbs.	350 to 450	1 inch square or less.	$230.00	3½ x 8	¼ to ½	1,400 lbs.
25 "	275 " 375	2 " " "	285.00	4½ x 12	½ " 1	2,100 "
30 "	275 " 375	2¼ " " "	312.00	4½ x 12	½ " 1	.....
50 "	250 " 350	3 " " "	380.00	4½ x 16	1½ " 2	3,400 lbs.
75 "	225 " 325	3½ " " "	500.00	5½ x 18	2 " 3	4,500 "
100 "	200 " 300	4 " " "	680 00	6½ x 18		6,200 "

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DROP HAMMERS.

POPPET DROP.

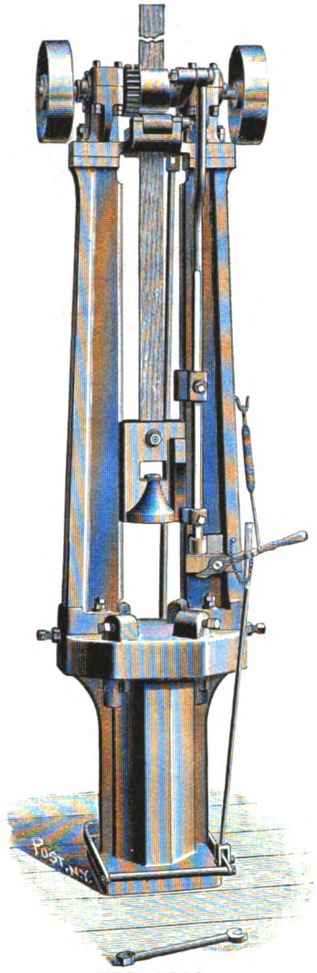


FIG. 3802.

FORGING DROP.

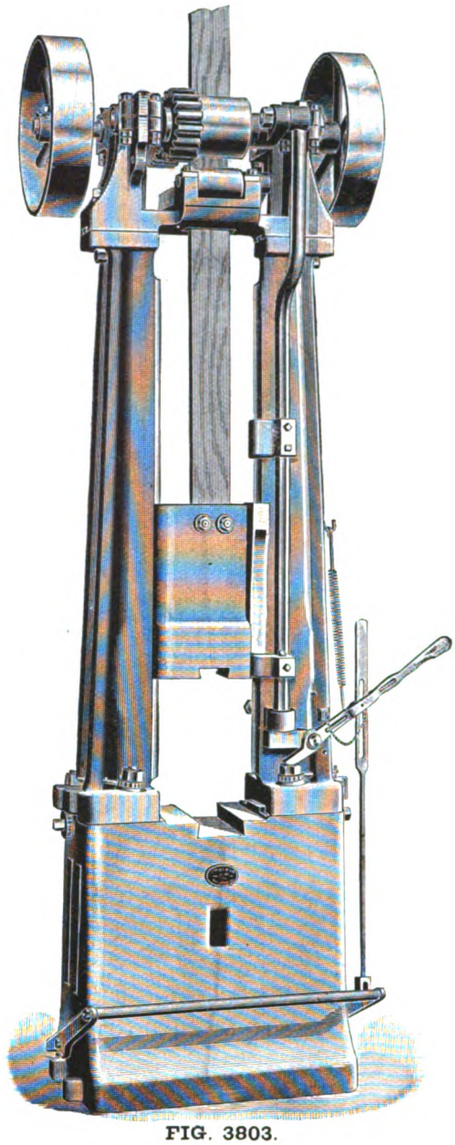


FIG. 3803.

PRICES.

Weight of hammer..... lbs.	50	100	200	300	400	600	800	1,000	1,200	1,500	2,000
Price for Forging Drop, Fig. 3803.....	$200.00	$350.00	$500.00	$650.00	$800.00	$950.00	$1,100.00	$1,250.00	$1,400.00	$1,650.00	$2,000.00
" " Poppet " " 3802.....	210.00	375.00	550.00	725.00	875.00	1,025.00	1,250.00	1,500.00	1,700.00	1,900.00	2,300.00
Length of uprights.....in.	48	54	60	72	78	84	90	96	96	108	108
Distance between uprights, { For forging.....in.	6	8	10	12	14	15	16	16	16	16	18
With poppets.....in.	6	10	12	14	16	18	20	25	25	36	36
Weight, complete, about.....lbs.	1,200	2,000	4,000	5,500	7,000	10,000	12,500	16,000	20,000	24,000	30,000
Diameter and width of pulleys.....in.	10 x 2½	14 x 3	18 x 4	20 x 6	24 x 8	28 x 8	32 x 8	36 x 8	40 x 8	42 x 10	48 x 10
Number of revolutions per minute.....	200	175	150	135	125	115	110	100	100	90	80

DESCRIPTION.

A board secured to the hammer passes up between two friction rolls, which revolve in opposite directions. When the two rolls are moved toward each other, the friction on the board causes the hammer to rise; and when again separated the hammer will fall. The back roll is keyed to a shaft, on each end of which is a driving pulley; and thus by the use of two pulleys on the same shaft, equal wear comes on the bearings in which it revolves. The front roll turns freely on its shaft, and is driven by the back roll, being geared to it. To secure to the gears both strength and durability, they are made with wide faces, and the teeth are of peculiar shape and made of steel. These gears are made separate so that they can be replaced if necessary.

The bearings of the shaft, on which the front roll revolves freely, are eccentric to the roll, and a partial revolution of the shaft moves the front toward the back roll, pinching the board. To an arm which is secured to the front shaft, is fastened the upright rod, the upward movement of which opens the rolls, and whose downward movement closes the same; the weight of the rod being sufficient to cause the hammer to rise.

A pair of clamps for holding up the hammer are located on the lifter, under the rolls, and hold the hammer centrally, preventing any side blow on the guides. The back roll is made adjustable to different thicknesses of board or belt, as also are the clamps. The clamps in holding up the hammer keep the board from touching either roll, and prevent the same from being worn uneven when not in use.

The opening of the clamps by the foot treadle allows the hammer to fall; and the clamps are so made that the hammer will ascend freely, whether the foot is on the treadle or not, and if the foot is off the treadle, will hold up the hammer at any point where it may be arrested in its downward movement.

The automatic trip, as shown on forging drop, Fig. 3803, is now put on the poppet drop, Fig. 3802, in place of that shown. The hammers in forging drops are made of steel castings.

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POPPET DROP PRESSES.

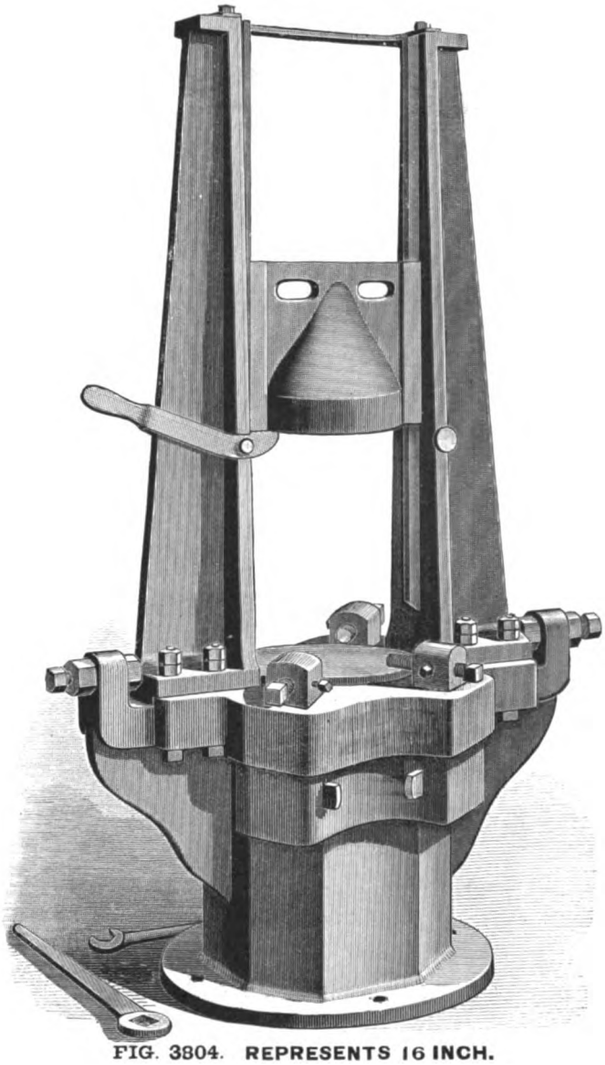


FIG. 3804. REPRESENTS 16 INCH.

DESCRIPTION OF DROP PRESSES, FIG. 3804.

Fig. 3804 represents the general style of poppet drop presses having 7 inch to 28 inch space between poppets. They are very largely used by manufacturers of silver and plated ware, brass, iron, steel and tin goods, etc.

The poppets are of wrought iron, with cast steel screws, lathe turned, and provided with set screws and soft metal plugs to prevent marring the poppet screws. The guides may be made longer or shorter than given in table, if required, and the hammers can also be modified to suit special work and dies.

PRICES.

Sizes.	7 inch, light.	7 inch, heavy.	9 inch, light.	9 inch, heavy.	12 inch.	16 inch.	24 inch.	28 inch
Price	$100.00	$125.00	$135.00	$150.00	$225.00	$375.00	$700.00	$900.00
Weight of hammer	60 lbs.	80 lbs.	120 lbs.	175 lbs.	225 lbs.	400 lbs.	600 lbs.	800 lbs.
Weight of bed	500 lbs.	800 lbs.	1,100 lbs.	1,400 lbs.	1,800 lbs.	3,500 lbs	5,000 lbs.	9,000 lbs.
Weight complete, about	700 lbs.	1,200 lbs.	1,600 lbs.	2,000 lbs.	2,500 lbs.	4,500 lbs.	6,500 lbs.	12,000 lbs.
Length of guides	5 ft.	5 ft.	5 ft.	5 ft.	5 ft.	5 ft.	5 ft.	5 ft.
Width between guides	9 ins.	9 ins.	12 ins.	12 ins.	15 ins.	18 ins.	26 ins.	30 ins.
Height of bed	24 ins.	28 ins.	24 ins.	28 ins.	30 ins.	30 ins.	30 ins.	36 ins.
Countershaft and hangers, with flange and driving pulleys, extra	$20.00	$20.00	$20.00	$20.00	$20.00	$25.00	.....	.....
Peck lifter	78.00	133.00	133.00	205.00	205.00	417.00	$528.00	$528.00
Williams, White & Co. lifter	100.00	100.00	150.00	190.00	190.00	250.00	350.00	350.00

COKE HEATING FORGES.

These forges are designed to be used in connection with power hammers, and for a proper, economical, general use forge cannot be excelled. The blast area is ample, and they are so constructed that the combustion of fuel is complete. These forges are now made in three sizes, Nos. 1, 2 and 3, to which we shall add other sizes, and for certain work special sizes can be furnished.

The forge complete, as shown in cut, consists of ordinary iron castings; the legs, hoppers and fore plates being separate and affixed to body of same, which is one casting. The legs are bolted to the body; the hopper and fore plate supporters fit in grooves cast in body. A wrought iron band holding fire brick in place by means of key bricks through center forms the top and rests on inside lining or walls of fire brick. The top can be raised or lowered according to the height that fire brick lining is carried up. Both ends have fire openings so any extra long stock can very easily be heated in center, the ends projecting out at each end of forge.

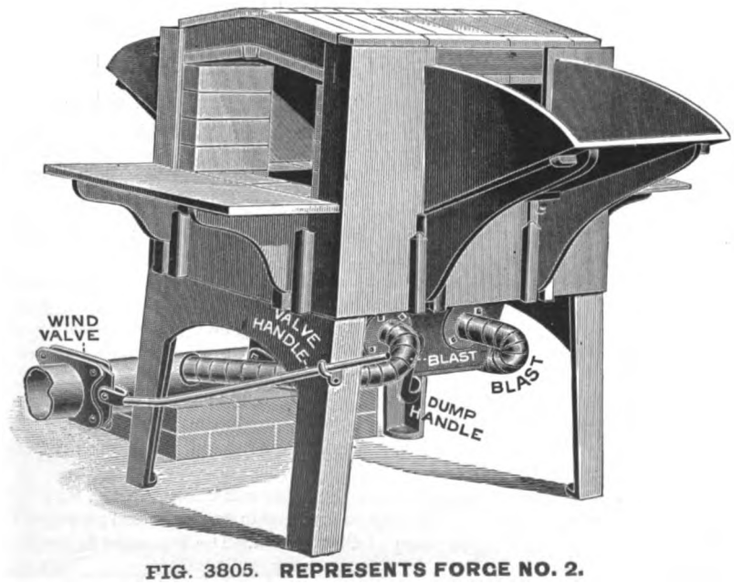


FIG. 3805. REPRESENTS FORGE NO. 2.

The hoppers are on both sides as shown in cut and are quite large, thus permitting the fuel to be banked up in sufficient quantities to feed properly into forge.

Number.	Area grate surface.	Height.	Fire opening.	PRICES.
No. 1.	7 ins. x 9 ins.	3 ft. 6 ins.	8½ ins.	$25.00
No. 2.	10 " x 20 "	3 " 9 "	18 "	50.00
No. 3.	10 " x 20 "	3 " 9 "	25 "	75.00

Furnished fitted ready for brick work.

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HARD COAL OR COKE HEATING FORGES.

NOS. 6 AND 7.

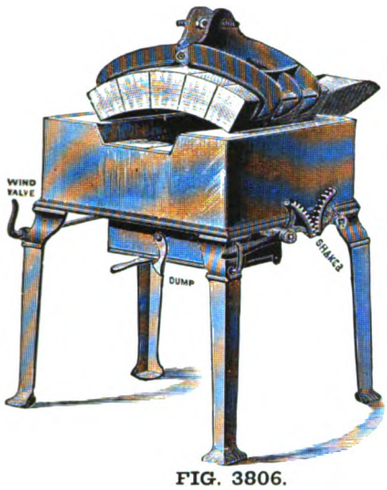


FIG. 3806.

NO. 8.

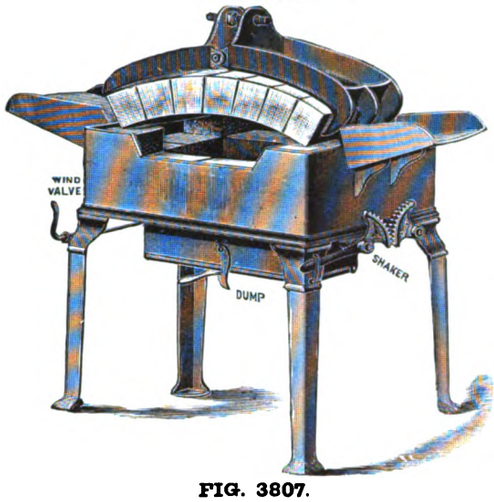


FIG. 3807.

NO. 9.

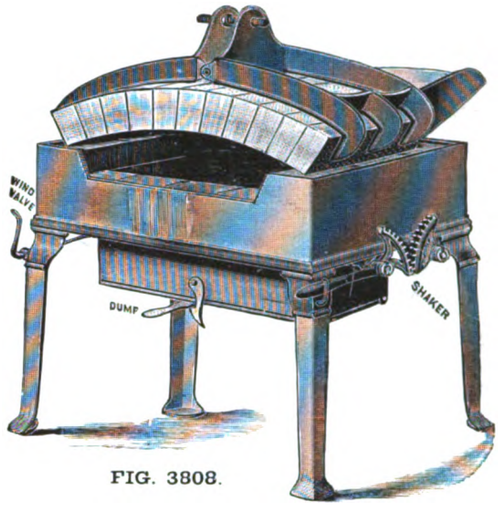


FIG. 3808.

PRICES, WITHOUT BRICKS.

No. 6—Has 2 grates, each 4½x9 inches, giving a total grate surface of 9x9 inches.

WEIGHT, 278 LBS. PRICE, $30.00.

Brick required—for box, 16 common, 2½x4½x9 inches; for top, 5 arch, 3⅜ and 3⅞x4½x12 inches.

No. 7—Has 2 grates, each 4½x14 inches, giving a total grate surface of 9x14 inches.

WEIGHT, 308 LBS. PRICE, $40.00.

Brick required—for box, 25 common, 2½x4½x9 inches; for top, 5 arch, 3⅜ and 3⅞x4½x12 inches.

No. 8—Has 2 grates, each 4½x18 inches, giving a total grate surface of 9x18 inches.

WEIGHT, 405 LBS. PRICE, $50.00.

Brick required—for box, 26 common, 2½x4½x9 inches; for top, 7 arch, 3⅜ and 3⅞x4½x12 inches.

No. 9—Has 2 grates, each 7x23 inches, giving a total grate surface of 14x23 inches.

WEIGHT, 560 LBS. PRICE, $55.00.

Brick required—for box, 35 common, 2½x4½x9 inches; for top, 12 common, 2½x4½x9 inches, and 12 arch, 2 and 2½x4½x9 ins.

In filling top, put a common brick in first, then a taper one, and thus alternate until complete.

NOS. 10 AND 11.

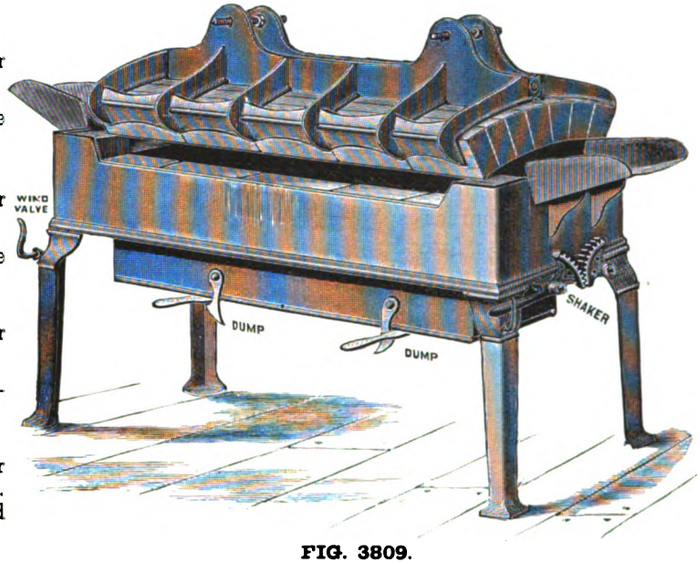


FIG. 3809.

No. 10—Has 4 grates, each 4½x20½ inches, giving a total grate surface of 9x41 inches.

WEIGHT, 800 LBS. PRICE, $70.00.

Brick required—for box, 46 common, 2½x4½x9 inches; for top, 5 common, 2½x4½x9 inches, and 30 arch, 2 and 2½x4½x9 inches.

In filling top use a common brick for the center one.

No. 11—(No cut)—Has 4 grates, each 7x23 inches, giving a total grate surface of 23x28 inches.

WEIGHT, 1,000 LBS. PRICE, $90.00.

Brick required—for box, 52 common, 2½x4½x9 inches; for top, 24 common, 2½x4½x9 inches, and 24 arch, 2 and 2½x4½x9 inches.

NO. 12.

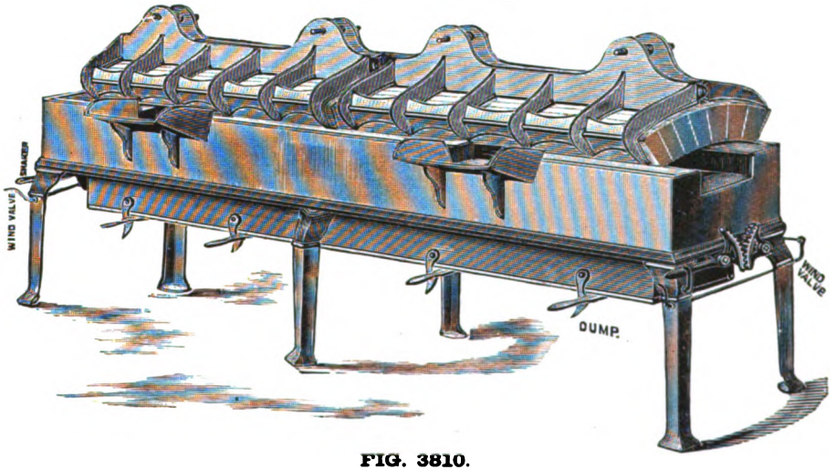


FIG. 3810.

No. 12—Has 4 grates, each 7x37 inches, giving a total grate surface of 14x74 inches. Open ends.

WEIGHT, 2,025 LBS. PRICE, $125.00.

Brick required—for box, 120 common, 2½x4½x9 inches; for top, 40 common, 2½x4½x9 inches, and 40 arch, 2 and 2½x4½x9 inches.

In filling top, put a common brick in first, then a taper one, and thus alternate until complete.

Grate surfaces given are inside measurements after bricks are in place. In ordering, always state plainly style and size, and which way you wish to use the forge. Brick—common, 5 cts. each; arch, 10 cts. each, net.

Prices quoted are for forges without fire-brick, but we will furnish the brick, when desired, at the prices named in list. These prices for brick are net.

The blast is received in an air-box, and reaches the fire through several openings, so that the pressure is evenly distributed, insuring an even fire. The force of the blast is under complete control. As a rule, these forges are made with the opening in front, as shown in cuts, but we can furnish them open at the ends when so desired. The open front style is always shipped unless special mention is made of the other, as the latter are desirable only when long pieces are to be heated.

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FUEL OIL BURNERS AND FORCES.

The Henry fuel oil burner, Fig. 3810H, is used for heating forges, annealing furnaces, hardening ovens, etc., etc. A blast is necessary taken from an ordinary blower at about 8 oz. pressure and is made hot by a system of passes within each forge or furnace. The hot blast vaporizes the oil and the mixture of gas and air burns without smoke or with a smoke if not enough air is given to produce a perfect combustion. The results are most economical, when compared with cost of coal heating. The intensity of the heat is at all times perfectly within the control of the operator. All the expenses of handling coal and ashes are saved.

NO. 4 HEATING FURNACE & BURNER.

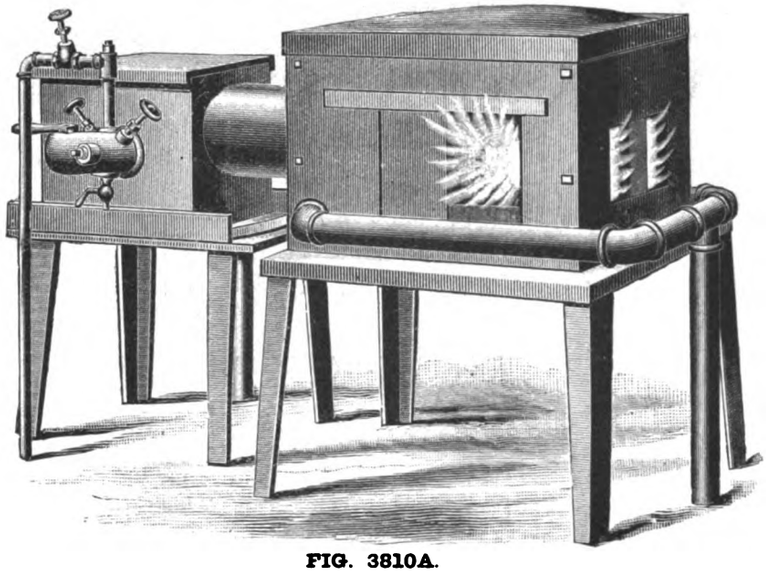


FIG. 3810A.

This furnace and burner can be used for tempering, annealing, case-hardening, etc. Size furnace, 4 ft. 2 in. by 3 ft. 3 in. It will heat a billet of steel 7 inches square by 18 inches long.

WEIGHT, 900 LBS. PRICE, $190.00.

No bricks furnished.

NO. 5 BURNER.

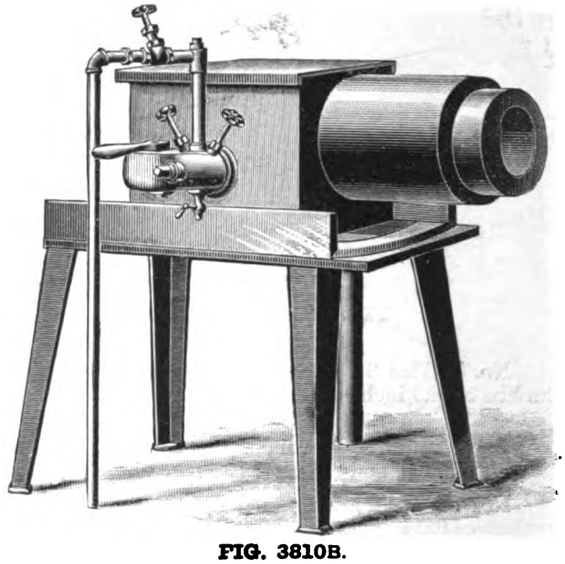


FIG. 3810B.

This burner is used with an annealing oven. It will make a blaze from 5 to 8 inches in diameter hot enough for welding iron.

WEIGHT, 450 LBS. PRICE, $100.00.

Sample brick lining with first order only.

NO. 11 HEATING FURNACE.

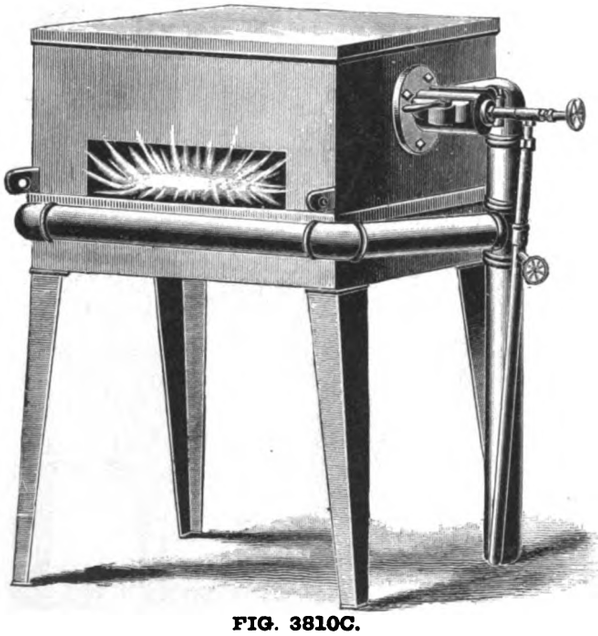


FIG. 3810C.

In this furnace the opening is 14 inches by 2½ inches. It will heat 6 bars at once up to a welding heat.

WEIGHT, 600 LBS. PRICE, $125.00.

Weight of brick, 350 lbs.

NO. 12 HEATING FURNACE.

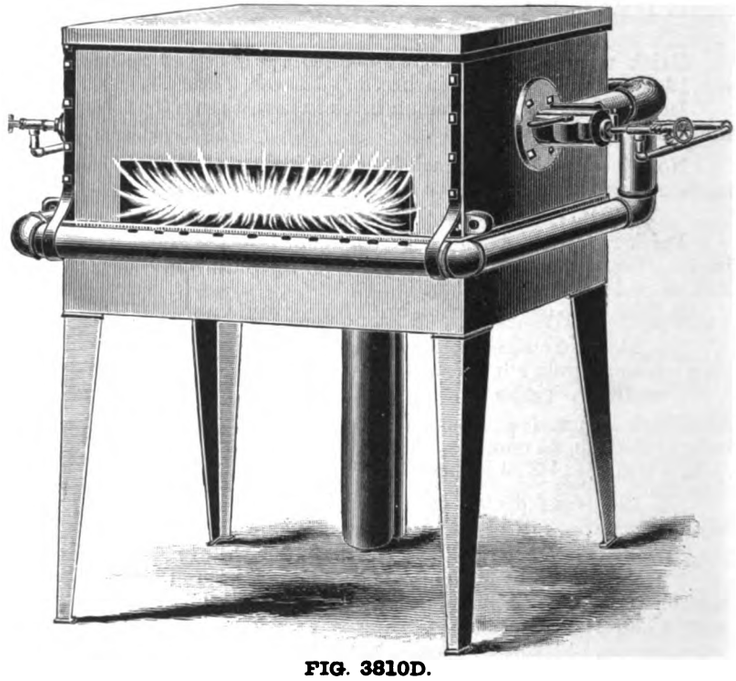


FIG. 3810D.

In this furnace the opening is 24 inches by 2½ inches. It will heat 7 bars at once, 2½ by 12 inches.

WEIGHT, 810 LBS. PRICE, $150.00.

Weight of brick, 500 lbs.

Bricks sent only with first order.

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FUEL OIL BURNERS.

Fig. 3810E represents No. 9 burner as applied to heading of a boiler. It is more economical than coal and requires less labor and will maintain a uniform heat.

Prices on application.

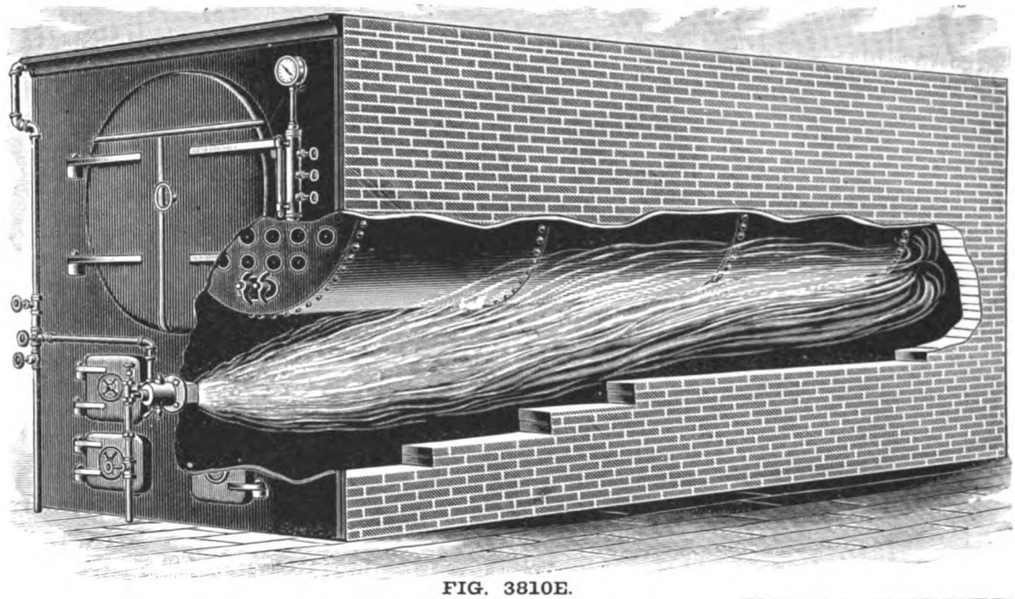


FIG. 3810E.

NO. 9 BURNER.

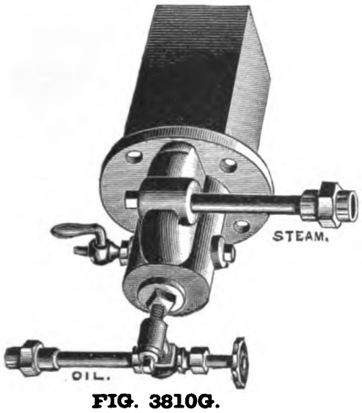


FIG. 3810G.

Fig. 3810G is the steam burner, that is, when the blast is obtained by using a small jet of steam.

PRICE, $30.00.

Fig. 3810H is the Henry air burner, that is, when the blast is obtained by using a blast of air from a blower of about 8 oz. pressure, the air blast should be heated by contact with the furnaces, as in cuts on page 291A, to obtain the best results.

PRICE, $30.00.

This burner can be used with almost any furnace.

NO. 10 BURNER.

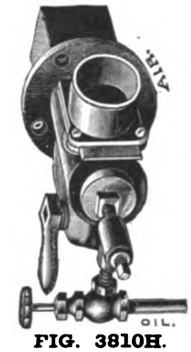


FIG. 3810H.

WATER FRONT FORCES.

PRICES ON APPLICATION.

TABLE OF DIMENSIONS.

No.	Length of case from right to left.	Depth of case from front to rear.	Length of opening to admit iron.	Depth of fire bed.	Size of grate.		Nos. and size of bars and length it will heat.		
					From right to left.	From front to rear.	No. of bars.	Size of bars.	Length will heat.
1	12	22	6	5	3	7	6	¼	7
2	22	36	10	5	10	10	10	½	10
3	30	38	18	6	18	10	10	1	10
4	38	20	16	7	16	9	8	1¼	9
5	44	22	20	7	20	10	9	1½	10
6	38	20	16	7	16	9	8	1¼	9
7	44	22	20	7	20	10	9	1½	10
8	50	24	24	8	24	12	9	2	12
9	48	20	16	6	16	8	8	1¼	8
10	54	22	18	7	18	10	7	1½	10
11	60	24	20	8	20	12	7	1¾	12
12	64	24	24	8	24	12	7	2¼	12
13	70	22	10	6	10	10	12	1	10
14	93	24	24	8	24	12	12	2	12
15	42	50	30	8	30	24	8	2½	24
16	52	30	40	8	40	8	16	1½	8
17	86	22	46	8	46	10	16	1¾	10

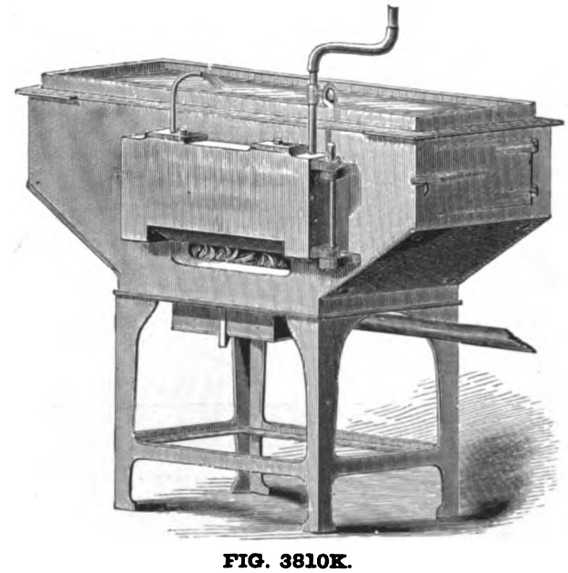


FIG. 3810K.

This cut represents sizes 6, 7, 8, 9, 10, 11 and 16. No. 17 is much the same, only water door slides up and down instead of swinging on hinge.

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BULLDOZER FORGING, BENDING, SHEARING AND GANG PUNCH.

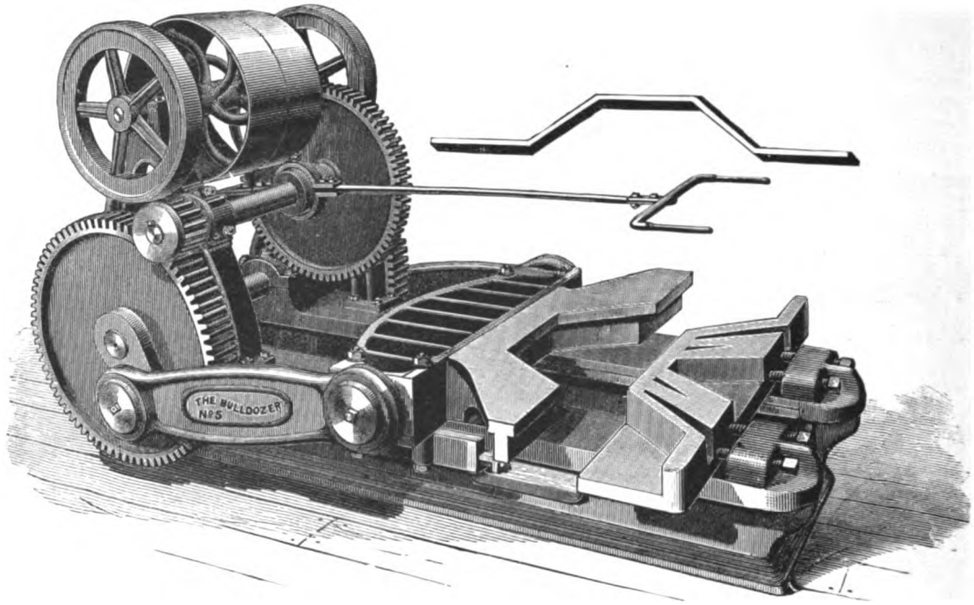


FIG. 3811, WITH DIES.

DOUBLE ENDED BULLDOZER.

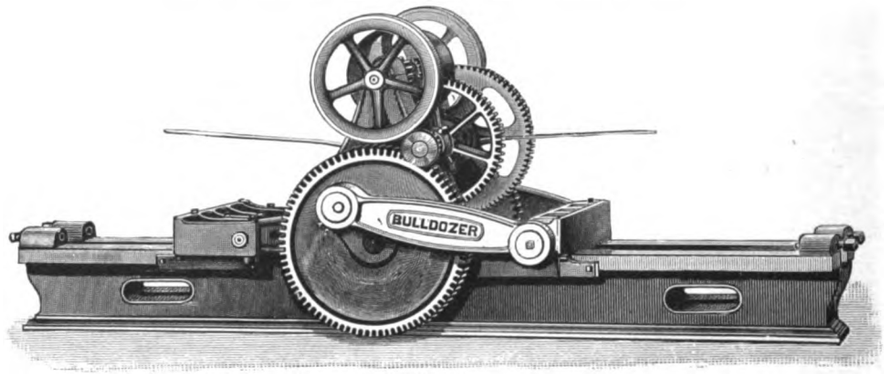


FIG. 3812.

PRICES, FIG. 3811.

Single ended machines.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Length over all	6 ft. 7 in.	7 ft. 4½ in.	8 ft. 8 in.	10 ft. 3 in.	11 ft. 9 in.
Width over all	3 ft. 5 in.	3 ft. 6 in.	3 ft. 6 in.	4 ft. 7 in.	7 ft. 1 in.
Face of crosshead	29½x5 in.	34½x6¾"	39x7 in.	45½x7 in.	63x11¾ "
Movement of crosshead	14 in.	16 in.	16 in.	18 in.	20 in.
Pulleys	18x4½ in.	20x6½ in.	24x6½ in.	24x8½ in.	30x10½ in.
Revolutions of pulley to one movement of crosshead	36	42	51	45	46
Space for dies	14 in.	17½ in.	25 in.	38 in.	38 in.
Weight, complete	3,800 lbs.	5,500 lbs.	7,000 lbs.	11,000 lbs.	16,000 lbs.
PRICES, without dies	$	$	$	$	$

Fig. 3812, double, made to order only, and in sizes, Nos. 2, 3 and 4.

NO. 5 BENDER.

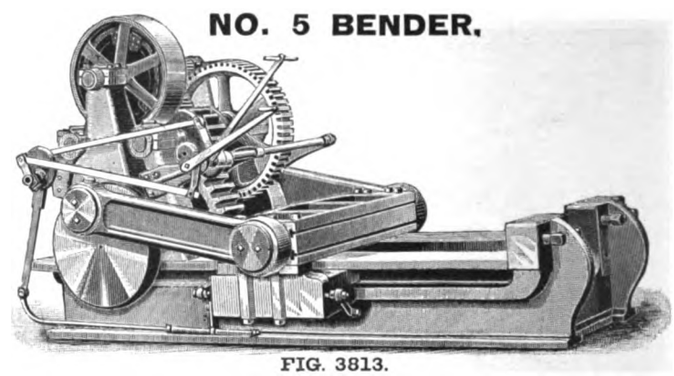


FIG. 3813.

Has friction clutch and automatic back stop movement.

PRICES, FIG. 3813.

Number.	1	2	3	4	5
Length over all	6 ft.	7 ft.	10 ft.	10 ft.	12 ft. 6 inch.
Width over all	36 inch.	52 inch.	62 inch.	69 inch.	78 inch.
Face length of crosshead	24 "	36 "	44½ "	54 "	60 "
Depth of crosshead	5 "	7 "	8 "	8 "	10 "
Movement of crosshead	14 "	16 "	17 "	18 "	20 "
Space for dies	14 "	16¾"	26½ "	38 "	39 "
Back gear	7½ to 1	26 to 1	35 to 1	45 to 1	51 to 1
Strokes per minute	15	12	10	8	6
Speed of driving pulley	120	320	350	200	300
Driving pulley	30x6 in.	28x6 inch.	30x6 inch.	30x8 inch.	30x8 inch.
Weight	3,500 lbs.	5,500 lbs.	8,000 lbs.	15,000 lbs.	22,500 lbs.
Friction clutch, extra	None.	None.	$100.00	$100.00	$100.00
Automatic back stop movement ex. inc'g clutch	None.	None.	150.00	160.00	175.00
PRICES, without dies	$	$	$	$	$

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FRAME SETTING MACHINE.

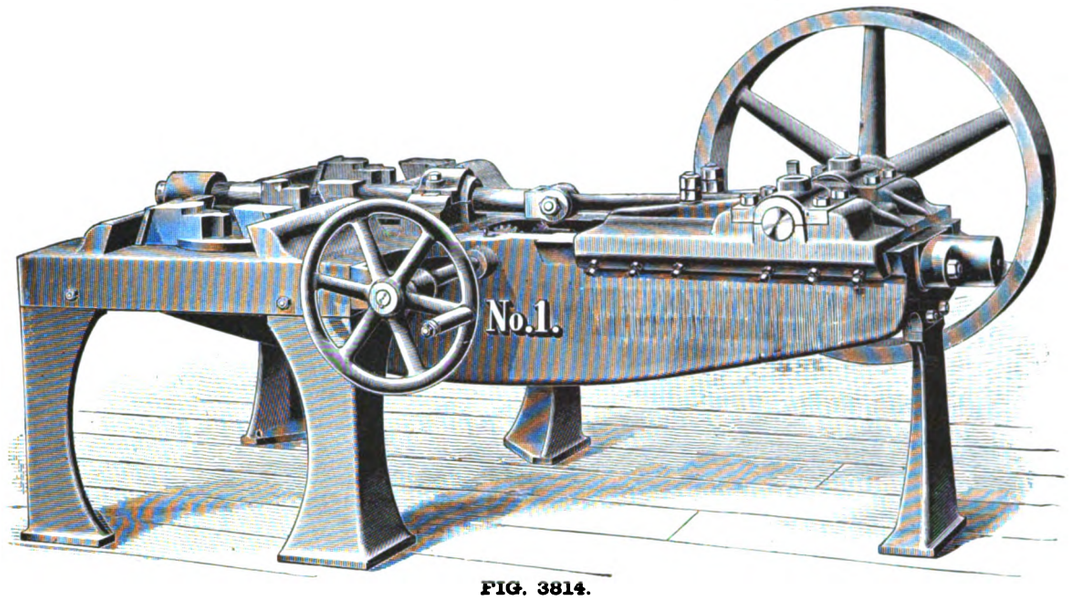


FIG. 3814.

On this machine the motion is obtained from a shaft with an eccentric, which is fed up against the work, giving a succession of short blows; the forms, etc., being arranged to suit the work required and set to give the proper curve to the work, such as angles, "Z" bars and ship frames.

WEIGHT, ... **LBS.** **PRICE, $**.....

HYDRAULIC FRAME BENDER.

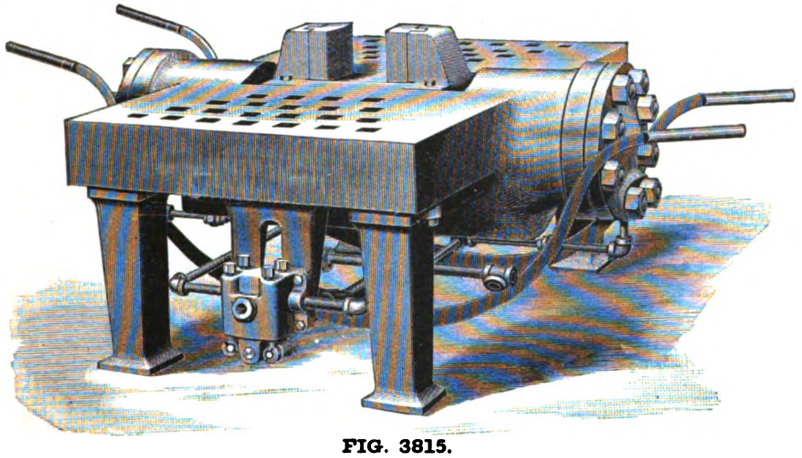


FIG. 3815.

This tool is capable of bending a 6 x 3 inch "Z" bar in the direction of its greatest depth, with blocks 3 ft. apart, the water pressure being 1,500 lbs. per square inch. The table is 4 ft. by 6 ft., with holes placed in the table 3½ inches in diameter. There are four rows of staggered holes, three holes in the first row and six in the outer. The cylinders are 7 inches in diameter and have a stroke of 12 inches, the ram being double-headed and extending from one cylinder to the other, and with center bearing, the cylinder being copper-lined. The bending blocks are dovetailed into a double-headed saddle, which is let into the surface of the ram, and slides in guides, which are covered to prevent the scale from dropping on them, and through the covers are placed oil holes, which are provided with screw plugs. Both heads of the cylinders are removable, and are also provided with air passages for allowing the air to get out, and allow the filling to be drained out of it in cold weather, if desired. The valves are placed in one body, and a lever at each corner of the press governs the motion completely, opening the release valve for one cylinder when pressure valve is opened for the other, and the motion is automatically stopped by the taking of the hand from the lever. The press complete weighs about 7,250 lbs.

PRICE, $ .....

CAR LINK MACHINE.

This machine is designed to form car or large links, and is rapid and effective in its operation.

The bar iron can be taken as it leaves the rolls, and without reheating formed directly into car links. It first passes between grooved feed rolls, which carry it between the shearing-off or scarfing knives the exact length necessary to make the link, and the ends scarfed being thus obtained, a former carried by a sliding carriage in connection with the pitman arm moves forward and bends the iron between two rollers, which also serve to bend the scarfed ends around ready for welding. The pitman on retiring lifts former out of link, which is discharged in front. The feed rolls are driven automatically by means of a segment gear controlled by friction clutch.

The upper feed roll is readily thrown back from the lower by a stationary lever in case of hand feeding or otherwise.

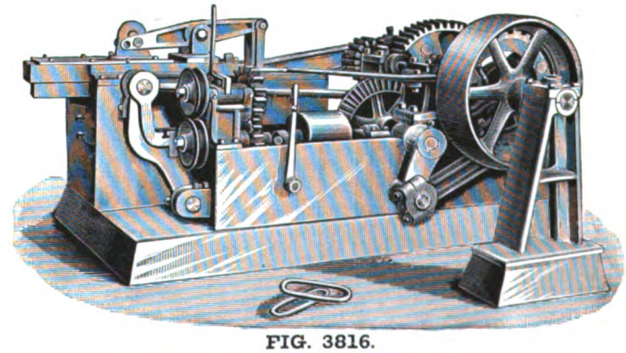


FIG. 3816.

The main driver is also a powerful friction clutch, so that machine is under complete control of operator. The product is 17 links per minute or 15 tons per day. We also supply special car pin machinery, with a capacity of 1,500 to 4,000 pins per day.

PRICES AND FURTHER DETAILS ON APPLICATION.

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SIZE A, RAPID, BOLT, RIVET AND TRACK BOLT HEADER.

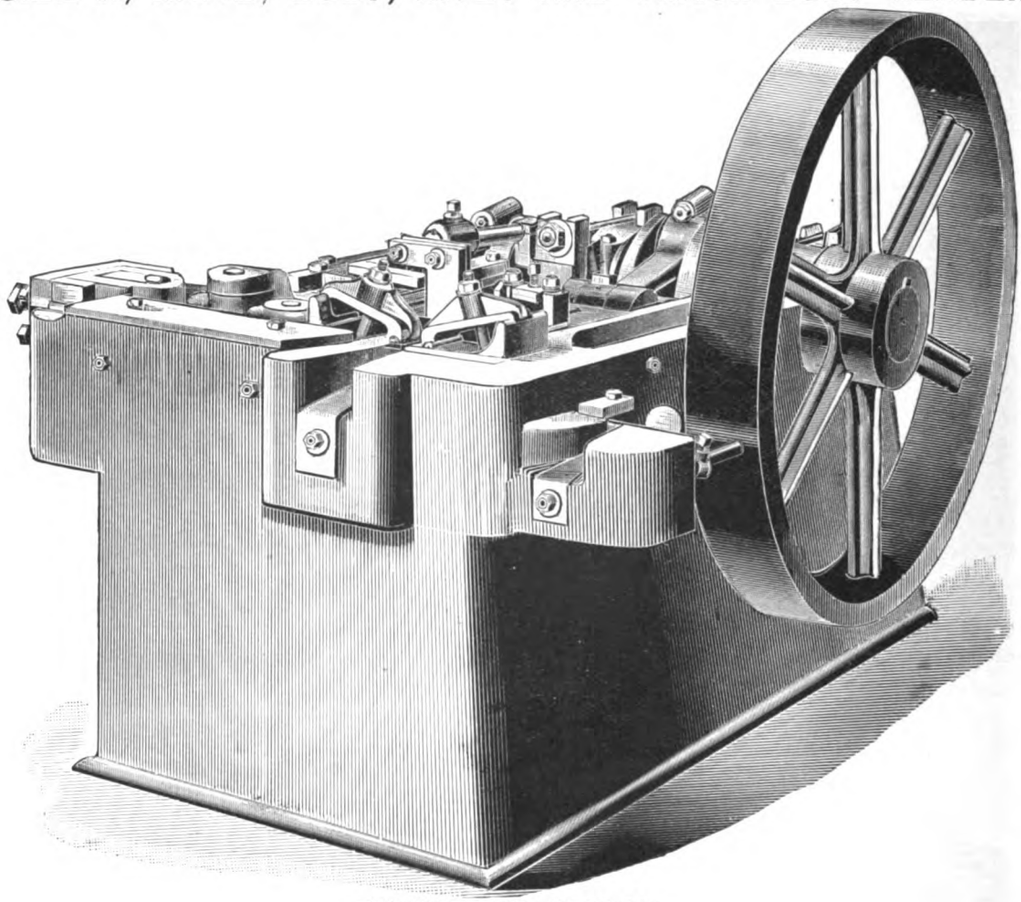


FIG. 3817. SEE PAGE 295.

SIZE B, BOLT HEADER AND GENERAL FORGING MACHINE.

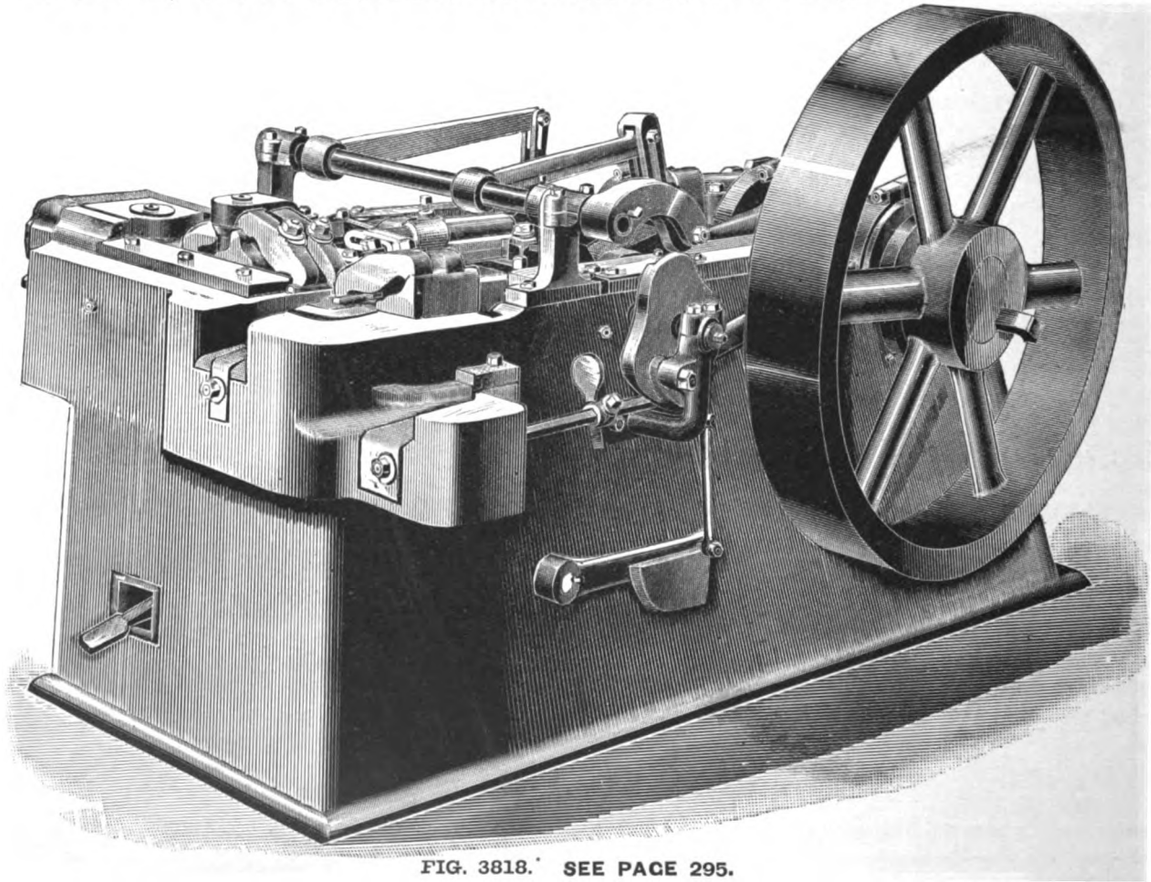


FIG. 3818. SEE PAGE 295.

SEE PAGES 296 AND 297 FOR SAMPLES OF WORK DONE ON ABOVE MACHINES.

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SIZE C, BOLT HEADER UPSETTING AND FORGING MACHINE.

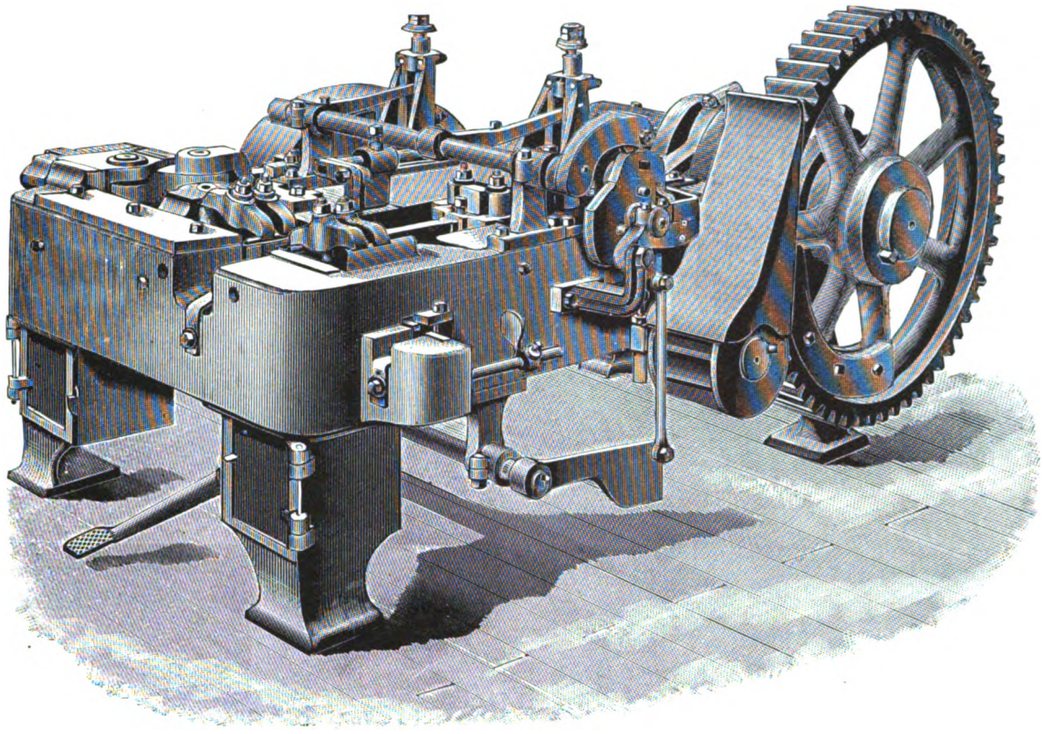


FIG. 3819.

FOR SAMPLES OF WORK DONE ON THIS MACHINE, SEE PAGES 296 AND 297.

SIZE A. FIG. 3817.

Has continuous movement and is a rapid bolt header. Makes bolts from ⅜ inch to 1½ inch iron, upsets on truss rods from ½ inch to 1¼ inch iron, 4 inch long on any length of rod. Punches small key bolts, etc. The capacity of this machine is only limited by the ability of the operator, and is recommended for railroads and car shops requiring a machine for making small sizes only. When this machine is to be used for rivets or track bolts, we put on our automatic cutter, which insures a perfect and even head and increases the length of time that the dies will stand without redressing to double the amount of work that any other machine will do, thereby greatly reducing the cost of making rivets or track bolts. These machines are constructed so that either the double or single dies can be used. If desired, the box die can be used for making bolts.

Floor space required ..... 7 feet by 5 feet.
Speed of machine ..... 80 to 120.
Weight ..... 9,500 lbs.
Price, with one pair of dies ..... $.....
Price of countershaft ....
Price of heating furnace ....

SIZE B. FIG. 3818.

This machine, although lighter, is otherwise the same as size "C." It will make bolts from ⅝ inch to 2 inch iron, upsets truss rods up to 2 inches on any length of rod; forge coupling pins, center pins, rivets and track bolts, punches, key bolts, etc. These machines are constructed so that either the double or single dies can be used. If desired, the box die can be used for making bolts.

Floor space required ..... 7½ feet by 5½ feet.
Speed of machine ..... 65.
Weight ..... 16,000 lbs.
Price, with one pair of dies ..... $.....
Price of countershaft ....
Price of heating furnace ....
Price, with lock ....

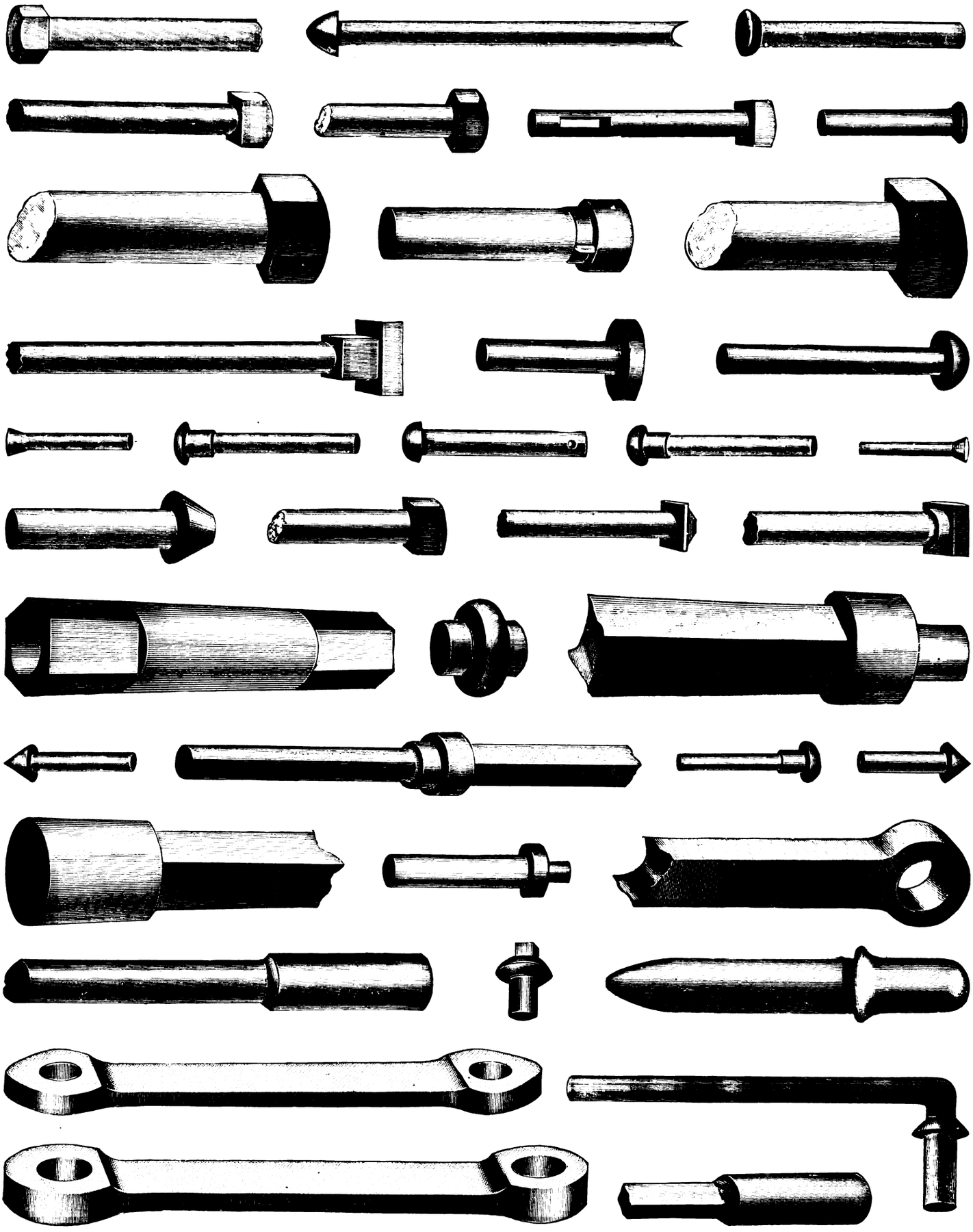
SIZE C. FIG. 3819.

The range of this machine in iron it will work, is from ½ inch to 2½ inches round, and from 1 inch to 4½ inches wide, up to 1½ inches thick. Will upset or bend the end of arch bars, heads and punches center pins or tail bolts; upsets truss rods of any size iron up to 2½ inches, makes crank rods for Wagner car door corner plates, staples, coal car axles, hexagon, square, T and round head bolts, break wheel shafts, stay bolts and other special forgings within the range of the machine. It is fitted up with Blakeslee's patent lock, which gives the operator full control of the machine with his foot in connection with the treadle, leaving both hands free to handle the iron which is to be worked. These machines are constructed so that either the double or single dies can be used. If desired, the box die can be used for making bolts.

Floor space required ..... 8 feet by 5½ feet.
Speed of pinion shaft ..... 200.
Speed of machine ..... 50.
Weight ..... 24,000 lbs.
Price, with one pair of dies ..... $.....
Price of countershaft ....
Price of heating furnace ....

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SAMPLES OF WORK DONE ON HEADERS AND FORCING MACHINES, FIGS. 3817 TO 3819.



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SAMPLES OF WORK DONE ON HEADERS AND FORGING MACHINES, FIGS. 3817 TO 3819.



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SIZE AA BOLT HEADER.

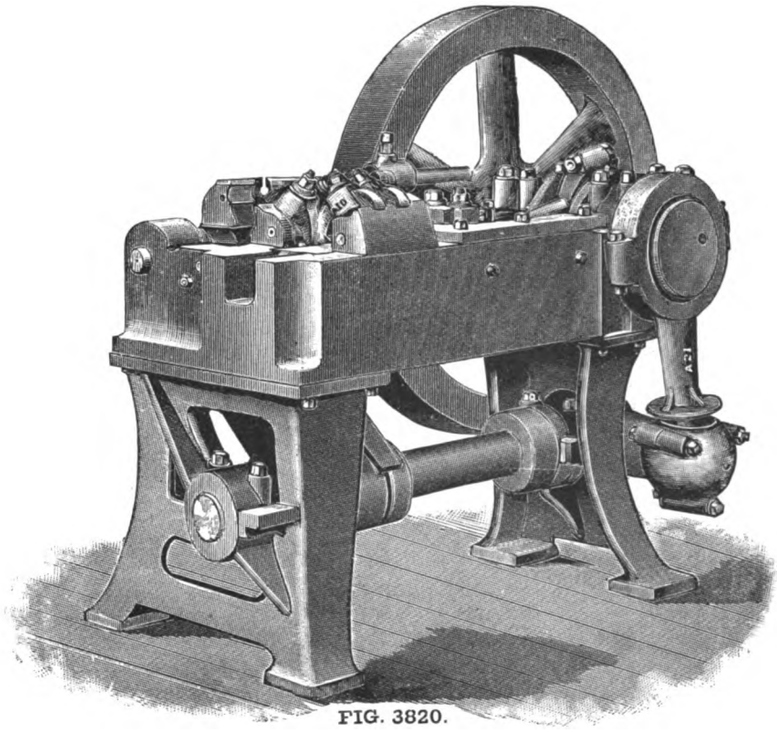


FIG. 3820.

DESCRIPTION, FIG. 3820.

For making hexagon, square, T and round head bolts from ⅜ inch to 1⅛ inch iron, this machine has no equal. Being very strong and simple in construction and quickly adjusted, it is not liable to get out of order. These machines are constructed so that either the double or single dies can be used.

PRICES.

Floor space required..... 6 feet by 4 feet.
Speed of machine.....120.
Weight of machine..... .....6,000 lbs.
Price, with one pair of dies.....$.....
Price of heating furnace.....$.....
Price of countershaft..... $.....

SIZE D. O. BOLT HEADER UPSETTING AND FORGING MACHINE.

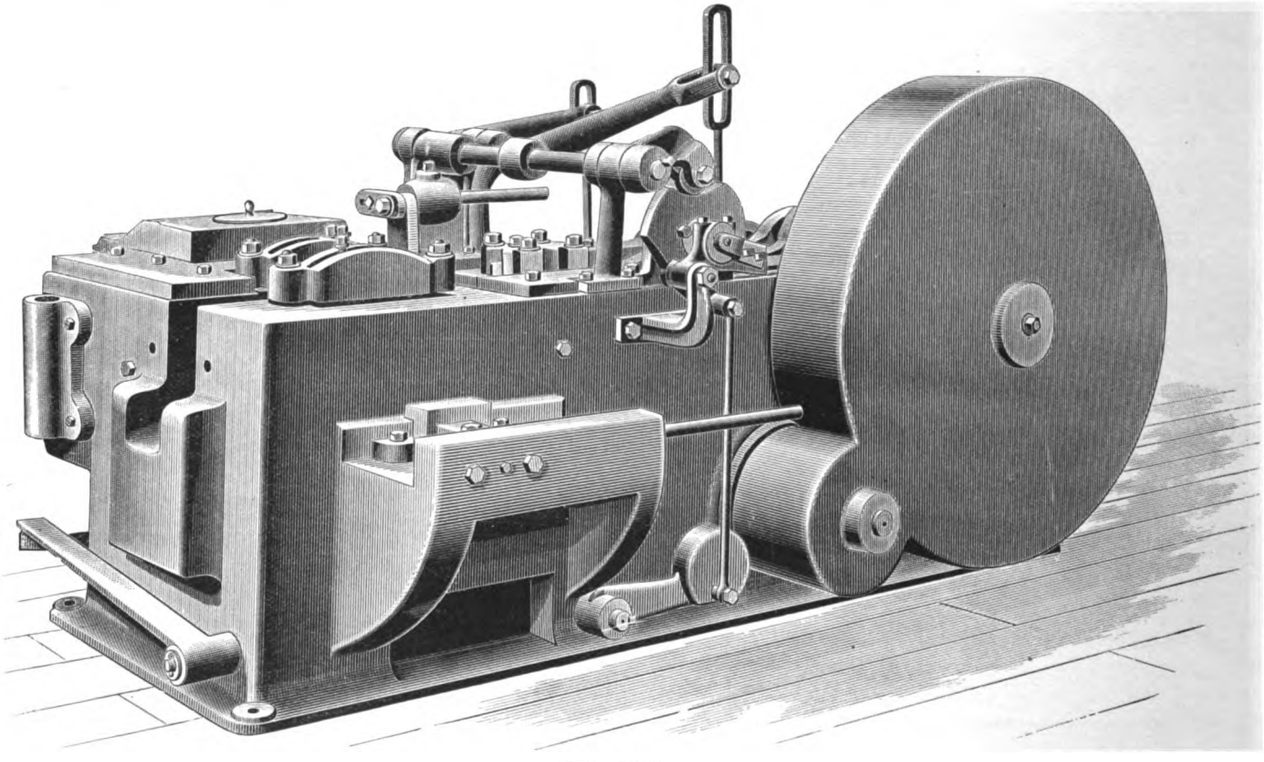


FIG. 3821.

This machine has an automatic lock, and the range of iron that this machine will work is from ⅝ inch to 3 inches round, and flat iron up to 8 inches wide by 2 inches thick.

This machine will upset truss rods, brake staffs, upset or bend the lips of arch bars, upset truck hangers, weld transoms or bolsters up to 8 inches wide after the ends have been turned over, or weld them and make a fine job by laying a piece on the end, make truck yokes, ladder or grab irons, the P. R. winding shaft, switch jaws, stay bolts, head and punch tail or draft bolts, make cranks for car doors, anchor irons, bolts, either square, hexagon, T or round head, and many other forgings within the range of the machine.

Floor space required.....9½ feet by 7½ feet.
Speed of machine..... 45 revs.
Speed of pinion shaft.....175 revs.
Speed of countershaft.....240 revs.
Width of belt used .....8 inches.
Weight of machine.....3,200 lbs.

PRICES.

Machine, with one pair dies .....$.....
Countershaft.....$.....
Heating furnace.....$.....

Extra dies, per pair; prices given after sketch of work to be done is submitted.

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1, 1 1-2 AND 2 INCH BOLT HEADER.

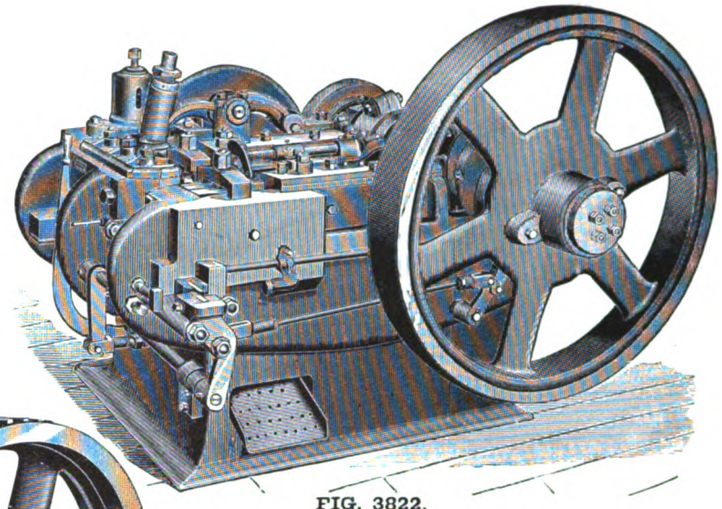


FIG. 3822.

DESCRIPTION, FIG. 3822.

1 in., weight, 5 tons.....Price, $1,500.00
1½ in., weight, 7½ tons..... " 1,800.00
2 in., weight, 15 tons..... " 3,000.00

Each header is complete with countershaft, wrenches and three sets of sample tools.

2 1-2 AND 3 INCH BOLT HEADER.

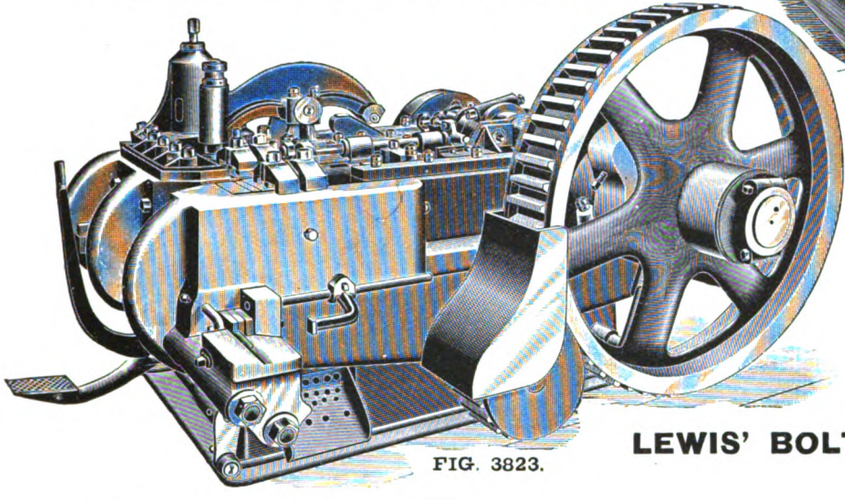


FIG. 3823.

DESCRIPTION, FIG. 3823.

2½ in., weight, 18 tons.....Price, $3,600.00
3 in., weight, 22 tons..... " 4,000.00

Each header is complete with countershaft, wrenches and three sets of sample tools.

FOOT BOLT HEADER.

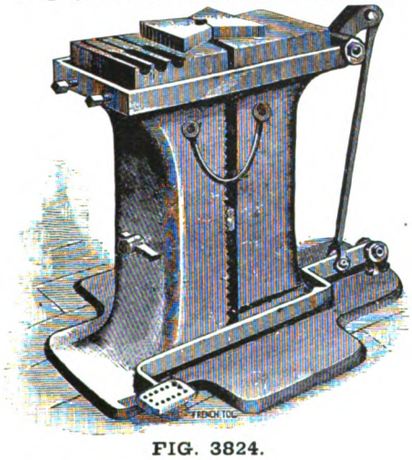


FIG. 3824.

No. 1, with dies ⅜, ½, ⅝, ¾, ⅞, 1 in.....$80.00
No. 2, with dies ⅜, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½ in.....100.00

LEWIS' BOLT AND TRACK BOLT HEADER.

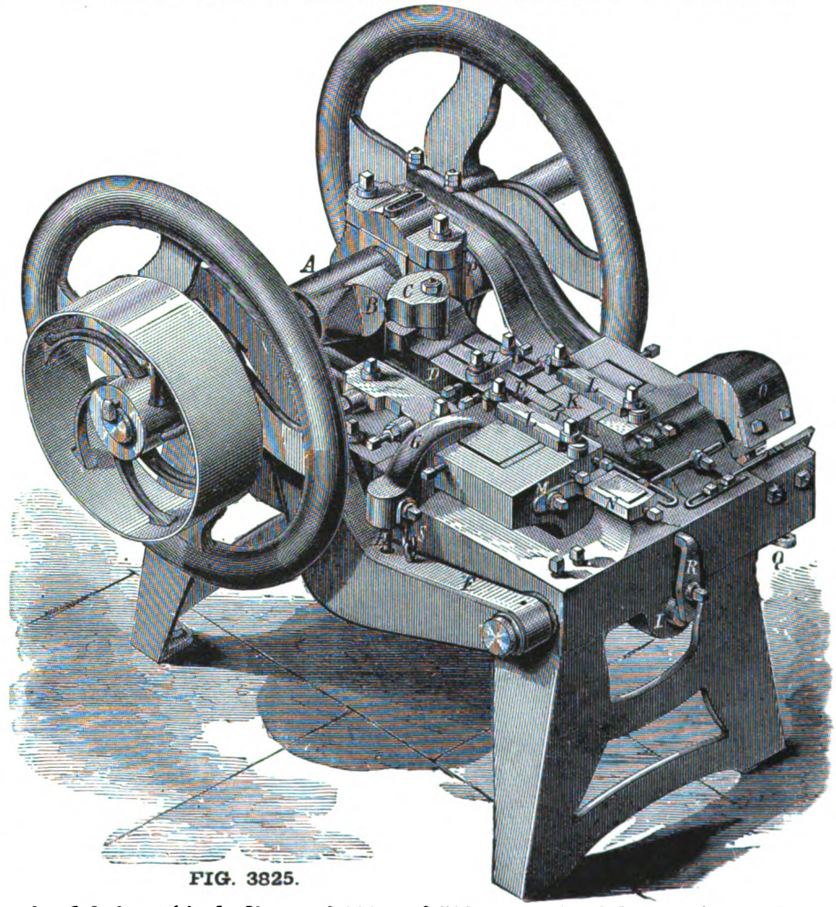


FIG. 3825.

DESCRIPTION, FIG. 3825.

The castings are strong and well fitted up with steel and brass, while the metal parts subjected to friction are chilled. The dies are made of excellent steel, and are so constructed and held that they can be dressed down a great many times. The machine can be run by either one or two persons, and is so simple that a boy can run it and keep it in order. It heads iron from ¼ to 1¼ in. diameter. With one boy heating and one heading, it will, in ten hours, head: 5,000 to 6,000 square head bolts, ½ inch diam.; 4,500 to 5,000 square head bolts, ⅝ inch diam.; 3,000 to 3,500 square head bolts, ¾ inch diam.; 2,000 to 2,500 square head bolts, ⅞ inch diam.; 1,800 square head bolts, 1 inch diam. It will also head 7,000 to 10,000 rivets or track bolts in the same time.

PRICE.....$.....

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BOLT HEADER.

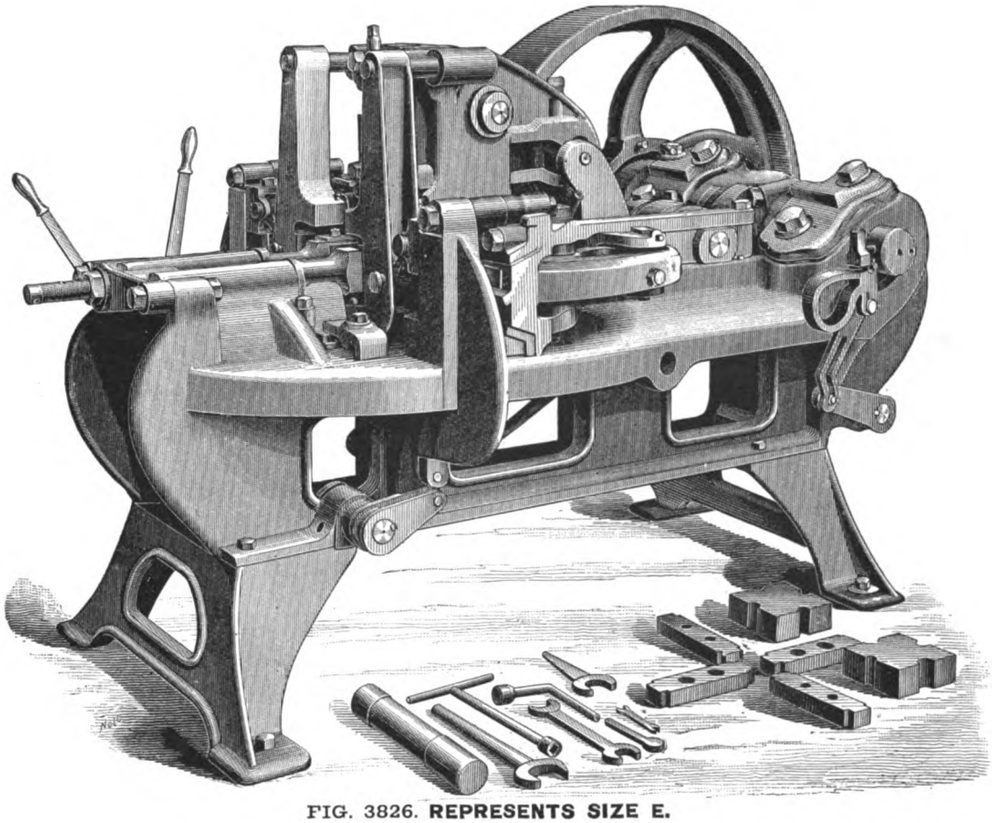


FIG. 3826. REPRESENTS SIZE E.

These machines are particularly adapted to the manufacture of square and hexagon heads, but capable of making any desired style. They are put up in the best manner, free from gear or complication, and by the use of our new water drip the lower slide is protected from the cutting or wearing caused by the working in of water and scale. They are quickly adjusted from one size to another, take little power, and can head bolts of any length. Unlike other machines, where the blank is horizontal, it remains stationary until the head is completed. Other machines clamp the blanks tightly with the holding dies, and turn it one-quarter or one-half around each revolution, thereby reducing the size of the rod directly under the head where the dies strike it. In this machine, the end of the blank rests against a stop, and the holding dies simply close on the iron and remain so until the head is completed. The stock for the head is upset by a plunger which recedes, and the forging dies, acting on the four sides, form the head to the required size and shape, thus producing heads uniform in size and retaining the full strength of the iron. It is so arranged that it will make four, six or eight revolutions, thus giving each head twenty, thirty or forty blows, according to the finish desired; then stops to discharge the bolt and is ready to receive another blank. The working parts of the machine are operated only while the blank is being headed, thus reducing the wear in proportion to the work done.

As to capacity, would say that they will forge from 2,000 to 6,000, depending upon size and style. To be more explicit, 4,000 five-eighths square head bolts would be a day's work of ten hours. Are prepared to furnish these machines in five sizes: Size A, to head from three-sixteenths to five-eighths, inclusive; size B, from three-eighths to one inch, inclusive; size E, from three-eighths up to one and one-quarter, inclusive; size C, from five-eighths to two inches, inclusive; size D, from one to three inches, inclusive.

PRICES.

Size A, weight, 3,500 lbs.....**PRICE, $**.....
" B, " 5,000 " ..... " $.....
" C, " 14,000 " ..... " $.....
Size D, weight, 40,000 lbs.....**PRICE, $**.....
" E, " 8,000 " ..... " $.....

1 AND 1 1-4 INCH HEADER.

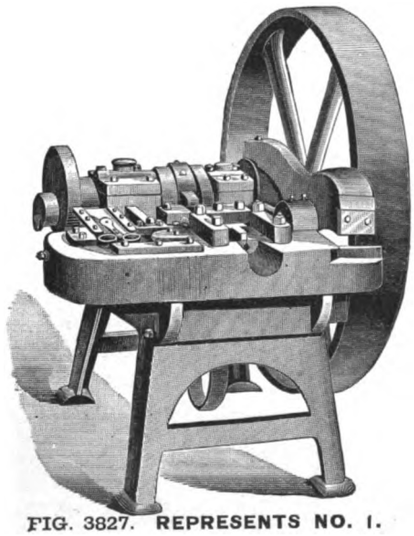


FIG. 3827. REPRESENTS NO. 1.

This simple, plain and strong tool has met a want in the market. The dies are similar to the Lewis header, and instead of the rocker grip it has a strong steel toggle grip on which we have recently put some improvements.

For some classes of work the cam is preferable, and for others the eccentric. We make them with both.

Upsetting requires a regular eccentric or crank, as it needs a slower motion, but rivet heads and short upsets can be done more advantageously with the cam or blow motion.

Hammer headers, such as the Burdick and Abbe, have been accused of making bolt heads with cold shuts in the neck; heating has considerable to do with this; however, this tool is free from those objections. The safety breaker is more reliable than the pin in the Lewis machine, and workmen cannot tamper with it. The bolt can be tongued or fed off the rod as preferred. It makes track bolts, rivets, etc.

PRICES.

No. 1 heads up to 1 in. Speed, 80 revs. per minute. Weight, 5,000 lbs. Price, with one size of dies..... $650.00
No. 2 heads up to 1¼ in. Speed, 70 revs. per minute. Weight, 6,000 lbs. Price, with one size of dies..... $850.00
Extra dies, $10.00 per set.

SEE NEXT PAGE FOR FURTHER DETAILS.

NO. 3 HEADER.

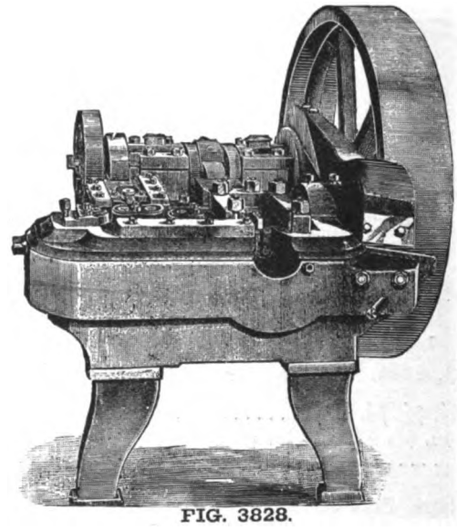


FIG. 3828.

HEADS TO 1 1-2 INCH PLAIN—HEADS TO 2 INCH GEARED.

This machine is similar in style to No. 1 and 2, and is largely used by car builders and railroads for bolt work, upsetting truss rods, etc. The shear on those is only intended for hot iron. A clutch to stop and start is sometimes put on. Machine is generally run with a tightener.

PRICES.

Weighs 9,000 lbs. Speed, 60 revolutions.
Machine, plain, with one size of dies....$1,100.00
Machine, geared, with one size of dies....$1,200.00
Extra dies, $12 to $15 per set. Clutch, $50 extra.

NO. 4, OR 2 1-2 INCH HEADER.

Weighs 12,000 lbs. Speed, 45 revolutions. Geared 66 to 17.

This tool has been largely sold to railroad, forge and car shops, for heavy upsetting, and we generally supply it with friction clutch and stop and start foot motion, which leaves header die at back of stroke. It is like the others, a very simple tool to operate; any blacksmith can run it.

PRICES.

Machine, without friction clutch, and with one size of dies.... $1,600.00
Machine, with friction clutch, and with one size of dies..... 1,800.00
Extra dies, per set..... ....$.....

SEE NEXT PAGE FOR FURTHER DETAILS.

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NEW STYLE HEADERS.

Finding a demand for a still heavier tool than our 2½ in. header, out of our years of experience we designed the above.

The features of novelty in it lie in the suspended rocking die attached to a hinge toggle motion and operated by eccentric face cam on side shaft.

1st. This does away with the hard reciprocating movement of the heavy live or movable die box, which, in a machine this size, would equal 500 lbs. to stop and start 80 times per minute.

2d. It gives a full center line grip whole length of die box.

3d. It has an extremely strong, positive and easy variety of toggle movement entirely new.

4th. The eccentric closing cam is novel in this application, and very soft and easy.

5th. Three lobed cam on cushioned lever gives three strokes of same to every revolution of shaft, and is very useful in shaping or finishing work prior to or after upsetting.

6th. The hand levers are for stopping or starting on back of stroke, or if left in position the tool will run right along. This gives complete control of machine.

7th. The die box is exceptionally large for upsetting, this hitherto a great objection in tools used for this purpose. Any class of work which can be done with those motions in perfect control can be made on this machine. Heading bolts, rivets, car pins, upsetting truss rods, eye bars, connecting rods, turnbuckles, etc.; in fact, in the hands of an ingenious mechanic, it is hard to say what cannot be accomplished by its aid. Often where machine itself does not finish, it will shape it for the drop hammer.

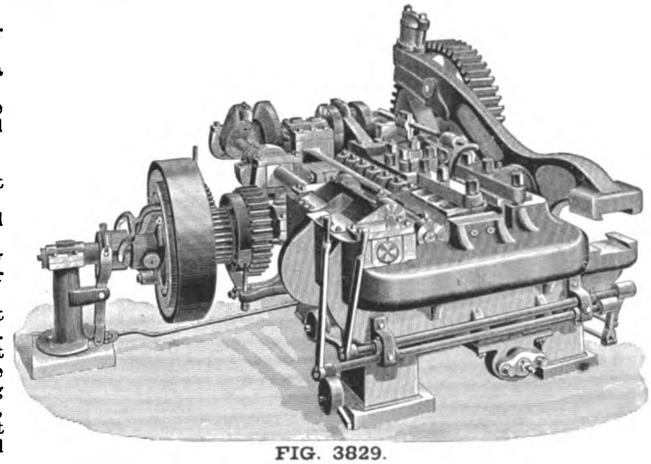


FIG. 3829.

8th. The grip opens 3½ in.; die box is 17 in. long, 18 in. wide, and takes two die blocks 17 by 9 by 6 in.; the header slide has 12 in. stroke. Header slide makes 12 strokes per minute for heavy work, and 37 for light work.

9th. It has a friction clutch and a safety breaker, both of which aid in preventing accidents or breakages.

PRICES, FIGS. 3827 TO 3829.

NUMBER.	OLD STYLE.					NEW STYLE. FIG. 3829.				
	1 FIG. 3827.	2 FIG. 3827.	3 PLAIN. FIG. 3828.	3 GEARED. FIG. 3828.	4 FIG. 3828.	3 PLAIN.	3 ONE GEAR.	3 FULL GEAR.	4	5
Capacity	1 in.	1¼ in.	1¾ in.	2 in.	2½ in.	1½ in.	2 or 2½ in.	2½ in.	3 in.	3½ in
Die space	2½ x 5⅛	3⅛ x 6⅛	8 x 6	8 x 6	12 x 4¾	10 x 4	10 x 4	10 x 4	13½ x 5⅛	6 x 17
Stroke	4 in.	4½ in.	6 in.	6 in.	7 in.	9¼ in.	9⅛ in.	9½ in.	11 in.	12 in.
Opening of grip	1¾ in.	1¾ in.	2½ in.	2¼ in.	2¾ in.	2½ in.	2½ in.	2½ in.	3 in.	3½ in.
Stock gathered	2½ in.	3¼ in.	4¾ in.	4¾ in.	5¼ in.	5 in.	5 in.	5 in.	5½ in.	6¾ in.
Strokes per minute	80	70	60	50	45	70	45 and 90	45 and 90	45 and 15	12 and 37
Speed of fly wheel	80	70	60	190	155	70	180	180	180	170
Fly wheel	52 x 10 in.	52 x 10 in.	12 x 61 in.	12 x 37 in.	12 x 45 in.	12 x 61 in.	8 x 37 in.	8 x 37 in.	8 x 37 in.	12 x 37 in.
Weight	5,000	6,900	9,000	9,500	12,000	10,000	10,500	11,000	17,000	28,000
Cushion hammer, ext.	$25.00	$29 00	$40.00	$40.00	$50.00	$50.00	$50.00	$50.00	$60.00	$75.00
Friction clutch, extra	.....	.....	75.00	$100.00	$100.00	75.00	$100.00	$100.00	.....	.....
Stop motion, includ'g clutch, extra	$75.00	$75.00	$100.00	$150.00	$150.00	$125.00	$150.00	$150.00	.....	.....
Dies per set, extra (except special)	$10.00	$10.00	$12.00 to	$15.00	$25.00	$15.00	$15.00 to	$25.00	$25.00	$30.00
Header, with one set of dies	$650.00	$850.00	$1,100.00	$1,200.00	$1,600.00 to 1,800.00	.....	.....	.....	.....	.....

FOOT BOLT HEADER.

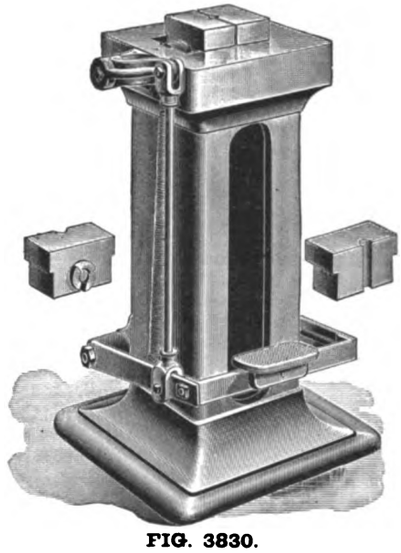


FIG. 3830.

This machine is adapted to head bolts from ¼ in. to 1½ in. diameter, and by the use of other forms of dies can be used for a considerable variety of work besides bolt heading.

The base is made sufficiently heavy and broad at the bottom to make it stand firm, and the dies are so made as to clamp very firmly under the head, and prevents upsetting there.

The dies are 6 in. square, 2¾ in. thick, and the machine, with ten sets of dies, complete, weighs about 650 lbs. **PRICE,** $50.00.

NO. 1 BOLT HEADER.

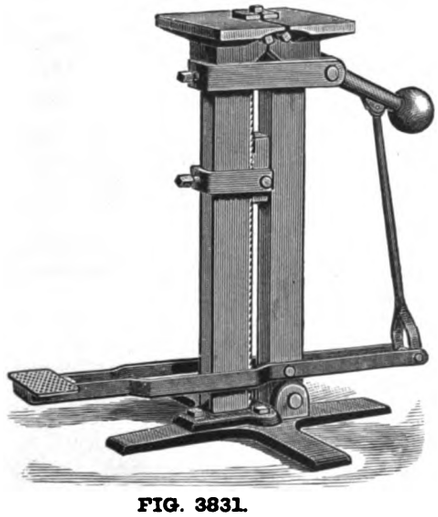


FIG. 3831.

NO. 2 BOLT HEADER.

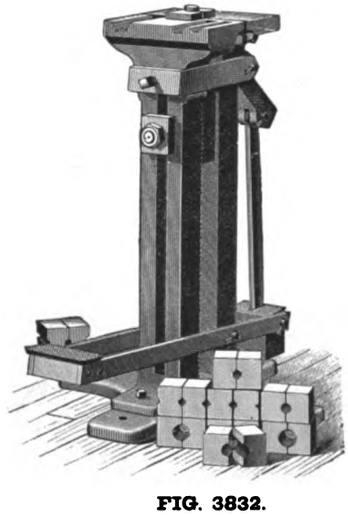


FIG. 3832.

These machines are valuable in shops using bolts of any kind, as the time going to store for ready-made bolts and welding same to make a long bolt, is saved by making the bolt head on this machine. They are strongly built, and capable of standing a large amount of heavy work.

Weight, with dies, 225 lbs.

PRICE, with cast iron dies, ¼, 5/16, ⅜, 7/16, ½, 9/16, ⅝, ¾, ⅞, 1 in., $40.00. **PRICE,** steel dies, $2.00 each.

Weight, with dies, 400 lbs.

PRICE, with cast iron dies, ¼, 5/16, ⅜, 7/16, ½, 9/16, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½ in., $60.00. **PRICE,** steel dies, $2.50 each.

Will head bolts any length desired.

DAVIS' BOLT HEADER.

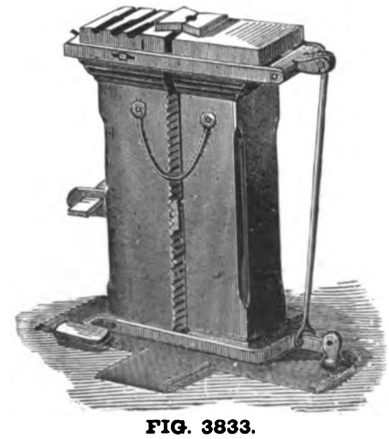


FIG. 3833.

DESCRIPTION, FIG. 3833.

Size No. 1 will make bolts from 1 inch to 2 feet in length. Wrought iron dog, strap and treadle. Dies for ⅜, ½, ⅝, ¾, ⅞ and 1 in. Hexagon swages of 6 sizes. Weight, about 450 lbs. **PRICE,** $75.00.

Size No. 2 has dies ⅜ to 1½ inch, and weighs about 800 lbs. Makes bolts 1 in. to 2 feet long. Treadle is somewhat stronger than in No. 1, and machine is designed for heavier work. **PRICE,** $100.00.

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SINGLE BOLT CUTTERS WITH POWER FEED AND LEAD SCREWS.

6, 5 AND 4 INCH.

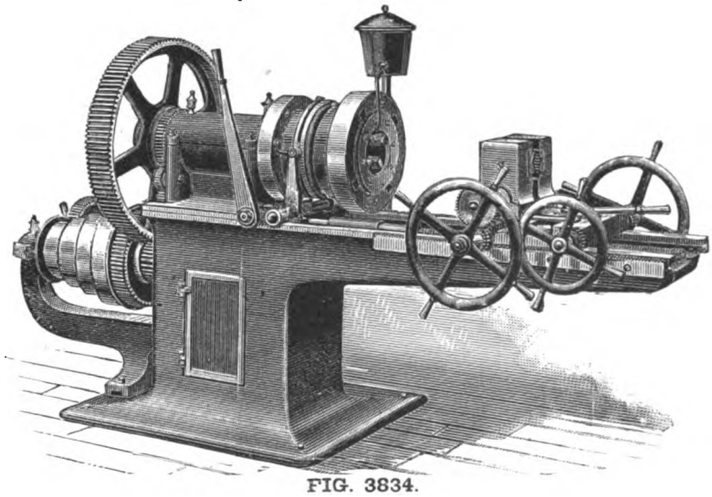


FIG. 3834.

PRICES, 6 INCH.

Price of machine with head, pump, countershaft and wrenches.....$800.00
Power feed attachment..... 50.00
Lead screw and bronze nuts, $12.00 each.
17 sets of cap dies, 2, 2¼, 2½, 2¾, 3, 3¼, 3½, 3¾, 4, 4¼, 4½, 4¾, 5, 5¼, 5½, 5¾, 6, at $10.00 per set..... 170.00
Nut taps at regular prices.
1 adjustable tap chuck and stop die, to hold taps up to 4 in. diam. 30.00
Solid tap holders for larger taps, $5.00 each.

WEIGHT, 5,200 LBS.

Speed of countershaft with 16x4 inch pulleys, 200 revolutions per minute.
Extra dies, without caps, $6.00 per set. Extra hardened steel caps, $4.00 per set.

PRICES, 5 INCH.

Price of machine with head, pump, countershaft and wrenches.....$733.00
Power feed attachment..... 50.00
Lead screw and bronze nuts, $12.00 each.
15 sets of cap dies, 1⅛, 1⅝, 1¾, 1⅞, 2, 2¼, 2½, 2¾, 3, 3¼, 3½, 3¾, 4, 4½, 5 in. at $8.00 per set..... 120.00
Nut taps at regular prices.
1 adjustable tap chuck and stop die, to hold taps up to 4 in. diameter, 30.00
Solid tap holders for larger taps, $5.00 each.

WEIGHT, 4,800 LBS.

Speed of countershaft with 16x4 inch pulleys, 200 revolutions per minute.
Extra dies without caps, $4.00 per set. Extra steel caps, $4.00 per set.

PRICES, 4 INCH.

Price of machine with head, pump, countershaft and wrenches.....$683.00
Power feed attachment..... 50.00
Lead screw and bronze nuts, $12.00 each.
13 sets of cap dies, 1½, 1⅝, 1¾, 1⅞, 2, 2¼, 2½, 2¾, 3, 3¼, 3½, 3¾, 4, at $7.00 per set..... 91.00
13 nut taps as per dies..... 196.00
1 adjustable tap chuck..... 30.00

WEIGHT, 4,200 LBS.

Speed of countershaft with 16x4 inch pulleys, 200 revolutions per minute.
Extra dies without caps, $3.50 per set. Extra hardened steel caps, $3.50 per set.

GENERAL DESCRIPTION, FIG. 3834.

In order to insure true pitches on special work such as jack screws, vise screws and bridge rods, where deep nuts are required, we make the machines with power feed and lead screws attached to the carriage as shown.

The power feed is a fixture to the machine, and consists of a shaft passing through the bed under the head stock, and is so geared that it revolves in either right or left direction to suit the thread to be cut; the power feed shaft has a socket to receive a lead screw of the same pitch of thread as the dies. In the carriage are secured two half nuts which engage with the lead screw in the same manner as in all engine lathes, and are opened and closed by hand lever. It will require a different lead screw and nut for each different pitch of thread, but right and left hand threads of the same pitch can be cut with one lead screw. Lead screws and nuts can be changed from one pitch to another inside of three minutes.

Sizes over 6 inch built to order.

3 1-2 INCH SINGLE BOLT CUTTER.

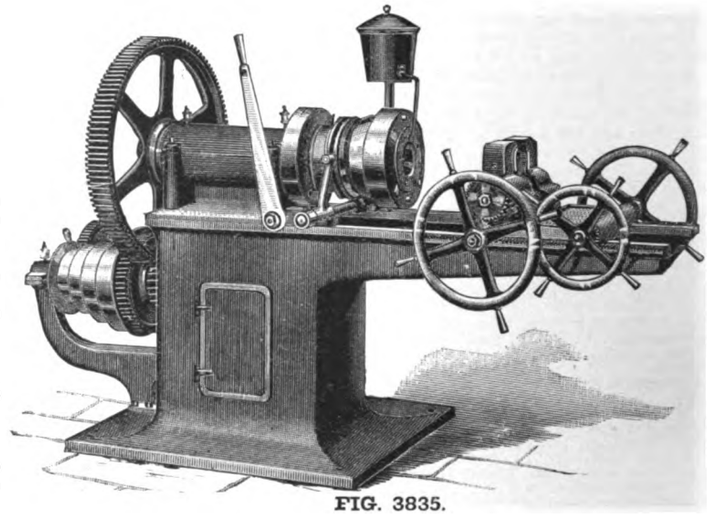


FIG. 3835.

This machine will cut any shape of right and left hand thread, from ½ inch to 3½ inches in diameter, and tap nuts for same size bolts. The dies can be changed from one diameter bolt to another in less than a minute, and from threading bolts to tapping nuts in the same time. The spindle is hollow, so any length of thread can be cut. The main gear is 31¾ inches in diameter, 3½ inch face. All gears, pinions and racks are cut from the solid. The cone is 8, 10, 12 and 14 inches in diameter, for 3 inch belt. Power feed and lead screw can be attached to this machine for doing special work.

PRICES.

Price of machine with head, pump, countershaft and wrenches, $620.50
15 sets of cap dies, 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 1¾, 1⅞, 2, 2¼, 2½, 2¾, 3, 3¼, 3½, at $5.50 per set..... 82.50
15 nut taps as per dies..... 147.00
1 adjustable tap chuck..... 25.00
Price of machine, complete, as above.....$875.00

WEIGHT, 3,600 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revs. per minute.
Extra dies without caps, $2.50 per set. Extra hardened steel caps, $3.00 per set.

3 INCH SINGLE BOLT CUTTER.

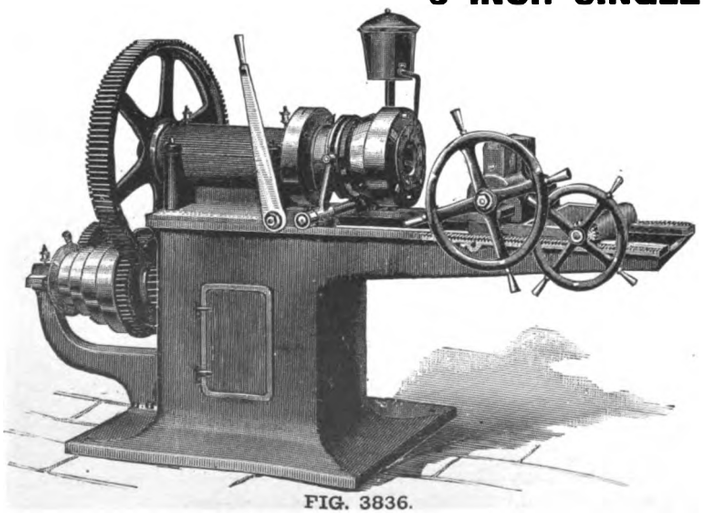


FIG. 3836.

This machine will cut any shape of right and left hand thread, from ½ inch to 3 inches in diameter, and tap nuts for same size bolts. The dies can be changed from one diameter bolt to another in less than a minute, and from threading bolts to tapping nuts in the same time. The spindle is hollow, so any length of thread can be cut. The main gear is 30 inches in diameter, 3¼ inch face. The gears, pinions and racks are all cut from the solid. The cone is 8, 10, 12 and 14 inches in diameter, for a 3 inch belt. Power feed and lead screw can be attached to this machine for doing special work.

PRICES.

Price of machine with head, pump, countershaft and wrenches... $603.50
13 sets of cap dies, 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 1¾, 1⅞, 2, 2¼, 2½, 2¾, 3, at $5.50 per set..... 71.50
13 nut taps as per dies..... 100.00
1 adjustable tap chuck and stop die..... 25.00
Price of machine, complete, as above $800.00

WEIGHT, 3,400 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies without caps, $2.50 per set. Extra hardened steel caps, $3.00 per set.
Extra nut taps at regular prices.
If desired, these machines can be made with automatic opening and closing device same as on double machines. See pages 304 and 305.

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2 1-2 INCH SINGLE BOLT CUTTER.

These machines will cut any shape of right and left hand thread, and tap nuts for bolts. The dies can be changed from one diameter bolt to another in less than a minute, and from threading bolts to tapping nuts in the same time. The spindle is hollow, so any length of thread can be cut. Power feed and lead screw can be attached to this machine for special work ; see page 302.

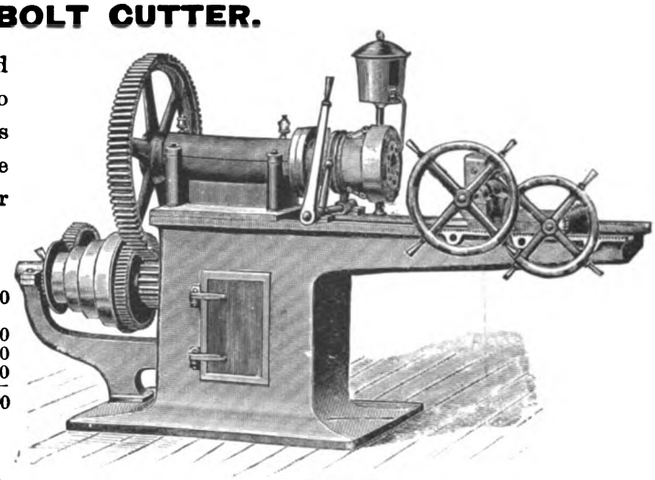


FIG. 3837.

PRICES, 2 1-2 INCH.

Price of machine with head, pump, countershaft and wrenches	$594.20
13 sets of cap dies, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 1¾, 1⅞, 2, 2¼, 2½, at $5.00 per set	65.00
13 nut taps as per dies	70.80
1 adjustable tap chuck and stop die	20.00
Price of machine, complete, as above	$750.00

WEIGHT, 3,200 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies without caps, $2.00 per set. Extra hardened steel caps, $3.00 per set.

2 1-4 INCH SINGLE BOLT CUTTER.

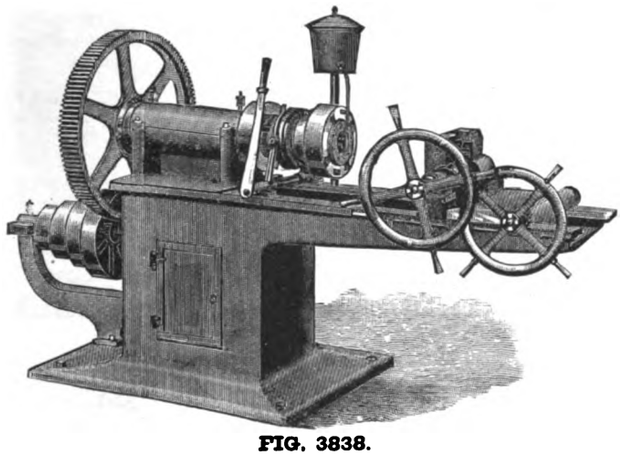


FIG. 3838.

PRICES, 2 1-4 INCH.

Price of machine with head, pump, countershaft and wrenches,	$561.70
12 sets of cap dies, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 1¾, 1⅞, 2, 2¼, at $5.00 per set,	60.00
12 nut taps as per dies,	58.30
1 adjustable tap chuck and stop die	20.00
Price of machine, complete, as above	$700.00

WEIGHT, 3,000 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies without caps, $2.00 per set. Extra caps, $3.00 per set.

2 INCH BOLT CUTTER.

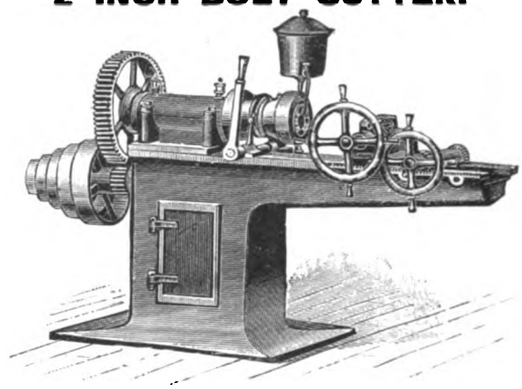


FIG. 3839.

PRICES, 2 INCH.

Price of machine with head, pump, countershaft and wrenches	$450.25
11 sets of cap dies, ⅛, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½, 1¾, 2, at $4.25 per set	46.75
11 nut taps as per dies	38.00
1 adjustable tap chuck and stop die	15.00
Price of machine, complete, as above	$550.00

WEIGHT, 2,300 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies without caps, $1.75 per set. Extra hardened steel caps, $2.50 per set.

1 1-2 AND 1 1-4 INCH BOLT CUTTERS.

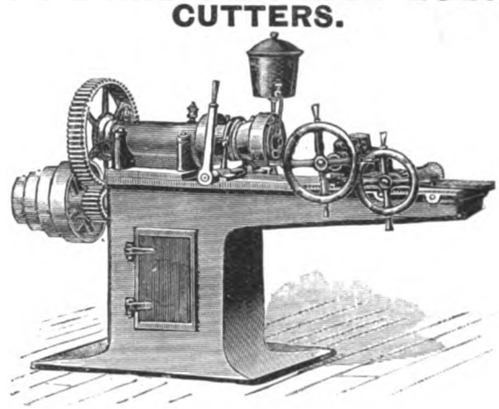


FIG. 3840.

PRICES, 1 1-2 INCH.

Price of machine with head, pump, countershaft and wrenches	$334.00
9 sets of cap dies, ½, ⅝, ¾, ⅞, 1⅛, 1¼, 1⅜, 1½, at $3.50 per set	31.50
9 nut taps as per dies	24.50
1 adjustable tap chuck and stop die	10.00
Price of machine, complete, as above	$400.00

WEIGHT, 1,750 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies without caps, $1.50 per set. Extra hardened steel caps, $2.00 per set.

PRICES, 1 1-4 INCH.

Price of machine with head, pump, countershaft and wrenches	$320.50
8 sets of cap dies, ⅜, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, at $3.50 per set	28.00
8 nut taps as per dies	16.50
1 adjustable tap chuck and stop die	10.00
Price of machine, complete, as above	$375.00

WEIGHT, 1,600 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies without caps, $1.50 per set. Extra hardened steel caps, $2.00 per set.

1 INCH BOLT CUTTER.

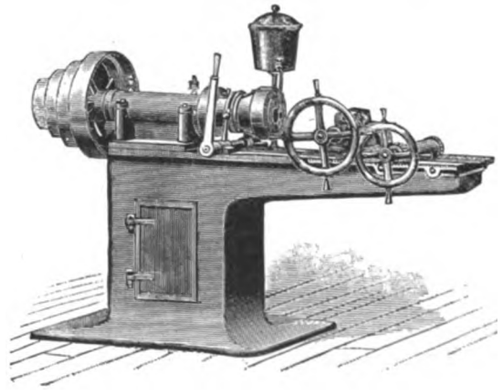


FIG. 3841.

PRICES, 1 INCH.

Price of machine with head, pump, countershaft and wrenches	$305.30
7 sets of cap dies, ¼, ⅜, ½, ⅝, ¾, ⅞, 1, at $3.50 per set	24.50
7 nut taps as per dies	10.20
1 adjustable tap chuck and stop die	10.00
Price of machine, complete, as above	$350.00

WEIGHT, 1,500 LBS.

Speed of countershaft with 16x4 inch pulleys, 100 revolutions per minute.
Extra dies, without caps, $1.50 per set. Extra hardened steel caps, $2.00 per set.

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1 1-2, 1 1-4 AND 1 INCH CLASS B SINGLE BOLT CUTTERS.

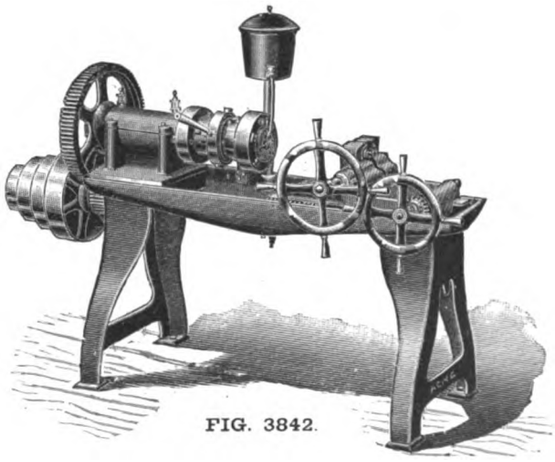


FIG. 3842.

The head, dies and carriage on these machines are the same as the tools on pages 302 and 303; they will cut any shape of right and left hand thread, and tap nuts for same. The dies can be changed from one diameter bolt to another in less than a minute, and from threading bolts to tapping nuts in the same time. The spindle is hollow, so any length of thread can be cut. The rack and pinion are cut from the solid.

PRICES, 1 1-2 INCH.

Price of machine with head, countershaft and wrenches	$284.00
9 sets of cap dies, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½, at $3.50 per set	31.50
9 nut taps as per dies	24.50
1 adjustable tap chuck and stop die	10.00
Price of machine, complete, as above	$350.00

WEIGHT, 1,300 LBS.

Speed of countershaft with 16x4 inch pulleys, 220 revolutions per minute.
Extra dies without caps, $1.50 per set. Extra hardened steel caps, $2.00 per set.

PRICES, 1 1-4 INCH.

Price of machine with head, countershaft and wrenches	$270.50
8 sets of cap dies, one set each, ⅜, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, at $3.50 per set.	28.00
8 nut taps as per dies	16.50
1 adjustable tap chuck and stop die	10.00
Price of machine, complete, as above	$325.00

WEIGHT, 1,200 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies without caps, $1.50 per set. Extra hardened steel caps, $2.00 per set.

PRICES, 1 INCH.

Price of machine with head, countershaft and wrenches	$259.40
6 sets of cap dies, ⅜, ½, ⅝, ¾, ⅞, 1, at $3.50 per set	21.00
5 nut taps as per dies	9.60
1 adjustable tap chuck and stop die	10.00
Price of machine, complete, as above	$300.00

WEIGHT, 1,100 LBS.

Speed of countershaft with 16x4 inch pulleys, 100 revolutions per minute.
Extra dies without caps, $1.50 per set. Extra hardened steel caps, $2.00 per set.

2 INCH DOUBLE BOLT CUTTERS.

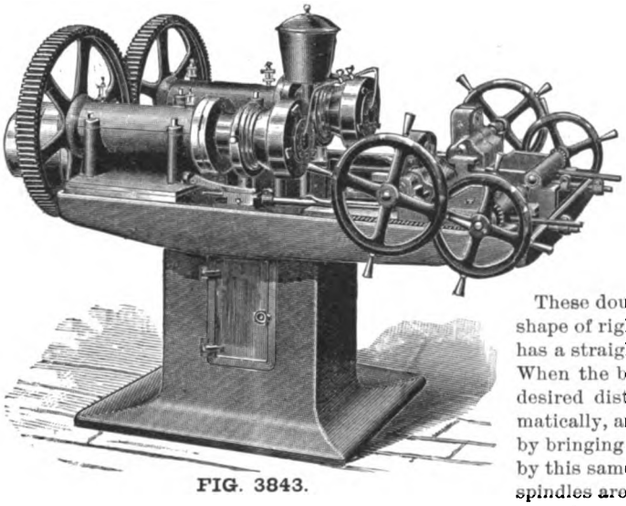


FIG. 3843.

These double machines will cut any shape of right or left hand thread. It has a straight line, automatic motion. When the bolt has been threaded the desired distance the dies open automatically, and as the bolt is withdrawn by bringing the carriage back, the dies by this same motion are closed. The spindles are hollow. Nuts can also be tapped on one or both spindles.

PRICES, 2 INCH.

Price of machine with head, pump, countershaft and wrenches	$712.00
20 sets of cap dies, two sets each, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½; one each, 1¾, 2, at $4.25 per set	85.00
11 nut taps as per dies	38.00
1 adjustable tap chuck and stop die	15.00
Price of machine, complete, as above. Weight, 4,200 lbs.	$850.00

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies without caps, $1.75 per set. Extra hardened steel caps, $2.50.

1 1-2 AND 1 1-4 INCH DOUBLE BOLT CUTTER.

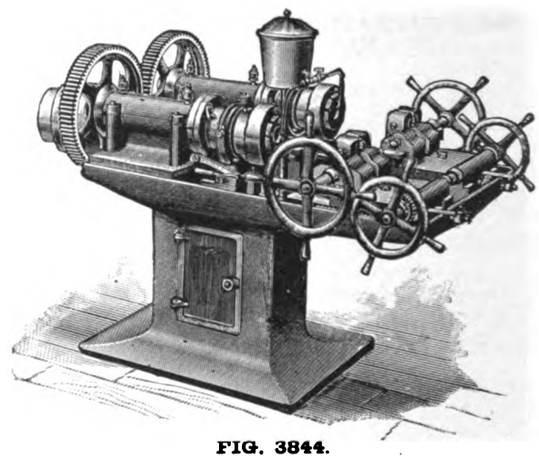


FIG. 3844.

PRICES, 1 1-2 INCH.

Price of machine with head, pump, countershaft and wrenches	$566.50
14 sets of cap dies, two sets each, ½, ⅝, ¾, ⅞, 1; one set each, 1⅛, 1¼, 1⅜, 1½, at $3.50 per set	49.00
9 nut taps as per dies	24.50
1 adjustable tap chuck and stop die	10.00
Price of machine, complete, as above	$650.00

WEIGHT, 2,700 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies without caps, $1.50 per set. Extra hardened steel caps, $2.00 per set.

PRICES, 1 1-4 INCH.

Price of machine with head, pump, countershaft and wrenches	$528.00
13 sets of cap dies, two sets each, ⅜, ½, ⅝, ¾, ⅞; one set each, 1, 1⅛, 1¼ inches, at $3.50 per set	45.50
8 nut taps as per dies	16.50
1 adjustable tap chuck and stop die	10.00
Price of machine, complete, as above	$600.00

WEIGHT, 2,500 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies without caps, $1.50 per set. Extra hardened steel caps, $2.00 per set.

EXTRA NUT TAPS AT REGULAR PRICES.

1 INCH DOUBLE BOLT CUTTER.

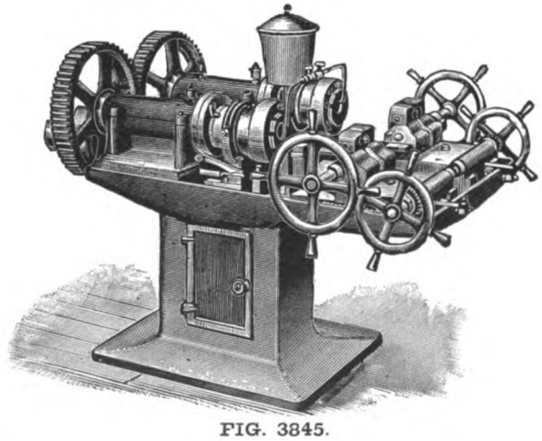


FIG. 3845.

Price of machine with head, pump, countershaft and wrenches	$487.80
12 sets of cap dies, two sets each, ¼, ⅜, ½, ⅝, ¾; one set each, ⅞, 1, at $3.50 per set	42.00
7 nut taps as per dies	10.20
1 adjustable tap chuck and stop die	10.00
Price of machine, complete, as above. Weight, 2,200 lbs.	$550.00

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies without caps, $1.50 per set. Extra hardened steel caps, $2.00.

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1 1-2 INCH SINGLE STAY BOLT CUTTER.

This machine is designed for boiler shops where common machine bolts, man and hand hole bolts, as well as stay bolts, are threaded. It will cut right and left hand thread from $\frac{3}{8}$ inch to $1\frac{1}{2}$ inches in diameter, and tap nuts for same size bolts. The carriage has 36 inch travel. The spindle is hollow, so any length of thread can be cut. Dies can be changed from one size bolt to another in less than a minute, and from threading bolts to tapping nuts in same time.

PRICES.

Price of machine with head, pump, countershaft and wrenches.....$334.00
9 sets of cap dies, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, at $3.50 per set 31.50
9 nut taps as per dies..... 24.50
1 adjustable tap chuck..... 10.00
Price of machine, complete, as above.....$400.00

WEIGHT, 1,800 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies, without caps, $1.50 per set. Extra caps, $2.00 per set.

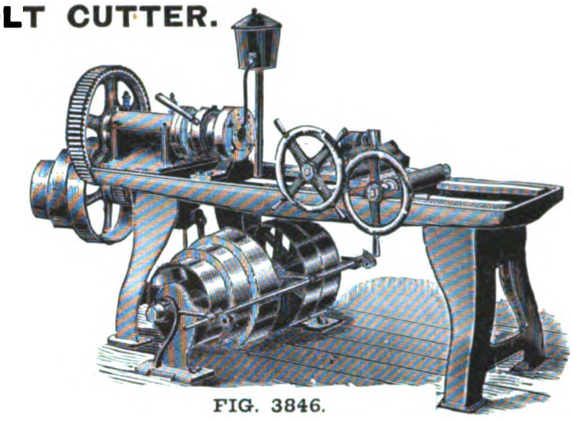


FIG. 3846.

1 1-2 INCH DOUBLE STAY BOLT CUTTER.

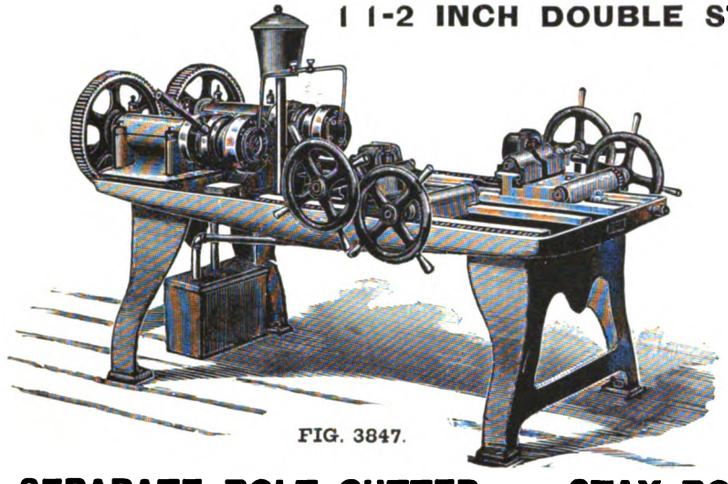


FIG. 3847.

This machine is designed for large boiler shops where quantity as well as quality is desired. It will cut right and left hand threads from $\frac{3}{8}$ inch to $1\frac{1}{2}$ inches in diameter and tap nuts for same size bolts. The carriages have 36 inch travel. One head is made to open automatically and the other by hand lever; both heads can be made to open automatically if desired. The spindles are hollow, so any length of thread can be cut. Dies can be changed from one size bolt to another in less than a minute, and from threading bolts to tapping nuts in the same time.

PRICES.

Price of machine with head, pump, countershaft and wrenches....$566.50
14 sets of cap dies, two sets each, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1; one each, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, at $3.50 per set..... 49.00
9 nut taps as per dies..... 24.50
1 adjustable tap chuck 10.00
Price of machine, complete, as above.....$650.00

WEIGHT, 3,300 LBS.

Speed of countershaft with 16x4 inch pulleys, 225 revolutions per minute.
Extra dies, without caps, $1.50 per set. Extra caps, $2.00 per set.

SEPARATE BOLT CUTTER HEADS WITH DIES.

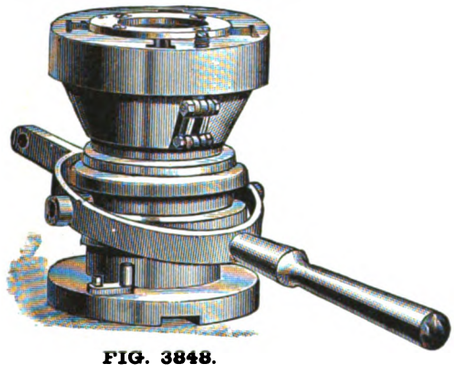


FIG. 3848.

The "ACME" head can be put on almost any bolt cutter.

PRICES.

1 in. head, with 6 sets of cap dies, one set each, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1.....$100.00
Extra dies, $1.50 per set. Steel caps, $2.00 per set.
$1\frac{1}{4}$ in. head, with 8 sets of cap dies, one set each, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$...$115.00
Extra dies, $1.50 per set. Steel caps, $2.00 per set.
$1\frac{1}{2}$ in. head, with 9 sets of cap dies, one set each, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $125.00
Extra dies, $1.50 per set. Steel caps, $2.00 per set.
2 in. head, with 11 sets of cap dies, one set each, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2.....$150.00
Extra dies, $1.75 per set. Steel caps, $2.50 per set.
$2\frac{1}{2}$ in. head, with 13 sets of cap dies, one set each, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$ $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$.....$175.00
Extra dies, $2.00 per set. Steel caps, $3.00 per set.
3 in. head, with 13 sets of cap dies, one set each, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3.....$200.00
Extra dies, $2.50 per set. Steel caps, $3.00 per set.
$3\frac{1}{2}$ in. head, with 15 sets of cap dies, one set each, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$.....$225.00
Extra dies, $2.50 per set. Steel caps, $3.00 per set.
4 in. Head, with 15 sets of cap dies, one set each, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, 4.....$250.00
Extra dies, $3.50 per set. Steel caps, $3.50 per set.
5 in. head, with 15 sets of cap dies, one set each, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, 4, $4\frac{1}{2}$, 5.....$300.00
Extra dies, $4.00 per set. Steel caps, $4.00 per set.
6 in. head, with 17 sets of cap dies, one set each, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, 4, $4\frac{1}{4}$, $4\frac{1}{2}$, $4\frac{3}{4}$, 5, $5\frac{1}{4}$, $5\frac{1}{2}$, $5\frac{3}{4}$, 6.....$350.00
Extra dies, $4.50 per set. Steel caps, $4.50 per set.
Extra nut taps, see page 315.

DIMENSIONS, FIG. 3848.

Size of head.	Dia. of flange.	Dia. of die ring.	Length over all.	Size of hole.
1 in.	7 in.	7 in.	10 in.	$1\frac{1}{8}$ in.
$1\frac{1}{8}$ "	8 "	8 "	11 "	2 "
2 "	10 "	10 "	$12\frac{1}{4}$ "	$2\frac{1}{8}$ "
$2\frac{1}{2}$ "	11 "	11 "	$13\frac{1}{4}$ "	$3\frac{1}{4}$ "
3 "	13 "	12 "	$14\frac{1}{2}$ "	4 "
$3\frac{1}{2}$ "	13 "	13 "	$14\frac{1}{2}$ "	$4\frac{1}{2}$ "
4 "	15 "	16 "	15 "	$5\frac{1}{4}$ "
5 "	15 "	17 "	15 "	$6\frac{1}{4}$ "
6 "	15 "	19 "	15 "	$7\frac{1}{4}$ "

STAY BOLT THREADER AND NUT TAPPER.

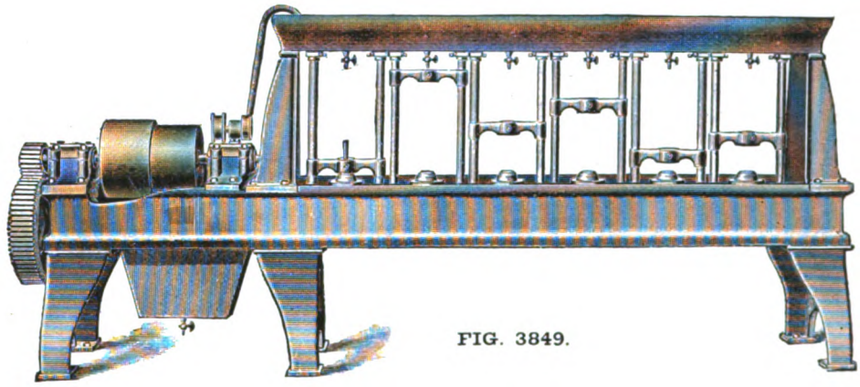


FIG. 3849.

DESCRIPTION OF FIG. 3849.

This machine is designed to obtain the greatest accuracy and economy of dies and taps with the greatest production, and to be operated by the cheapest labor. It consists ordinarily of six spindles arranged to receive the head of stay bolt or shank of taps, and driven by gearing beneath the bed top. Above these spindles is located a feed tank, from which a constant stream of oil is kept upon the work. This oil runs off into a lower tank from which it is pumped into the feeder to be again used. The best results are obtained by using six spindles; any length of stay bolt from 24 inches under can be threaded without altering the machine. At the slowest speed the working spindles should make 35 revolutions per minute. To obtain this, the countershaft, which has tight and loose pulleys 12 inches in diameter, and using a 6 inch belt, should make 280 revolutions.

With this machine are furnished countershaft, wrenches, rotary pump and connections, die holders, and one die for each holder.

PRICES.

Price of six spindle machine.....$ .....

WEIGHT, 4,400 LBS.

Price of two spindle machine..... $ .....

WEIGHT, 1,200 LBS.

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POWER BOLT CUTTERS.

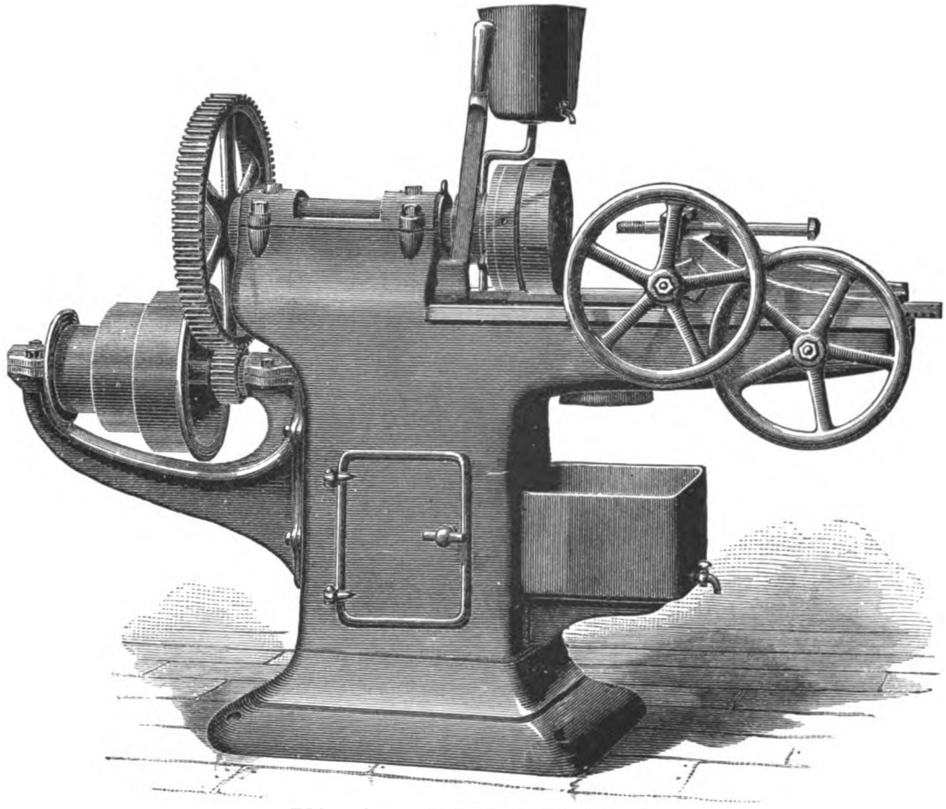


FIG. 3850. **REPRESENTS NO. 2.**

DESCRIPTION, FIG. 3850.

The dies cut the thread by passing over the bolt but once—they never run backward—which obviates tearing the thread off the bolt or injuring the cutting edge of the dies.

When the thread has been cut as far as desired, the dies are opened by moving the lever and the bolt is withdrawn, while the machine still continues in motion as before. Another bolt may then be inserted and the operation continued.

The dies can be removed in thirty seconds and those for another size substituted without turning or loosening a bolt, screw or nut; and when the dies are placed in the head of a machine, it combines every advantage of a solid die and adjustable dies.

It is provided with an "index," by the use of which the machine can be instantly adjusted to cut the required size, so that the bolts can be made to fit the nuts without the vexatious "cutting and trying" that is required on most machines.

It is provided with means for tapping nuts, when needed, and the change from cutting threads to tapping can be made in a minute, or vice versa.

With each machine we send taps and dies, as below, finished and ready for use; tap sockets for tapping nuts; the bolt and nut holders; countershaft, pulleys and hangers; making a complete machine for screw cutting and nut tapping.

PRICES.

No. 1. To cut and tap ¼, 5/16, ⅜, 7/16, ½, ⅝, ¾.....$250.00

No. 2. " " " ⅜, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½..... 360.00

No. 3. To cut and tap ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 1¾, 1⅞, 2..... 525.00

No. 4. To cut and tap ½ ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 1¾, 1⅞, 2, 2¼, 2½.....$560.00

No. 5. To cut and tap 1 to 2 inches, by 8ths up to 2 inches, and by 4ths from 2¼ to 3 inches..... 750.00

No. 6. To cut and tap 1 to 2 inches, by 8ths and by 4ths from 2¼ to 4 inches.....

Oil pumps extra, $10.00, automatic opening of dies on Nos. 1 and 2, $25.00 extra.

No. 1.—Speed of countershaft, 125; diameter of pulley, 12 inches, 3 inch face; weight complete, 600 lbs. This machine is not geared, but has a cone of three pulleys, each 3 inches broad, giving ample power and variations of speed. Intended for doing light work very rapidly.

No. 2.—Speed of countershaft, 150; diameter of pulley, 12 inches, 3 inch face; weight complete, 1,000 lbs. This size machine is intended for medium sized work. Is very effective in railroad and general machine shops, general jobbing, etc.

No. 3.—Speed of countershaft, 150; diameter of pulley, 16 inches, 4½ inch face; weight about 2,200 lbs. This machine is double geared, and is intended for heavy work, bridge bolts, etc.

No. 4.—Speed of countershaft, 150; diameter of pulley, 16 inches, 4½ inch face; weight about 2,600 lbs. This is a heavily double geared machine, so arranged as to give three speeds in gear, and three speeds from pulleys direct, with broad belt surfaces—thus fitting it for a large range of work, from very large down to moderately small, and doing any size with celerity.

No. 5.—Speed of countershaft, 100; diameter of pulley, 18 inches, 4½ inch face; weight about 3,200 lbs.

No. 6.—Speed of countershaft, 100; diameter of pulley, 18 inches, 4½ inch face; weight about lbs.

POWER BOLT CUTTERS AND NUT TAPPERS.

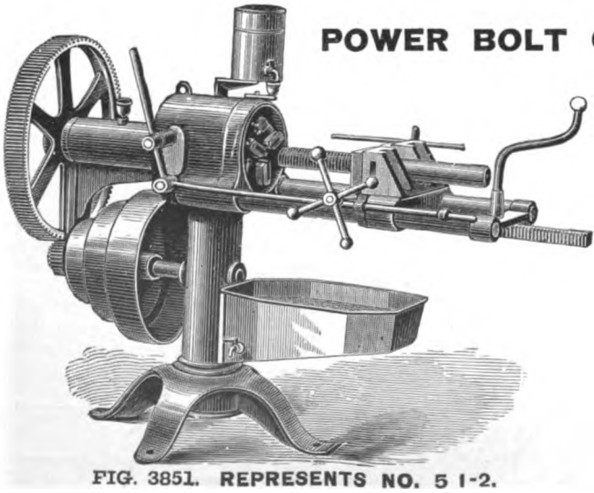


FIG. 3851. **REPRESENTS NO. 5 1-2.**

PRICES.

No. 4, double headed, cuts from ¼ to 7/8 inch inclusive. 16 sets of dies. Weight, 1,550 lbs.....$400.00

No. 5 cuts from ¼ to 1¼ ins. inclusive. 9 sets of dies. Weight, 950 lbs. 275.00

No. 5½ " " ⅜ " 2 " " 14 " " " 1,700 " 400.00

No. 6 " " ⅜ " 3 " " 18 " " " 2,600 " 750.00

No. 7 " " ⅜ " 3 " " 18 " " " 2,750 " 810.00

No. 8 " " ⅞ " 3 " " 14 " " " 2,800 " 650.00

No. 7 has nut-tapping combination, and is, in fact, two machines in one. Nuts can be tapped and threads cut at the same time.

Nos. 6 and 7 have oil pumps instead of can.

Prices include dies, master taps or hobs, nut tap holders, dies and steel chuck for nut tapping, and countershaft complete; but not nut taps.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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POWER BOLT CUTTERS.

4, 3 1-2 AND 3 INCH.

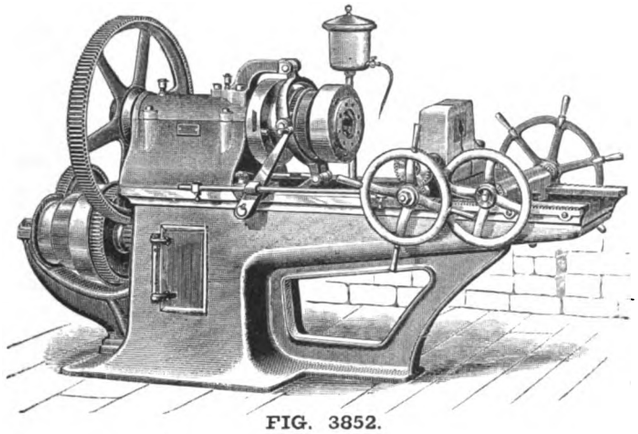


FIG. 3852.

PRICES, 4 INCH.

Machine, pump, automatic and hand opening and countershaft..	$795.00
Case dies 1½, 1⅝, 1¾, 1⅞, 2, 2¼, 2½, 2¾, 3, 3¼, 3½, 3¾ and 4 inch	85 00
Nut taps as per dies	150 00
Adjustable tap chuck and stop die	20.00
Complete	$1,050.00
Deduct from above if not wanted, automatic $20.00, pump $10.00.	
Class B, with hat dies and pump, but without automatic	$1,000.00
Class C, with plain dies and pump, but without automatic	975.00

Plain dies $5.00 per set, hat $6.00, case $7.00, and flush case $7.50.

PRICES, 3 1-2 INCH.

Cuts to 3½ in., weight 4,100 lbs., pulleys 18 by 4 in., geared 36 to 1. Countershaft speed 250 revs. per minute.

Machine, pump, automatic and hand opening and countershaft..	$700.00
Case dies 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 1¾, 1⅞, 2, 2¼, 2½, 2¾, 3, 3¼ and 3½ inch	90.00
Nut taps as per dies	115.00
Adjustable tap chuck and stop die	20.00
Complete	$925.00
Deduct if not wanted, automatic $20.00, pump $10.00.	
Class B, with hat dies and pump, but without automatic	$875.00
Class C, with plain dies and pump, but without automatic	855.00

PRICES, 3 INCH.

Cuts to 3 inch, weight 3,600 lbs., pulleys 18 by 4 in., geared 30 to 1. Countershaft speed 250 revs. per minute.

Machine, pump, automatic and hand opening and countershaft..	$652.00
Case dies 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 1¾, 1⅞, 2, 2¼, 2½, 2¾ and 3 in.	78.00
Nut taps as per dies	75.00
Adjustable tap chuck and stop die	20.00
Complete	$875.00
Deduct from above if not wanted, automatic $20.00, pump $10.00.	
Class B, with hat dies and pump, but without automatic	$785.00
Class C, with plain dies and pump, but without automatic	765.00

Plain dies $3.50, hat $4.00, case $6.00, and flush case $6.50 per set.

PRICES, 2 1-2 INCH.

Cuts to 2¼ inch, weight 3,100 lbs., pulleys 18 by 4 in., geared 7 to 1. Countershaft speed 230 revs. per minute.

Machine, pump, automatic and hand opening and countershaft..	$535.00
Case dies ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 1¾, 1⅞, 2, 2¼ and 2½ inch	75.00
Nut taps as per dies	50.00
Adjustable tap chuck and stop die	15.00
Complete	$675.00
Deduct from above if not wanted, automatic $20.00, pump $10.00.	
Class B, with hat dies and pump, but without automatic	$645.00
Class C, with plain dies and pump, but without automatic	630.00

Plain dies $3.50, hat $4.00, case dies $6.00, and flush case $9.50 per set.

PRICES, 2 INCH.

Cuts ½ to 2 inch, weight 2,700 lbs., pulleys 18 by 4 in., geared 6 to 1. Countershaft speed 230 revs. per minute.

Machine, pump, automatic and hand opening and countershaft..	$460.00
Case dies ½, ⅝, ¾, ⅞, 1⅛, 1¼, 1⅜, 1½, 1¾ and 2 inch	55.00
Nut taps as per dies	30.00
Adjustable tap chuck and stop die	15.00
Complete	$560.00
Deduct from above if not wanted, automatic $15.00, pump $10.00.	
Class B, with hat dies and pump, but without automatic	$530.00
Class C, with plain dies and pump, but without automatic	520.00

2 1-2, 2, 1 1-2 AND 1 1-4 INCH.

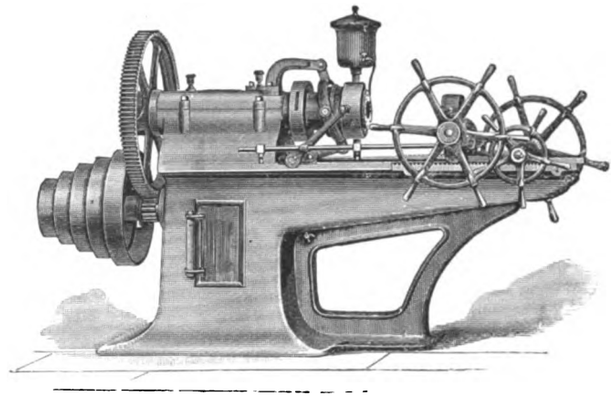


FIG. 3853.

PRICES, 1 1-2 INCH.

Cuts ⅜ to 1½, weight 1,700 lbs., pulleys 14 by 4 in., geared 5 to 1. Countershaft speed 250 revs. per minute.

Machine, pump, automatic and hand opening and countershaft..	$360.00
Case dies ⅜, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼ and 1½ inch	40.00
Nut taps as per dies	15.00
Adjustable tap chuck and stop die	10.00
Complete	$425.00
Deduct from above if not wanted, automatic $15.00, pump $10.00.	
Class B, with hat dies and pump, but without automatic	$390.00
Class C, with plain dies and pump, but without automatic	380.00

Plain dies $2.50, hat $3.00, case dies $4.50, and flush case $5.00 per set.

PRICES, 1 1-4 INCH.

Cuts ¼ to 1¼ in., weight 1,500 lbs., pulleys 12 by 4 in. Countershaft speed 250 revs. per minute.

Machine, pump, automatic and hand opening and countershaft..	$295.00
Case dies ¼, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼ inch	32.00
Nut taps, as per dies	13.00
Adjustable tap chuck and stop die	10.00
Complete	$350.00
Deduct from above if not wanted, automatic $15.00, pump $10.00.	
Class B, with hat dies and pump, but without automatic	$320.00
Class C, with plain dies and pump, but without automatic	310.00

Plain dies $2.50, hat $3.00, case $4 00, and flush case $4.50 per set.

PRICES, FIG. 3854, 1 INCH.

Cuts ¼ to 1 in., weight 1,400 lbs., pulleys 12 by 4 in. Countershaft speed 100 revolutions per minute.

Machine, pump, automatic and hand opening and countershaft..	$262.00
Case dies ¼, ⅜, ½, ⅝, ¾, ⅞ and 1 inch	28.00
Nut taps as per dies	10.00
Adjustable tap chuck and stop die	10.00
Complete	$310.00
Deduct from above if not wanted, automatic $15.00, pump $10.00.	
Class B, with hat dies and pump, but without automatic	$280.00
Class C, with plain dies and pump, but without automatic	260.00

Plain dies $2.50, hat $3.00, case $4.00, and flush case $4.50 per set.

1 INCH.

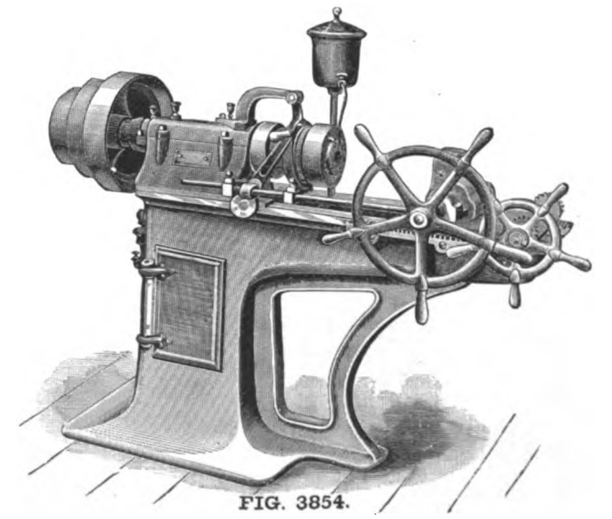


FIG. 3854.

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POWER BOLT CUTTER.

2 1-4 AND 1 1-4 INCH.

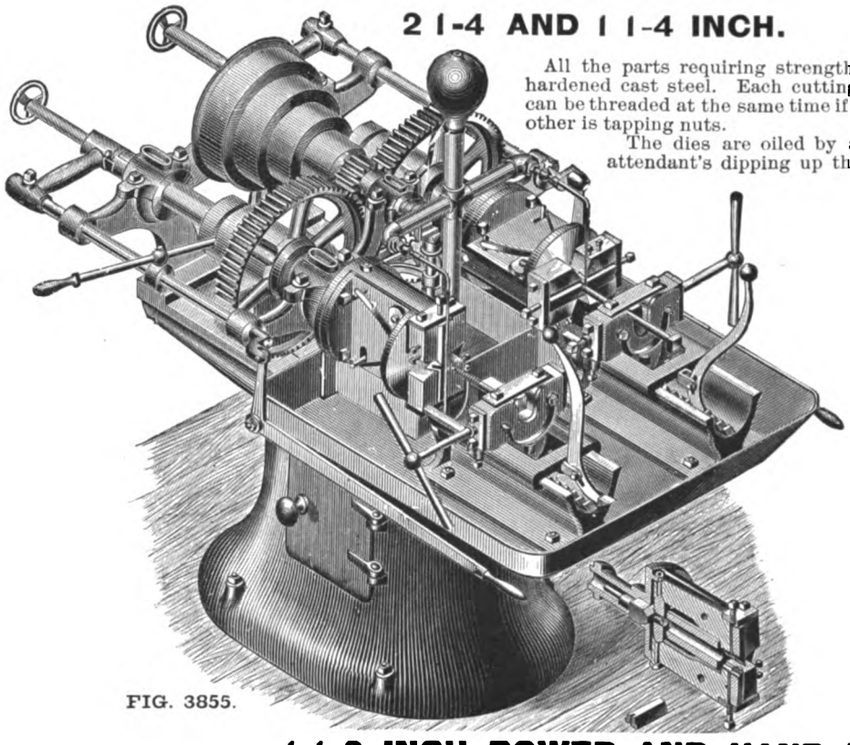


FIG. 3855.

All the parts requiring strength and hard wearing surfaces are made of wrought iron or hardened cast steel. Each cutting head is independent of the other, and two kinds of bolts can be threaded at the same time if desired, or, if so ordered, one head can cut bolts while the other is tapping nuts.

The dies are oiled by an automatic pump, which obviates the necessity of the attendant's dipping up the oil. The wrought iron jaws are self-opening, releasing the bolt when the desired length of thread has been cut. The dies are of excellent steel and are so made and held that they can be dressed down repeatedly. They can be easily and quickly adjusted.

We make two sizes of these machines; one cuts from 2¼ in., the other from 1¼ in. diameter down.

CAPACITY IN TEN HOURS.

BOLTS.

4,000	bolts	½ in. diam.
3,500	"	5/8 " "
2,500	"	¾ " "
1,500	"	7/8 " "
1,000	"	1 " "
800	"	1⅛ or 1¼ " "

WOOD SCREWS.

4,550	wood	screws	⅜ in. diam.
4,000	"	"	½ " "
3,500	"	"	5/8 " "
3,000	"	"	¾ " "
2,500	"	"	7/8 " "
1,500	"	"	1 " "

Speed of countershaft, 150 revolutions per minute.
Special prices quoted on application.

PRICES.

2¼ in. WEIGHT, ... LBS. $.....
1¼ " " ..... " $.....

1 1-2 INCH POWER AND HAND BOLT CUTTER.

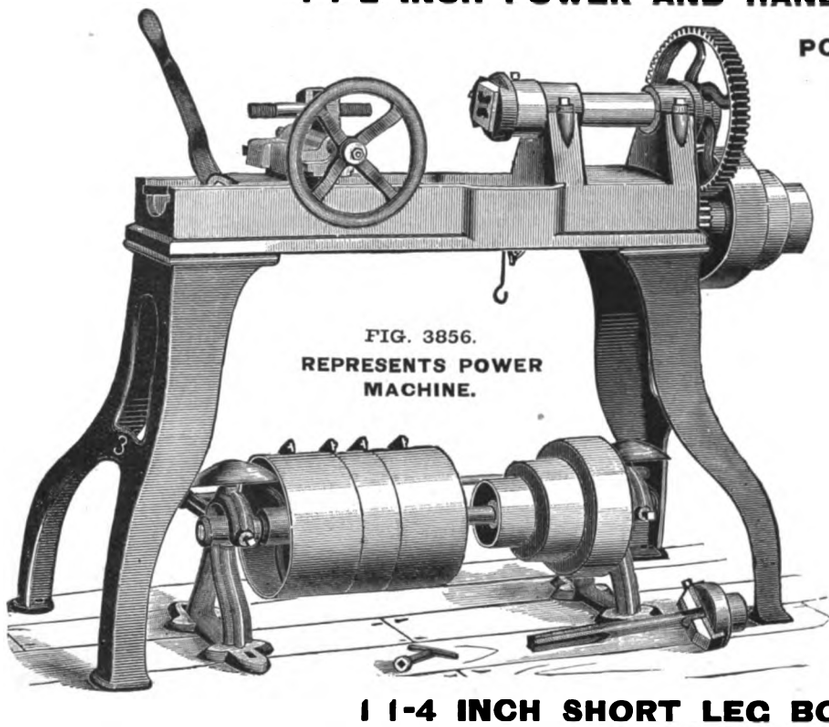


FIG. 3856.
REPRESENTS POWER MACHINE.

POWER BOLT CUTTER AND NUT TAPPER.

Cuts ⅜, 7/16, ½, 5/8, ¾, 7/8, 1, 1⅛, 1¼, 1⅜, 1½.

When desired, we attach a crank to cone at end of all power machines, to use by hand in an emergency. The driving cones are large, and take a 3-inch belt. Driving pulleys are 10 inches diameter, and take a 2¾-inch belt. Speed of countershaft, 100 turns per minute. Weight, 500 lbs.

PRICES.

Including countershaft, without taps and dies.....$110.00
" " with taps and solid dies..... 157.50
" " " " " adjustable dies, 175.00

HAND BOLT CUTTER AND NUT TAPPER.

Cuts ⅜, 7/16, ½, 5/8, ¾, 7/8, 1, 1⅛, 1¼, 1⅜, 1½.

PRICES.

Without taps and dies.....$95.00
With taps and solid dies, ⅜ to 1½ in.....142.50
" " " adjustable dies, ⅜ to 1½ in.....160.00

Above prices include tap chuck, wrenches, solid die holder.

Geared 5 to 1. Weight, 500 lbs.

GENERAL REMARK, FIGS. 3856 TO 3859.

All sizes of bolt cutters when ordered, without specifying to the contrary, are furnished with taps and dies for rough iron sizes; solid or adjustable dies furnished as may be desired. In ordering, please be careful to state whether solid or adjustable dies are wanted.

1 1-4 INCH SHORT LEC BOLT CUTTER.

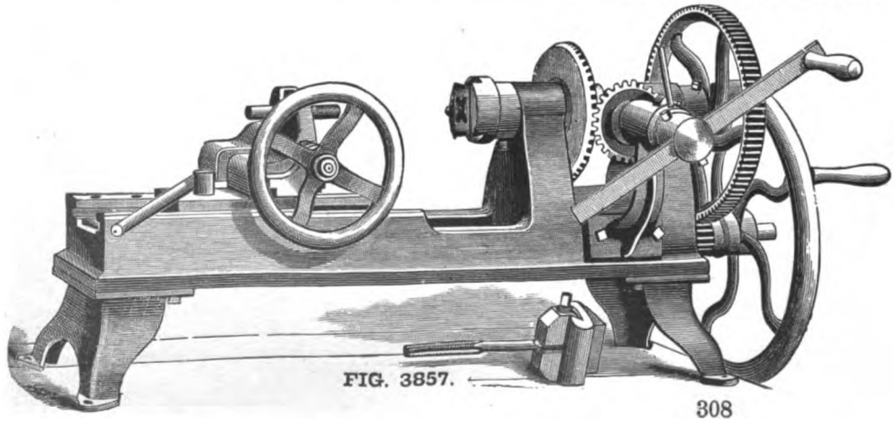


FIG. 3857.

HAND BOLT CUTTER AND NUT TAPPER.

ON SHORT LECS.

Cuts ¼, 5/16, ⅜, 7/16, ½, 5/8, ¾, 7/8, 1, 1⅛, 1¼.

PRICES.

Without taps and dies.....$65.00
With taps and solid dies, ¼ to 1 inch..... 90.00
" " " " " ¼ to 1¼ in..... 102.50
" " " adjustable dies, ¼ to 1 inch..... 98.00
" " " " " ¼ to 1¼ in.....115.00

With 2-step cone pulley and countershaft for power (see illustration No. 3 power), $15.00 extra.

Geared 5 to 1. Weight, 225 lbs.

Above prices include tap chuck, wrenches, solid die holder.

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1 1-4 POWER AND HAND BOLT CUTTER.

PRICES, BOTH POWER AND HAND.

Geared 5 to 1. **WEIGHT, 345 LBS.**

Cuts ¼, 5/16, ⅜, 7/16, ½, 5/8, ¾, 7/8, 1, 1⅛, 1¼.

PRICES.

Price, without taps and dies	$70.00
" with taps and solid dies ¼ to 1 inch	95.00
" " " " ¼ to 1¼ inches	107.50
" with taps and adjustable dies ¼ to 1 inch	103.00
" " " " ¼ to 1¼ inches	120.00

Price, with 2-step cone pulley and countershaft for power (see Fig. 3856), $15.00 extra.

Above prices include tap chuck, wrenches, solid die holder.

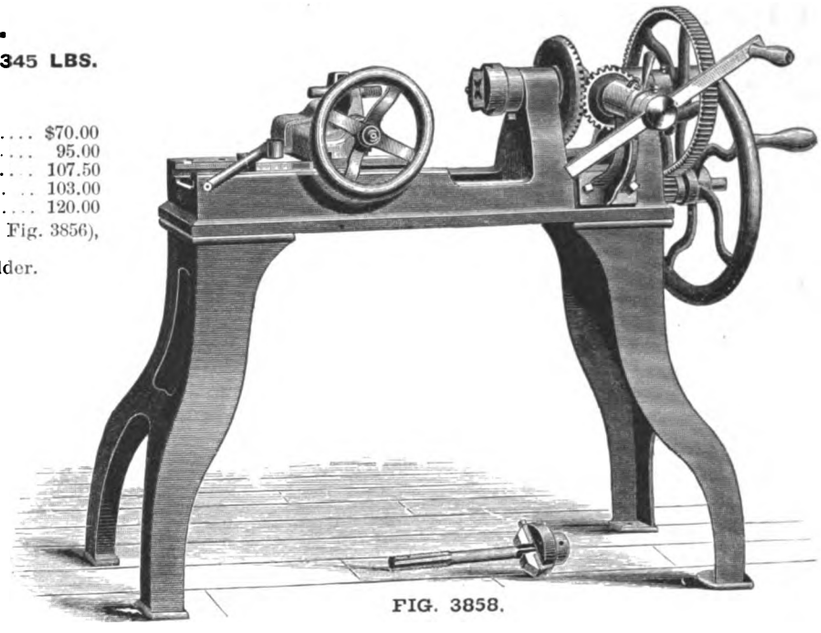


FIG. 3858.

1 INCH HAND BOLT CUTTER.

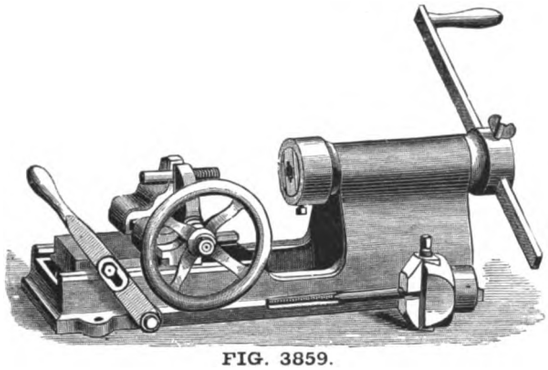


FIG. 3859.

PRICES.

Without taps and dies	$38.00
With taps and solid dies	55.00
With taps and adjustable dies	60.00

With pulley on spindle, 4 inches wide, for power, including tight and loose pulley countershaft, $15.00 extra.

Above prices include tap chuck, wrenches and solid die holder.

1 INCH HAND BOLT CUTTER.

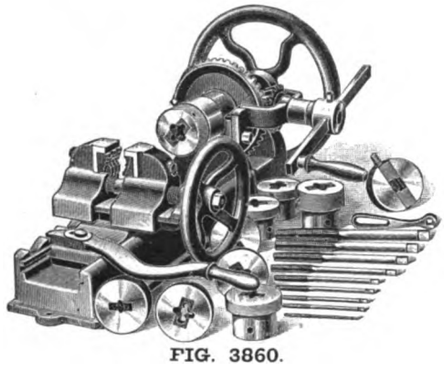


FIG. 3860.

PRICES.

With tap chuck, taps, dies and collets, cutting ¼, 5/16, ⅜, 7/16, ½, 5/8, ¾, ⅞, 1 in. Price complete.. $70.00

With balance wheel. Clutch on spindle.

Weight of machine complete, 200 lbs.

1 1-2 IN. HAND BOLT CUTTER.

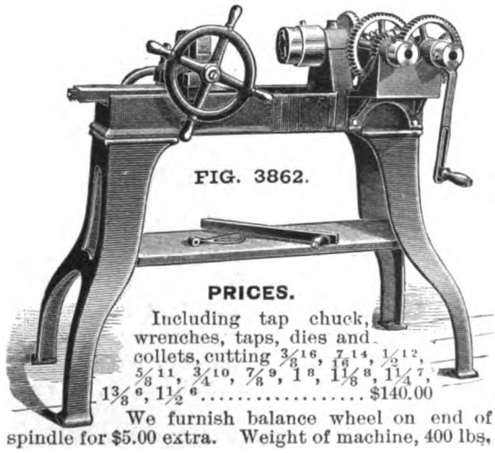


FIG. 3862.

PRICES.

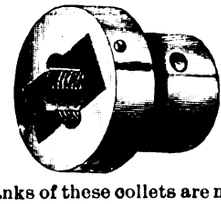
Including tap chuck, wrenches, taps, dies and collets, cutting 3/8[16], 7/16[14], ½[12], 5/8[11], ¾[10], ⅞[9], 1[8], 1⅛[8], 1¼[7], 1⅜[6], 1½[6]..... $140.00

We furnish balance wheel on end of spindle for $5.00 extra. Weight of machine, 400 lbs.

FIGS. 3860 TO 3863

Can be furnished with solid dies and collets at same prices as the adjustable dies quoted.

COLLETED DIES.



Shanks of these collets are made 2¾ inches diameter.

THESE BOLT CUTTERS

Have an improved steel jaw, for holding bolts.

They will cut straight or crooked work equally well.

Spindles are made hollow.

The hand machines have a great variety of changes of speed.

The changes of sizes of dies can be made instantly.

When ordering, care should be taken to give full particulars as to form of thread, as well as number desired on each size. Unless otherwise ordered, "V" threads, rough iron sizes, and number of threads as given in assortment will be sent.

3-4 INCH HAND BOLT CUTTER.

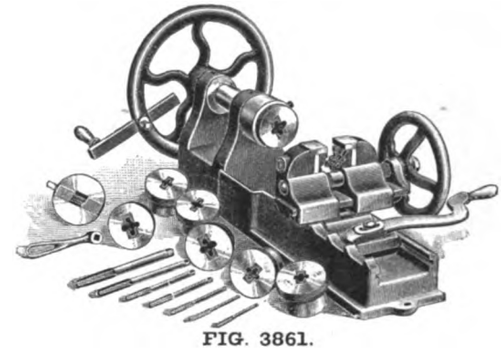


FIG. 3861.

PRICES.

With tap chuck, taps, dies and collets, cutting ¼, 5/16, ⅜, 7/16, ½, 5/8, ¾. Price complete..... $50.00

Weight of machine complete, 150 lbs.

1 1-4 AND 1 IN. BOLT CUTTERS.

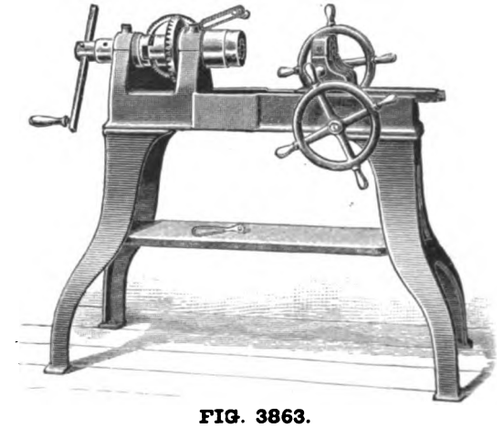


FIG. 3863.

This machine has three changes of speed, multiplying the power two and seven times, and equalizing it once.

This machine has our improved tail block jaws, for holding iron; also clutch on spindle, for throwing out gear.

Balance wheel furnished on end of spindle for $5.00 extra.

PRICES, 1 1-4 INCH.

Cutting ¼, 5/16, ⅜, 7/16, ½, 5/8, ¾, ⅞, 1, 1 1/8, 1¼. Price, $108.00

Weight of machine, 350 lbs.

PRICES, 1 INCH.

Cutting ¼, 5/16, ⅜, 7/16, ½, 5/8, ¾, ⅞, 1. Price.....$90.00

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POWER BOLT CUTTERS AND NUT TAPPERS.

1 1-2 INCH.

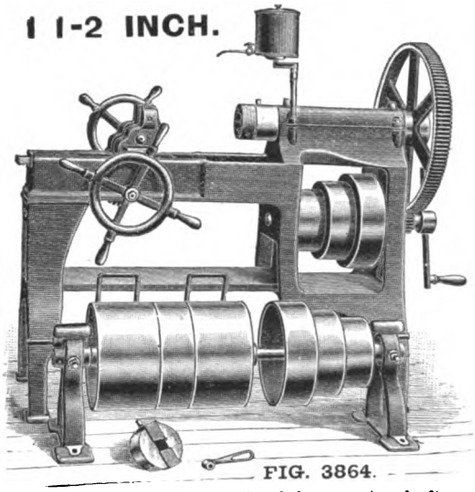


FIG. 3864.

Machine, complete, with plain countershaft, tap chucks, taps, dies and collets.

PRICE.

$\frac{3}{8}$ ^{16}, $\frac{7}{16}$ ^{14}, $\frac{1}{2}$ ^{12}, $\frac{5}{8}$ ^{11}, $\frac{3}{4}$ ^{10}, $\frac{7}{8}$ ^{9}, 1 ^{8}, 1 $\frac{1}{8}$ ^{8}, 1 $\frac{1}{4}$ ^{7}, 1 $\frac{3}{8}$ ^{6}, 1 $\frac{1}{2}$ ^{6} $165.00

If with friction clutch on countershaft, $10.00 extra.

Weight, of machine, complete, 850 lbs.

Speed of countershaft, 200 revs. per minute.

Pipe dies and collets extra.

Three-step cone pulley, with steps 3½ x 8, 10, 12 inches. Large gear, 22 inches diameter. Small gear, 3 inches, giving great power.

1 1-4 AND 1 INCH.

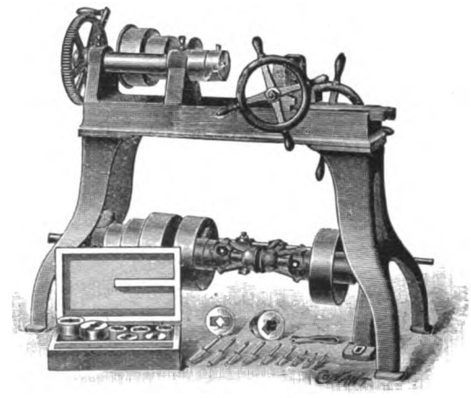


FIG. 3865.

Machine, complete, with plain countershaft, tap chucks, taps, adjustable dies and collets.

PRICE, 1 1-4 INCH.

For $\frac{1}{4}$ ^{20}, $\frac{5}{16}$ ^{18}, $\frac{3}{8}$ ^{16}, $\frac{7}{16}$ ^{14}, $\frac{1}{2}$ ^{12}, $\frac{5}{8}$ ^{10}, $\frac{3}{4}$ ^{10}, $\frac{7}{8}$ ^{9}, 1 ^{8}, 1$\frac{1}{8}$ ^{8}, 1$\frac{1}{4}$ ^{7} $143.90

PRICE, 1 INCH.

For $\frac{1}{4}$ ^{20}, $\frac{5}{16}$ ^{18}, $\frac{3}{8}$ ^{16}, $\frac{7}{16}$ ^{14}, $\frac{1}{2}$ ^{12}, $\frac{5}{8}$ ^{10}, $\frac{3}{4}$ ^{10}, $\frac{7}{8}$ ^{9}, 1 ^{8} $125.00

HAND POWER.

Deduct for friction counter..... $10.00

WEIGHT, 600 LBS.

Speed of countershaft, 250 revs. per minute.

3-4 INCH POWER BOLT CUTTER FOR BENCH NO. 0.

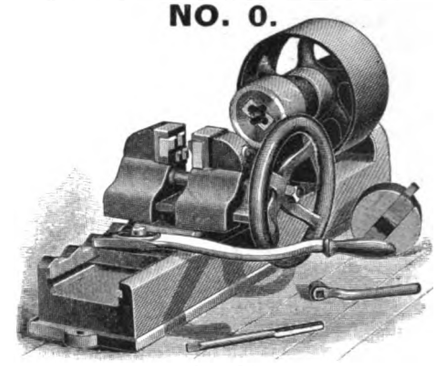


FIG. 3866.

The above cut shows our new power bolt cutter and nut tapper, arranged for bench. This makes a convenient machine where parties desire to cut one or more sizes of bolts, etc., and in many places takes the place of much higher-priced machines. It cuts to ¾ inch inclusive.

Pulley on spindle 4 inches wide.

We price machine without taps, die and collets as follows:

Machine with pulley on spindle, and tap chuck..... $40.00

Machine with tight and loose pulley countershaft..... 55.00

Machine with friction clutch countershaft, 65.00

BOLT POINTERS.

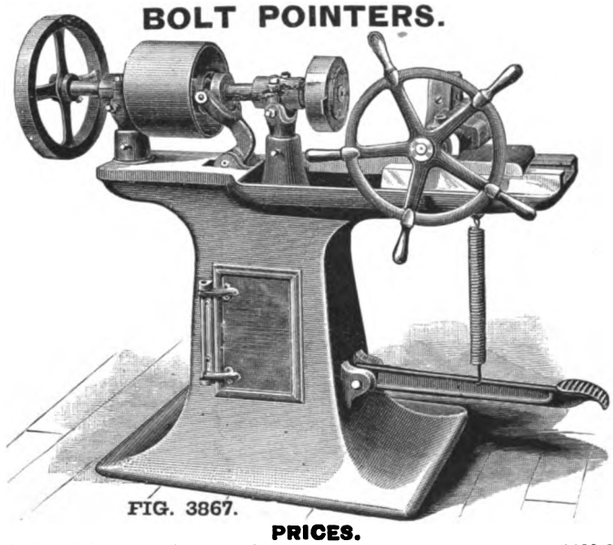


FIG. 3867.

PRICES.

1. Small bench pointer to ⅝ in..... $100.00
2. Small bench pointer to ⅝ in., with all steel head..... 115.00
3. Large bench pointer to 1 in., with all steel head..... 125.00
4. Small pedestal pointer to ¾ in., on frame like above..... 135.00
5. Large pedestal pointer to 1 in., on frame like above..... 150.00
6. Large pointer to 1¼ or 1½ in..... 175.00
7. Large pointer to 2 in., geared..... 250.00

Countershaft, extra, $10.00. Tools, $1.50 per set.

DESCRIPTION, FIG. 3867.

The pointing tools consist of knives made of square steel, and in some cases flat steel, similar to those used in dowel machine.

BOLT POINTERS.

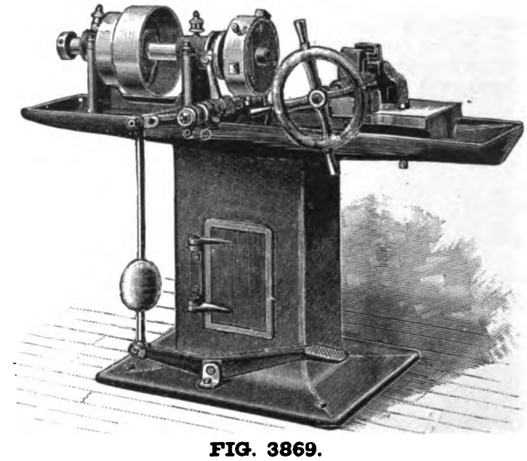


FIG. 3869.

1-2 INCH POINTER.

This machine will point machine bolts and lag screws from ¼ inch to ½ inch in diameter to any shape of point desired. The tools are made of square bar steel; they can be ground without changing their form. We furnish different carriages or vises, as may be required.

PRICE.

With countershaft, wrenches, and 5 sets of tools, ¼, $\frac{5}{16}$, ⅜, $\frac{7}{16}$, ½..... $175.00

WEIGHT, 800 LBS.

Speed of countershaft with 16 x 4 inch pulleys, 200 revolutions per minute.

1 INCH POINTER.

This machine is same as the above described, and will point machine bolts and lag screws from ⅜ inch to 1 inch in diameter, to any shape of point desired.

PRICE.

With countershaft, wrenches, and 6 sets of tools, ⅜, ½, ⅝, ¾, ⅞, 1..... $200.00

WEIGHT, 1,000 LBS.

Speed of countershaft with 16 x 4 inch pulleys, 100 revolutions per minute.

Larger size pointers built to order.

HEAD SHAVER OR TRIMMER.

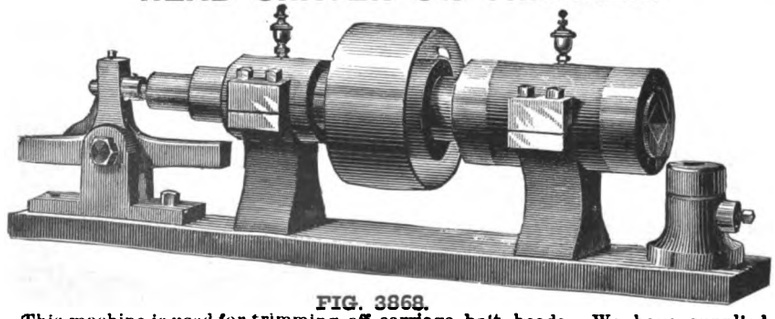


FIG. 3868.

This machine is used for trimming off carriage bolt heads. We have supplied several bolt shops with these in their outfit. We make it to suit customers, with tight or loose pulleys, or as shown in cut.

PRICE, $75.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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HOT PRESSED NUT MACHINES.

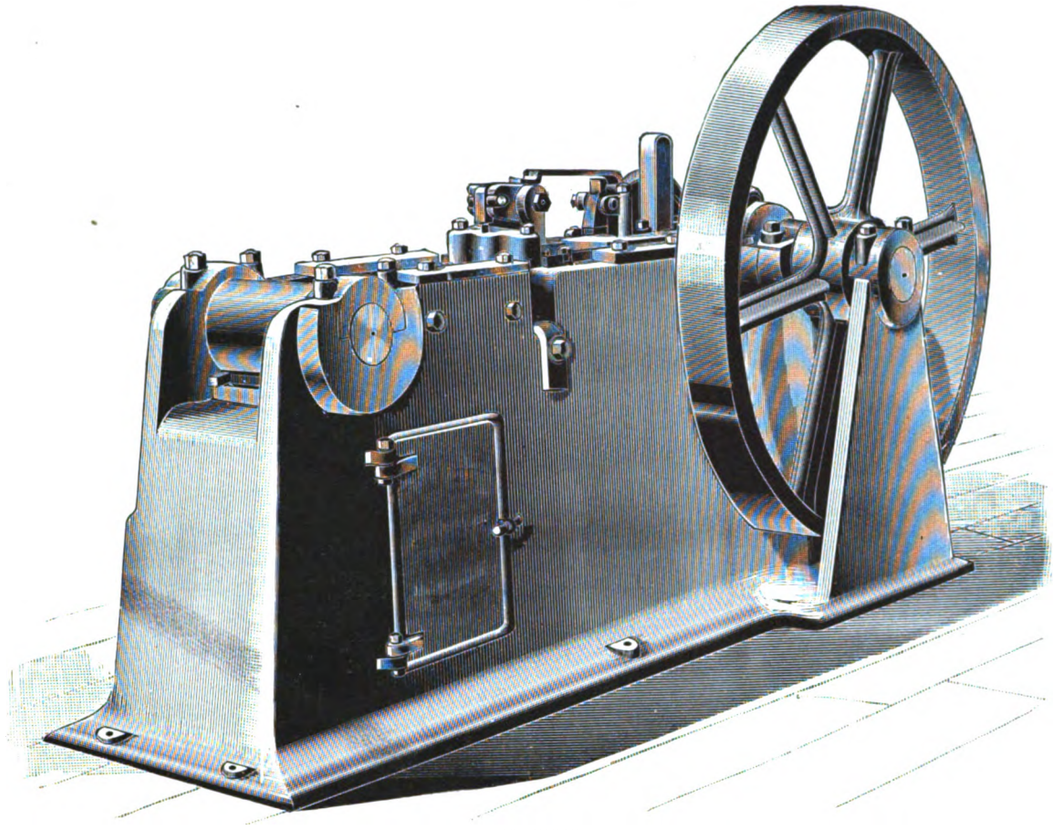


FIG. 3870.

This is the only nut machine that is made without using more or less cams. Our movements are all derived from crank and pitman, thereby obtaining long life to the tools, noiseless movements to the slides, and speed only limited by the speed of the operator.

PRICES.

Size No. 1. Will make nuts from $\frac{3}{8}$ inch to 1 inch.....$.....
" " 2. " " " " $\frac{3}{4}$ " " $1\frac{1}{2}$ " .....$.....
" " 3. " " " " 1 " " 2 " .....$.....

PITTSBURGH NUT MACHINES.

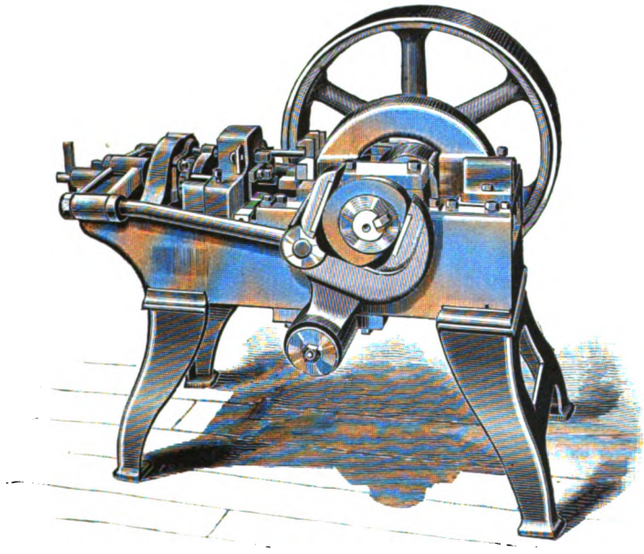


FIG. 3871. REPRESENTS NO. 2.

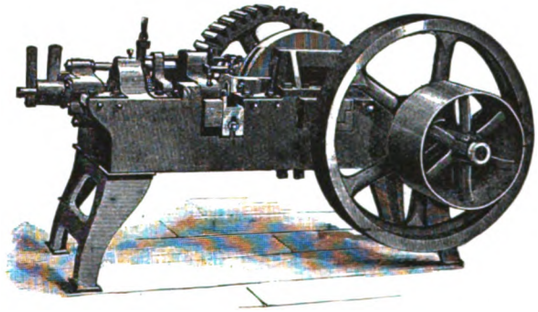


FIG. 3872. REPRESENTS NO. 3.

These machines consist of a cam shaft carrying three cams; a center or pinch cam, and two outside or piercer cams. All of these work in Scotch yokes and wear on plain hardened steel plates.

The cams are chilled cast iron and can be replaced cheaply.

The center cam gives motion to a crosshead or slide carrying the top die, which shears the nut from the bar; carries it into the cast iron box, and forces it against the bottom die, which gives the crown or raised boss on the nut. This bottom die is backed by a large screw to give it the required adjustment.

The two piercer cams are connected with the piercer at a point beyond the die box and bottom die, and pull it through the nut, forcing the punch through the top die. The piercer is then retracted. Between the large set screw and the bottom die there is a press plate, connected with the crosshead by two rods that play back and forth through it, and pull it forward far enough to cause the bottom die to expel the nut when the crosshead is on its extreme back stroke.

The boxes are very simple in construction and can be redressed many times. They are held in a cast iron holder, which can be adjusted vertically and laterally by set screws. This makes the adjustment of the boxes to the top die, which is usually a difficult matter, very easy.

PRICES.

No. 1 cuts $\frac{1}{4}$, $\frac{5}{8}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$ inch, square or hexagon;	speed, 80 revs. per minute;	weighs 2,500 lbs.;	price.....	$450.00
No. 2 cuts $\frac{1}{4}$ to $\frac{3}{4}$ inch, square or hexagon;	speed, 80 revs. per minute;	weighs 3,600 lbs.;	price.....	600.00
No. 3 cuts to $1\frac{1}{4}$ inch, square or hexagon;	speed, 60 revs. per minute;	weighs 9,000 lbs.;	price.....	900.00
No. 4 cuts to $2\frac{1}{2}$ inch, square or hexagon;	speed, 45 revs. per minute;	weighs 20,000 lbs.;	price.....	2,000.00

Prices include one size of tools. Extra tools.....$..... per set.

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NUT TAPPERS.

GEARED 2 INCH 6 SPINDLE.

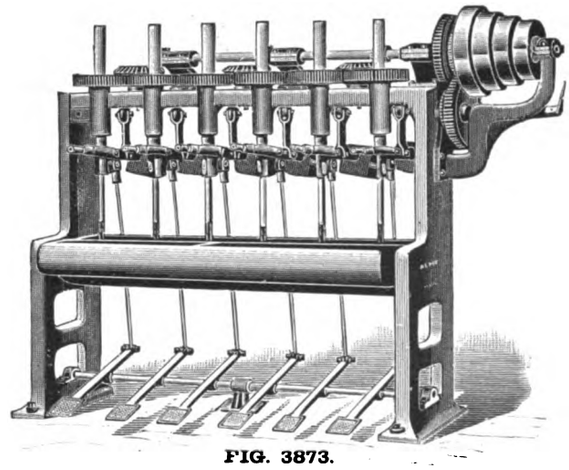


FIG. 3873.

This machine is the same in every respect as the one described below, except it is back geared, so that nuts up to and including 2 inches may be tapped on two of the spindles.

PRICES.

Machine, with countershaft and wrenches	$525.00
11 sockets, at $5.00 each	55.00
11 tapper taps, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½, 1¾, 2	45.00
Machine, complete, as above	$625.00

WEIGHT, 3,600 LBS.

Speed of countershaft, with 16x4 inch pulleys, 300 revolutions per minute.

GEARED 2 INCH 4 SPINDLE.

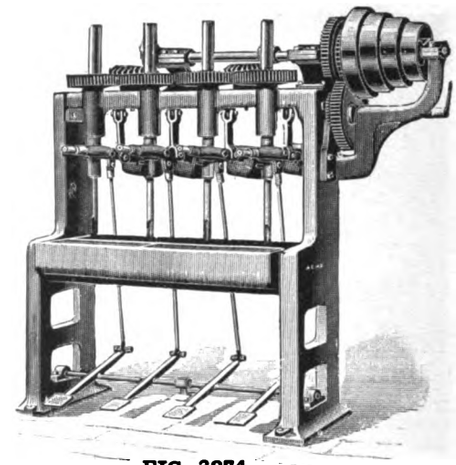


FIG. 3874.

This machine is the same in every respect as the one described below, except it is back geared, so that nuts up to and including 2 inches may be tapped on two of the spindles.

PRICES.

Machine, with countershaft and wrenches	$425.00
11 sockets, at $5.00 each	55.00
11 tapper taps, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½, 1¾, 2	45.00
Machine, complete, as above	$525.00

WEIGHT, 3,000 LBS.

Speed of countershaft, with 16x4 inch pulleys, 300 revolutions per minute.

1 1-2 AND 1 INCH 6 SPINDLE.

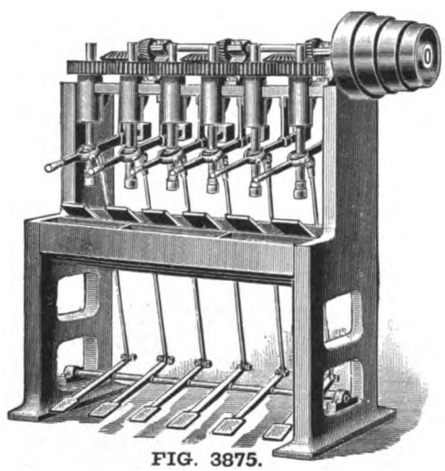


FIG. 3875.

This machine will tap both square and hexagon nuts, from ⅜ inch to 1½ inch. The nut holders are adjustable to suit a variety of sizes and shape nuts. The sockets are self-acting, so the tap can be removed and again reinserted while the machine runs at full speed. The spindles are steel with double spline, all counterbalanced. All gears are cut from the solid. Nuts may be tapped in soda solution, or the pan may be partly filled with water and a half inch of lard oil added, in which case the nut is tapped in oil and the water below keeps the tap cool.

PRICES, 1 1-2 INCH.

Machine, with countershaft and wrenches	$475.00
9 sockets, at $5.00 each	45.00
9 special tapper taps, one each, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½	30.00
Machine, complete, as above	$550.00

WEIGHT, 3,300 LBS.

Speed of countershaft, with 16x4 inch pulleys, 300 revolutions per minute.

PRICES, 1 INCH.

Machine, with countershaft and wrenches	$407.40
6 sockets, at $5.00 each	30.00
6 special tapper taps, one each, ⅜, ½, ⅝, ¾, ⅞, 1 inch	12.60
Machine, complete, as above	$450.00

WEIGHT, 2,700 LBS.

Speed of countershaft, with 16x4 inch pulleys, 300 revolutions per minute.

1 1-2 AND 1 INCH 4 SPINDLE.

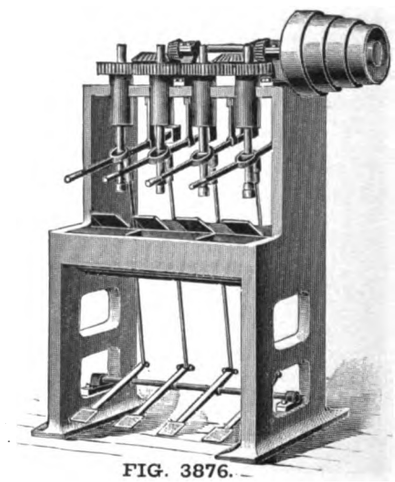


FIG. 3876.

This machine will tap both square and hexagon nuts, from ⅜ inch to 1½ inch The nut holders are adjustable to suit a variety of sizes and shape nuts The sockets are self-acting so the tap can be removed and again reinserted while the machine runs at full speed. The spindles are steel with double spline, all counterbalanced. All gears are cut from the solid. Nuts may be tapped in soda solution, or the pan may be partly filled with water and a half inch of lard oil added, in which case the nut is tapped in oil and the water below keeps the tap cool.

PRICES, 1 1-2 INCH.

Machine, with countershaft and wrenches	$375.00
9 sockets, at $5.00 each	45.00
9 special tapper taps, one each, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½	30.00
Machine, complete, as above	$450.00

WEIGHT, 2,700 LBS.

Speed of countershaft, with 16x4 inch pulleys, 300 revolutions per minute.

PRICES, 1 INCH.

Machine, with countershaft and wrenches	$332.40
6 sockets, at $5.00 each	30.00
6 special tapper taps, one each, ⅜, ½, ⅝, ¾, ⅞, 1 inch	12.60
Machine, complete, as above	$375.00

WEIGHT, 2,200 LBS.

Speed of countershaft, with 16x4 inch pulleys, 300 revolutions per minute.

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NUT TAPPERS.

7 SPINDLE.

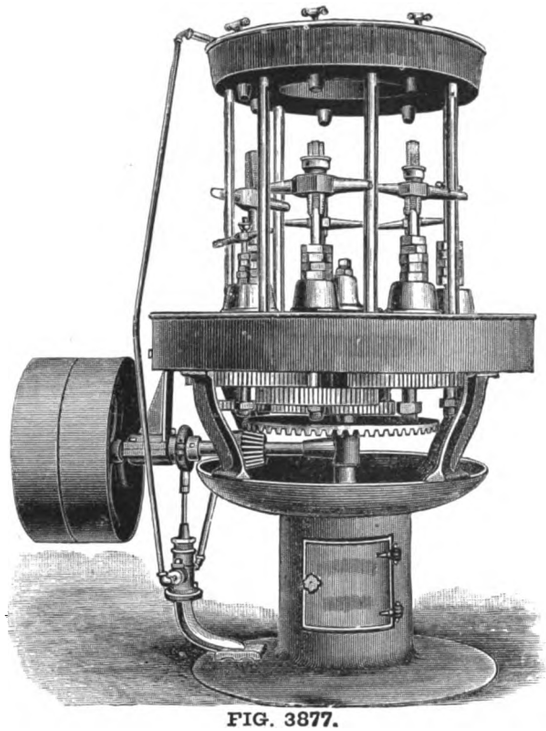


FIG. 3877.

PRICES.

7 spindle, tapping to 1½ inch, weight 1,150 lbs.... $350.00
7 " " 2 " " 1,300 " 400.00

GENERAL DESCRIPTION.

The arrangement of these machines provides against any gumming or obstructions in the sockets resulting in chips, cutting or oil. The sockets for holding the taps are so constructed that any tap will fit and work in or on any spindle, and the nuts, when finished, drop below the teeth of the tap, and when full the tap can be taken off and replaced without stopping the machine. With this machine nuts of the same or different sizes may be cut as rapidly as one man can put them on and take them off the taps; the attendant can be kept busy and at the same time run at a speed sufficiently slow to preserve the life of the tap; the motion or speed of the tap is within the control of the operator and can be made fast or slow as desired; and one or any number of the taps may be used, as required.

This machine runs seven taps with three different speeds, so arranged that two of the taps may be run with the fastest, two with the slowest, and three at the medium speed at the same time, the gearing being so arranged as to enable the operator to get the desired speed for any given size tap; or all may be run at any of the three speeds, if so desired, by having the necessary gears. By the substitution of the necessary gearing—easily done—three, two or one of the taps can be run "left hand." The necessary oil is regularly supplied by graduating cocks, in itself a source of economy.

3 SPINDLE.

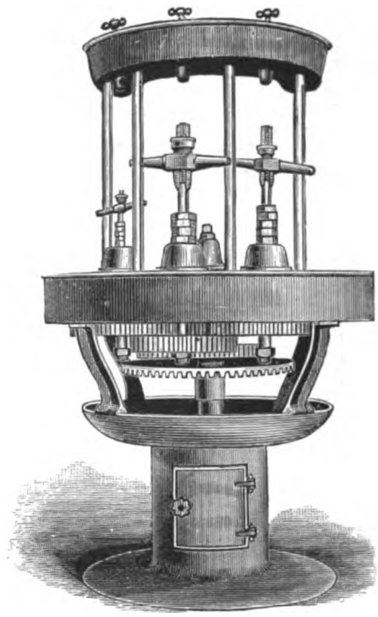


FIG. 3878.

PRICES.

3 spindle, tapping to 2½ inch, weight 850 lbs.....$250.00

AUTOMATIC ROTARY NUT TAPPER.

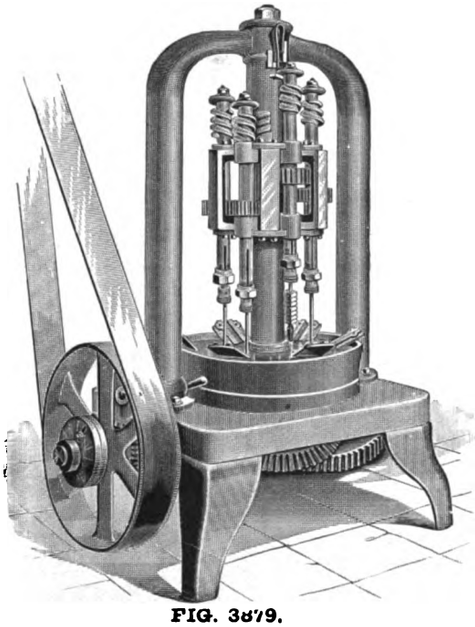


FIG. 3879.

It is provided with patent sockets, back geared for heavy work, substantial.

WEIGHT, COMPLETE, 5,000 LBS.

PRICES.

Machine, with countershaft and 6 sockets..... $850.00
Plain steel tap-holders to 1 inch, each.....$3.00 Patent.... 5.00
" " " " 1½ " " ..... 5.00 " 7.50

DESCRIPTION, FIG. 3880.

The above tool represents a form of tool useful in a hardware factory where work is placed in jigs and drilled and tapped. The weighted treddle is balanced according to the power needed by moving the weight; this lifts the lower spindle containing the work to the revolving tool. When used as a pointer, the head of bolt or lag screw is put in lower holder and the upper spindle containing the revolving cutters makes the point. There are many operations it comes in handy for. The lower spindles can be hollow tubes or solid, as wanted.

TAPPER, DRILL AND LAG SCREW POINTER.

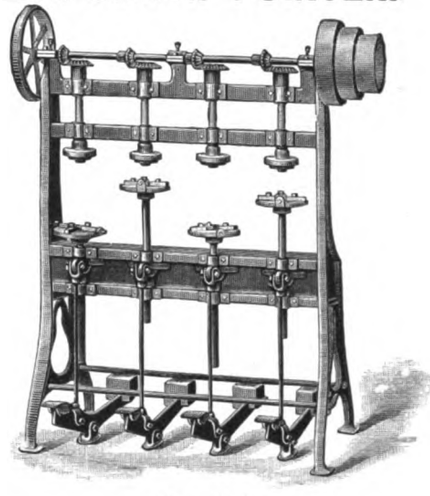


FIG. 3880.

WEIGHT, 1,700 LBS.
PRICE, COMPLETE WITH COUNTERSHAFT, $175.00.

SINGLE SPINDLE TAPPER.

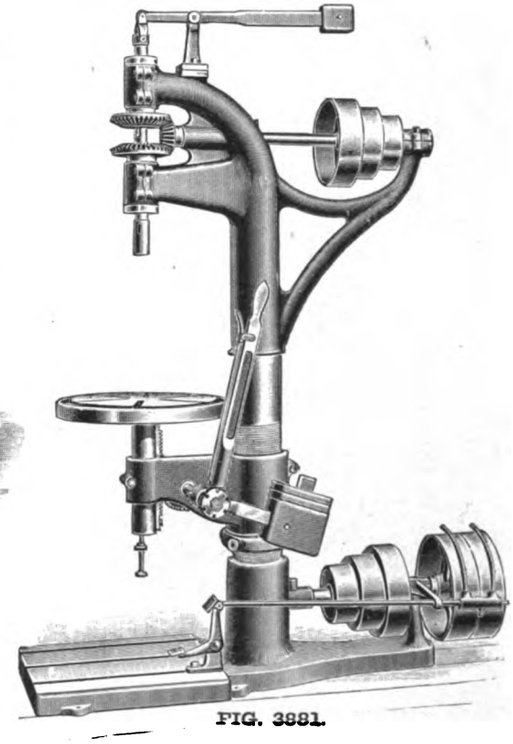


FIG. 3881.

Greatest distance from spindle to table, 21 inches. Greatest distance from spindle to base plate, 42 inches. Vertical adjustment of table on column, 12 inches. Maximum distance from floor to table, 36 inches. Minimum distance from floor to table, 24 inches. Diameter of spindle, 1⅜ inches. Diameter of table, 18 inches. Driving pulleys, 12 inches diameter by 3 inch face. Width of belt on cone, 2½ inches. Total height of machine, 5 feet 10 inches. Floor space required, 52 inches by 21 inches.

WEIGHT, 750 LBS. **PRICE, $.....**

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NUT AND WASHER MACHINERY.

1 1-2 IN. BACK GEARED NUT TAPPER.

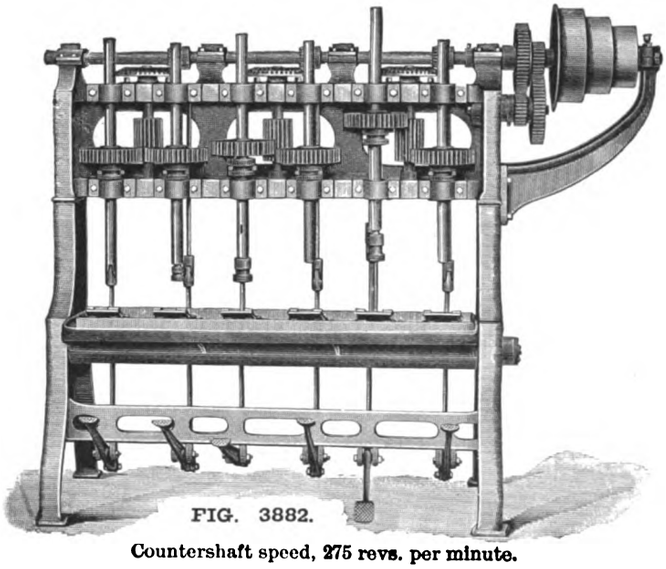


FIG. 3882.

Countershaft speed, 275 revs. per minute.

WEIGHT, COMPLETE, 3,500 LBS.

PRICES.

Machine with countershaft and six (6) sockets.....$600.00
Plain steel tap holders to 1 inch, each.....$3.00. Patent, 5.00
Plain steel tap holders to 1½ inch..... 5.00. Patent, 7.50

NUT AND BOLT FACING MACHINE.

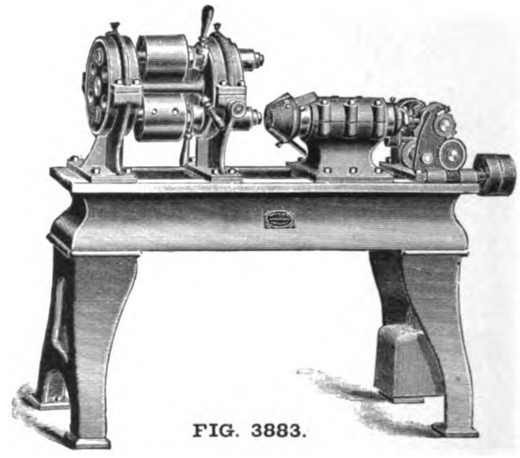


FIG. 3883.

This machine dresses the tops of nuts and bolts, and the bottoms of nuts. Two duplicate spindles are placed in a revolving drum, which is locked in such a position as always to have one spindle above the other. This arrangement permits the upper spindle to remain at rest and allows the work to be removed and replaced, while at the same time the cutters are facing the work on the lower spindle.

The cutters, which are made of bar steel, ground to shape and tempered, are held in an oscillating head, governed by a cam motion and change gears. Three cutters are used. One cutter removes the first thread, the second relieves or rounds the corner, and the third finishes the flat. While each cutter can be shaped to do all these operations, this arrangement is much cheaper in time of grinding and resharpening. It will be seen that in this machine the cost to relieve the thread, chamfer, and face, is no greater than to face alone.

Depending upon the size of the work, the machine should make from 1 to 4 oscillations per minute, each oscillation meaning a face dressed; and as this speed is independent of the motion of the spindle, and drives the operator, it can be relied on safely for estimates of product after deducting a percentage of time for necessary stops, delays, etc.

A pair of chucks serve to hold all sizes of bolts while dressing the top of the heads. To secure accurate and true results in facing nuts, the rock ring principle is utilized on the arbors. This permits very rapid handling of work, and at the same time secures the desired accuracy.

Countershaft has 18 x 6 pulleys and should make 75 revs. per minute.

WEIGHT, 2,900 LBS. PRICE, $650.00.

NUT BROACHING MACHINE.

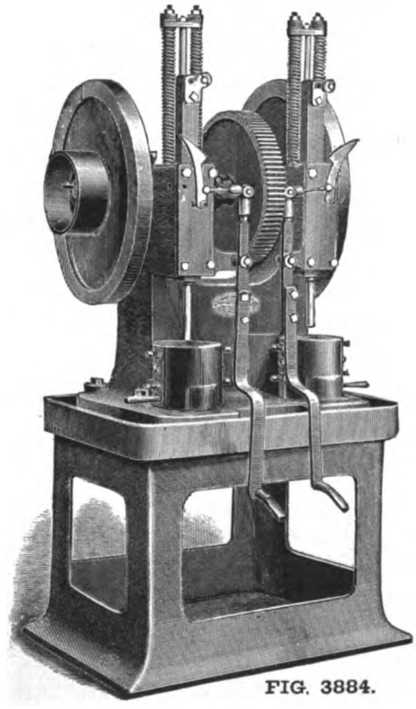
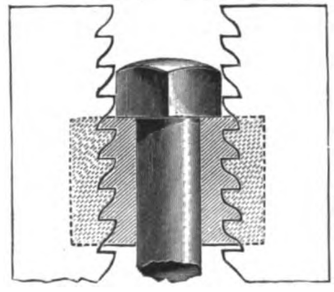


FIG. 3884.

SHOWING CUTTERS.



This machine performs the operation of finishing the sides of nuts and bolt heads. The principle upon which the cutting is done is that of a shaving or drawing cut, and is used in the shape of a straight mill-cutter, on which the teeth are placed at a sharp angle. Two of these cutters are used, and so set as to approach nearer each other at the bottom than at the top.

The nut or bolt is forced down between these mills, and is guided centrally by a guide which also governs the angle for square or hexagonal.

The cutters are held in position in a work block and adjusted by set screws in and out for the various sizes, and to centralize. The work block is arranged to swing out from under the plunger, to facilitate the entering of work. Above this work block is arranged a plunger, made to descend by throwing in a clutch, which, at the bottom of the stroke, is unfastened, allowing the plunger to return to its highest position actuated by weight or springs.

As this machine finishes two sides of a nut or bolt head at one pass, it is necessary for a hexagonal nut to make three passes for each head. Pulleys 14 x 5 inches, and should make 150 revs. per minute.

WEIGHT, 5,000 LBS. PRICE, $850.00.

NO. 1 WASHER MACHINE.

This machine makes washers up to 2½ inch outside diameter, No. 10 wire gauge. One complete at every revolution.

Weight, 4,000 lbs.; speed, 100 to 200 revs. per minute; fly wheel, 38 x 8 inches, and we have shaft for balance wheel if wanted.

Price for iron, with one size of dies.....$375.00
Price for steel, with one size of dies..... 400.00

Extra dies, $15.00 per set.

NO. 2 WASHER MACHINE.

Similar to No. 1, but geared.

This machine makes up to 4½ inches outside diameter; hole 2⅜, ⅜ thick. We have also a heavier bed for cutting steel.

Speed, 60 to 75 revolutions per minute; weighs over 6,000 lbs.; heavy style, 8,000 lbs.

Price, with one size of dies.....$800.00

Extra dies, $20.00 per set.

NO. 1 AND 2 WASHER MACHINE.

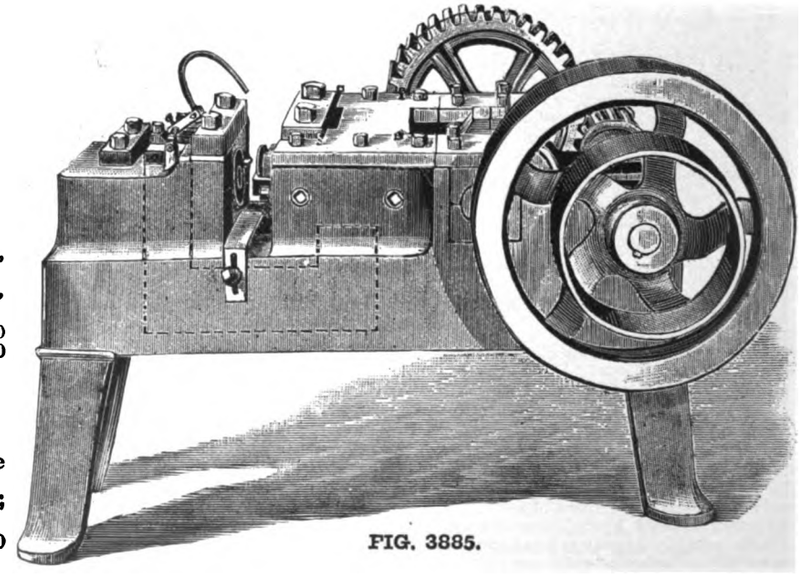


FIG. 3885.

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HUBS, TAPS AND DIES.

MACHINE OR NUT TAPS.

V, U. S. or Whitworth shape of thread.
Long shank. Patent relieved.
Unless advised to the contrary, we fill orders with V threads.



FIG. 3886.

Size.	Whole length.	Length thread.	No. V threads to inch.	PRICE.
1/4	4 1/2	1 7/8	16, 18, 20	$0.60
5/16	5 1/8	2	16, 18	.70
3/8	5 3/4	2 1/16	14, 16	.80
7/16	6 3/8	2 1/2	12, 14, 16	.90
1/2	7	2 11/16	12, 13, 14	1.00
9/16	7 5/8	2 7/8	12, 14	1.15
5/8	8 1/8	3 1/8	10, 11, 12	1.30
11/16	8 7/8	3 7/16	11, 12	1.45
3/4	9 1/2	3 3/4	10	1.60
13/16	10 1/8	3 15/16	10	1.80
7/8	11 1/16	4 1/8	9, 10	2.10
15/16	11 11/16	4 7/16	9	2.40
1	12	4 3/4	8	2.80
1 1/8	12 5/8	5	7, 8	3.20
1 1/4	13 1/4	5 1/8	7, 8	3.70
1 3/8	13 7/8	5 3/4	6	4.20
1 1/2	14 1/2	6	6	4.70
1 5/8	15 1/8	6 1/8	5, 5 1/2	5.30
1 3/4	15 3/4	6 1/2	5	6.00
1 7/8	16 3/8	6 3/4	4 1/2, 5	6.80
2	17	7	4 1/2	7.70
2 1/8	17	8	4 1/2	9.00
2 1/4	18	8 1/2	4 1/2	10.20
2 3/8				11.50
2 1/2	19	9	4	12.50
2 5/8				
2 3/4	19 1/2	9 1/2	4	15.00
2 7/8				
3	21	10	3 1/2	18.00
3 1/8				
3 1/4	21	10 1/2	3 1/2	21.50
3 3/8				
3 1/2	21	11	3 1/4	25.50
3 5/8				
3 3/4	21	11 1/2	3	29.50
3 7/8				
4	21	12	3	33.50

We keep in stock of the V thread the above 1/8 over size for rough iron.

In ordering always state exact diameter and thread wanted.

When exact duplicates are wanted, special orders should always be accompanied by a stub with nut fitting same.

The above cut represents tap we recommend for use in cold pressed nuts. For hot pressed nuts we often make end of tap with a reamer for cleaning out the scale.

MACHINE OR SOLID BOLT DIES.



FIG. 3888.

Diameter.	No. threads to in.	Size of square.	PRICE, EACH.
1/4	20	2 1/2	$1.80
5/16	18	2 1/2	1.80
3/8	16	2 1/2 } 1/2 inch thick.	1.80
7/16	14	2 1/2	1.80
1/2	12	2 1/2	1.80
5/8	11	2 1/2 } 3/4 inch thick.	2.00
3/4	10	2 1/2	2.20
7/8	9	2 1/2	2.40
1	8	2 1/2	2.70
1 1/8	7	2 1/2	3.00
1 1/4	7	2 1/2 } 1 inch thick.	3.30
1 3/8	6	2 1/2	3.60
1 1/2	6	3	3.90
1 5/8	5 1/2	3	4.20
1 3/4	5	3 by 1 1/4 thick.	5.40
1 7/8	5	3 1/2 by 1 1/2 "	6.50
2	4 1/2	3 1/2 by 2 "	7.50

The above are kept in stock—by sixteenths and thirty-seconds to 1 inch; by eighths and thirty-seconds from 1 inch to 1 1/2 inch.

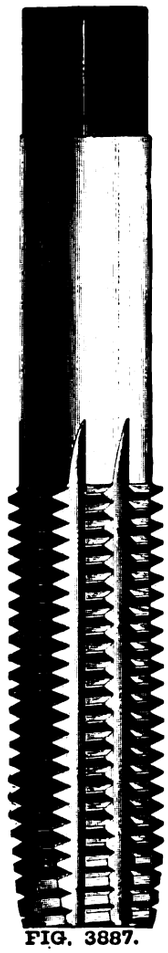


FIG. 3887.

SHORT PLUG HUB TAP.

Diameter.	No. threads to inch.	PRICE.
1/4	16, 18, 20	$0.60
5/16	16, 18	.70
3/8	14, 16	.80
7/16	12, 14, 16	.90
1/2	12, 13, 14	1.00
9/16	12, 14	1.15
5/8	10, 11, 12	1.30
11/16	11, 12	1.45
3/4	10	1.60
13/16	10	1.80
7/8	9, 10	2.10
15/16	9	2.40
1	8	2.80
1 1/8	7, 8	3.20
1 1/4	7, 8	3.70
1 3/8	6	4.20
1 1/2	6	4.70
1 5/8	5, 5 1/2	5.30
1 3/4	5	6.00
1 7/8	4 1/2, 5	6.80
2	4 1/2	7.70

HUB OR MASTER TAPS.

Diameter.	No. threads to inch.	PRICE, EACH.
1/4	16, 18, 20	$0.75
5/16	16, 18	.87
3/8	14, 16	1.00
7/16	12, 14, 16	1.12
1/2	12, 13, 14	1.25
9/16	12, 14	1.44
5/8	10, 11, 12	1.62
11/16	11, 12	1.81
3/4	10	2.00
13/16	10	2.25
7/8	9, 10	2.62
15/16	9	3.00
1	8	3.50
1 1/8	7, 8	4.00
1 1/4	7, 8	4.62
1 3/8	6	5.25
1 1/2	6	5.87
1 5/8	5, 5 1/2	6.62
1 3/4	5	7.50
1 7/8	4 1/2, 5	8.50
2	4 1/2	9.62

We also make hub taps for the various bolt cutters in the market, and need a drawing with order to show exact diameter and length of thread needed; these hubs are usually made like a bottoming tap with parallel or straight thread part—that is, without the taper, as shown in cut.

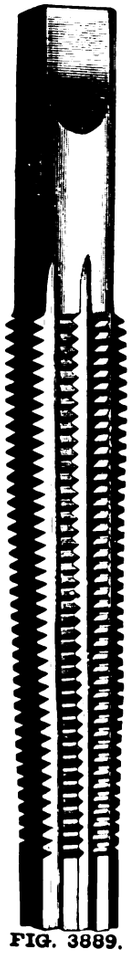


FIG. 3889.

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PIPE THREADING MACHINE.

NO. 9 MACHINE.

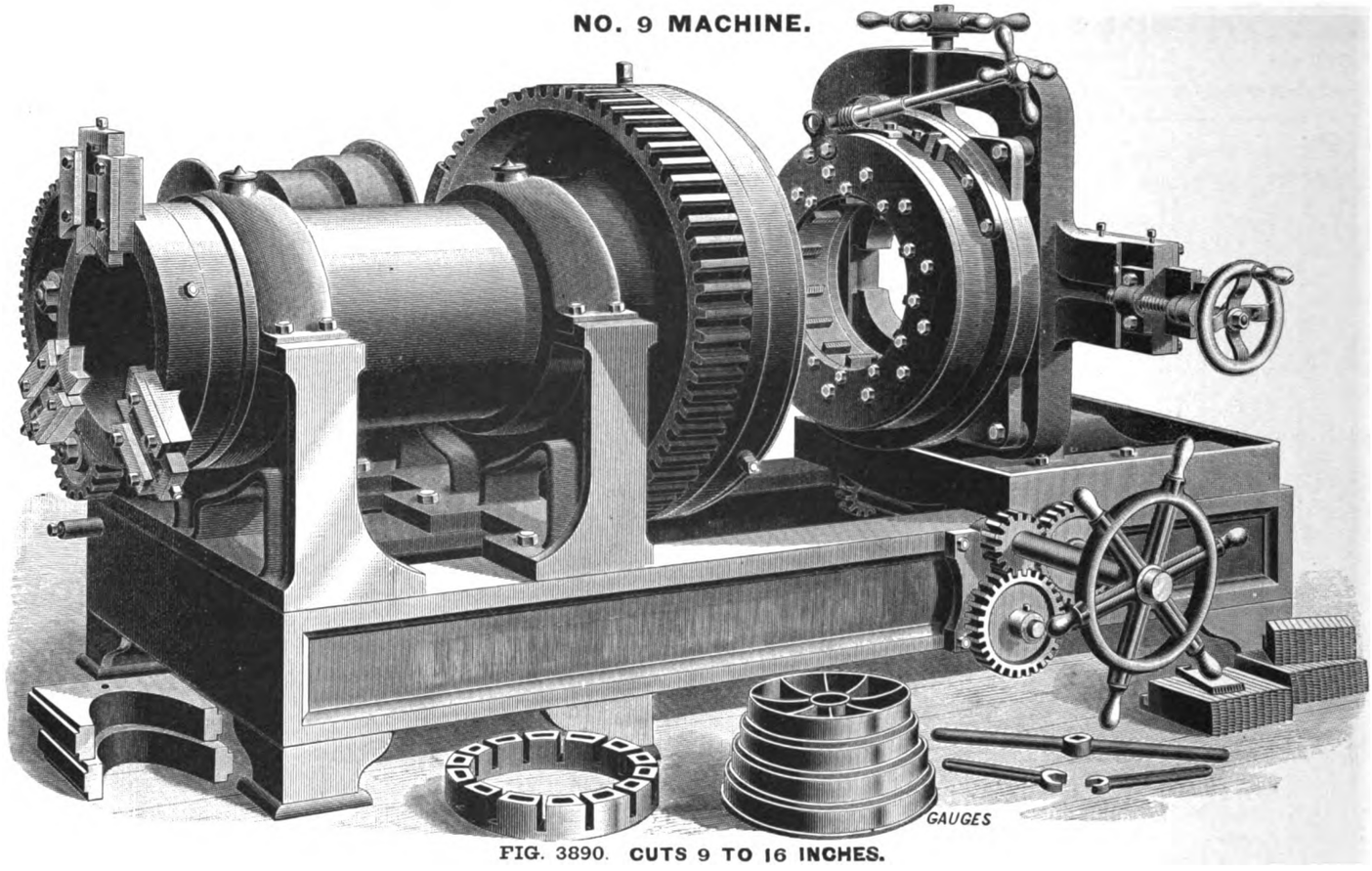


FIG. 3890. CUTS 9 TO 16 INCHES.

NO. 8 AND 7 MACHINES.

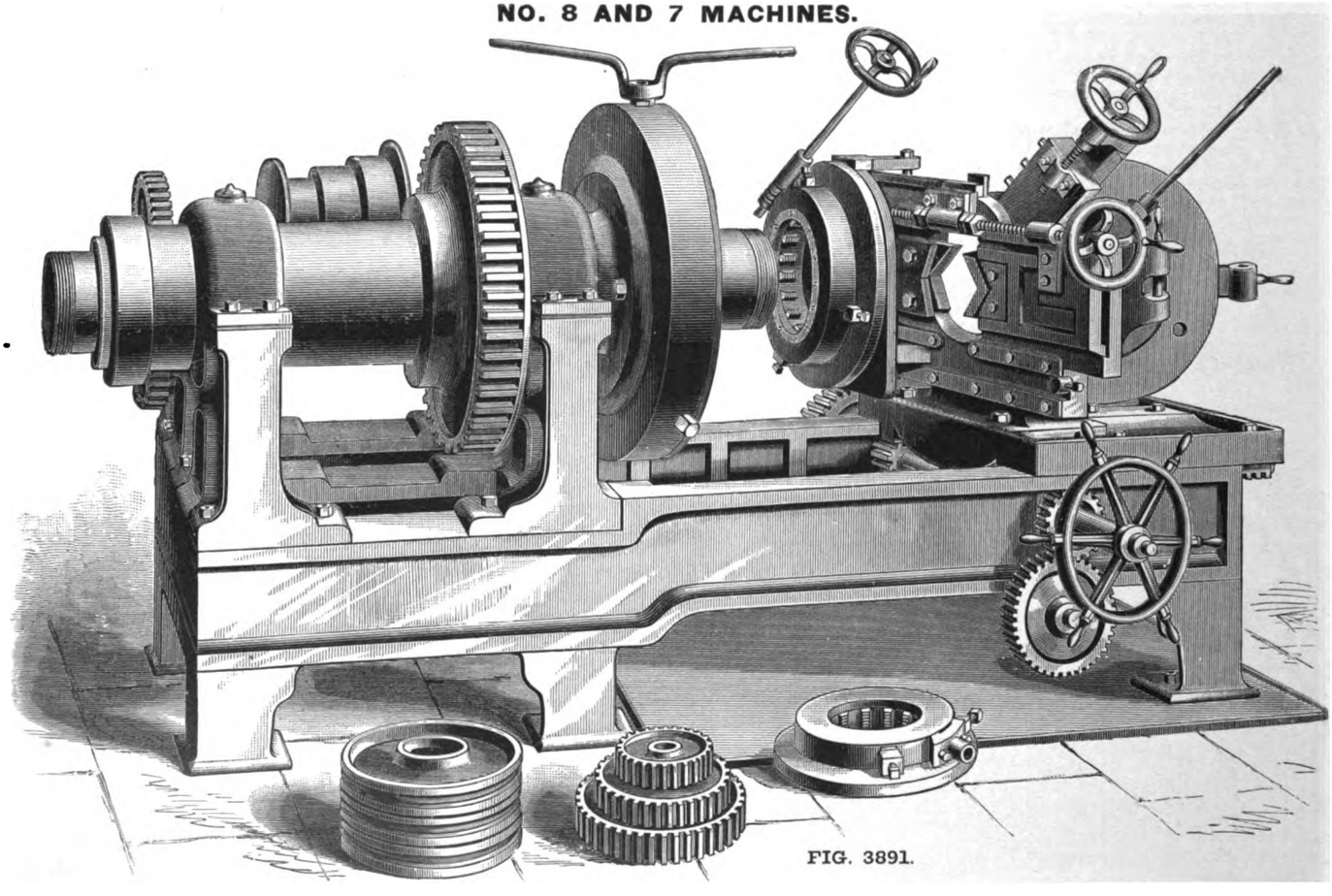


FIG. 3891.

No. 8 cuts 4 to 12 inches. No. 7 cuts 2½ to 10 inches.

FOR EXTRA DIES, SEE PAGES 322 AND 323.

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DESCRIPTION, FIG. 3890. NO. 9.

For cutting and threading wrought iron pipe 9 to 16 inches diameter. The machine is provided with adjustable expanding die with interchangeable chasers. Short pieces can be cut as the die comes close to the gripping chuck.

To thread the different sizes of pipe there are a number of sets of chasers all fitting into the same die head; a set of chasers can be withdrawn and another set inserted in a few minutes, and adjustment to size is readily effected by using the blank standard gauges to set the chasers by to the size to be threaded. The chasers in the die head open or expand to allow the pipe to pass through into the cutting head, and rest on the lower half-circular jaw in cutting head, preventing the pipe from touching the chasers while passing through the die head. The cutting-off tool is convenient, and operated by the hand wheel. With the three jawed independent gripping chuck for holding the pipe, the pipe can always be brought to the center. The cone pulley has three speeds for a six inch belt.

Weight, 14,000 lbs. Speed of countershaft, 175 revolutions per minute; pulleys, 20 inches diameter—one fast, 6½ inch face, two loose, 12½ inch face each.

PRICES.

Threads and cuts off pipe 9 to 16 inches, with patent adjustable expanding die with interchangeable chasers, to thread 9, 10, 11, 12, 13, 14, 15, 16 inches, set of standard blank gauges to set chasers to, countershaft, oil can and wrenches	$2,400.00
Extra chasers, per set of 12	55.00
Extra cutting-off tool	1.50

PRICES, FIG. 3891. NOS. 8 AND 7.

No. 8 threads and cuts off pipe 4 to 12 inches, with standard patent adjustable expanding dies, 4, 5, 6, 7, 8, 9, 10 and 12 inches, and countershaft complete	$2,300.00
No. 8, with adjustable expanding dies with interchangeable chasers, two die heads, one threading 4 to 8 inches, the other 9, 10, 11, 12 inches. Countershaft, oil can and wrenches and set of blank standard gauges to set chasers to	2,000.00
No. 7 threads and cuts off pipe 2½ to 10 inches, with standard patent adjustable expanding dies, 2½, 3, 3½, 4, 5, 6, 7, 8, 9 and 10 inches, and countershaft complete	1,950.00
No. 7, with adjustable expanding dies with interchangeable chasers, two die heads, one threading 2½ to 8 inches, the other 9 and 10 inches. Countershaft, oil can and wrenches and set of blank standard gauges to set chasers to	1,700.00

Speed of countershaft for Nos. 7 and 8, 172 revolutions per minute; pulleys, 18 inches diameter—two loose, each 8½ inch face, one fast, 4½ inch face. No. 7, weight, 10,000 lbs. No. 8, weight, 12,000 lbs.

NOS. 6 AND 5 PIPE THREADING MACHINES.

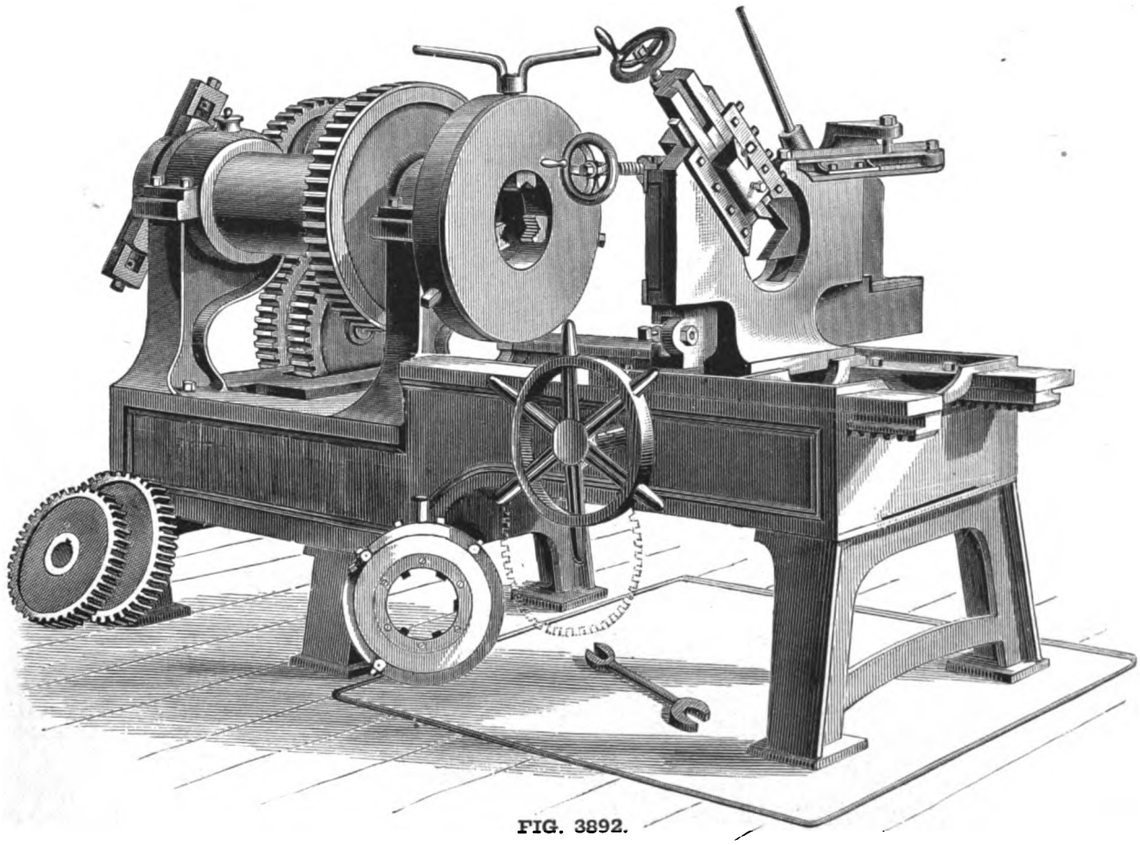


FIG. 3892.

NO. 6 CUTS 2 1-2 TO 8 INCHES. NO. 5 CUTS 1 1-4 TO 6 INCHES. **FOR PRICES, SEE PAGE 318.**

The belting and gearing of the machines have been arranged with the view of obtaining suitable power and speed for the various sizes of pipe, so proportioned as to give a nearly uniform surface speed for each of the different sizes of pipe.

The power of the machine is in the arrangement of the gearing, avoiding the necessity of using large pulleys and tight belts.

The die and head to which it is attached are so constructed that pipe may be alternately threaded and cut off without removing the die from the machine by sliding it back, as shown in cut. The cutting-off tool is convenient, and out of the way. The steel jaws for steadying the pipe while cutting it off are moved by a right and left screw, thereby centering the pipe truly. The jaws are adjustable so as to compensate for wear.

The chuck for holding the pipe is strong and well fitted, and provided with independent jaws, permitting of the adjustment of the pipe to the center. When desired, a universal gripping chuck is fitted to the machine in place of the independent.

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PRICES, FIG. 3892. NOS. 6 AND 5 MACHINES.

NOS. 6 AND 5.

With standard adjustable expanding dies which open so the die can be taken off the pipe without stopping or reversing spindle of machine. A complete die head with set of chasers for each size.

PRICES.

No. 6 threads and cuts off pipe 2½ to 8 inches, with the standard patent adjustable expanding dies, 2½, 3, 3½, 4, 5, 6, 7, 8 inches, right hand $1,275.00

No. 5, with the standard patent adjustable expanding dies, 1¼, 1½, 2, 2½, 3, 3½, 4, 5, 6 inches, right hand 1,100.00

No. 5, with the standard patent adjustable expanding dies, 2½, 3, 3½, 4, 5, 6 inches, right hand 1,025.00

NOS. 6 AND 5.

With our new adjustable expanding die with interchangeable chasers, that is, one die head with a number of sets of chasers all fitting into the die head to thread a number of sizes.

PRICES.

No. 6 machine threads and cuts off pipe 2½ to 8 inches, with patent adjustable expanding die with interchangeable chasers, to thread 2½, 3, 3½, 4, 4½, 5, 6, 7 and 8 inches. Set of standard blank gauges to set chasers to, countershaft, oil can and wrenches $1,075.00

No. 5 machine threads and cuts off pipe 1¼ to 6 inches, with patent adjustable expanding dies with interchangeable chasers, with two die heads, one to thread 1¼, 1½ and 2 inches, the other 2½, 3, 3½, 4, 4½, 5 and 6 inches. Set of standard blank gauges to set chasers to, countershaft, oil can, wrenches, and solid die attachment 975.00

No. 5 machine, with one die head to thread 2½, 3, 3½, 4, 4½, 5 and 6 inches. Set of standard blank gauges to set chasers to, countershaft, oil can, wrenches, and solid die attachment 925.00

NOS. 6 AND 5.

With solid and adjustable cutter dies.

PRICES.

No. 6 threads and cuts off pipe 2½ to 8 inches, with countershaft, complete; cutter dies, 2½, 3, 3½, 4, 5, 6, 7, 8 inches, right hand $1,050.00

No. 6, 172 revolutions per minute; pulleys, 16 inches diameter—one fast, 4½ inch face, two loose, 8½ inch face each. Pulley on line shaft, 22 inch face and diameter to drive countershaft at required speed.

No. 5 threads and cuts off pipe 1¼ to 6 inches, with countershaft, complete; solid dies, 1¼ to 2 inches; cutter dies, 2½, 3, 3½, 4, 5, 6 inches, right hand 875.00

No. 5, weight, complete, 4,800 lbs. No. 6, 5,600 lbs.

No. 5, 180 revolutions per minute; pulleys, 16 inches diameter—one fast, 4½ inch face, two loose, 8½ inch face each.

For description of the different styles of dies, see page 323.

NO. 4 PIPE THREADING MACHINE.

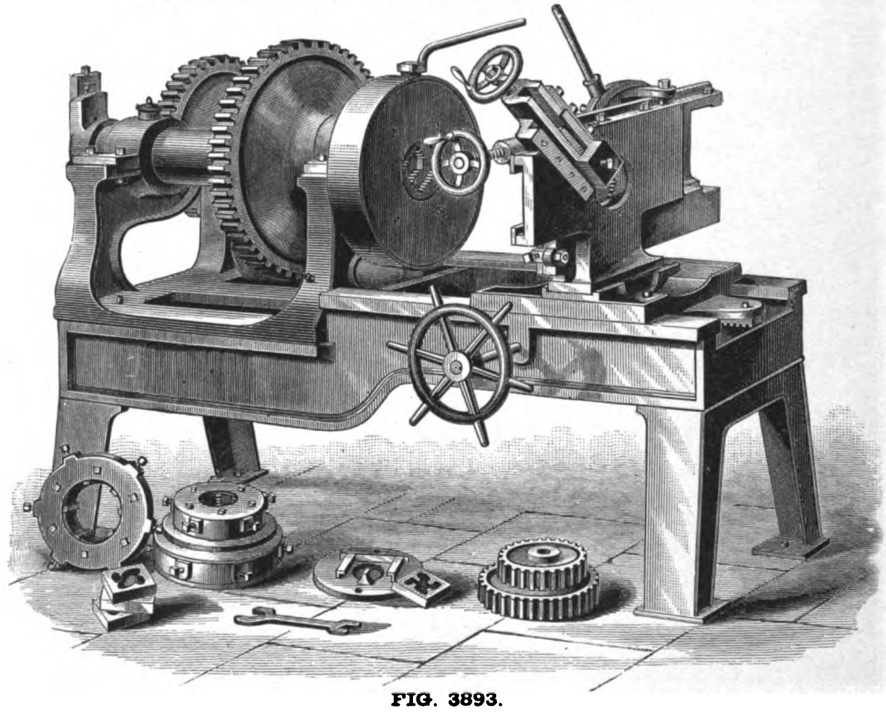


FIG. 3893.

CUTS 1 TO 4 INCHES. FOR PRICES, SEE PAGE 319. GENERAL DESCRIPTION, FIGS. 3893 AND 3894.

The die and head to which it is attached are so constructed that pipe may be alternately threaded and cut off without removing the die from the machine. The die, being on front of cutting head, can be brought close to the gripping chuck; short pieces of pipe can be threaded. This advantage often saves the use of a nipple socket. The die plate is moved upon slides provided for that purpose. The cutting-off tool is convenient, and is operated by the upper hand wheel. Two steel jaws are used for steadying the pipe while cutting it off; they are moved by a right and left hand screw, operated by a hand wheel, thereby centering the pipe. The jaws are also adjustable, to compensate for wear. The universal gripping chuck for holding the pipe is strong and well fitted, and the whole arrangement of this part will be found convenient and well adapted to the purpose. We have exercised great care in making the patterns for the gearing, which are cast from iron patterns cut in the most approved shape of teeth, and we have thereby succeeded in making the machine run almost noiselessly.

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NO. 3 PIPE THREADING MACHINE.

PRICES, FIGS. 3893 AND 3894.

NOS. 3 AND 4.

With standard adjustable expanding dies which open so the die can be taken off the pipe without stopping or reversing the spindle of machine. A complete die head with set of chasers for each size.

SIZES AND PRICES.

No. 3, with the standard patent adjustable expanding dies, right hand, ½, ¾, 1, 1¼, 1½, 2, 2½ and 3 inches, solid dies ¼ and ⅜, countershaft and bushings, complete.....$600.00

No. 4, with the standard patent adjustable expanding dies, right hand, 1, 1¼, 1½, 2, 2½, 3, 3½ and 4 inches, countershaft, complete..... 700.00

NOS. 3 AND 4.

With our new adjustable expanding die with interchangeable chasers, that is one die head with a number of sets of chasers all fitting into the die head to threading a number of sizes.

SIZES AND PRICES.

No. 3 machine threads and cuts off pipe ¼ to 3 inches, with patent adjustable expanding dies with interchangeable chasers, two die heads (one threading ¼ to 2 inches, the other 2½ and 3 inches), all right hand. Set of standard blank gauges to set chasers to, countershaft, oil can, wrenches, and solid die attachment.....$500.00

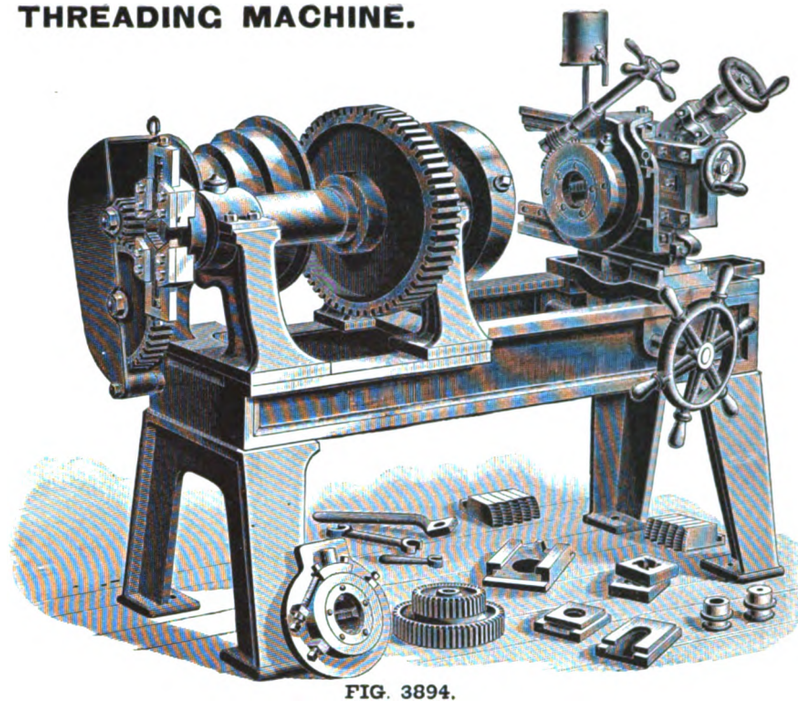


FIG. 3894.

CUTS 1-4 TO 3 INCHES.

No. 4 machine threads and cuts off pipe 1 to 4 inches, with patent adjustable expanding dies with interchangeable chasers, two die heads (one threading 1 to 2 inches, the other 2½, 3, 3½ and 4 inches), all right hand. Set of standard blank gauges to set chasers to, countershaft, oil can, wrenches, and solid die attachment.....$575.00

NOS. 3 AND 4.

With solid and adjustable cutter dies.

PRICES.

No. 3 threads and cuts off pipe ¼ to 3 inches, with cutter, dies right hand, 2½ and 3 inches, solid dies, ¼ to 2 inches, countershaft and bushings, complete.....$400.00

No. 4 threads and cuts off pipe 1 to 4 inches, with cutter, dies right hand, 2½, 3, 3½ and 4 inches, solid dies, 1 to 2 inches, countershaft, complete..... 490.00

SPEEDS OF COUNTERSHAFTS.

No. 3. 200 revolutions per minute; pulleys, 14 inches diameter—two loose, 8½ inches face each, one fast, 4½ inches face.

No. 4. 210 revolutions per minute; pulleys, 14 inches diameter—two loose, 8½ inches face each, one fast, 4½ inches face.

NO. 3, WEIGHT, 2,400 LBS. **NO. 4, WEIGHT, 3,200 LBS.**

When these machines are made to work by hand as well as power, extra cost, $40.00.

NO. 2 IMPROVED PIPE MACHINE.

Fig. 3895 represents No. 2 improved machine, which threads and cuts off pipe ⅛ to 2 inches, inclusive, with patent quick opening gripping chuck for holding the pipe, worked by lever while revolving; no stopping of the chuck to get the pipe out or in; also standard adjustable expanding dies, that is a complete die head and set of chasers for each size.

The die and head to which it is attached are so constructed that pipe may be alternately threaded and cut off without removing the die from the machine.

The advantages of these dies are: They are more easily adjusted and can be opened instantly by the lever, when the requisite thread has been cut, without stopping or reversing the machine, thereby saving time, with no possibility of stripping the thread, as is frequently the case with solid dies; they also keep the size accurately

PRICES.

No. 2 threads and cuts off pipe ⅛ to 2 inches, with countershaft, patent gripping chuck, also the standard patent adjustable expanding dies, right hand, ½, ¾, 1, 1¼, 1½, 2 inches; solid dies, ⅛, ¼, ⅜, and countershaft, complete, and solid die attachment....$550.00

No. 2, with standard patent adjustable expanding dies, 1, 1¼, 1½ and 2, and the patent combination adjustable expanding die in halves, ⅛, ¼, ⅜, ½, ¾, all right hand, and solid die attachment..... 575.00

Speed of countershaft, 200 revolutions per minute; pulleys, 11 inches diameter—two loose, each 7 inch face, one fast, 3½ inch face.

WEIGHT, 1,800 LBS.

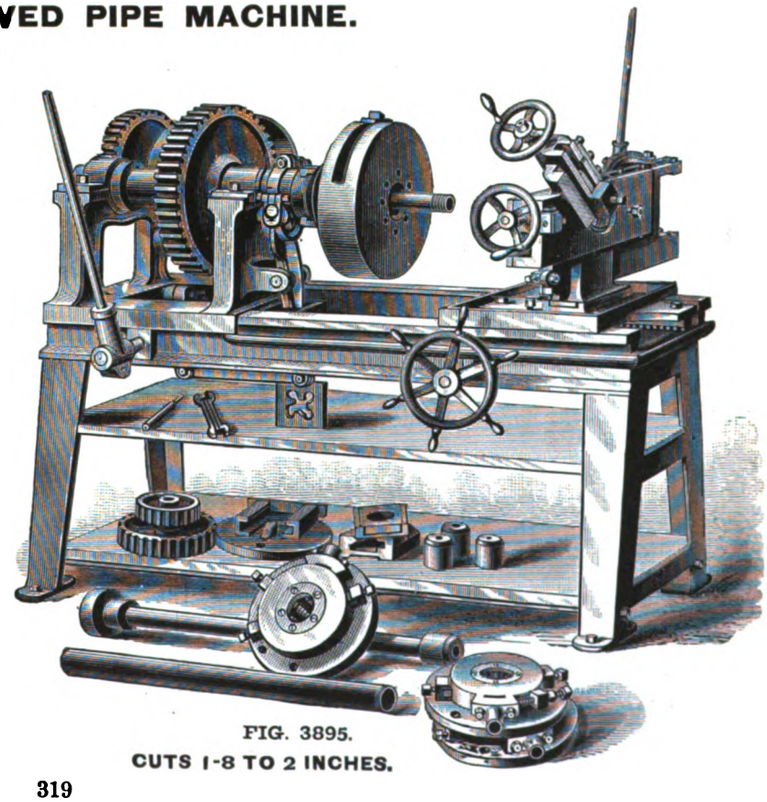


FIG. 3895.

CUTS 1-8 TO 2 INCHES.

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NO. 2 HEAVY PIPE MACHINE.

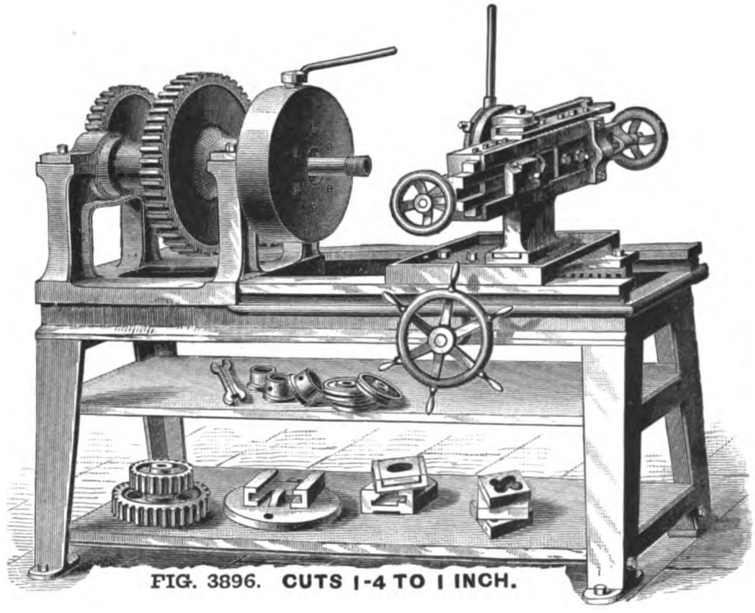


FIG. 3896. CUTS 1-4 TO 1 INCH.

WITH UNIVERSAL GRIPPING CHUCK, SOLID OR EXPANDING DIES FOR THREADING AND CUTTING OFF STEAM AND GAS PIPE.

PRICE

No. 2 threads and cuts off pipe ¼ to 2 in., with right hand solid dies, countershaft and bushings, complete.....$275.00

No 2 threads and cuts off pipe ¼ to 2 in., right hand, with adjustable expanding dies with interchangeable chasers, set of standard blank gauges to set chasers to, countershaft, bushings, oil can, wrenches and solid die attachments, $350.00

Speed of countershaft, 200 revs. per minute; pulleys, 11 in. diameter—two loose, each 7 in. face, one fast, 3½ in. face.

WEIGHT, 1,200 LBS.

NO. 1 PIPE MACHINE WITH ADJUSTABLE EXPANDING DIE HEAD AND CHASERS.

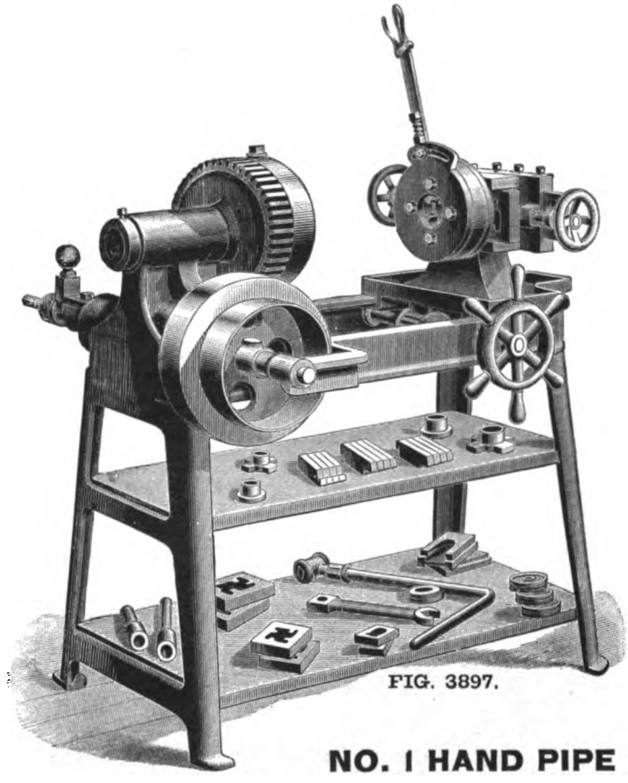


FIG. 3897.

The No. 1 power machine is arranged with the adjustable expanding die with interchangeable chasers, threading ¼ to 2 in. The cutting head is so constructed that either the expanding die or solid dies can be used. The universal gripping chuck is of substantial construction. The carriage is moved by rack and pinion, worked by hand wheel. The cone pulley and shaft are supported by a bracket on side of the ways.

When desired, a bolt threading and nut tapping attachment is fitted to it at extra cost. The machine is of substantial construction for the work it is intended for.

HAND MACHINE.

PRICE.

With adjustable expanding die head with interchangeable chasers, to thread ¼, ⅜, ½, ¾, 1, 1¼, 1½ and 2 inches, right hand, crank wheel, set of sockets for making nipples ¼ to 2 in., and attachment for solid dies.....$170.00

POWER AND HAND MACHINE.

PRICES.

With adjustable expanding die head with interchangeable chasers, to thread ¼, ⅜, ½, ¾, 1, 1¼, 1½ and 2 in., right hand, crank, set of sockets for making nipples ¼ to 2 in., countershaft complete, and attachment for solid dies.....$205.00

Extra chasers, right or left hand, per set of 4..... 6.00

Extra tool or cutter, each..... .50

Solid dies, right or left hand, extra.....

Speed of countershaft, 150 revs. per minute; pulleys, 11 in. diameter—two loose, each 7 in. face, one fast, 3½ in. face.

WEIGHT OF HAND MACHINE, 600 LBS.

WEIGHT OF POWER AND HAND MACHINE, 750 LBS.

NO. 1 HAND PIPE CUTTER WITH SOLID DIES.

HAND MACHINE.

PRICE.

Cutting and threading pipe from ¼ in. to 2 in. in diameter, with universal chuck, fly wheel and solid dies, right hand, also a set of sockets for making nipples ¼ to 2 in., complete.....$120.00

POWER AND HAND MACHINE.

PRICE.

Cutting and threading pipe from ¼ in. to 2 in. in diameter, with universal chuck, cone pulleys, countershaft and solid dies, right hand, also a set of sockets for making nipples ¼ to 2 in., complete.....$155.00

Speed of countershaft, 150 revs. per minute; diameter of pulleys, 11 in.—two loose, each 7 in. face, one fast, 3½ in. face.

WEIGHT OF HAND MACHINE, 550 LBS.

WEIGHT OF POWER MACHINE, 700 LBS.

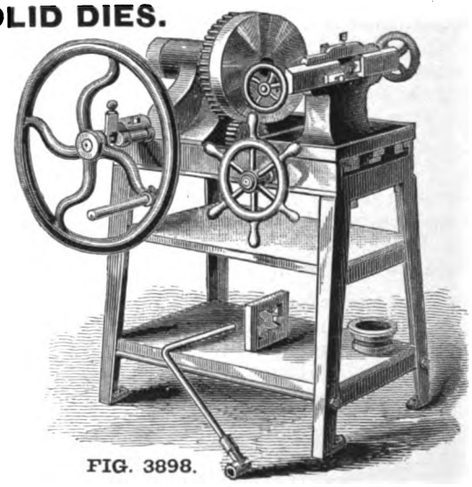


FIG. 3898.

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IXL POWER AND HAND PIPE MACHINE.

The fast speed cuts ¼, ⅜ and ½; the next ¾, 1 and 1¼ inches; and the slowest, 1½ and 2 in. The changes are made by the movement of the lever in front of the machine, sliding the compound gear on the spindle, from one train to another.

HAND MACHINE.

PRICES.

With set of right hand solid dies ¼ to 2 in. inclusive, fly wheel, and set of sockets for making nipples ¼ to 2 in., complete.....$90.00

WEIGHT, 475 LBS.

POWER AND HAND MACHINE.

The power machine is the same as the hand, excepting that it is provided with a pulley on driving shaft in place of crank wheel.

PRICES.

With set of right hand solid dies ¼ to 2 in. inclusive, crank wheel, pulleys, countershaft, and set of sockets for making nipples ¼ to 2 in., complete.....$110.00

Speed of countershaft, 150 revs. per minute; pulleys, 11 in. in diameter—two loose, each 7 in. face, one fast, 3½ in. face.

WEIGHT, 675 LBS.

Attachments fitted to these machines, when ordered, for threading bolts and tapping nuts 1¼ in. and smaller sizes, at an additional cost.

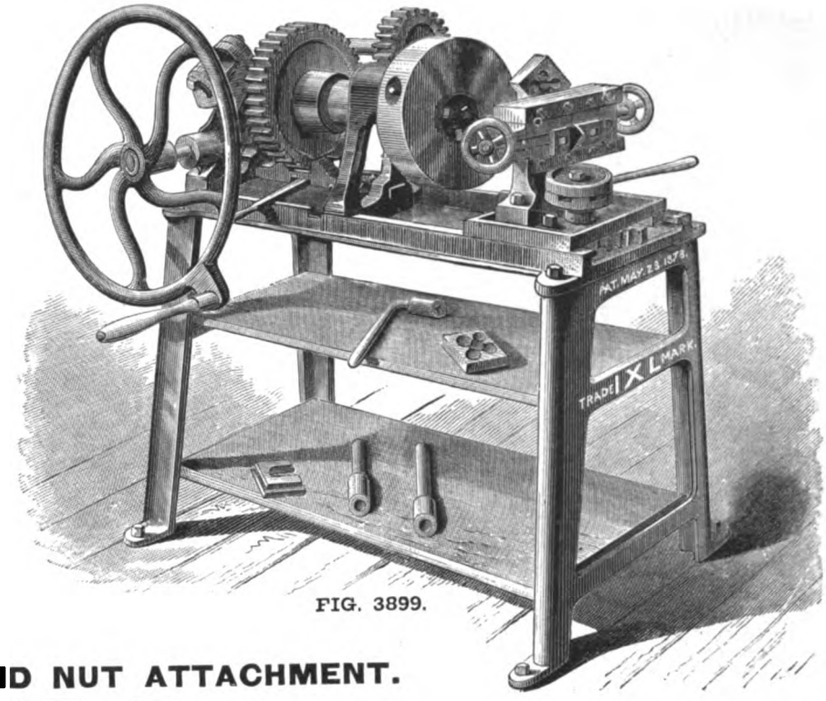


FIG. 3899.

BOLT AND NUT ATTACHMENT.

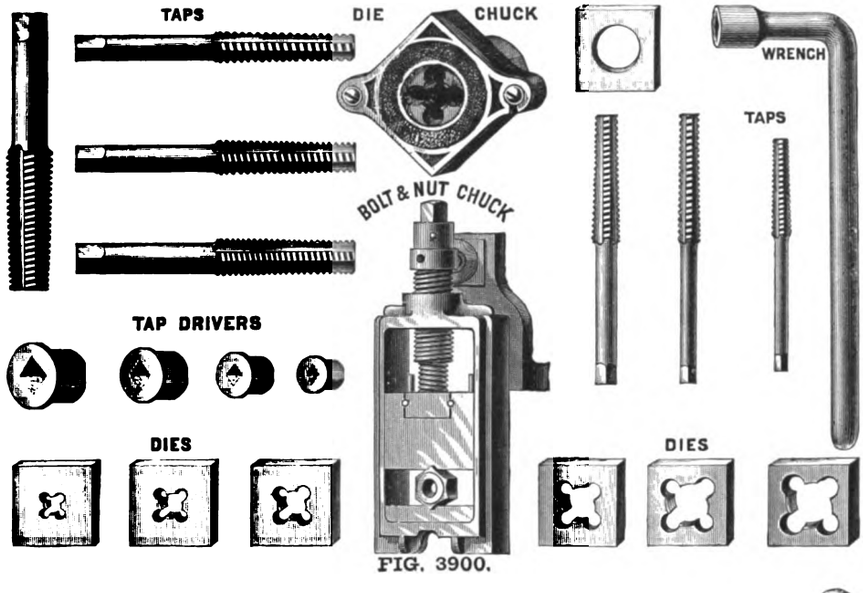


FIG. 3900.

PRICES, FIG. 3900.

No. 1 attachment, with nut taps and solid bolt dies, right hand, ½, ⅝, ¾, ⅞, 1, 1⅛ and 1¼.....$76.00

No. 2 attachment fits Nos. 3, 4, 5 and 6 machines, with nut taps and solid bolt dies, right hand, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 1¾, 1⅞ and 2 in.....$175.00

Other sizes, taps and dies, at extra cost. Unless advised to the contrary, we fill orders with "V" threads, 1/32 over size for rough iron.

IXL SPECIAL, HAND AND POWER.

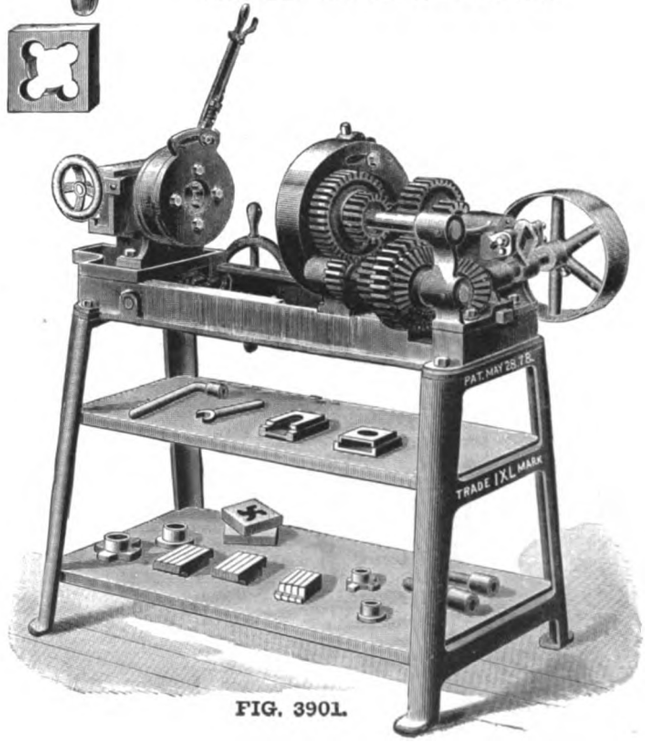


FIG. 3901.

PRICES, FIG. 3901.

HAND MACHINE.

PRICES.

With adjustable expanding die head, with interchangeable chasers to thread ¼, ⅜, ½, ¾, 1, 1¼, 1½ and 2 in., right hand, crank wheel, set of nipple sockets ¼ to 2 in., and attachment for solid dies.....$165.00

WEIGHT, 500 LBS.

POWER AND HAND MACHINE.

PRICES.

With adjustable expanding die head, with interchangeable chasers to thread ¼, ⅜, ½, ¾, 1. 1¼, 1½ and 2 in. right hand, crank wheel, pulley, countershaft complete, set of nipple sockets ¼ to 2 in., and attachment for solid dies, $190.00

WEIGHT, 700 LBS.

Extra chasers, right and left hand, per set of 4.....$6.00
Extra tool or cutter.....50
Solid dies, right or left hand, extra.....

Speed of countershaft, 150 revs. per minute; pulleys, 11 in. diam.—two loose, each 7 in. face, one tight, 3½ in. face.

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THE UNXLD PIPE MACHINE.

HAND MACHINE, WITH ADJUSTABLE EXPANDING DIES.

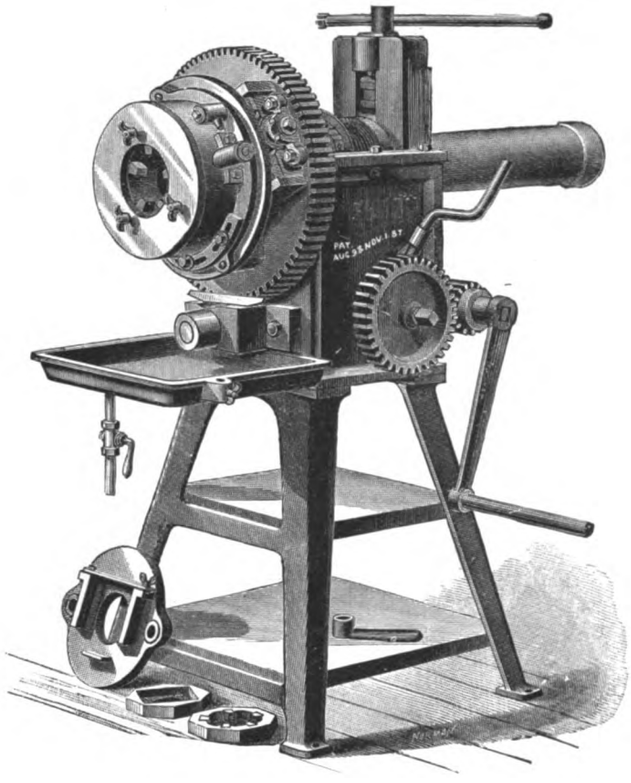


FIG. 3902.

Capacity up to 4 inch pipe. Either solid or adjustable expanding dies may be used. Cutting-off attachment is fastened to large driving gear.

There is provided a universal gripping chuck on back end of the machine for holding pipe, to which is attached a threaded sleeve which engages with a ring having threaded sections in it, these sections being movable by a lever, so as to be engaged with the threaded sleeve or not, as desired. Thus, large pipes are forced into the dies at the proper rate.

POWER MACHINE, BACK VIEW.

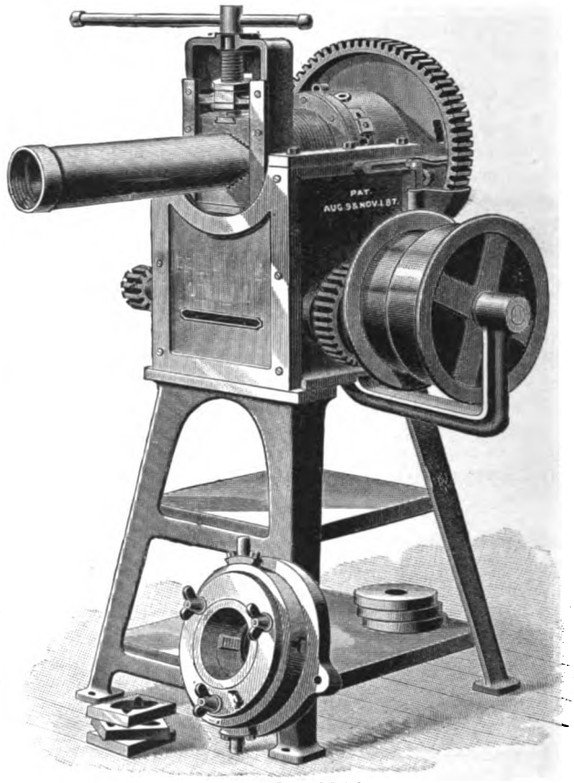


FIG. 3903.

PRICES, FIGS. 3902 AND 3904.

Hand machine on stand, with solid dies, right hand, 1 to 4 inches, cranks, oil can and wrenches; weight, 900 lbs.,	$240.00
Power and hand machine, with solid dies, right hand, 1 to 4 inches, countershaft, cranks, oil can and wrenches; weight, 1,400 lbs.,	325.00
Hand machine, with two adjustable expanding die heads with interchangeable chasers, 1 inch to 4 inches, right hand, cranks, oil can, wrenches and solid die attachment,	315.00
Power and hand machine, with two adjustable expanding die heads with interchangeable chasers, 1 to 4 inches, right hand, countershaft, cranks, oil can, wrenches and solid die attachment,	400.00
Hand machine, without stand, with solid dies, right hand, 1 to 4 inches, cranks, oil can and wrenches; weight, 775 lbs.,	230.00
Hand machine, without stand, with two expanding die heads with interchangeable chasers, 1 to 4 inches, right hand, countershaft, cranks, oil can, wrenches and solid die attachment,	305.00

EXTRAS.

Extra chasers for expanding dies:	
For No. 1 die, per set of 4,	$6.00
For No. 2 die, per set of 5,	12.50
Set socket nipple holders, 1 to 4 inches,	20.00
Pipe rest for long lengths,	8.00
Cutting-off tool,	.75

Speed countershaft, 200 revs.; it has 3 pulleys 14 inch diameter—2 loose, 8½ inch face, 1 fast, 4½ inch face.

BENCH HAND MACHINE.

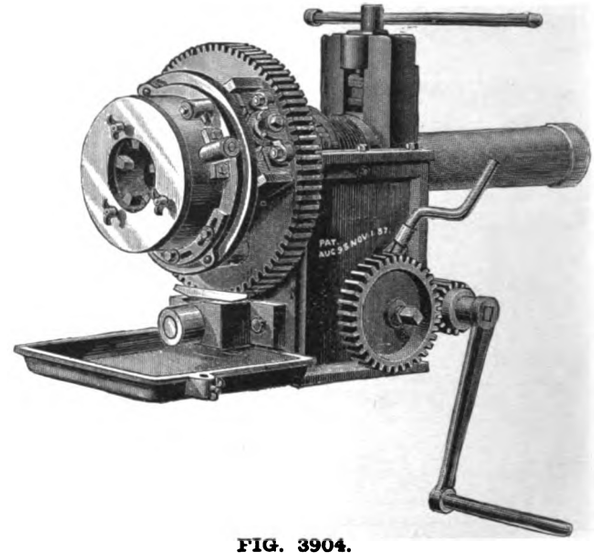


FIG. 3904.

CUTTER DIES.

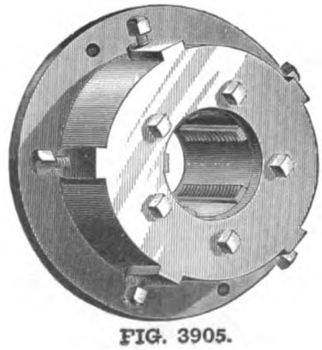


FIG. 3905.

DESCRIPTION, FIG. 3905.

A cutter die is a block, as shown in cut, with slots milled in to receive the cutters, and a cap fitted on to hold the cutters in place, with set screws to adjust them to the size. It works similar to the ordinary solid pipe die.

PRICES.

Size,	2½	3	3½	4	4½	5	6	7	8 inches.
Price,	$17.00	17.00	20.00	20.00	22.00	26.00	30.00	40.00	45.00

PRICES, EXTRA CUTTERS.

Size,	2½	3	3½	4	4½	5	6	7	8 inches.
No. per set,	5	5	5	6	6	6	6	8	8
Price, per set,	$10.00	10.00	10.00	12.50	12.50	12.50	13.00	17.50	17.50

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ADJUSTABLE EXPANDING DIE WITH INTERCHANGEABLE CHASERS.

2 1-2 TO 12 INCH.

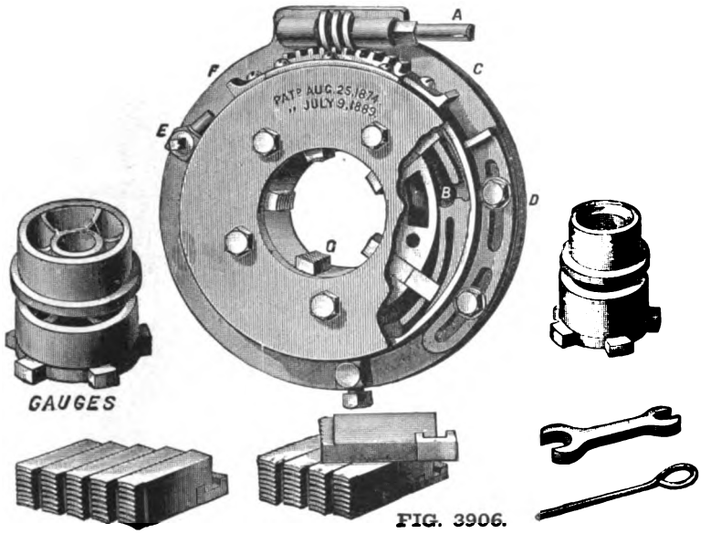


FIG. 3906.

1-4 TO 2 INCH.

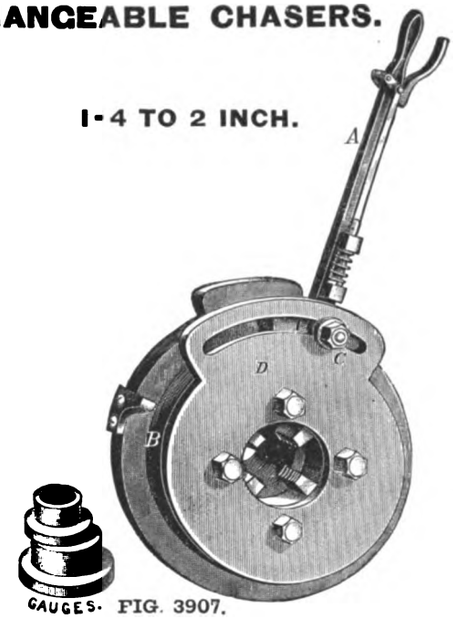


FIG. 3907.

This improvement relates to that class of dies for screw cutting designed so they can be attached to any of the ordinary pipe threading machines in use for threading steam and gas pipe.

The distinguishing features of these dies are the arranging of the die block or head with a number of sets of chasers all fitting into the same, to thread the different sizes of pipe. The head is adjustable and expanding, the thread being cut in once passing over; when the thread is cut to the desired length the cutters or chasers are opened by a movement of the worm and the pipe released without stopping or reversing the motion of the machine. One set of chasers can be withdrawn and another set inserted in a few minutes; and adjustment to size is readily effected.

These dies do not require to be moved from their place while cutting off the pipe, as they expand to allow the pipe to pass through into the guide in the cutting-off head of machine. The chasers can be taken out and sharpened by grinding; when too much worn they can be re-cut and used again, which operation can be repeated several times.

The dies are carefully fitted by milling, planing and turning to steel gauges, thereby enabling us to duplicate the chasers or any other part; also to re-cut old chasers without the die block they fit into.

PRICES.

No. 1 die threads ¼ to 2 inches inclusive, with 4 sets chasers	$55.00
No. 2 die threads 2½ to 4 inches inclusive, with 2 sets chasers	75.00
No. 3 die threads 2½ to 6 inches inclusive, with 4 sets chasers	150.00
No. 4 die threads 2½ to 8 inches inclusive, with 6 sets chasers	200.00
No. 5 die threads 9 to 12 inches inclusive, with 2 sets chasers	225.00

PRICES, EXTRA CHASERS.

For No. 1 die, per set of 4 chasers	$6.00
For No. 2 die, per set of 5 chasers	14.00
For No. 3 die, per set of 6 chasers	20.00
For No. 4 die, per set of 6 chasers	20.00
For No. 5 die, per set of 9 chasers	38.00

STANDARD ADJUSTABLE EXPANDING DIE.

1-4 TO 2 INCHES, WITH LEVER MOVEMENT.

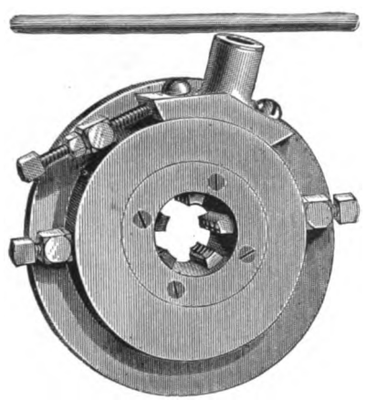


FIG. 3908.

2 1-2 INCHES AND LARCER, WITH WORM MOVEMENT.

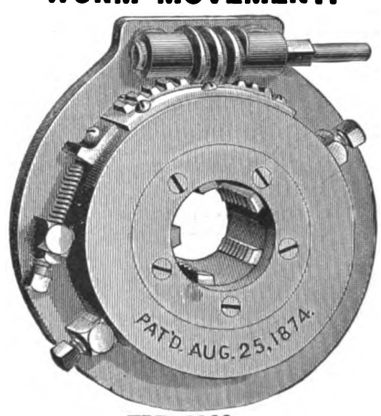


FIG. 3909.

Each die is complete. A separate die block for each size.

PRICES.

Size,	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½ inches.
Price,	$20.00	20.00	20.00	20.00	20.00	22.00	22.00	30.00	35.00	35.00	40.00
Size,	4	4½	5	6	7	8	9	10	11	12 inches.	
Price,	$45.00	50.00	50.00	55.00	65.00	75.00	110.00	120.00	140.00	145.00	

EXTRA CHASERS FOR PATENT DIES.

Size,	¼	⅜	½	¾	1	1¼	1½	2	2½	3 inches.
No. per set,	4	4	4	4	4	4	4	5	5	5
Price,	$5.25	5.25	5.25	5.25	5.25	5.25	5.25	6.00	11.50	11.50
Size,	3½	4	4½	5	6	7	8	9	10	11	12 inches.
No. per set,	5	6	6	6	6	8	8	10	10	12	12
Price,	$11.50	14.00	14.00	14.00	14.00	18.50	18.50	30.00	30.00	35.00	35.00

EXPANDING SCREW CUTTING DIE IN HALVES.

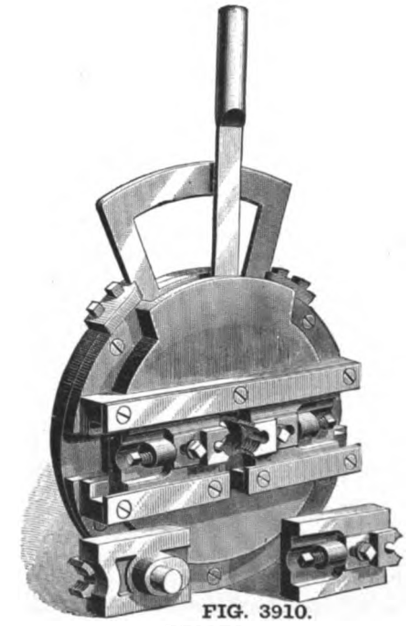


FIG. 3910.

PRICES.

No. 1 die head threads ⅛ to ¾ inch inclusive, right hand, complete	$65.00
Extra chasers or cutters, right or left, per set	2.50
No. 2 die head threads ⅛ to 1 inch inclusive, right hand, complete	82.50
Extra chasers or cutters, ⅛ to ¾ inch, per set	2.50
Extra chasers or cutters, 1 inch, per set	3.25

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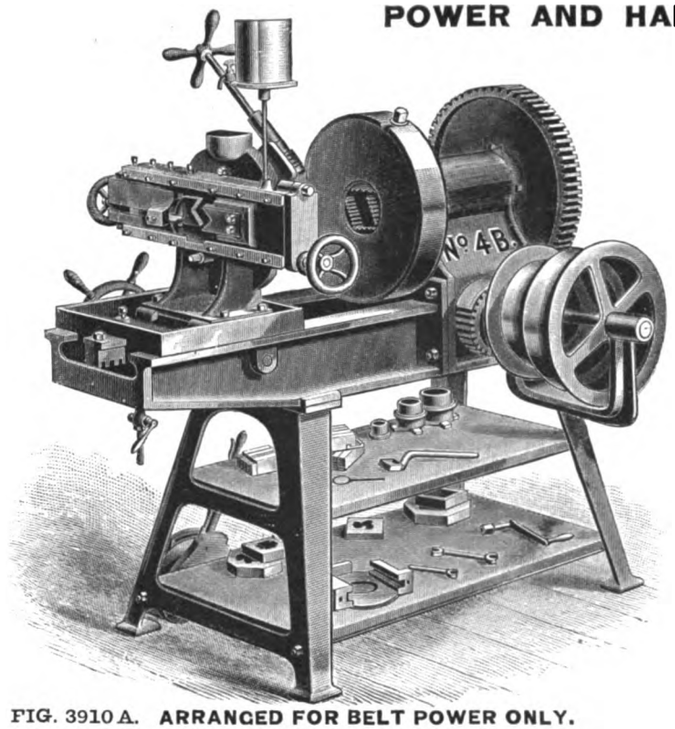


FIG. 3910 A. ARRANGED FOR BELT POWER ONLY.

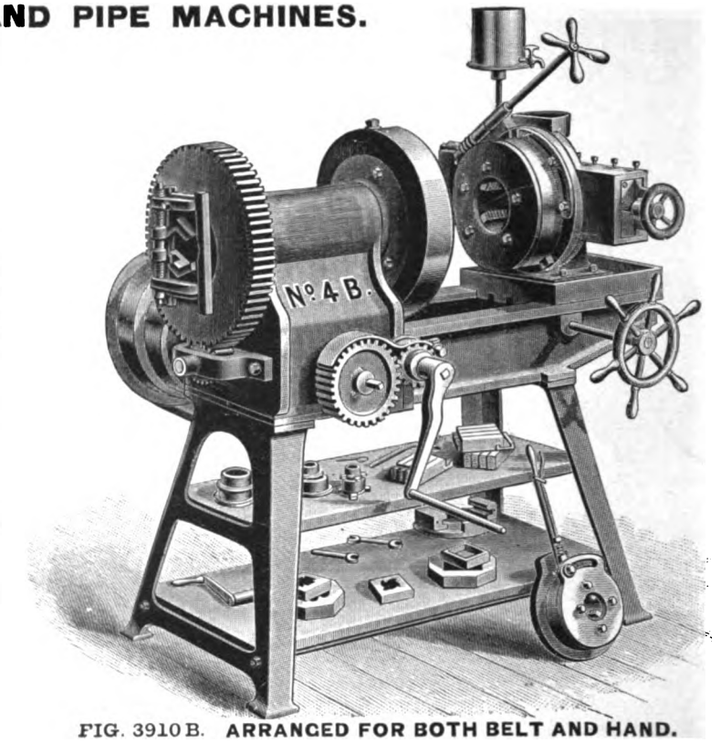


FIG. 3910 B. ARRANGED FOR BOTH BELT AND HAND.

The power machine has the cone pulley at right angles to the ways; though there are but two steps on the cone, four different speeds are secured by attaching the cone pulley and pinion to the shaft by a slip bolt.

The hand machine is so arranged that the relative speeds of the crank and the large gear driving the spindle may readily be changed, thus giving to the operator whatever advantage of gearing may be necessary for the size of pipe being cut or threaded. This is done simply by changing the crank from one shaft to another, three such changes being provided for. Two cranks may also be used at the same time, one on each side, thus enabling two to work at the machine, though ample power is provided to enable one man to thread or cut 4 in. pipe.

The cutting-off head is arranged with a tool slide and self-centering V jaws to steady the pipe while being cut off. It is also arranged to use adjustable expanding or solid dies. The carriage with cutting-off head and die is moved by rack and pinion, worked by a hand wheel.

At the rear end of the spindle, on the face of the large driving gear, is a two-jawed self-centering chuck to center the pipe, doing away with bushings or guides.

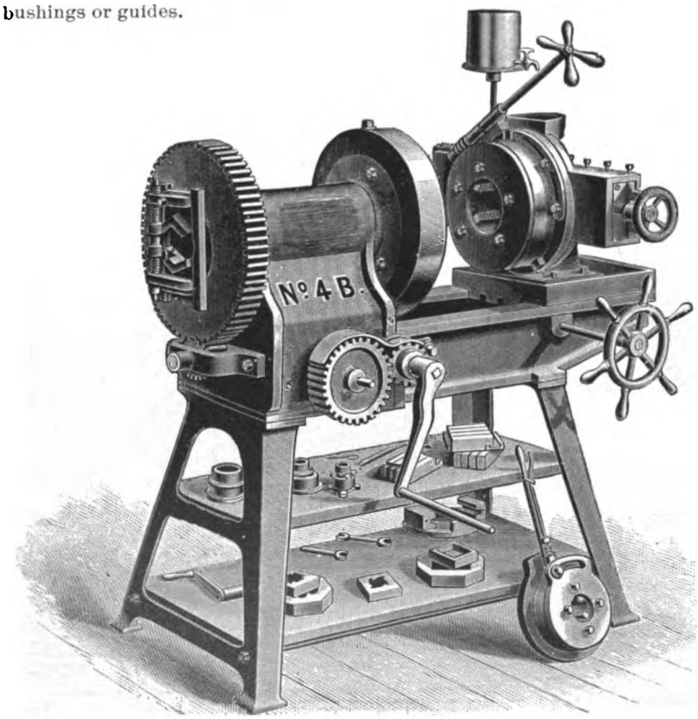


FIG. 3910 C. ARRANGED FOR HAND POWER ONLY.

The die shown in place on the machine is adjustable by the movement of a ring in which there are cam slots that operate to open and close the chasers for 2½ in. to 4 in. by a worm, 2 in. and smaller sizes, by a lever, as shown.

PRICES.

Hand machine, with solid dies, right hand, ½ in. to 4 in., cranks, oil can and wrenches $245.00

Power and hand machine, with solid dies, right hand, ½ in. to 4 in., countershaft, crank, oil can and wrenches $330.00

Hand machine, with two adjustable expanding die heads, one threading ½ in. to 2 in., the other 2½ in. to 4 in., all right hand, set of standard blank gauges to set chasers to, cranks, oil can, wrenches and attachment for using solid dies $320.00

Power and hand machine, with two adjustable expanding die heads, one threading ½ in. to 2 in., the other 2½ in. to 4 in., all right hand, set of standard blank gauges to set chasers to, cranks, oil can, wrenches and attachment for using solid dies $405.00

EXTRAS.

Chasers for No. 1 die, per set of 4 ..... $6.00

Chasers for No. 2 die, per set of 5 ..... 14.00

Set of socket nipple holders, ½ in. to 4 in. 20.00

Pipe rest for long lengths 8.00

Cutting-off tool ..... .75

Solid dies and dies with chasers inserted:

Dies, ½ in. and ¾ in., in steel, 3 in. x ¾ in. 2.00

Dies, 1 in. to 2 in., in steel, 4 in. x 1 in. 3.25

Dies with malleable iron frames, with chasers inserted:

Square frames, 5 x 1¼, for 2½ and 3 in. dies ..... Each, $10.00

Octagon frames, 7½ x 1½ in., for 3½ in. and 4 in. dies ..... " 18.00

SPEED OF COUNTERSHAFT.

200 revolutions per minute; pulley 14 in. diameter, two loose 8½ in. face each, one fast, 4½ in. face; pulley on line; shaft, 22 in. face and diameter, to drive countershaft at required speed.

WEIGHT.

Hand machine, complete ..... 1,400 lbs.

Power and hand machine ..... 1,900 "

Floor space ..... 4 ft. 6 in. x 3 ft.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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POWER AND HAND PIPE MACHINES.

PRICES, FIG. 3910 D, WITH OPENING AND ADJUSTABLE DIES.

No.	Range.		Weight.	Prices.
2	2½ to 4 inches.	R. H.	175 lbs.	$85.00
2½	1½ to 4 "	R. H.	175 "	100.00
2½ A	1½ to 4 "	R. & L.	180 "	115.00
2½ B	1 to 4 "	R. H.	180 "	110.00
2½ C	1 to 4 "	R. & L.	185 "	130.00
3	4 to 6 "	R. H.	310 "	115.00
3 A	3½ to 6 "	R. H.	315 "	130.00
3 B	2½ to 5 "	R. H.	320 "	150.00
3 C	2½ to 6 "	R. H.	325 "	175.00
3 F	1 to 6 "	R. H.	330 "	190.00
3 G	1 to 6 "	R. & L.	335 "	235.00
3 D	2½ to 8 "	R. H.	600 "	325.00

4-INCH PIPE REVOLVING MACHINE.

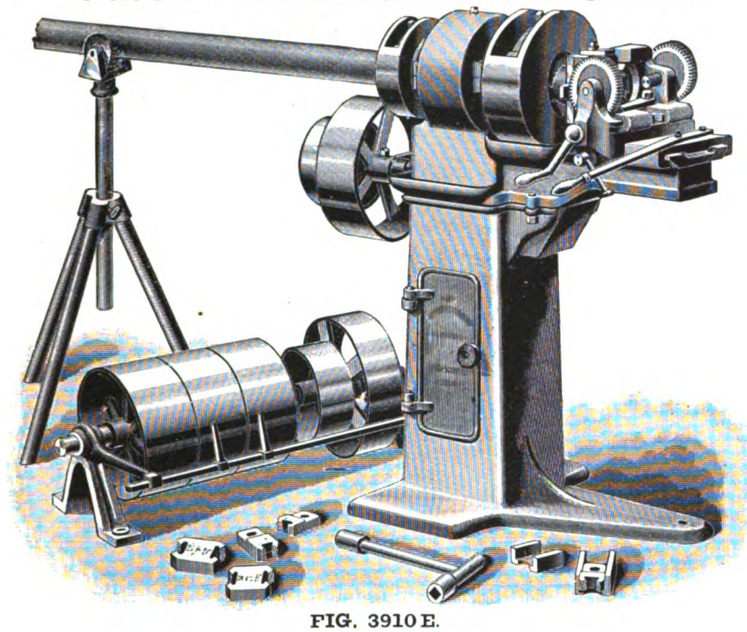


FIG. 3910 E.

BENCH HAND PIPE MACHINE.

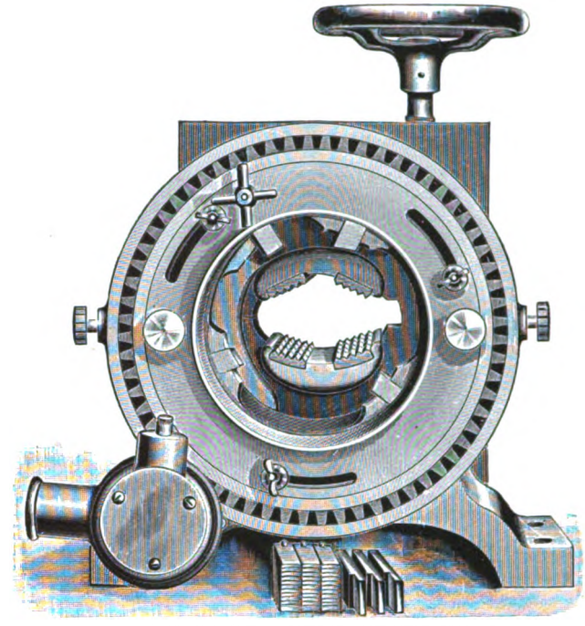


FIG. 3910 D. REPRESENTS NO. 2.

DESCRIPTION, FIG. 3910E.

The pipe revolves, being held by tight gripping chucks. The dies and cutting off tool are held stationary, and are opened and closed with a double geared crank handle. Weight, 1,000 lbs.

PRICES.

Machine, with countershaft and right hand dies, from 1 to 4 inches..... $316.00
Extra dies, cutting 3½ and 4, right or left..... 16.90
Extra dies, cutting 2½ and 3, right or left..... 15.00
Extra dies, cutting 1 to 2, right or left..... 4.00
Extra dies, cutting ½ or ¾, right or left..... 4.00

Speed of countershaft, 225 revolutions per minute.

HAND.

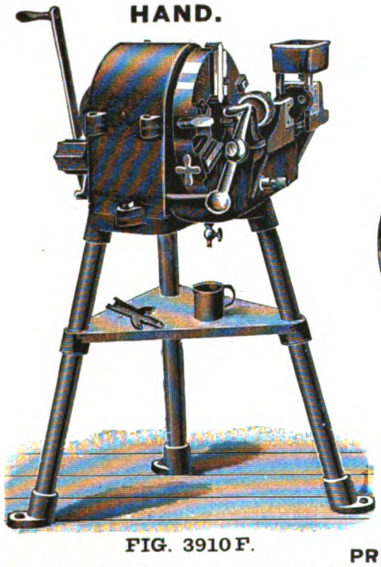


FIG. 3910 F.

HAND AND POWER.

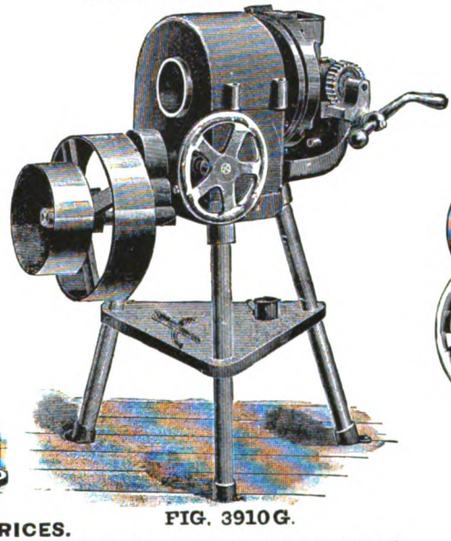


FIG. 3910 G.

PRICES.

Cuts off and threads pipe from 1 to 3 inches inclusive. This machine is geared 8 to 1, which makes it very rapid in its work, and also very powerful. It is very simple and strong in its construction. All the driving gears are enclosed in an oil chamber, thus keeping them well lubricated and free from dirt or chips.

Price for hand, with right or left dies, 1 to 3 inches..... $125.00
Price for power, with right or left dies, 1 to 3 inches..... 170.00
Extra dies, either right or left, per set of 4 pieces..... 14.00

We send one of our adjustable pipe rests with one of our machines.
Weight of machine for power, 250 lbs.; of hand, 225 lbs.

PRICES, FIG. 3910 H.

No. 1½, machine cuts and threads pipe, from 1 to 4 inches, inclusive, for hand use. Weight, 900 lbs..... $350.00
No. 1½, machine for power, with right hand dies, 1 to 4 inches, with countershaft. Weight, 925 lbs..... 380.00
No. 3, machine for power, cuts and threads pipe, from 1 to 6 inches, inclusive, with dies as above and countershaft. Weight, 1,200 lbs..... 550.00

6-INCH AND 4-INCH PIPE MACHINES.

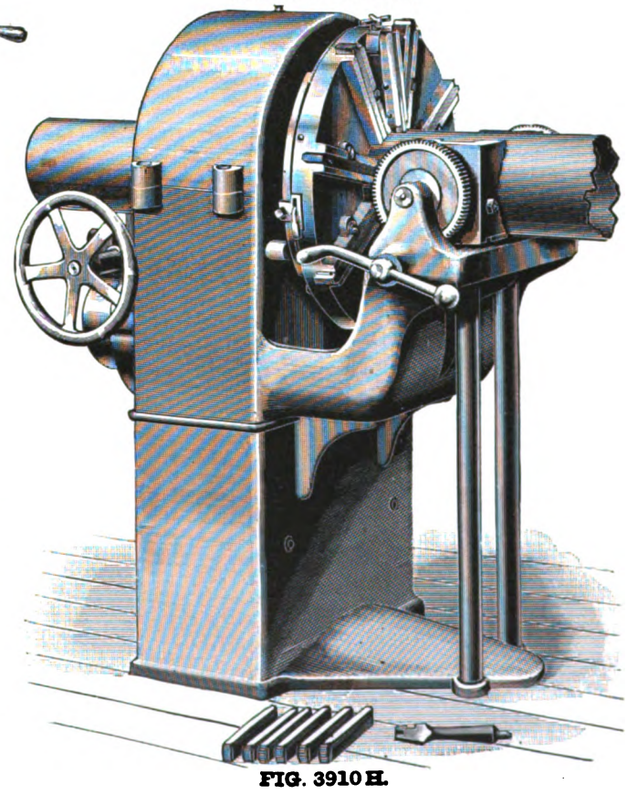


FIG. 3910 H.

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PIPE MACHINES, ALL WITH ADJUSTABLE DIES.

NO. 10 ENGINE ATTACHMENT CUTS 1 TO 4 IN.

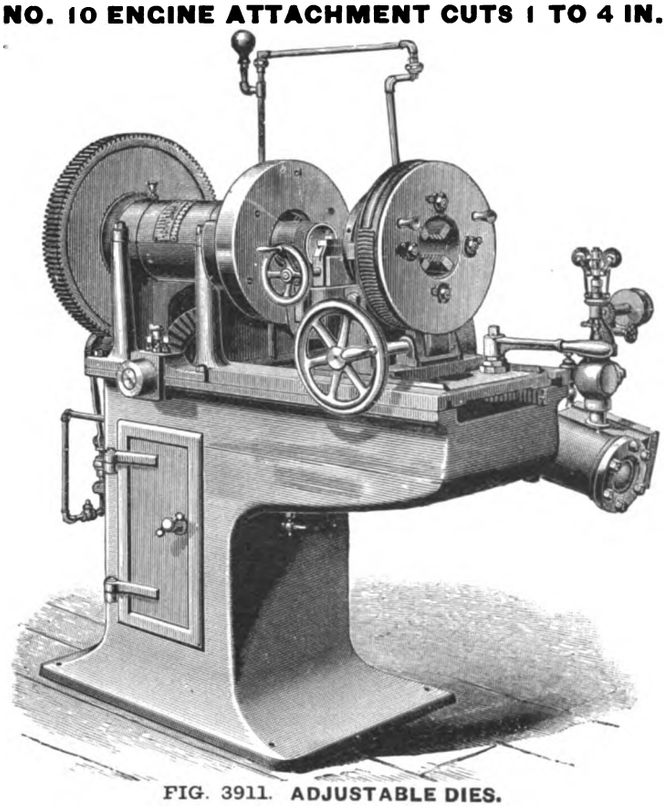


FIG. 3911. ADJUSTABLE DIES.

PUMP FOR SUPPLYING OIL TO DIES AND CUTTING-OFF TOOL. ON ALL MACHINES FROM 7 A AND LARGER.

HAND NO. 6 CUTS 1-4 TO 2 IN.

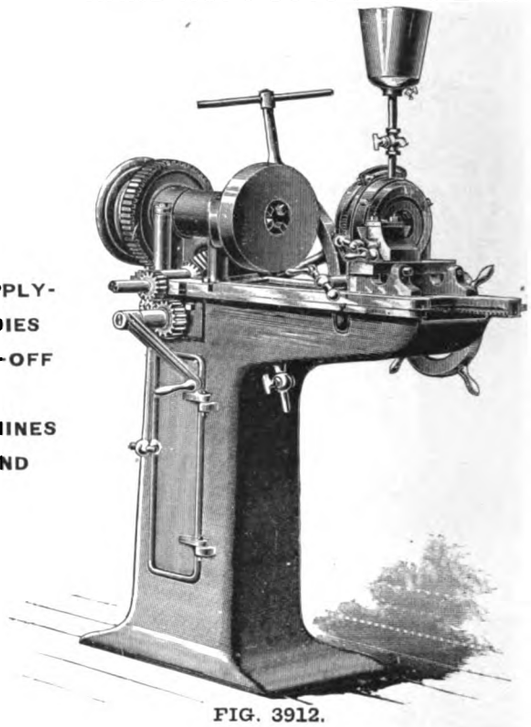


FIG. 3912.

2 1-2 TO 4 INCH MACHINE.

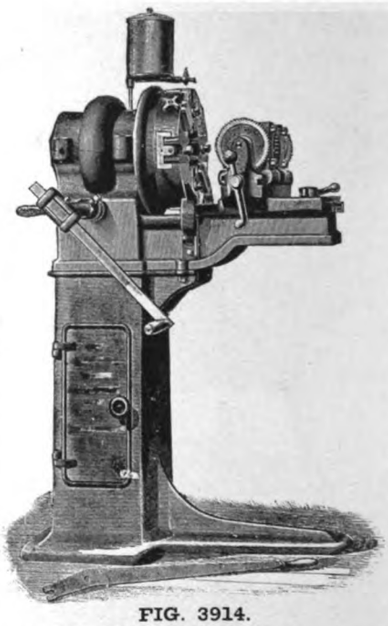


FIG. 3914.

With patent adjustable die easily opened without stopping the machine.

PRICE, FIG. 3914 ONLY.

With dies 2½, 3, 3½ and 4 inches, all right hand, and countershaft, $300.00.

HAND AND POWER NO. 7 CUTS 1-4 TO 2 INCHES.

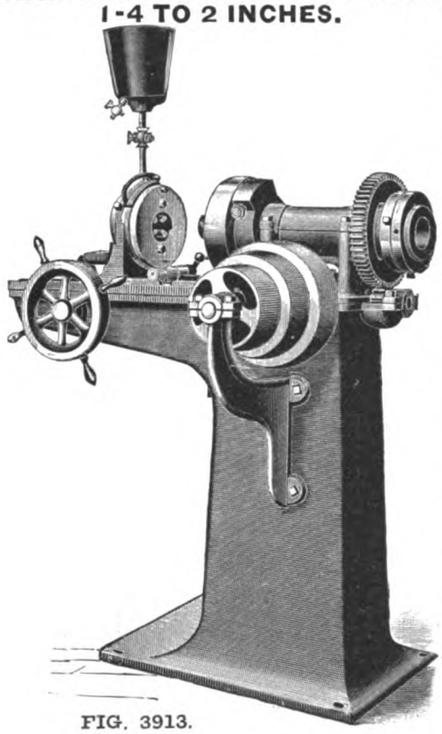


FIG. 3913.

PRICES.

No. 6. Hand, ¼ to 2 in. Weight, about 600 lbs.	$90.00
No. 7. Hand and power combined, ¼ to 2 inches. Weight, 870 lbs.	105.00
No. 7A. Hand, ¼ to 3 inches. Weight, 1,300 lbs.	300.00
No. 7B. Hand and power combined, ¼ to 3 inches, with countershaft. Weight, 1,500 lbs.	325.00
No. 8. Hand, 1 to 4 in. Weight, 1,650 lbs.	400.00
No. 9. Power, 1 to 4 inches, with countershaft. Weight, 1,900 lbs.	425.00
No. 10. Engine attachment, 1 to 4 inches. Weight, 1,800 lbs.	475.00
No. 11. Power, 2½ to 6 inches, with countershaft. Weight, 2,500 lbs.	550.00
No. 12. Engine attachment, 2½ to 6 inches. Weight, about 2,500 lbs.	625.00
No. 13. Power, 2½ to 8 inches, with countershaft. Weight, ... lbs.	900.00
No. 14. Engine attachment, 2½ to 8 inches. Weight, ... lbs.	1,000.00
No. 15. Power, 2½ to 10 inches, with countershaft. Weight, ... lbs.	1,250.00
No. 16. Engine attachment, 2½ to 10 inches. Weight, ... lbs.	1,350.00
No. 17. Power, 2½ to 12 inches, with countershaft. Weight, ... lbs. Speed of countershaft, ... revs.	1,500.00
No. 18. Engine attachment, 2½ to 12 inches. Weight, ... lbs.	1,600.00

PRICES, EXTRAS.

No. of pipe machine	6	7	7 A	7 B	8	9	10	11	12
Price per set of four pieces pipe dies, right and left. Each set threads two sizes	$2.50	$2.50	$3.50	$3.50	$4.00	$4.00	$4.00	$6.00	$6.00
Price cutting-off knive	.50	.50	.50	.50	.75	.75	.75	1.00	1.00
Price nipple holders, complete	16.00	16.00	25.00	25.00	35.00	35.00	35.00	45.00	45.00
Price nipple holder shank	6.00	6.00	8.00	8.00	15.00	15.00	15.00	20.00	20.00
Price nipple holder collars, each	1.25	1.25	1.75	1.75	2.50	2.50	2.50	4.00	4.00

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HAND AND POWER PIPE MACHINES.

NO. 3 CUTS 1 TO 6 INCH.

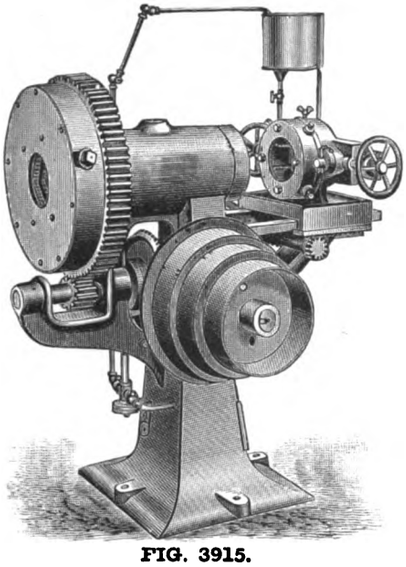


FIG. 3915.

NO. 2 CUTS 1 TO 4 INCH.

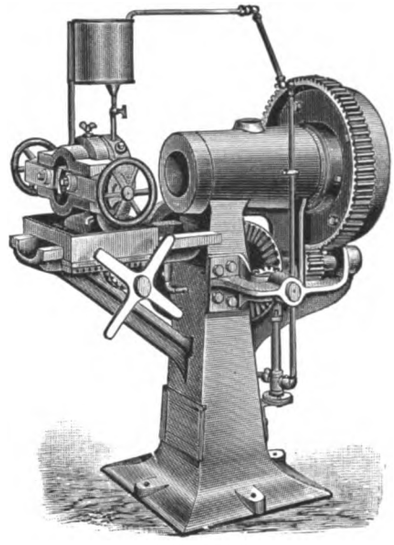


FIG. 3916.

NO. 1 CUTS 1-4 TO 2 INCH.

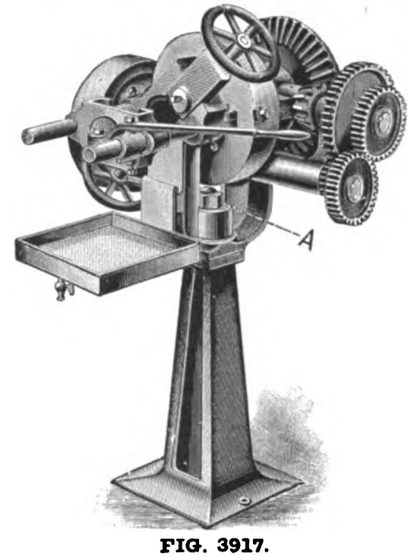


FIG. 3917.

NO. 1 HAND CUTS 1-4 TO 2 INCH.

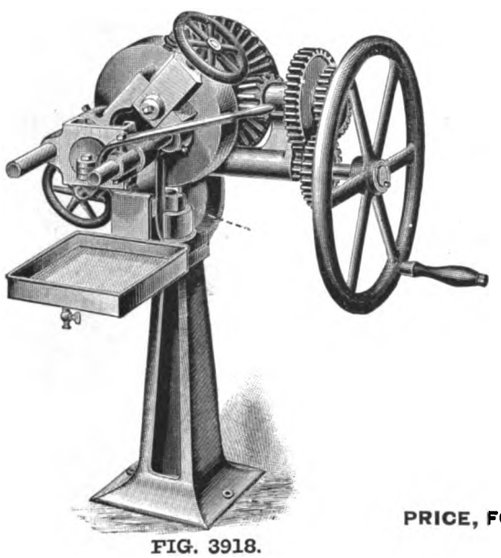


FIG. 3918.

ROLLER PIPE STAND.

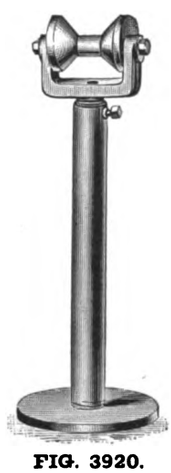


FIG. 3920.

NOS. 2 AND 3 HAND.

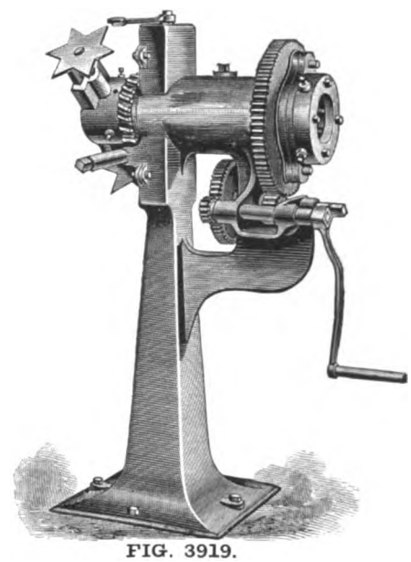


FIG. 3919.

PRICE, FOR NO. 1 MACHINE, $5.00; FOR NOS. 2 AND 3, $7.00.

PRICES.

No. 2 (Fig. 3916) machine cuts off and threads pipes from 1 to 4 in., inclusive, using ordinary solid dies from 1 to 2 in. and cutter dies 2½ to 4 in., and has three speeds for cutting various sizes. Diameter of pulleys on countershaft, 12 in.; proper speed, 200 revolutions per minute, using 3-inch belt. Total weight of machine and dies and countershaft, 1,300 lbs. Floor space required, 42 x 30 in. Price, complete, including countershafting, pulleys, etc., $325.00. Boxing, extra, $3.00.

No. 3 (Fig. 3915) machine cuts 1 to 6 in., inclusive, and is similar in construction to No. 2 size. Weight, 2,025 lbs. Price, complete, $550.00. Boxing, extra, $4.50.

FITTED WITH EXPANDING DIES, FIG. 3921.

No. 2 (Fig. 3916) machine, with solid dies 1 to 2 inch, and expanding dies 2½ to 4 inch $395.00
No. 3 (Fig. 3915) machine, with solid dies 1 to 2 inch, and expanding dies 2½ to 6 in..... 700.00

FITTED WITH CUTTER DIES.

No. 2 (Fig. 3919) machine, with cutter dies 2½, 3, 3½, 4 inch; weight, 500 lbs..... $165.00
No. 3 (Fig. 3919) machine, with cutter dies 2½, 3, 3½, 4, 4½, 5, 6 inch; weight, 730 lbs..... 275.00
Boxing, extra, Nos. 2 and 3, $2.00.

FITTED WITH SOLID DIES.

The No. 1 eclipse machine takes standard sizes ordinary solid pipe dies, viz., ¼, ⅜, ½ in. steel, 2 x ½; ¾, 1 in. steel, 2½ x ¾; 1¼, 1½, 2 in. steel, 4 x 1.

No. 1 (Fig. 3917) power and hand machine, complete with hand crank, countershaft, cone pulleys, etc., weight, 500 lbs..... $105.00
No. 1 (Fig. 3918) hand machine, complete, with full set of nipple chucks and set of right-hand dies, ¼ to 2 in. inclusive, weight, 350 lbs..... 85.00
Boxing, Fig. 3918, extra, $1.00. Boxing, Fig. 3917, extra, $1.25.

EXPANDING DIE.

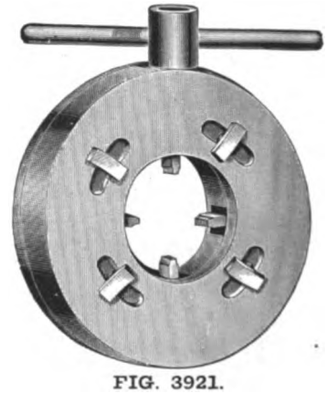


FIG. 3921.

PRICES.

Die to thread 2½, 3, 3½ and 4 in. pipes..... $100.00
Die to thread 4½, 5 and 6 in. pipes..... $110.00
Extra sets cutter blocks and dies, 2½, 3, 3½, 4 in..... $18.00
Extra sets cutter blocks and dies, 4½, 5, 6 in..... $27.00

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PIPE TAPPING MACHINES.

No. 3 MACHINE.

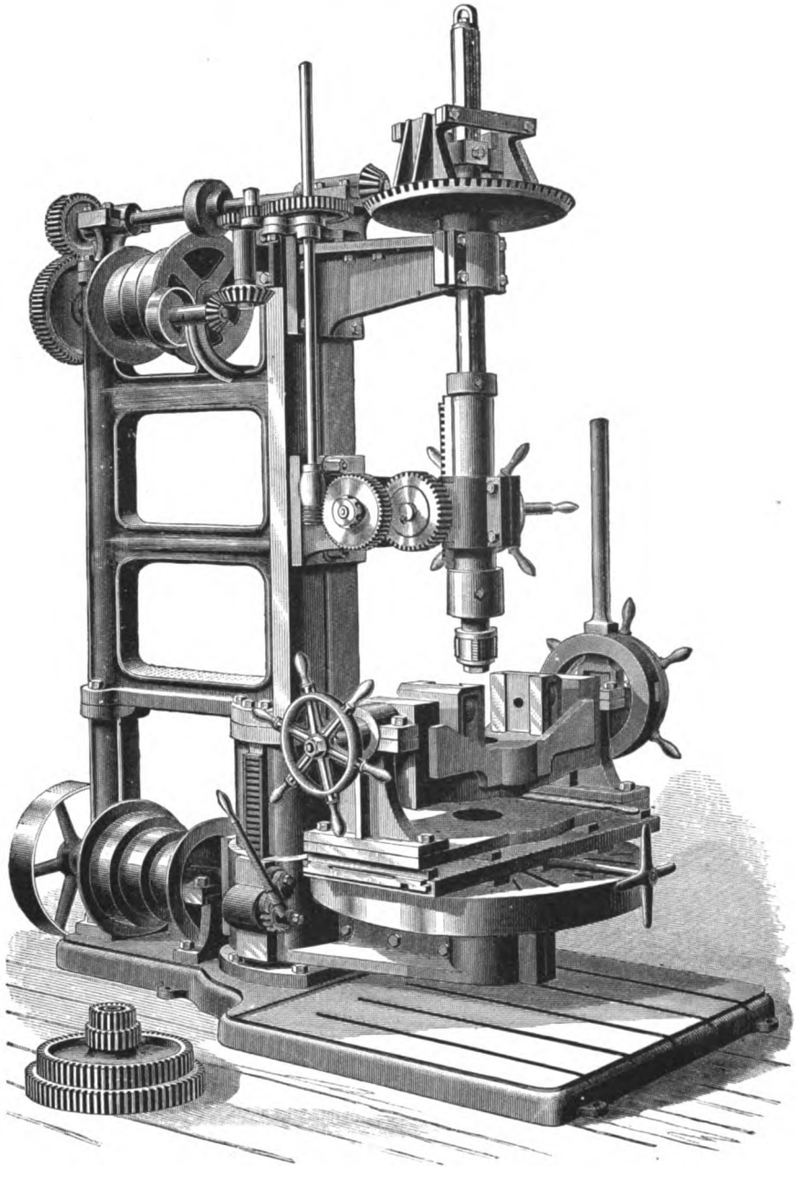


FIG. 3922.

When required for general use the machine is furnished with self-feed, making it a powerful and convenient drilling or boring machine.

PRICES.

No. 3, with No. 3 crank chuck, to hold fittings ½ to 6 inches countershaft, change wheels and wrenches; weight 5,900 lbs., $1,125.00

No. 3, with No. 4 crank chuck, to hold fittings ½ to 8 inches countershaft, change wheels and wrenches; weight 6,800 lbs., 1,275.00

Self-feed attachment for drilling and boring, extra, - - - - 50.00

Taps and reamers extra.

Speed of lower cone shaft, 125 revolutions per minute; pulley on same, 20 inches diameter, 5 inch face.

Countershaft pulleys, 16 inches diameter—one fast, 5 inches face, two loose, each 9½ inch face; driving pulley on countershaft to drive on to lower cone shaft pulley, 20 inches diameter, 5 inch face.

No. 2 MACHINE.

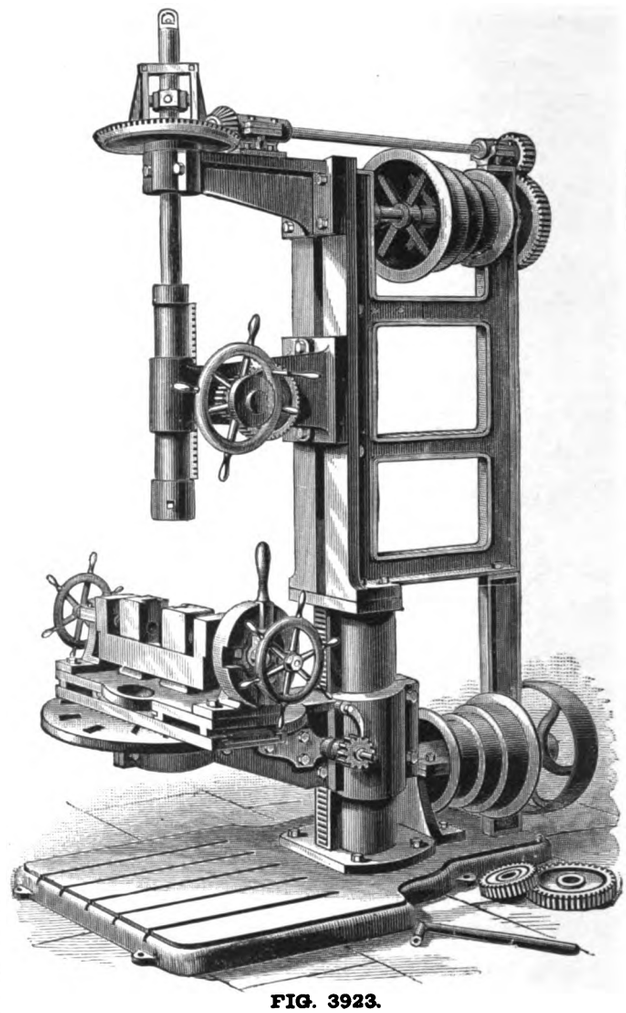


FIG. 3923.

PRICES.

With chuck, countershaft, change wheels and wrenches; weight 3,500 lbs., - - $675.00

Self-feed attachment, extra, - - - 50.00

Taps and reamers, extra, - - -

Speed of lower cone shaft, 150 revolutions per minute. Pulley on same, 18 inches diameter, 4½ inch face.

Countershaft pulleys, 14 inches diameter—one fast, 4½ inch face, two loose, each 8½ inch face; driving pulley on countershaft to drive on to lower cone shaft pulley, 18 inches diameter.

ROLLING PIPE CUTTER.

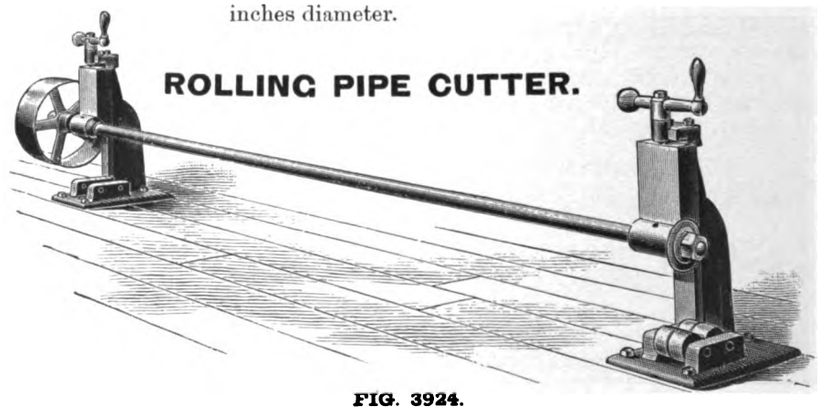


FIG. 3924.

PRICES.

No. 1 cuts pipe ¼ to 2 inches, - - - - - $60.00

No. 2 cuts pipe 1 to 4 inches, - - - - - 75.00

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COLLIAU CUPOLAS.—SEE NEXT PAGE.

NO. 2, WITH GALLERY.

The Colliau furnace is made in three distinct parts so that parties desiring to make only a small outlay, and at the same time secure the benefits arising from the use of "The Colliau," should order No. 3, which contains the essential parts, and it may be used with any suitable "stack" and "foundation."

The lower portion of the "Colliau" cupola, as shown in Fig. 3, is composed of two sheet iron shells, the inner shell being made very heavy and of the same size as the stack proper; the outer shell encircles the inner one and is made air tight, forming the wind chest, which varies in size according to the size of furnace. In the outer shell are arranged two doors or shutters held in position by tap bolts, also made air tight, which may be removed and again replaced after cleaning, should any dirt or slag accumulate in the wind chest.

Opposite each tuyere also is a sliding air tight gate with peep hole, and in the bevel top is furnished a brass nipple to connect hose from blast meter into the wind chest or chamber. The blast is introduced through two flanged openings, one on either side as shown, and reaches the melting point through two sets of six tuyeres each, arranged to concentrate the blast.

The tuyeres are so constructed that the melted iron in its downward course cannot pass through them in the air chamber.

The furnace, as a whole, is simple in its construction. There is no complicated machinery or parts to get out of order, and consequently does not require any more attention or repairs than a common cupola.

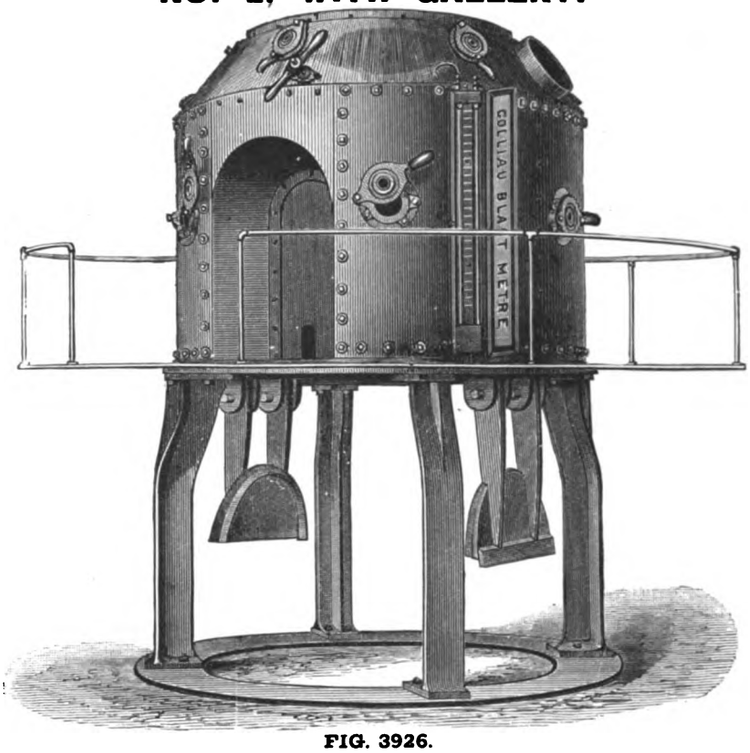


FIG. 3926.

The "gallery," as shown above, may be supplied with either size, No. 1 or Fig. 2, except on the **0.** It is not essential to the working of our furnace, but is a convenience, and will be appreciated by those who have room to accommodate it.

We do not furnish the "gallery" except when ordered. Prices for this on application.

Ordinary cupolas are slow in melting, use too much fuel, and are uncertain in their workings and results, and in large or long meltings will clog and chill, causing delays, losses and annoyances familiar to all foundrymen.

In the use of the Colliau furnace these annoyances and delays are practically overcome, and a saving of from 20 to 50 per cent. of fuel realized by securing more perfect combustion.

By concentrating the fire at the melting point in the smallest possible compass, the metal in fusion has less space to traverse while exposed to the oxidizing influence of the blast.

The foundry is the basis or starting point for the production of all cast iron machinery and tools, and imperfect castings, from whatever cause, spoil the work. For this reason the foundry should receive as much, if not more care and attention, than the machine or finishing shop, and the best cupola should be used.

The records of the "Colliau Cupola" show the most economy in fuel and iron, the greatest rapidity in fusion, and the largest amount of iron melted in a given time and size, as well as the greatest quantity of iron melted at a heat in one cupola without clogging.

The cupola should be supplied with a suitable blower, and in large shops, where practicable, should be operated by a separate engine.

The pipes to conduct the wind should be air tight, large in diameter, as straight as possible, and where bends are necessary they should be as long and easy as circumstances will admit.

In large shops, and where a large number of hands are employed, the most important factor in melting iron is the rapidity with which it can be done.

The records of the "Colliau" in this respect have never been excelled.

The cupola can be operated by unskilled workmen if instructions are followed. Melting may be continued as long as desired with hot fluid iron all through the heat, and a perfect "chilling" iron may be relied upon when desired.

BLAST METER.

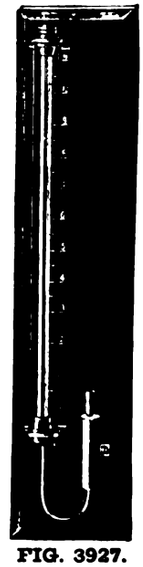


FIG. 3927.

PRICES ON APPLICATION.

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COLLIAU CUPOLA.

NO. 1 STYLE.

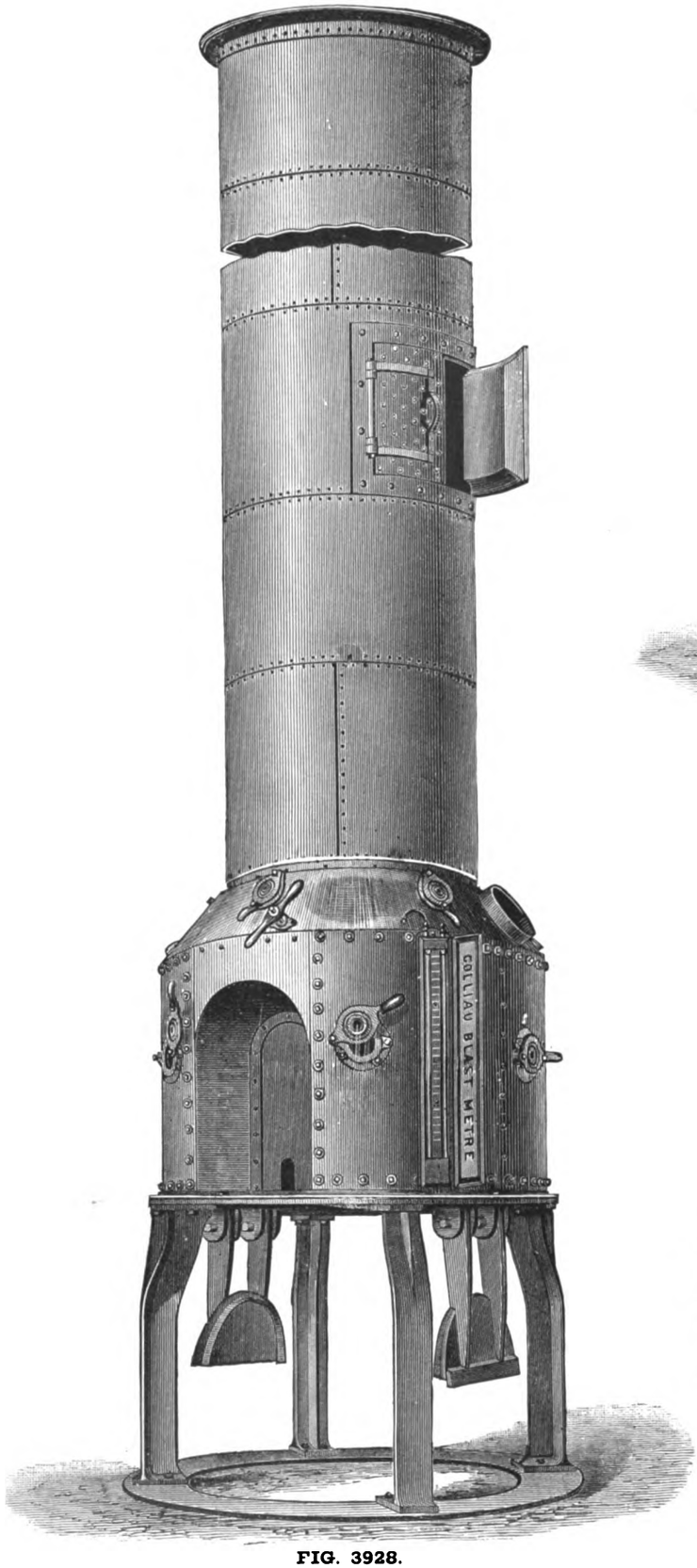


FIG. 3928.

NO. 2 STYLE.

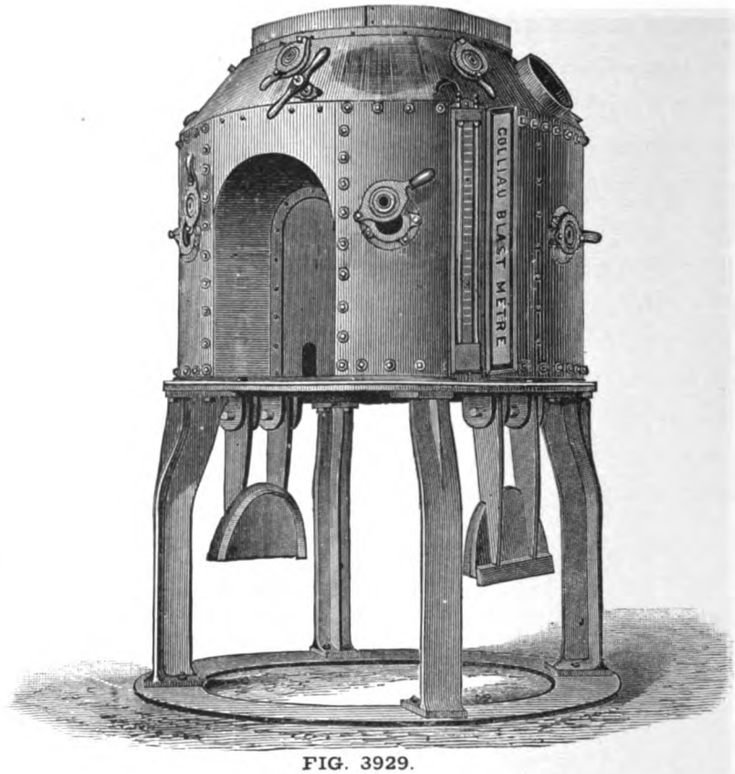


FIG. 3929.

NO. 3 STYLE.



FIG. 3930.

Fig. 3928 comprises the No. 2 portion, with the addition of the stack and charging doors, and represents the furnace complete ready for lining. The O size, No. 1, is twenty-eight feet high. The L size, Fig. 1, is thirty-five feet high; all other sizes are forty feet high.

We can, however, make the No. 1 any height desired, and can supply legs any height from two feet to seven feet.

We furnish tap troughs any length desired.

In ordering, observe the following: Give size of furnace and whether No. 1, 2, or 3; if No. 3, give length of tap trough wanted; if No. 2, give length of tap trough, and height of legs wanted; if No. 1, give length of tap trough, height of legs, and distance from bottom plate; *i. e.*, at tap hole, to bottom of charging doors.

For the D, B and A A sizes, we recommend the use of two pairs of charging doors.

Fig. 3930 contains the essential parts of the "Colliau" cupola furnace, viz.: Portion of shell 3 ft. 0 in. to 5 ft. 4 in. in height, according to size of furnace, together with air chamber, tuyeres, tap trough, slag trough and blast meter.

It may be used with any suitable "foundation" and "stack."

We recommend, however, the No. 2 portion as the most desirable to order.

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PRICES, ETC., FIGS. 3928 TO 3930.

No.	Total height of air box, in inches.	Diameter outside air box, in inches.	Diameter outside of shell, in inches.	Diameter inside after lining, in inches.	Capacity in tons of iron melted per hour.	Weight in lbs. No. 1.	Weight in lbs. No. 2.	Weight in lbs. No. 3.	Height of No. 1 over all, in feet.	Prices. No. 1.	Prices. No. 2.	Prices. No. 3.	Prices, L doors and frames.	Prices, crown rings.
2	65	112	91	66 to 67	16 to 20	24 500	15,800	5,400	40	$	$	$	$30.00 pr.	$10.50
4	63½	108	86	61 " 71	15 " 18	22.500	14,800	5,200	40				28.00 "	9.75
6	62	102	80	55 " 65	13½ " 16	17,600	11,500	5,000	40				26.00 "	9.00
8	61	100½	76	51 " 61	12 " 14	17,000	11,300	4,800	40				24.00 "	8.50
10	58½	89	67	49 " 54	10 " 12	14,500	9,300	3,600	40				22.00 "	7.75
12	54	87	63	46 " 50	8 " 10	14,000	9,000	3,400	40				18.00 "	7.00
14	52½	76	58	43 " 48	7 " 9	10,500	6,000	2,800	40				16.00 "	6.50
16	50½	74½	54½	40 " 45	5 " 7	10,100	5,700	2,600	40				14.00 "	5.75
18	49	66	50½	35½ " 40½	4 " 6	8,400	5,300	2,300	40				13.00 "	5.00
20	48½	64½	49	34 " 38	4 " 5	8,100	5,000	2,100	40				12.00 "	4.50
22	45	59½	44	30 " 34	3 " 4	7,350	4,200	2,000	38				11.00 "	4.00
24	43½	58	42	28 " 32	2 " 4	7,100	4,000	1,900	35				10.00 "	3.25
26	42½	50½	37	24 " 27	2 " 2½	5,700	3,200	1,300	33				9.00 "	3.00
28	41	49	35	21 " 25	1½ " 2	5,400	3,000	1,200	32				8.00 "	2.25
30	38	44	33	20 " 23½	¾ " 1¼	3,800	2,600	1,000	30				7 single	2.00
32	36	37	28	18	½	2,500	1,200	550	28				6 "	1.50

GEARED FOUNDRY LADLES.

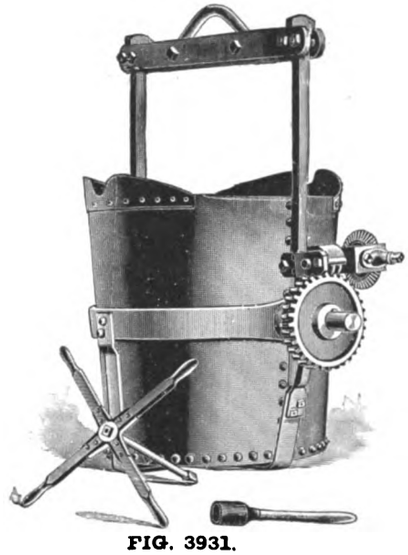


FIG. 3931.

ALL GEARED LADLES ARE PROVIDED WITH A HANDLE, WITH SOCKET FITTED TO SHAFT, TO HOLD SAME IN POSITION WHILE POURING. GEARING PROTECTED WITH IRON SHIELD.

CAPACITY IN LBS.	INSIDE DIMENSIONS. DIAMETER. TOP.	INSIDE DIMENSIONS. DIAMETER. BOTTOM.	INSIDE DIMENSIONS. DEPTH.	ALLOWS FOR DAUBING. AT BOTTOM.	ALLOWS FOR DAUBING. AT SIDES.	ALLOWS AT TOP ABOVE CAPACITY.	PRICES, COMPLETE.
2,000	25½ in.	23½ in.	24½ in.	1½ in.	1 in.	2½ in.	$86.70
2,500	27 "	25 "	26 "	1½ "	1 "	2½ "	93.50
3,000	28½ "	26 "	27½ "	1½ "	1 "	2½ "	100.00
3,500	30 "	27½ "	29 "	1½ "	1 "	2½ "	106.70
4,000	31½ "	28½ "	30 "	1½ "	1 "	3 "	113.50
4,500	33½ "	30½ "	32 "	2 "	1½ "	3 "	120.00
5,000	34½ "	31 "	33 "	2 "	1½ "	3 "	133.50
6,000	36½ "	33 "	35 "	2 "	1½ "	3 "	146.70
8,000	40½ "	36½ "	38½ "	2½ "	1¾ "	3 "	166.70
10,000	43½ "	39 "	41 "	2½ "	1¾ "	3½ "	200.00
12,000	45½ "	41 "	43½ "	2½ "	1¾ "	3½ "	233.50
14,000	48 "	43 "	45½ "	2½ "	1¾ "	3½ "	266.70
16,000	50 "	45 "	47½ "	2½ "	1¾ "	3½ "	300.00
18,000	52 "	46½ "	49 "	2½ "	1¾ "	3½ "	333.50
20,000	53½ "	48 "	50½ "	2½ "	1¾ "	3½ "	366.70
24,000	57 "	51 "	54 "	2½ "	2 "	3½ "	400.00

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FOUNDRY LADLES.

CRANE LADLE, WITH BAIL.

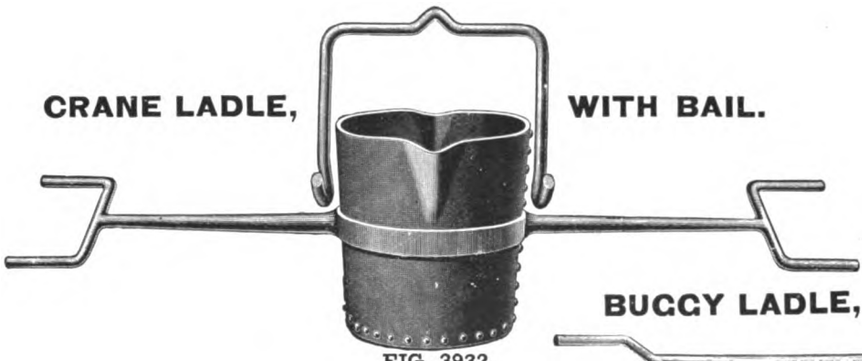


FIG. 3932.

BUGGY LADLE, WITH BAIL.

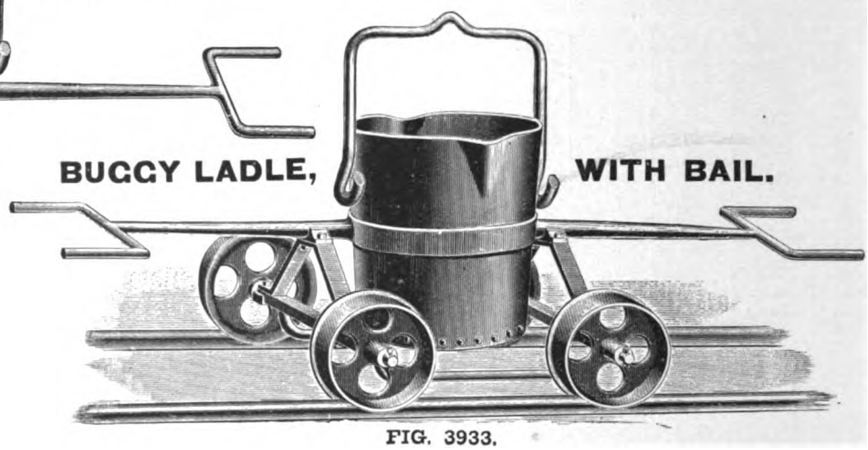


FIG. 3933.

PRICES.

Capacity in pounds.	Inside dimensions. Diameter. Top.	Diameter. Bottom.	Depth.	Allows for daubing. At bottom.	Allows for daubing. At sides.	Allows at top above capacity.	PRICES, complete.
Crane, with bail.							
500 (Fig. 3932.)	16½ ins.	15 ins.	15½ ins.	1¼ ins.	¾ ins.	1¾ ins.	$28.50
600 (Fig. 3932.)	17½ "	16 "	17 "	1¼ "	¾ "	1¾ "	30.00
700 (Fig. 3932.)	18 "	16½ "	17½ "	1¼ "	¾ "	1¾ "	33.50
800 (Fig. 3932.)	18½ "	17 "	18 "	1¼ "	¾ "	1¾ "	37.50
1,000 (Fig. 3932.)	20½ "	18½ "	19½ "	1½ "	1 "	2 "	41.50
1,200 (Fig. 3932.)	21½ "	19½ "	21 "	1½ "	1 "	2 "	45.50
1,500 (Fig. 3932.)	23 "	21 "	22 "	1½ "	1 "	2 "	51.00
2,000 (Fig. 3932.)	25½ "	23½ "	24½ "	1½ "	1 "	2½ "	56.00
2,500 (Fig. 3932.)	27 "	25 "	26 "	1½ "	1 "	2½ "	61.50
3,000 (Fig. 3932.)	28½ "	26 "	27½ "	1½ "	1 "	2½ "	67.00
Buggy, with bail.							
1,000 (Fig. 3933.)	20½ "	19 "	19½ "	1½ "	1 "	2 "	61.00
1,200 (Fig. 3933.)	21½ "	20 "	21 "	1½ "	1 "	2 "	69.00
1,500 (Fig. 3933.)	23 "	21½ "	22 "	1½ "	1 "	2 "	77.50
2,000 (Fig. 3933.)	25½ "	23½ "	24½ "	1½ "	1 "	2½ "	86.50

BULL LADLE.

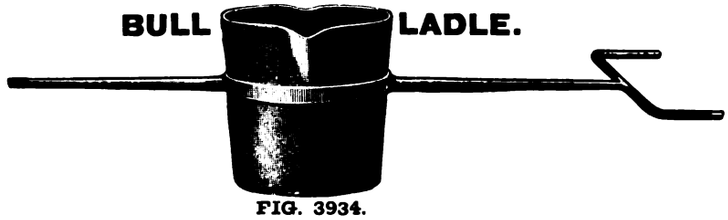


FIG. 3934.

HAND LADLE.



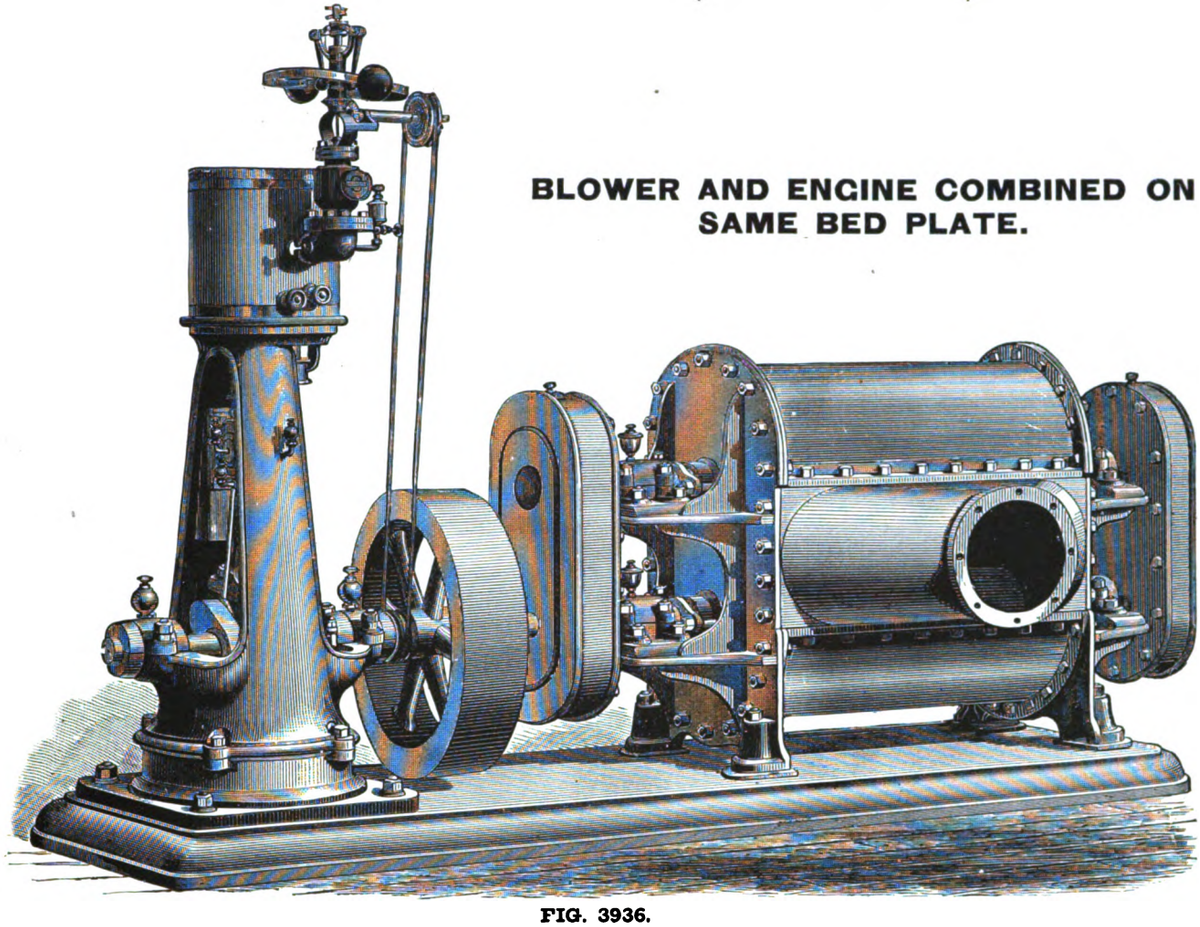
FIG. 3935.

Capacity in pounds.	Inside dimensions. Diameter. Top.	Diameter. Bottom.	Depth.	Allows for daubing. At bottom.	Allows for daubing. At sides.	Allows at top above capacity.	PRICES, complete.
Cast bowls.							
Hand ladles.							
50	8¼ ins.	.....	6 ins.	½ ins.	⅜ ins.	½ ins.	$2.28
Bull ladles.							
100	10 "	9 ins.	9½ "	1 "	½ "	1½ "	8.00
150	11 "	10 "	10½ "	1 "	½ "	1½ "	8.70
200	12 "	11 "	11½ "	1 "	½ "	1½ "	9.40
250	13 "	12 "	12½ "	1 "	½ "	1½ "	10.30
Wrought bowls.							
Bull ladles.							
300	14 "	12½ "	13 "	1 "	½ "	1½ "	13.50
350	14½ "	13 "	13½ "	1 "	½ "	1½ "	17.50
400	15½ "	14 "	14½ "	1¼ "	¾ "	1¾ "	22.70

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ROOT FOUNDRY BLOWERS, WITH ENGINE.



BLOWER AND ENGINE COMBINED ON SAME BED PLATE.

FIG. 3936.

ROOT FOUNDRY BLOWER, HORIZONTAL PATTERN.

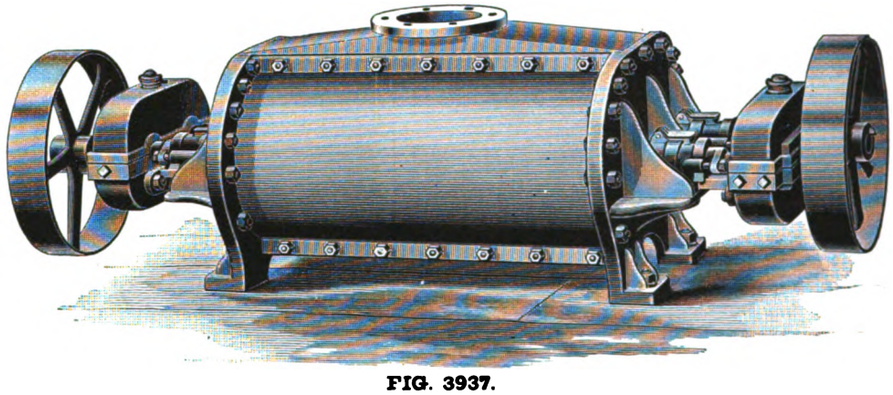


FIG. 3937.

GENERAL DESCRIPTION.

We manufacture two styles of positive blowers. The first style has the revolvers, or internal operating parts, covered with wood prepared by a process to prevent its shrinking or swelling. In the second style the revolvers are of iron, each cast entire in one piece, and dressed to the exact size and shape. Each of these styles has special adaptations which fit them for certain uses and places better than the other.

The external mechanical arrangement, the quality of workmanship, and the capacity of corresponding sizes, or numbers, are exactly the same in either of the styles. The various forms and positions are equally applicable to either style. The only difference in these, or any other modifications, is that in the first style the revolvers are covered with prepared wood, and in the second style they are made entirely of metal.

PRICES, ETC.

Size of blower.	Diameter of cupola suitable for.	WEIGHT.			PRICES.			Diameter discharge pipe.	H. P. required.
		With iron revolvers.	With wood revolvers.	With engine and bed plate.	With iron revolvers.	With wood revolvers.	With engine and bed plate.		
¼		360 lbs.	300	725	$144.00	$108.00	$	5	1
½		667 "	575	1,280	205.00	158.00		6	2
1	18 to 24	1,400 "	1,200	2,510	310.00	275.00		8	3½
2	24 to 30	1,836 "	1,520	3,840	365.00	330.00		10	5½
3	30 to 36	2,740 "	2,312	5,000	500.00	440.00		12	8
4	36 to 42	4,011 "	3,250	8,920	675.00	565.00		14	11½
5	42 to 50	6,385 "	4,915	12,000	1,005.00	890.00		16	17¾
6	50 to 60	10,811 "	8,535	16,200	1,480.00	1,330.00		20	27
7	72	16,000 "	13,362	27,100	1,995.00	1,790.00		24	40

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BAKER FOUNDRY BLOWERS.

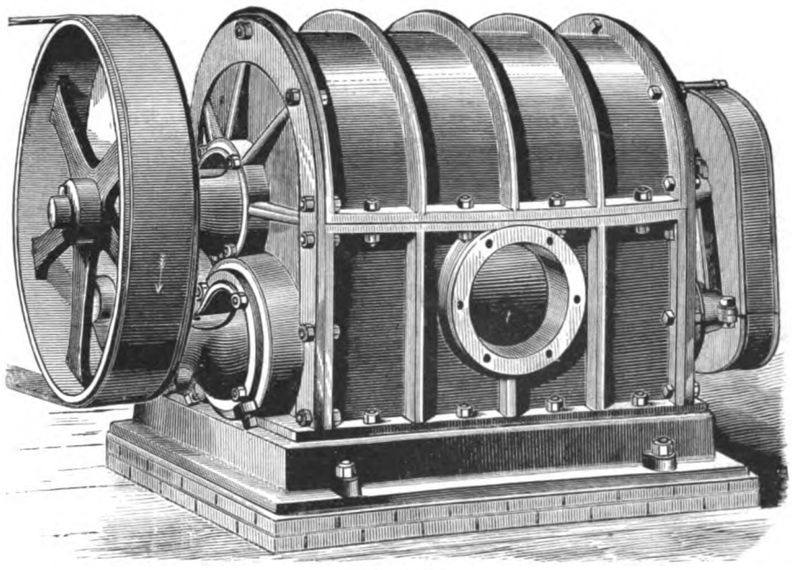


FIG. 3938.

GENERAL DESCRIPTION, FIG. 3938.

The Baker blower is made entirely of iron, and is not at all affected by changes of the weather, dampness or moderate heat.

It has no internal friction whatever, and requires but one belt to drive the largest-sized blower. It has no irregular shapes, all working parts being true circles.

The interior is composed of three drums, each of which is a single, strong casting, truly turned and accurately balanced.

The upper drum, which does all the work of blowing, is provided with two vanes, firmly bolted to it.

The two lower drums are merely valves for the purpose of preventing the air from escaping.

The duty of the three gear wheels is merely to keep the three drums in position.

The journals are made large so that they will run on the oil, and if properly oiled will last as long as the best constructed line shaft carrying a light load.

PRICES.

	Diameter of cupola suitable for	Diameter of discharge pipe.	Weight, with pulley.	Weight, with engine.	Price, with pulley.	Prices, with engine.
No. ¼, Displacement each rev., 1 ft.....	.....	3 inches.	350 lbs.	.....	$110.00	$.....
" ½, " " " 2 "	.....	5 "	750 "	.....	160.00	.....
" 1, " " " 3½ "	18 to 24	6 "	1,200 "	.....	220.00	.....
" 2, " " " 6 "	22 to 31	7½ "	1,700 "	.....	302.00	.....
" 3, " " " 9 "	28 to 36	8¾ "	2,250 "	.....	386.00	.....
" 4, " " " 12 "	32 to 40	11¾ "	3,000 "	.....	470.00	.....
" 4½, " " " 16½ "	34 to 45	11¾ "	3,700 "	.....	555.00	.....
" 4¾, " " " 20 "	34 to 45	13½ "	..... "	.....	645.00	.....
" 5, " " " 25 "	42 to 52	15 "	5,000 "	.....	735.00	.....
" 5½, " " " 30 "	49 to 56	17 "	6,350 "	.....	850.00	.....
" 6, " " " 45 "	53 to 66	21 "	9,700 "	.....	1,225.00	.....
" 7, " " " 60 "	64 to 78	24 "	12,800 "	.....	1,600.00	.....
" 7½, " " " 72 "	72 to 84	24 "	15,000 "	.....	1,810.00	.....

BLOWER AND ENGINE ON ONE BED-PLATE.

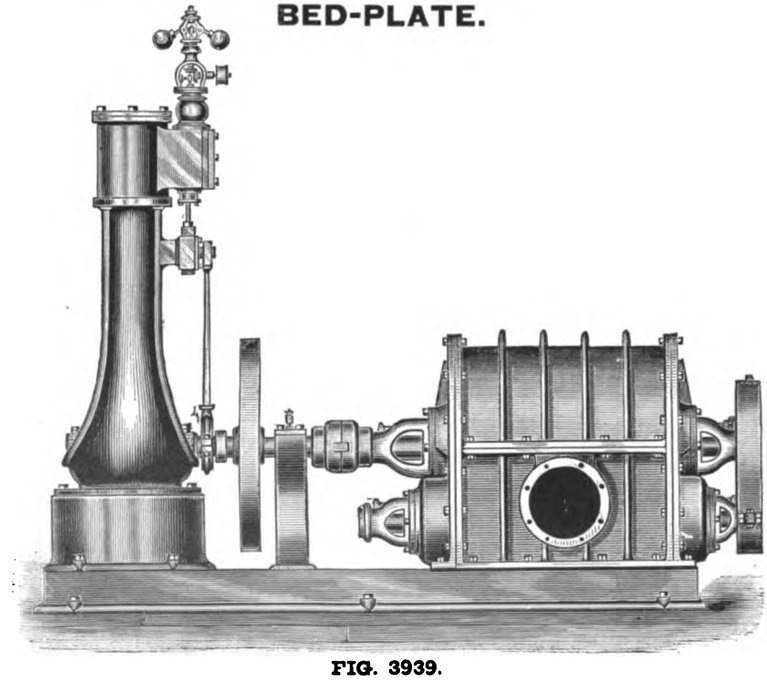


FIG. 3939.

BLOWER AND VERTICAL ENGINE COMBINED.

Blower, with engine attached on same base plate, has the advantage of requiring no belts or shafting, and the speed of blower can be varied at pleasure.

It is first-class in detail, and substantially built throughout.

Engine is built especially for the purpose, and provided with the best oilers and governor, etc.

Erected on a substantial bed-plate, it makes a complete self-containing machine.

The power required to run one of these blowers is in proportion to the pressure of the blast and volume of air delivered. A large machine runs with the same amount of power as a small one, when each is delivering the same number of cubic feet per minute at the same pressure; the only difference will be the amount of friction between the two blowers. The blast is very steady, consequently the blower runs steady.

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STURTEVANT STEEL PRESSURE BLOWERS.

ON ADJUSTABLE BED PLATE.

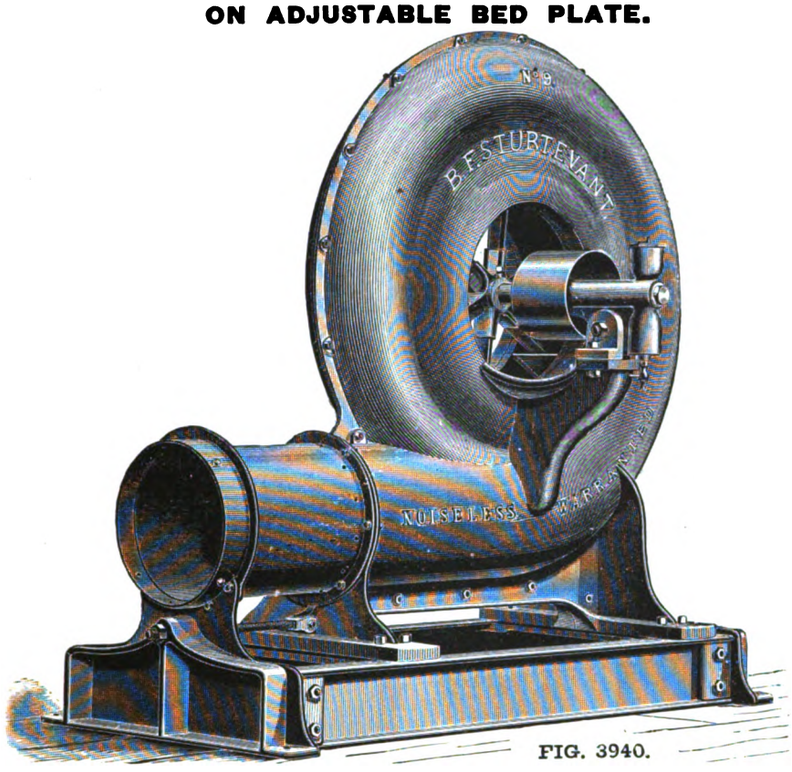


FIG. 3940.

PLAIN.

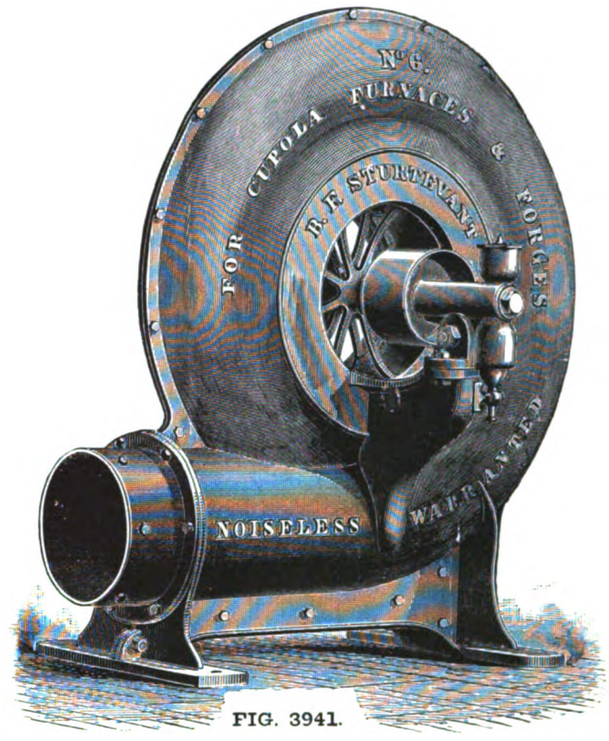


FIG. 3941.

ON ADJUSTABLE BED COMBINED WITH COUNTERSHAFT.

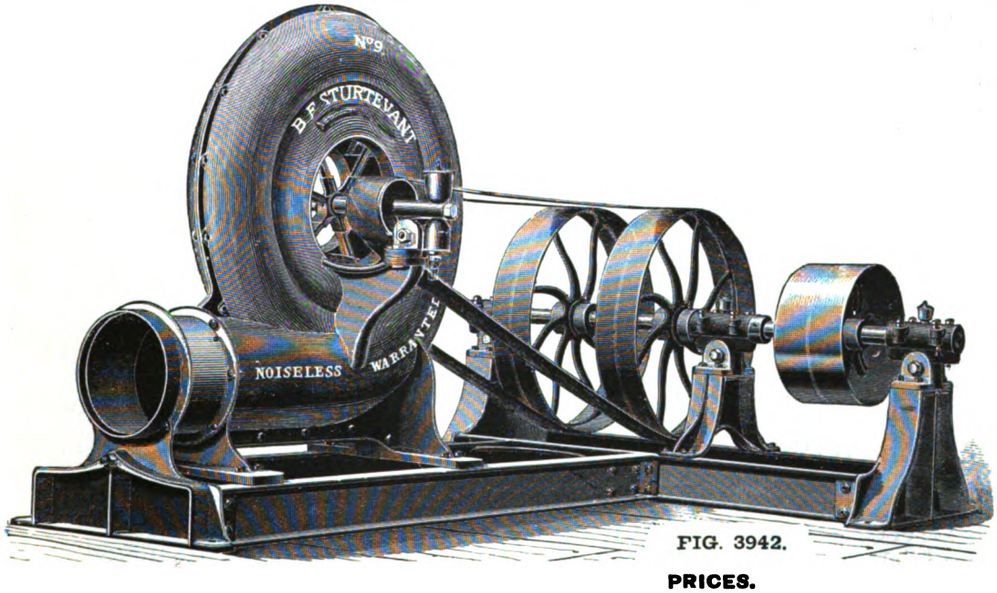


FIG. 3942.

The high speed at which pressure blower belts must run renders it necessary that special attention should be given them. If, while a heat is on in the foundry, the belts begin to run loose or slip, a stoppage is usually necessary to take out the slack, but by means of the arrangements shown above, consisting of a blower, adjustable by a screw, on a wrought iron frame bed—any required tension may be brought upon the belts while running, thus preventing the inconvenience and loss incident to a stoppage of the blower while work is in progress. The use of this bed will be found to result in a decided saving in belts, for relacing is ordinarily put off until a belt will run no longer, but a turn of the nut on the end of the adjusting screw, and re-tightening the holding-down bolts, takes but a moment at any time.

PRICES.

No. of blower.	PRICES, Fig. 3941.	Diameter of cupola suitable for	Melting capacity per hour in lbs.	Speed.	Horse power required.	Outside diameter of outlet.	PULLEY.		WEIGHT.		WEIGHTS.		PRICES.		WEIGHTS.		Prices on application for Fig. 3943.
							Diam.	Face.	Not packed.	Packed.	Fig. 3940. Blower on adjustable bed.	Fig. 3942. Blower on adjust. bed with combined countersh'ft.	Fig. 3940. Blower on adjustable bed.	Fig. 3942. Blower on adjust. bed with combined countersh'ft.	4 to 8 oz. pressure. Fig. 3943.	8 to 12 oz. pressure. Fig. 3943	
0000	$15.00					2 3/4	1 7/8	1 3/8	17	34							
00	20.00					3 1/2	2 5/8	1 7/8	36	64							
0	26.00					4	3	2 1/8	55	90							
1	36.00	22 in.	1,200	4,135	0.5	4 7/8	3 1/2	2 1/2	75	100							
2	44.00	26 "	1,900	3,756	1	5 3/8	3 7/8	2 5/8	96	140							
3	55.00	30 "	2,880	3,250	1.8	6 1/4	4 1/2	3	155	220							
4	70.00	35 "	4,130	3,100	3	7 3/8	5	3 1/2	226	312	335	695	$105.00	$140.00	1,290	1,650	
5	90.00	40 "	6,178	2,900	5.5	8 7/8	5 3/4	4	330	395	485	1,085	135.00	180.00	1,735	2,085	
6	115.00	46 "	8,900	2,820	9.7	10 1/4	6 3/4	4 1/2	460	498	640	1,465	175.00	230.00	2,320	2,775	
7	180.00	53 "	12,500	2,600	16	12	7 7/8	5 3/4	695	740	995	2,250	270.00	360.00	3,650	4,050	
8	225.00	60 "	16,560	2,270	22	13 7/8	9 1/8	6 1/4	870	920	1,365	3,300	340.00	450.00	4,650	5,330	
9	325.00	72 "	23,800	2.100	35	16	10 1/8	8	1,615	1,680	2,185	4,380	490.00	650.00	6,300	6,380	
10	450.00	84 "	33,300	1,815	48	18 1/2	12 5/8	9 3/4	2,095	2,170	2,830	5,935	675.00	900.00	7,935	7,935	

Nos. 0000 to 3 inclusive have only one pulley. Nos. 4 to 10 inclusive have two pulleys.

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STURTEVANT STEEL PRESSURE BLOWERS, ADJUSTABLE BED AND ENGINE.

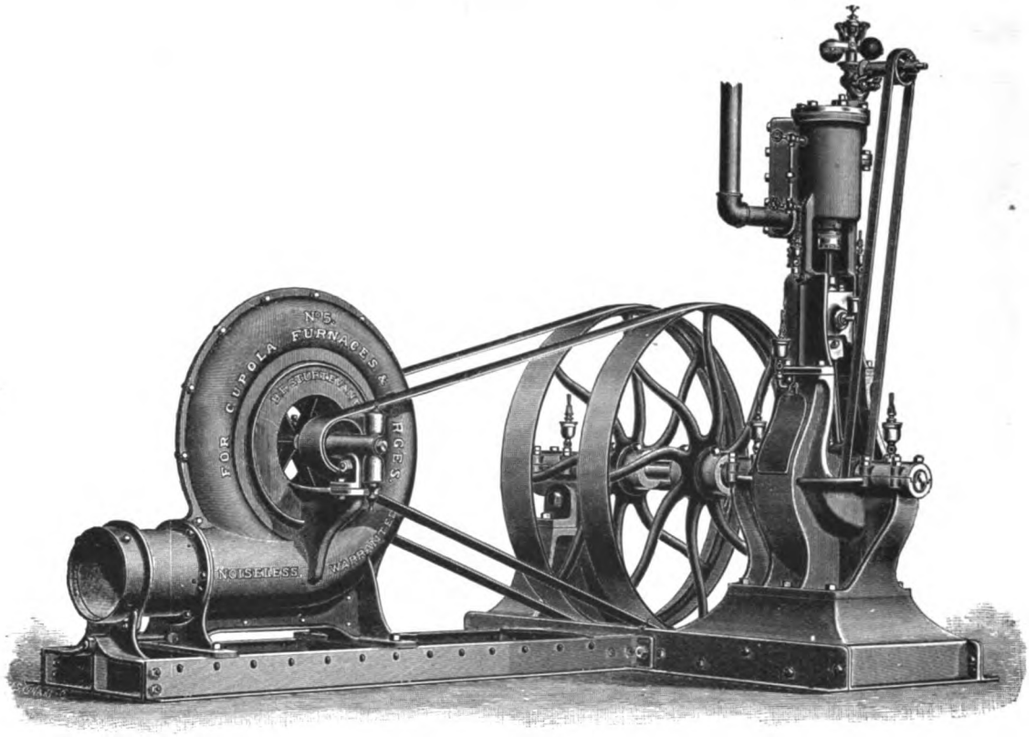


FIG. 3943. SEE TABLE, PAGE 333.

This type of machine represents the acme of convenience and economy. The merits of the adjustable bed have already been pointed out. Its combination with an upright engine insures perfect alignment, rigidity, ease in adjustment, perfect control over the tension of belts, and when desirable, an instantaneous change in the speed of the blower.

MONOGRAM BLOWERS FOR FORGES, BOILERS, ETC.

BOTTOM HORIZONTAL DISCHARGE BLOWER.

RIGHT HAND.

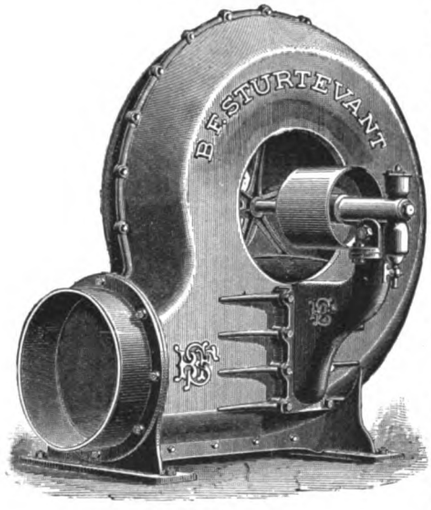


FIG. 3944.

All styles of blowers, exhausters and steam fans are built either right or left hand with the exception of the steel pressure blowers, Nos. 0000 to 3 inclusive, and the monogram blowers in all sizes, which are regularly built right hand, but can be made left hand to fill special orders.

By right hand is meant pulley on right hand as one faces the outlet. By left hand, pulley on left hand side. In the case of up, down, or oblique discharge, this may be better explained by saying that a blower or exhauster is right hand when the pulley is on the right hand as the observer stands at the discharge end of the machine.

When ordering any style of blower or exhauster, always state which hand is wanted, and when it makes no difference, so state in order.

In your correspondence, be sure and state what the blowers are to be used for, whether cupola furnaces, forges or other purposes. If for cupolas, state diameter inside of lining—number and size of tuyeres—quantity to be melted in given time—kind of fuel used—distance blower sets from cupola; if for forges, how many—kind of work—length of pipes, etc.

UP BLAST BLOWER.

LEFT HAND.

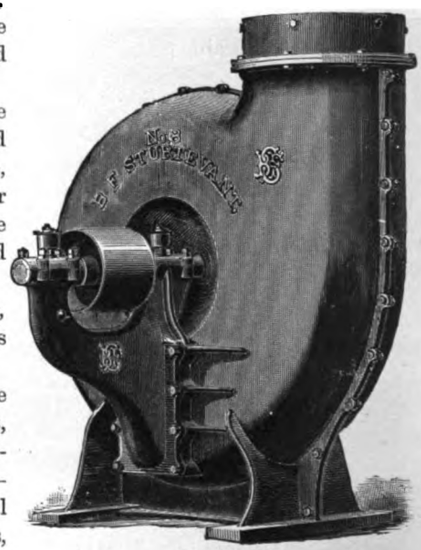


FIG. 3945.

No. of blower or exhauster.	PRICE.	Total height.	Outside diameter of inlet.	Outside diameter of outlet.	Diameter of pulley.	Face of pulley.	Revolutions per min., 2 oz. blast, for boiler fires.	Revolutions per min., 4 oz. blast, for forge fires.	Sq. ft. of boiler grate surface supplied by blower.	WEIGHTS.		Square inches of blast, and number of forges.
										Not packed.	Packed.	
0000	$12.00	10	3 5/8	2 3/4	1 7/8	1 1/4	4,675	6,640	2			
00	15.00	15	4 7/8	4 1/8	2 5/8	1 7/8	3,000	4,000	5	17	41	
0	20.00	18	5 3/4	4 3/4	3	2 1/2	2,600	3,600	6	32	62	
1	26.00	20	6 1/2	5 3/4	3 1/2	2 1/2	2,300	3,200	8	43	88	5
2	33.00	24	7 1/2	7 1/2	4 3/8	3 1/4	1,928	2,682	10	90	135	7
3	44.00	27	9	9	5 1/8	4	1,638	2,279	14	130	198	10
4	55.00	33	10 1/2	10 5/8	6	4 3/4	1,410	1,961	20	195	235	14
5	70.00	40	12 1/4	12 1/4	6 7/8	5 1/4	1,194	1,662	27	305	340	20
6	90.00	45	15	14 3/8	8	6 1/2	1,018	1,417	36	420	460	26
7	150.00	50	16 5/8	16 5/8	8 7/8	7 1/2	878	1,234	48	660	710	36
8	200.00	57	18 5/8	18 3/4	10 1/4	8 7/8	766	1,065	62	1,025	1,185	46
9	250.00	65	21 1/2	21 3/4	12	10 1/2	671	932	80	1,500	1,745	60
10	325.00	77	24 1/2	24 5/8	13 3/4	11 1/4	598	831	100	2,460	2,025	80

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COUNTERSHAFTS FOR FIGS. 3940 TO 3945.

FOR STEEL PRESSURE BLOWERS.

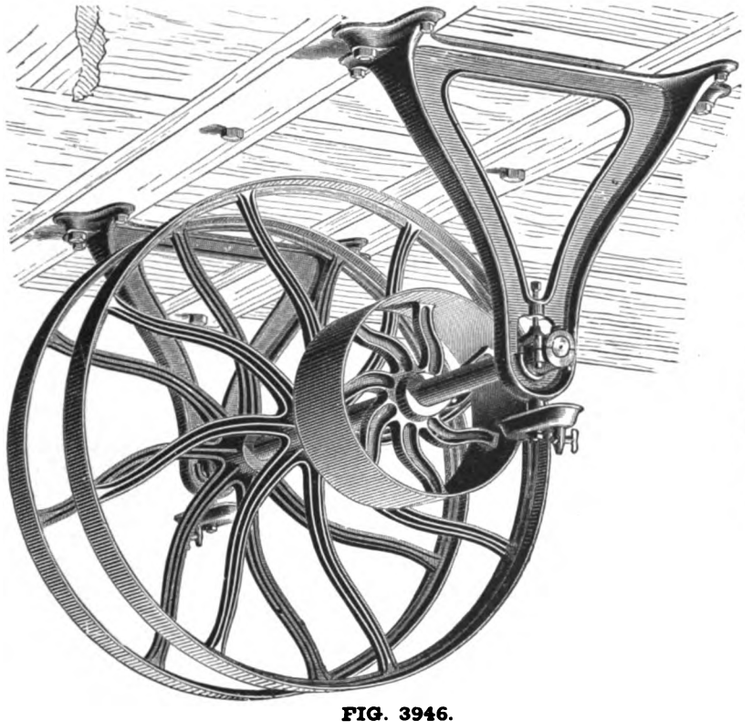


FIG. 3946.

FOR MONOGRAM BLOWERS.

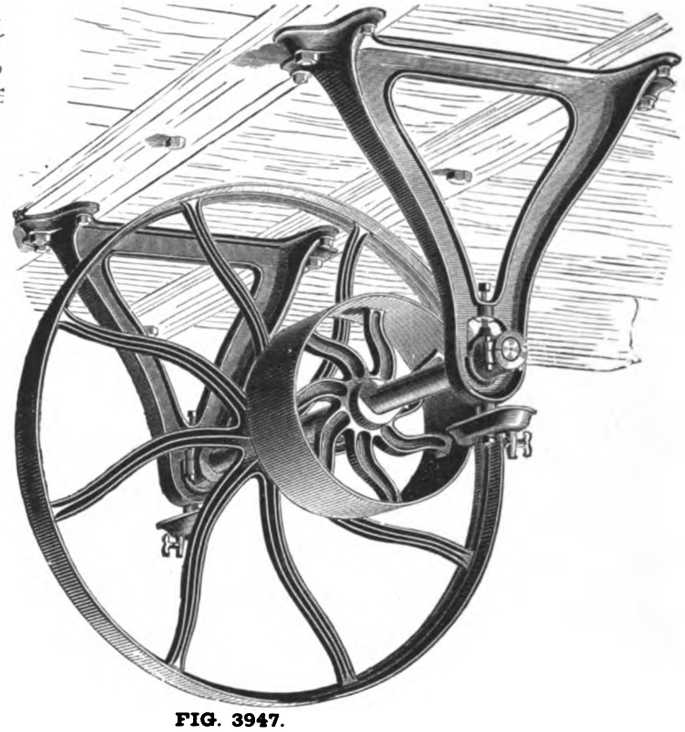


FIG. 3947.

In ordering blowers or exhausters, with countershaft and pulleys, the purchaser should always be particular to give speed of main line of shafting, and the largest pulley that can be used thereon, so that pulleys may be sent to suit the circumstances. It is desirable to get as much speed as possible from main line. Always use as large a pulley as possible on countershaft for main belt.

The shafts are of steel accurately turned to size, the pulleys light but strong, and carefully balanced, and the boxes well babbitted, easily adjustable, and provided with oil drip cups.

When so ordered, tight and loose pulleys are furnished at a nominal additional price, in place of the usual single pulley driven by main belt.

PRICES.

Number of blower.	Diameter of pulley driving blower.	Diameter of pulley driven by main belt from line shaft.	Diameter of shaft.	Fig. 3947. Price with one driving pulley.	Fig. 3946. Price with two driving pulleys.	Number of pulleys on blower.
0000	14	5½, 6	⅞	$8.00	$10.00	Nos. 0000 to 3 inclusive have only one pulley
00						
0	16	6, 7	1	10.00	12.00	
1	18	7, 8	1⅛	12.00	15.00	
2	21	7, 8, 10	1¼	16.00	20.00	
3	24	8, 10, 12	1½	22.00	25.00	
4	28	10, 12, 14	1⅝	30.00	35.00	
5	32	12, 14, 16	1¾	40.00	45.00	Nos. 4 to 10 inclusive have two pulleys.
6	36	12, 14, 16, 18	1 15/16	50.00	60.00	
7	42	14, 16, 18, 20	2 7/16	68.00	80.00	
8, 9	48	18, 20, 22, 24	2 15/16	85.00	100.00	
9, 10	54	18, 20, 22, 24	2 15/16	100.00	125.00	

BLAST GATES.

Prices are the same for lever pattern and slide pattern.

The size indicates the outside diameter of the collar of the blast gate where the pipe slips on.

Sizes 1½ to 3½ made from composition; all other sizes from iron.

LEVER PATTERN.

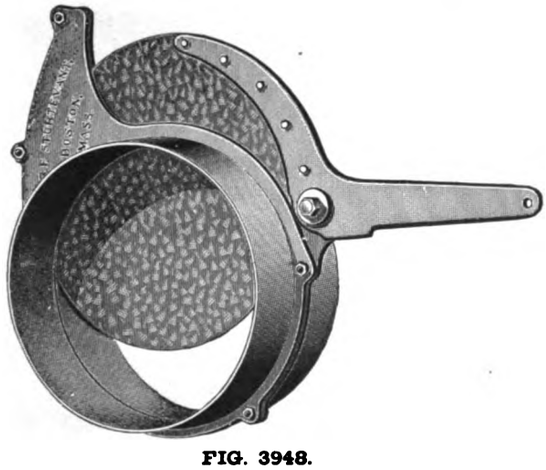


FIG. 3948.

PRICES.

1½	inch	$1.00	8	inch	$3.50
2	"	1.25	9	"	4.00
2½	"	1.50	10	"	4.50
3	"	1.75	12	"	6.00
3½	"	1.85	14	"	8.00
4	"	2.00	15	"	10.00
4½	"	1.75	16	"	12.00
5	"	2.00	18	"	15.00
5½	"	2.40	20	"	18.00
6	"	2.75	24	"	20.00
7	"	3.10	30	"	25.00

SLIDE PATTERN.

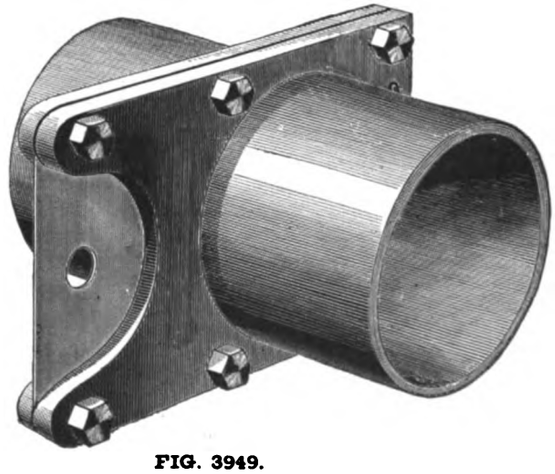


FIG. 3949.

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TABOR AUTOMATIC MOLDING AND DRAWING MACHINE.

NO. 1. **NO. 2.**

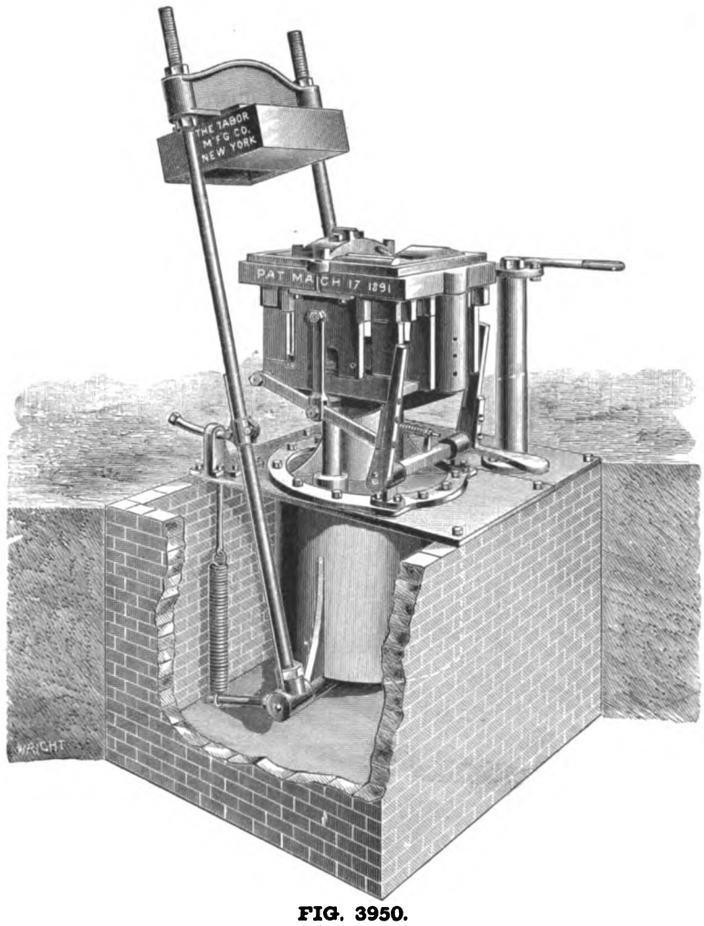


FIG. 3950.

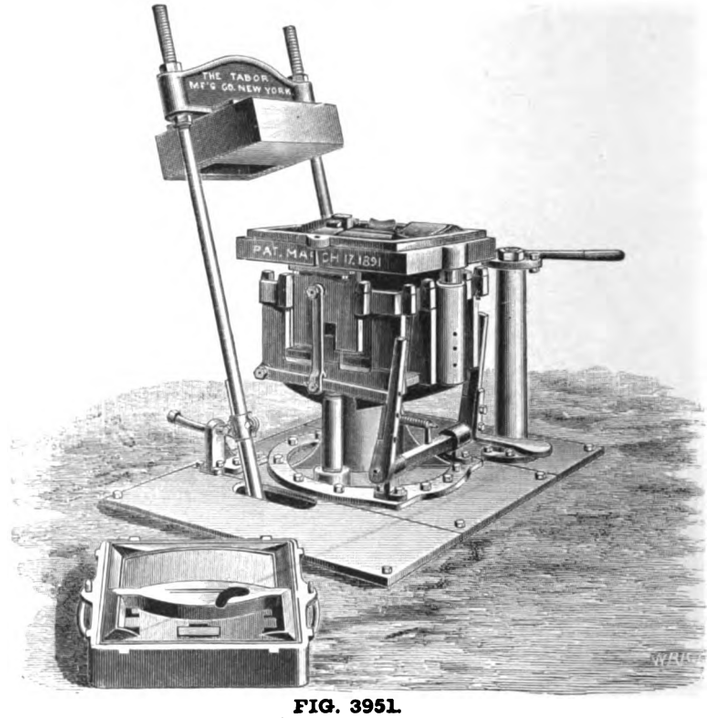


FIG. 3951.

AUTOMATIC POWER MOLDING MACHINE.

These machines are adapted to metal castings made in reasonable quantities. The power used is steam, which may be taken direct from the shop boiler, without the use of other machinery.

Cut No. 1 shows the foundry floor cut away to show the arrangement of cylinder below; this cut also shows the patterns projecting through the stripping-plate, ready for the flask. Cut No. 2 shows the patterns drawn through the stripping-plate after the mold is made. The ramming head is thrown back ready to receive the flask.

The machine, above the floor, consists of a table with upward projecting lugs which support a pattern frame to which is attached the patterns; this pattern frame has an annular space, into which steam is admitted each time a mold is rammed, for the purpose of keeping the patterns warm to prevent sweating, and to make them come cleaner from the sand.

Directly over the pattern frame, and resting on it, is the stripping-plate frame, which supports the stripping-plate; on each side of the machine is a lever, pivoted at the back end to the table, and connected in the middle, by a link, to the stripping-plate frame, the outer end being free. Directly in front of the machine is a tumbling or tripping shaft, with two arms projecting upward and along the line of motion of the free ends of the side levers; these arms are provided with stops, of suitable length, which engage the free ends of the levers on the downward stroke, reducing the motion of the stripping-plate one-half, and drawing the patterns through the stripping-plate. The stripping-plate frame is guided in the bored sockets in the table below, these sockets being provided with air cushions to prevent jar and noise when the stripping-plate is dropped.

The operation of making a mold is very simple. After the flask and sand box are put on the machine and filled with sand, the ramming head is brought forward against stops, the throttle quickly opened and the mold rammed; the throttle is then quickly closed, the same motion opening the exhaust, and the table descends, the free ends of the levers engaging the stops on the way and gently drawing the pattern from the sand; the ramming head is then pushed back, the sand struck off the flask, and the flask removed. As the flask is taken from the machine, the operator steps on the treadle, which disengages the stops, allowing the stripping-plate to descend ready for the next flask.

The capacity of these machines depends largely upon the number of molds that can be taken care of after they leave the machine.

The ramming head is of hard wood roughly cut out to approximate the pattern, which prevents too hard ramming over the pattern. This head may be readily changed to suit any sized flask within the limit of the machine.

For small snap-flask work these machines are made duplex, so that both parts of the mold may be made at one operation.

SIZES OF FLASKS.—16 x 16 inches; 20 x 20 inches; 24 x 24 inches; 30 x 30 inches. **PRICES ON APPLICATION.**

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TABOR AUTOMATIC DUPLEX MOLDING AND DRAWING MACHINE.

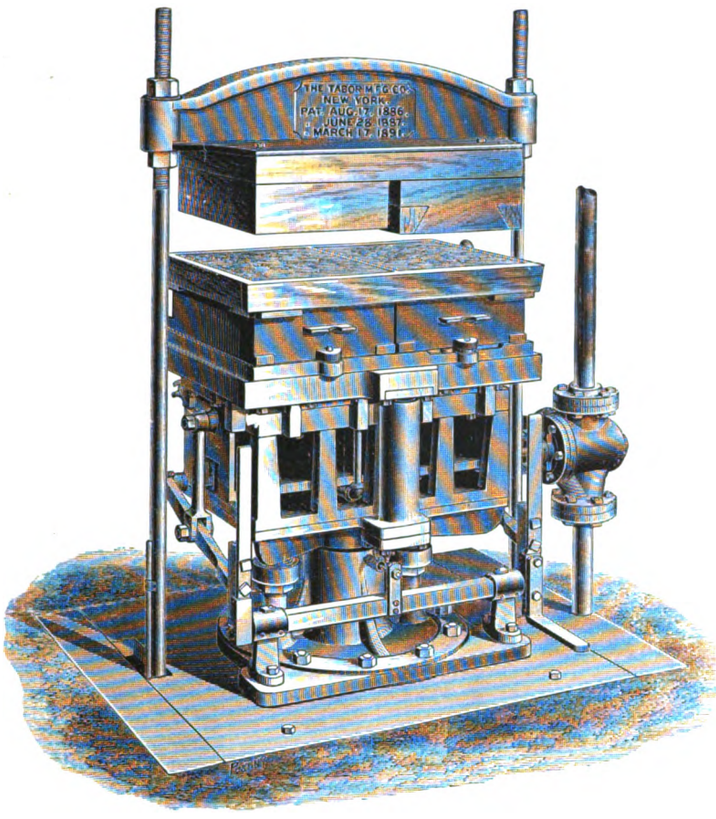


FIG. 3952.

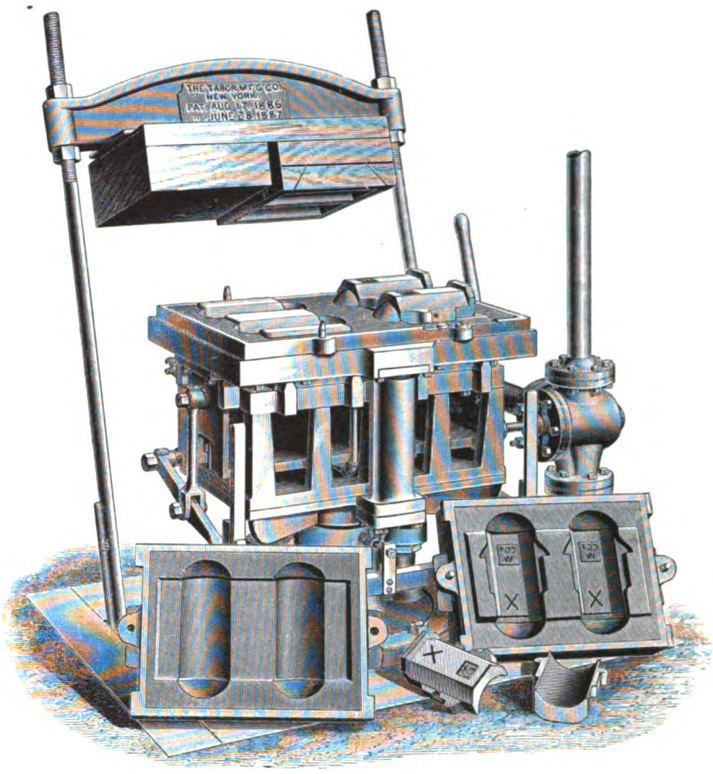


FIG. 3953.

The above cuts represent our Automatic Duplex Molding Machine for making light castings.

Fig. 3952 shows the machine with flasks on, filled with sand, ready for ramming, and Fig. 3953 illustrates same after a complete mold has been made by one operation of machine. In this case the patterns molded are journal bearings—brass—for railway cars of 60,000 lbs. capacity.

Our duplex was designed especially to meet the requirements of iron and brass founders who are engaged in making light castings for the trade, where competition is severe and prices low.

Its distinctive feature, when compared with our standard single machine, shown on opposite page, is in molding both parts of flask at one operation. It is, in fact, two machines in one and will make a complete mold, or two nowels or two copes for separate molds in the same time, and with the same operations that are required to make a half mold on our single machine.

The duplex principle enables us to make a great saving in molding light bench work, which has, until the introduction of this machine, been confined almost solely to hand labor.

Sand will stick to cold metal patterns and often cause a break in the mold. We avoid this, in our system of molding, by keeping the patterns constantly warmed by the steam used for ramming, which enables us, in many cases, to dispense with stripping-plates and use the ordinary match-plates; when this is done the match-plate is automatically drawn from the mold by the machine, the same as patterns are drawn through a stripping-plate.

Power molding machines are ordinarily so constructed that each machine is limited to one size flask only, which is a serious defect, and often compels the use of several machines to do work which would go on one if it were more universal in its range. Our machines possess this feature, and will mold any size of flask within the ramming capacity of the cylinder; they will also conform to any irregular shape in flask, which is often necessary, when cheap castings are made, to save handling a needless amount of sand.

We recommend the duplex machine especially for steam fittings, such as sight-feed lubricators, injectors, globe, gate, angle and check-valve bodies in brass; elbows, tees, return bends and all valve cases in iron; plumbers' supplies, such as brass fittings and iron tees, Y's and bends; sewing machine castings and hardware; agricultural implements and lighter car castings, such as brake-shoes and journal bearings, and, in fact, bench work generally.

Our duplex may also be used as a single machine when desired, and when so used will take a much larger flask. Our 16 inch machine—16 inch cylinder—when working duplex will take both parts of flask 12 x 15 inch, and when working single will take one-half of flask 15 x 24 inch.

When flasks are not too heavy one man will operate machine economically. A fair laborer, running a duplex with flasks 12 x 15 inch of average depth, should mold from 25 to 40 complete molds per hour, the number depending on the amount of core setting. An additional man on the machine would give a greatly increased product and would make it more economical.

The value of a successful molding machine in a foundry which has a fair amount of duplicate work cannot be estimated. We believe the molding machine is destined to do for the foundry what the turret lathe and milling machine have done in the machine shop, viz., reduce cost and increase quality, and this with a class of labor which is within the reach of all. It has been said of the turret lathe that its use is limited only by the skill and ingenuity of the tool maker; if we substitute pattern maker the same may be said of a good molding machine.

We do not standardize our machines according to flask for the reason that each machine will take a variety of sizes.

We make machines with the following size cylinders which can be furnished with reasonable promptness:

30 inch	single.	20 inch	single and duplex.	PRICES ON APPLICATION.
24 "	"	16 "	" " "	

We solicit correspondence, and will make propositions to furnish machines for molding castings, if samples are sent to us.

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PULLEY MOLDING MACHINES.

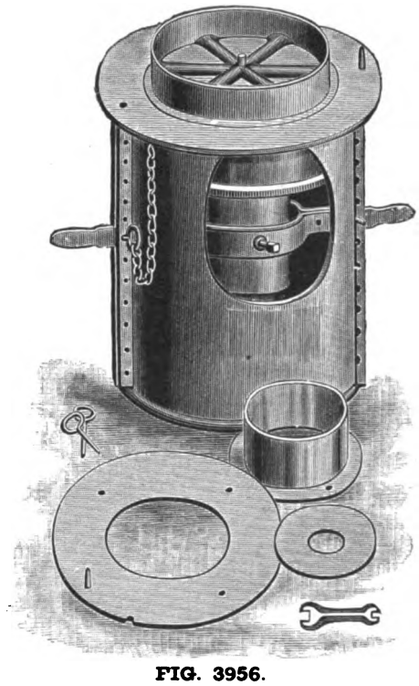


FIG. 3956.

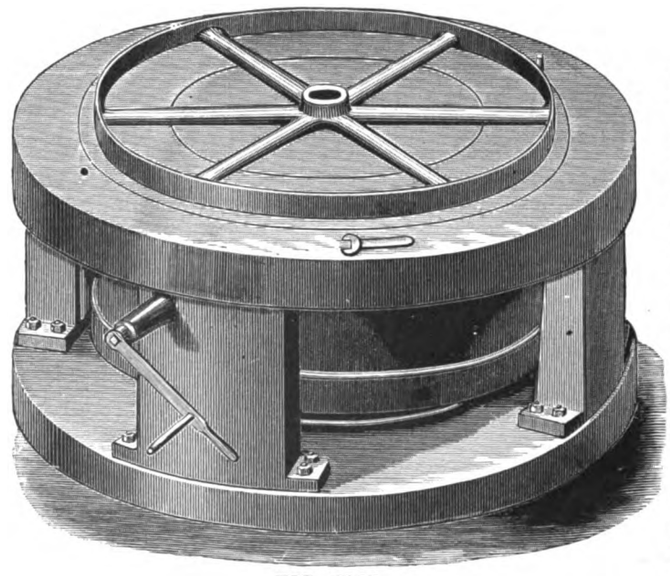


FIG. 3957.

These machines are designed to overcome the difficulties of molding pulleys from ordinary patterns. The two most common kinds of pulley patterns are the straight draw rim with whole arms separate from the rim, and the pattern in halves split through the center of the arms with draft both ways from the center. With the first of these the pulley castings can be made any desired width greater than width of pattern, by drawing the pattern up in the sand, or it can be made of the same width as pattern; but cannot be made narrower without much trouble.

The method, however, of molding pulleys in this manner—involving as it does the use of a three-parted mold and anchor plates for lifting the center above the arms—is too expensive for the smaller sizes, and an excessive amount of drawing produces a casting which is anything but true.

The second method, where the pattern is made in halves split through center of arms, will produce a good casting—if made in an iron flask—but will only make a casting of the width of pattern, without sacrificing the quality of the casting. Now, as there is an average of twenty widths required for each diameter of pulley, and from 6 inch to 24 inch diameter inclusive by inches takes nineteen patterns with only one width of face, it would require the enormous number of three hundred and eighty patterns to make the ordinary range of work within those sizes, which is, of course, out of the question.

With the molding machines only the nineteen patterns are required, and the faces can be made from one inch up to the maximum by any variation desired; the edges of rim are exactly parallel with each other, requiring only a touch with tool to finish; the faces are so true that for rough work they can be run without turning. There is no rapping required in drawing the patterns, and as they are made with a heavy flange on one edge will not get out of shape, but will remain perfectly round. By having three or four weights of arm patterns for the different faces there is no trouble in getting just the proportion wanted. For the smaller sizes snap flasks can be used, having one flask and a large number of plain rings. The rim pattern can be used as pattern in making flasks—each machine furnishing outside rims for all its own flasks except the largest one.

PRICES.

No. 1,	with	10	patterns,	from	6	to	15	inches	diameter	by		inches.	Faces	from	11	inches	to	30	inches	$318.00
No. 1,	"	5	"	"	6	to	14	"	"	"	2	"	"	"	"	"	"	"		223.00
No. 2,	"	9	"	"	16	to	24	"	"	"		"	"	"	"	"	"	"		598.00
No. 2,	"	5	"	"	16	to	24	"	"	"	2	"	"	"	"	"	"	"		418.00
No. 3,	"	12	"	"	25	to	36	"	"	"		"	"	"	"	"	"	"		1,210.00
No. 3,	"	6	"	"	25	to	36	"	"	"	2	"	"	"	"	"	"	"		805.00
No. 4,	"	12	"	"	37	to	48	"	"	"		"	"	"	"	"	"	"		1,755.00
No. 4,	"	6	"	"	37	to	48	"	"	"	2	"	"	"	"	"	"	"		1,215.00

CORE OVENS.

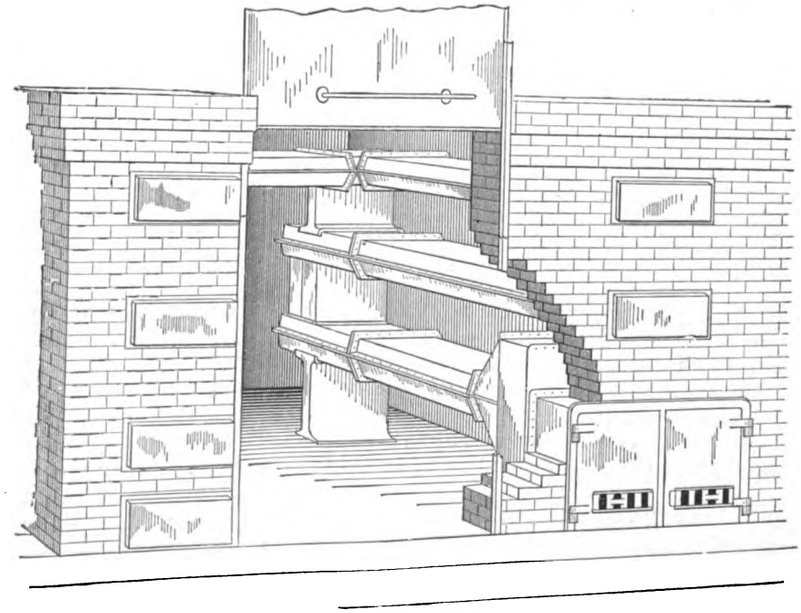


FIG. 3958.

The stove is 42 inches long, 32 inches wide and 33 inches high, and has a grate 14 inches long, 24 inches wide. The flue runs from the stove in three or four horizontal sections the entire length of the oven on each side, and is connected at the outlet, which is usually placed in the corner diagonally opposite the stove, with a chimney or stack where there is a good draft. The flue is 16 inches wide on top and forms a series of shelves.

For ovens much larger than 800 cubic feet, inside volume, two stoves are required.

This arrangement is suitable either for small ovens where only small cores are baked, or for larger ovens where a carriage is used with adjustable shelves, on which cores of any size are baked.

Prices are furnished on receipt of sketch or drawing showing the dimensions of the oven and location of chimney and door.

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CORE OVENS.

DESCRIPTION, FIG. 3959.

In the cut as shown, there are seven shelves or grates upon which the cores are placed for baking. Each of these shelves is independent of the other, and by means of the duplicate door on the back of each grate, when the grate is opened wide the back door closes the oven, hereby retaining the heat in the oven. Six of these doors, as shown in the cut, are 5 inches high, and one 10 inches high. They can be made of any height desired, and any number wished in each front.

The dimensions of the oven front as shown in the cut, are—

Extreme width.....A to C. ....42 inches.
Extreme height.....A to B .....63 inches
Width of doors ....32 inches.

Prices on application for the castings all ready to set in brick work.

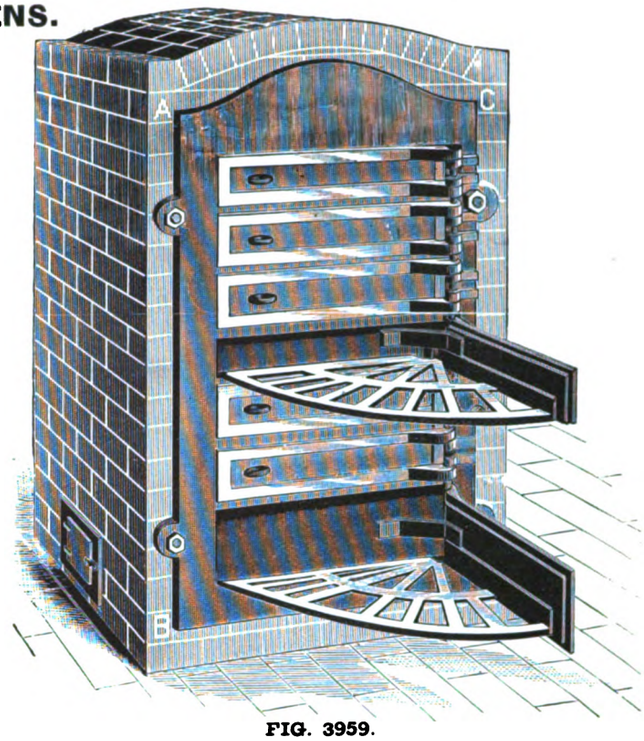


FIG. 3959.

TUMBLING BARRELS.

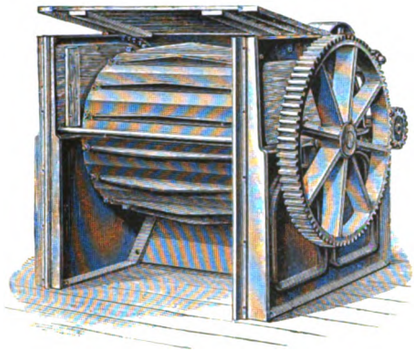


FIG. 3960.

They have iron frames, self-oiling boxes, and so encased as to keep all dust from bearings and the room.

These we are prepared to furnish either completed or the castings for same, in three sizes, as follows:

No.	Inside diameter.	Length.	Weight about.	PRICE.
1	23½ inches.	26 inches.	2,500 lbs.	$.....
2	31½ "	31½ "	4,800 "	.....
3	31½ "	52 "	5,700 "	.....

Floor space, No. 1, 44 in. x 54 in.; No. 2, 58 in. x 64 in.; No. 3, 69 in. x 82 in.

TUMBLING BARRELS.

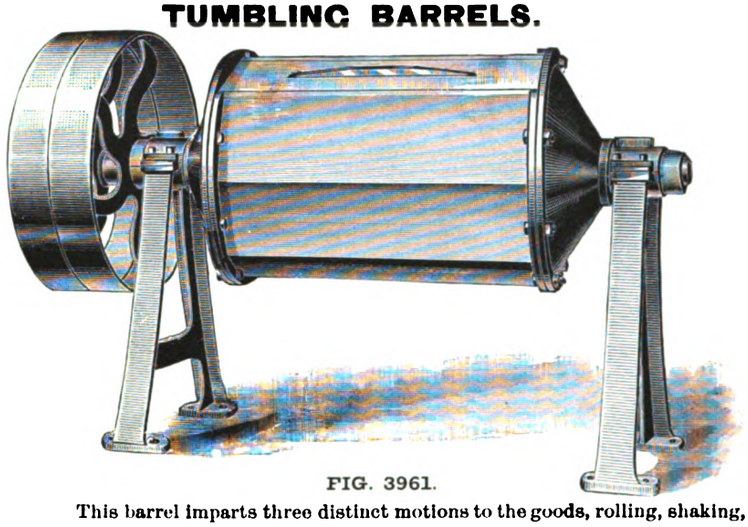


FIG. 3961.

This barrel imparts three distinct motions to the goods, rolling, shaking, spreading, and does its work very rapidly.

Convex head tumbling barrel, exhaust or non-exhaust.

Two sizes, 20 in. x 30 in., 26 in. x 30 in., between heads.

PRICE, $.....

TUMBLING BARRELS.

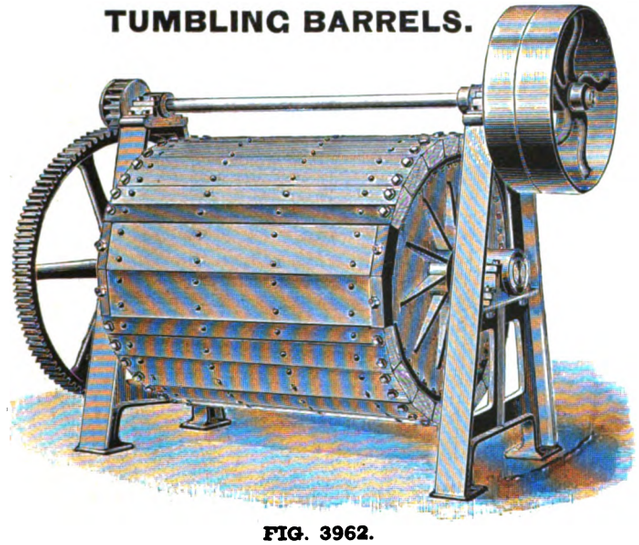


FIG. 3962.

Foundry tumbling barrels, non-exhaust. Size, 45 in. x 48 in.

WEIGHT, 4,780 LBS.

Has hard wood staves, lined with steel plates.

PRICE, $.....

DESCRIPTION, FIG. 3963.

Foundry tumbling barrels, exhaust or non-exhaust.

Sizes, 30 in. and 33 in. x 42 in. or 48 in. Two patterns of each size, medium and extra heavy.

Has wooden staves, steel lined. Shaft above or behind.

PRICE, $.....

TUMBLING BARRELS.

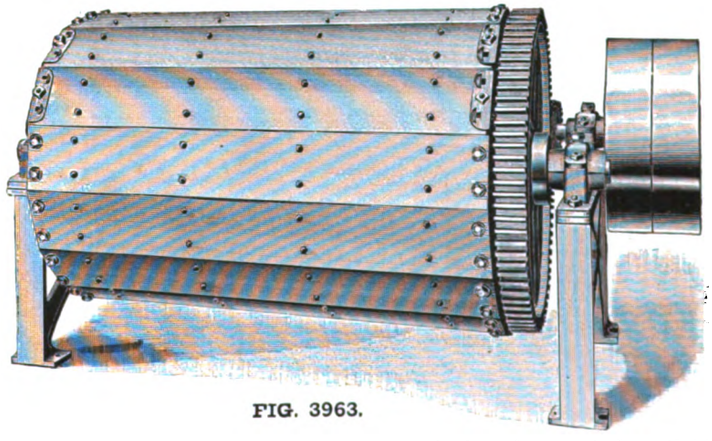


FIG. 3963.

Prices furnished on application. When writing for prices, please state the number and kind of barrels wanted, and whether they are to have tight and loose pulleys, friction gears or spur gears, high shaft or low shaft.

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SODA KETTLE.

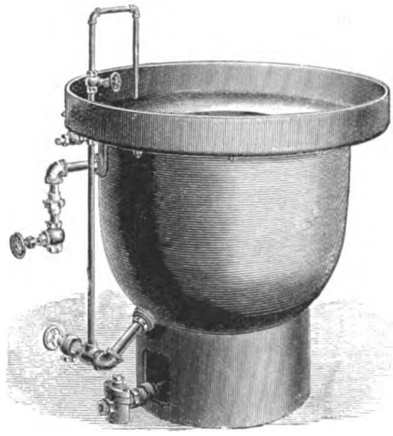


FIG. 3964.

This kettle is used for cleaning or removing grease and dirt from small tools or parts of machines. A coil of steam pipe is employed to thoroughly heat the water, in which a quantity of soda has been placed, and the pieces immersed in the solution become so warm that when taken out they dry without rusting.

The kettles are usually made with round tops and stand in the center of the room among the machines, but they are made with square tops when it is desired to place them against a wall or in a corner.

Outside diameter of top plate, 38 in.; diameter of kettle, 29 in.; diameter of inside coil of pipe, 24 in.; height from floor to top of flange, 37 in.; depth of kettle, 22 in.; diameter of wire basket or cage for receiving the work, 11 in.; capacity of kettle, about 60 gallons.

A perforated bucket or shaker $6\frac{1}{4}$ in. diameter, 13 in. long, is conveniently used in washing small pieces. Weight, about 750 lbs.

The price includes interior coil of pipe, wire basket, perforated bucket or shaker and the pipe with valves.

PRICE, $.....

ANNEALING FURNACE.

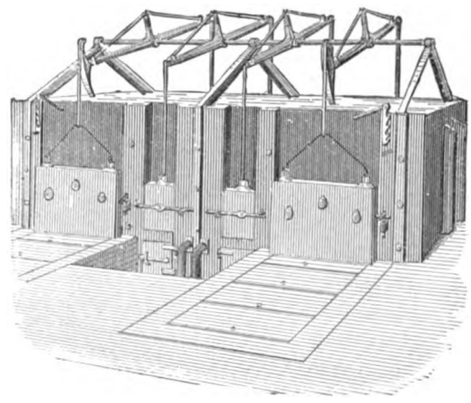


FIG. 3965.

These furnaces were designed for the expeditious and economical annealing of cast iron or steel, and have proved entirely satisfactory, many of them having been in use for a number of years. We make two sizes, which are similar in construction, consisting of iron plates to enclose the necessary space, which serve also as guides for the doors, which are raised perpendicularly (except the oven doors for the large furnace, which swing by means of a lever), and are balanced by a weight at the back of the furnace. The separate plates are held together by bolts, and also tie-rods extending through the brick work longitudinally and transversely. The inside of furnace consists of fire space and the oven proper, an arch extending over both, the fire space being separated by a bridge wall extending nearly to arch, leaving only a narrow space through which the flame is forced by the blast, completely filling the oven, the escape of gases being through small outlets in the corners, to the flues below, the flues being fitted with a damper operated from the front.

Oven and fire doors are lined with tiles; the oven floor is also of tiles.

PRICES ON APPLICATION.

CASE HARDENING FURNACE.

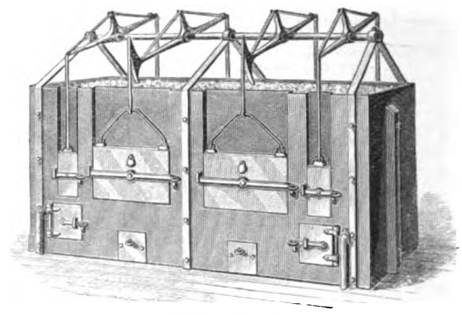


FIG. 3966.

The above cut shows case hardening furnaces, which are very similar to the annealing furnaces except that the oven floor is about 24 in. above the ground, for convenience in handling the small boxes used in them. They can be used equally well for annealing.

In ordering single furnaces of either kind, it is best to decide in which corner of the room it is to be placed, so that in case additions were to be made in the future, the proper one might be placed at first, to allow for the same.

We call them right or left hand, to go in the right or left hand corner of the room respectively, when facing the furnace, or as shown in the cut.

Floor space and size of oven for small annealing furnace.

Single oven.....6 ft. 2 in. x 7 ft. 5 in.
Double oven.....6 ft. 2 in. x 13 ft. 9 in.
Size of oven....4 ft. 10 in. x 2 ft. 10 in. x 1 ft. 10 in.

Floor space and size of oven for large annealing furnace.

Single oven.....8 ft. x 9 ft.
Double oven.....8 ft. x 17 ft.
Size of oven.....5 ft. $3\frac{1}{2}$ in. x 4 ft. x 2 ft. 5 in.

Floor space and size of oven for case hardening furnace.

Single oven.....6 ft. 7 in. x 6 ft. 10 in.
Double oven.....6 ft. 7 in. x 12 ft. 2 in.
Size of oven.....4 ft. 3 in. x 2 ft. 3 in. x 1 ft. 1 in.

Flue at back of each of above furnaces, 18 in. square.

IMPROVED HAND SAND-SIFTER.

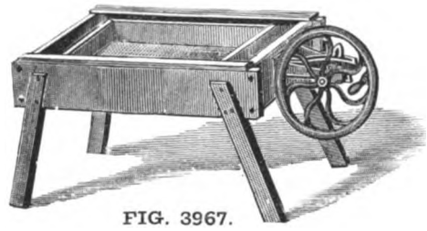


FIG. 3967.

PRICES.

Including one sieve, No. 6 Mesh.....$33.00
Extra sieves, each extra, net.....4.00

Weight of machine, 125 lbs. Extreme length, 4 ft. 9 in. Breadth, 2 ft. Height, 2 ft. 5 in. Dimension of sieve, 2 ft. 4 in. x 17 in. Motion, $1\frac{1}{2}$ in.

POWER SAND-SIFTER.

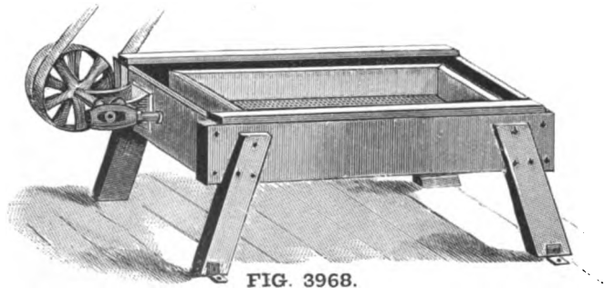


FIG. 3968.

PRICES.

Power sifter, complete, without countershaft, with one sieve.....$80.00
Extra sieves, each extra.....6.00
Countershaft, extra.....25.00

Extreme length, 7 ft. Extreme width, 2 ft. 8 in. Extreme height, 2 ft. 5 in. Weight, 160 lbs. Shipping weight, 225 lbs. Dimensions of sieve, 4 ft. 5 in. by 1 ft. 5 in., inside measurement. Motion, 3 in.

FUEL OIL HEATING FURNACE.

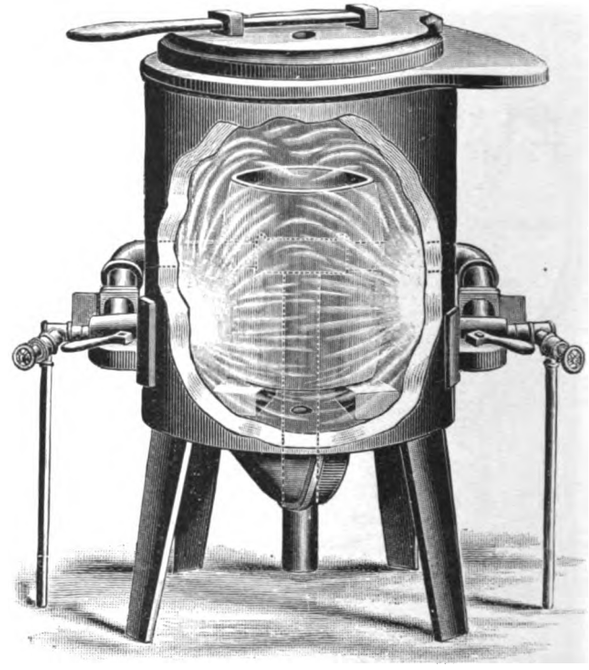


FIG. 3969.

This is a crucible furnace for melting brass, copper or iron. The oil is vaporized with a hot blast, the arrangement for doing which is complete in the furnace. The blast is furnished from an ordinary blower needing about 7 oz. pressure.

PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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GRINDSTONE TROUGHS.

The trough is a single casting mounted on wheels, with an opening at its base for the removal of sediment and slushing out, for which purpose it may easily be wheeled to a suitable place. In the same way it may be moved to tighten the belt when change in diameter of the stone makes it necessary to change pulleys.

The stone is hung on a square steel arbor with large journals running in self-oiling boxes, and is secured centrally in the trough by a nut and large washer on each side. Water running over the grinding rest, or the truing device, will return to the trough.

The truing device consists of wheels with faces of sharp teeth, mounted on a shaft held in a frame. To true the stone, the frame is moved with a screw to bring the wheels in contact with it and by means of a lever pushed back and forth across the face of the stone, thus making the stone a true circle with a smooth and straight face, in the quickest possible time and without making any dust.

Price, to take in stone 60 inches by 8 inches, - - - - - - $..... Weight ..... lbs.
Extra for truing device (see Fig. 3980), - - - - - - - $..... " ..... lbs.
Price, to take in stone 48 inches by 8 inches, - - - - - - $..... " ..... lbs.
Extra for truing device (see Fig. 3980), - - - - - - - $..... " ..... lbs.

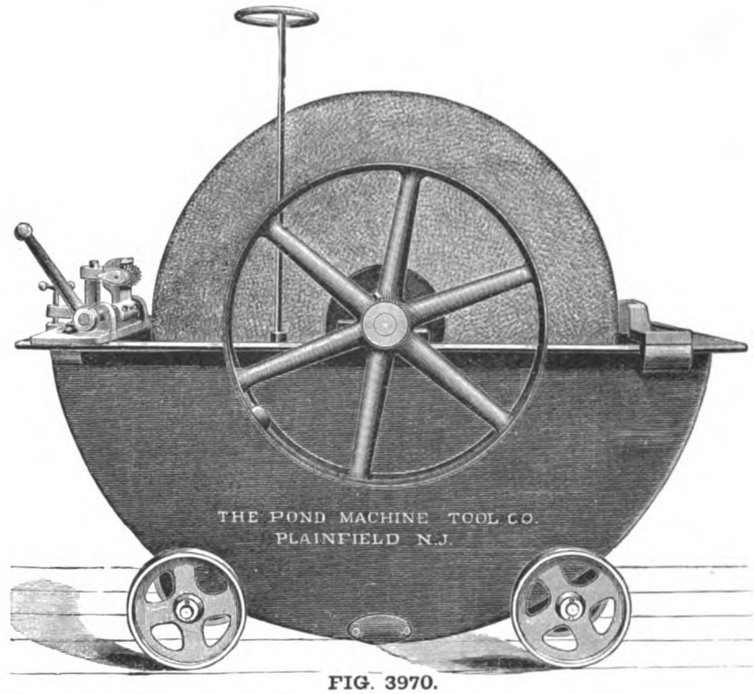


FIG. 3970.

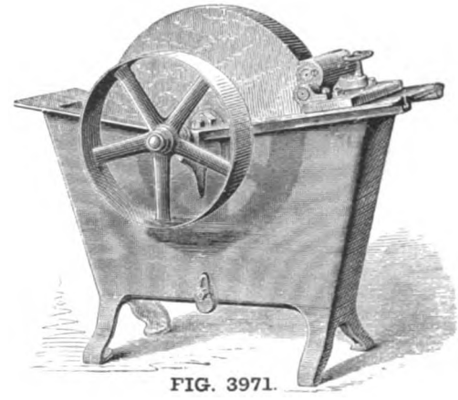
This cut represents a grindstone trough combining a number of very desirable qualities. In addition to the ordinary arrangement of trough, spindle and pulley, which is 20 inches diam. and 4½ inch face, it is provided with self-oiling boxes, and an adjustable truing device, which can be instantly applied to the face of the stone, working automatically, and without dust, keeping the face always in good shape without interfering with its constant use.

DIRECTIONS.—The stone should revolve so as to have the device upon the face which moves upwards. The main stand or bottom piece of the device is securely clamped upon the trough close to the face of the stone; then by turning the hand wheel, the threaded roll is brought into contact with the stone and allowed to remain as long as is requisite to produce the desired result. The water is to be left in the trough as usual. When, by long use, the thread on the hardened roll becomes worn, it can be recut, which operation may be repeatedly performed.

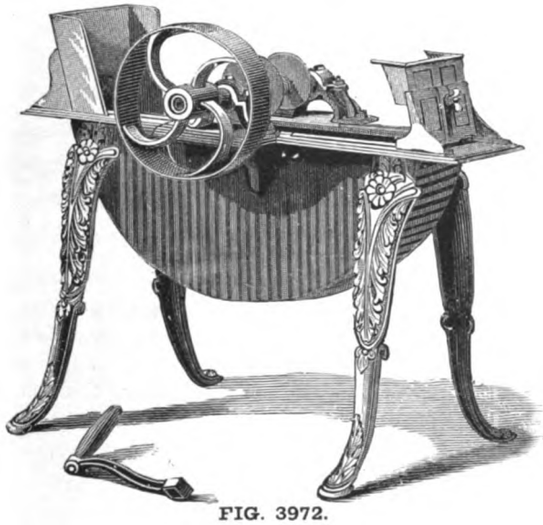
Weight, 650 lbs. ; with 40 inch stone, 1,250 lbs.

Price, without stone, $..... Price, stone included, $.....

Price, including stone and dresser, $.....


FIG. 3971.

IMPROVED CAST IRON GRINDSTONE FRAME, ARRANGED FOR POWER.


FIG. 3972.

PRICES.

Price, with pulley for power, to swing stone 30x4½ in.... $15.00
" arranged with pulley and treadle for power and foot. 16.00
" for size to swing stone 48x6 inches, with pulley for power..... 50.00

CAST IRON GRINDSTONE FRAME, ARRANGED TO BE WORKED BY HAND OR FOOT.


FIG. 3973.

PRICE.

Suitable to swing 30x4½ inch stone, each..... $12.00

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GRINDSTONE TROUGHS.

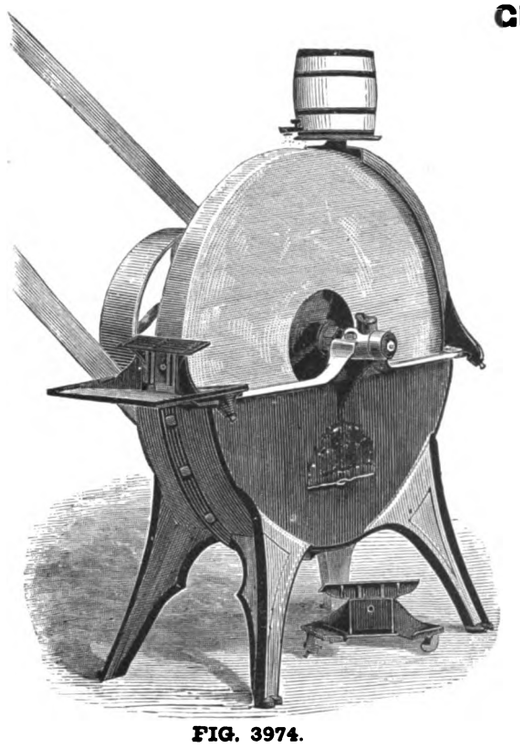


FIG. 3974.

PRICES, WITHOUT PULLEY OR STONE.

No. 1,	to take a	30	inch x	4	inch stone, with tool rest		$33.00
No. 2,	"	36	" x	6	" " "		45.00
No. 3,	"	48	" x	8	" " "		85.00
No. 4,	"	60	" x	10	" " "		130.00

Extra tool rests, Nos. 1 and 2, $4.00; No. 3, $5.00.

SHIELD AND STAND TO HOLD KEG TO DRIP WATER ON THE STONE.

For No. 1 frame	$3.50
For No. 2 "	5.00
For No. 3 "	6.00

Boxing, when required, extra.

STEEL GRINDSTONE ARBORS.

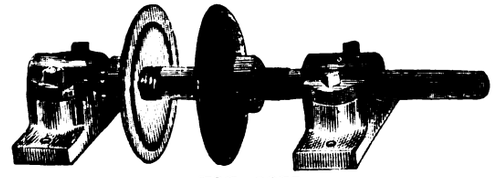


FIG. 3975.

PRICES.

Number (see Figs. 3976 and 3977)	0	1	2	3	4
Shaft, flanges and journal boxes	$5.00	$5.50	$6.00	$7.00	$8.50

WITH TREADLE.

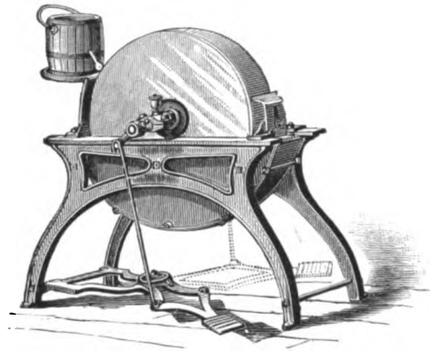


FIG. 3977.

WITH PULLEY.

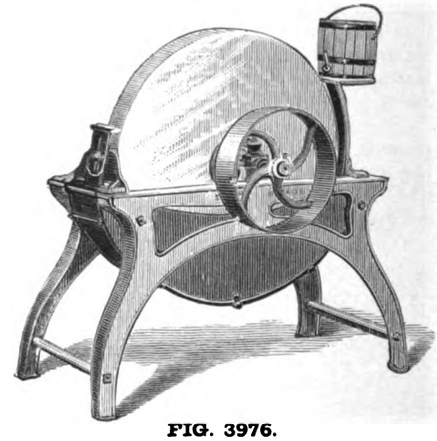


FIG. 3976.

Metal oilers on journal boxes. The dripping from tool-rest drains into the trough. Foot power frame has swivel treadle for right or left foot.

Extra heavy steel arbors, babbitt metal journal boxes, heavy flanges and nuts.

PRICES.

Number	1	2	3	4	5	6	7
Power applied by	Treadle.	Pulley.	Treadle and pulley.	Pulley.	Pulley.	Pulley.	Pulley.
Without stone	$12.00	$12.00	$13.50	$13.00	$18.50	$22.00	$35.00
With stone	14.00	14.00	15.50	15.00	22.00	26.00	40.00
Size of stone	24 x 2½ in.	24 x 2½ in.	24 x 2½ in.	24 x 3 in.	27 x 3½ in.	30 x 4 in.	36 x 5 to 6 in.
Shield, pan and bucket	$1.00	$1.00	$1.00	$1.00	$2.00	$2.00	$2.00
Hand crank	.50	.50	.50	.50	.75	.75	1.00

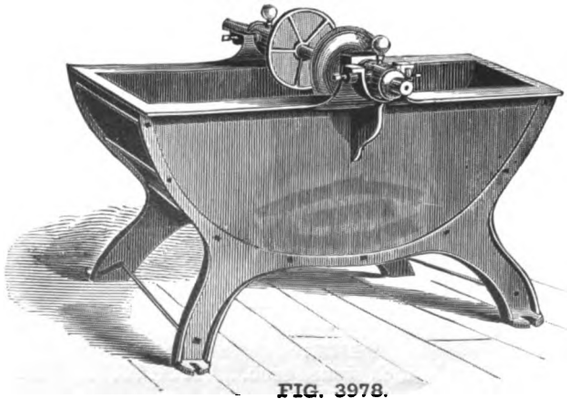


FIG. 3978.

It is provided with a shield to prevent the discharge of the water from the stone, and an adjustable rest with grooves for holding the tool, which will be appreciated by all mechanics. The frame is water tight, has the universal journal box, and the bearings are effectually protected from the grit of the stone. The arbor is made with flanges and nuts, and so arranged that a heavy stone can be hung with as little trouble, and held as firmly as a saw.

PRICES.

NOT INCLUDING STONE.

No. 4,	take stone	4	inches face,	30	inches diameter		$25.00
No. 5,	"	5	" "	42	" "		35.00
No. 6,	"	8	" "	54	" "		50.00

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GRINDSTONE TROUGHS.

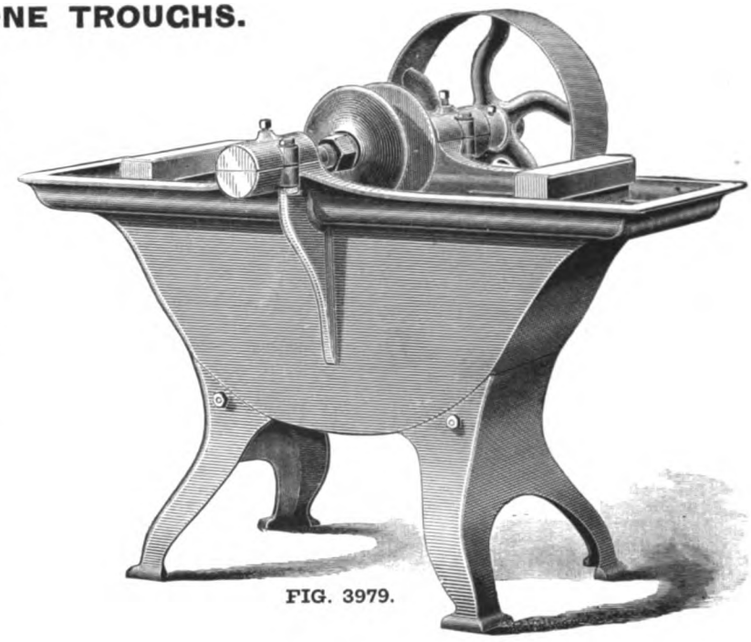


FIG. 3979.

DESCRIPTION, FIG. 3979.

The casting is neat in appearance, and all around the top has an ample gutter that catches about all the water that flies from the stone. At the bottom is a plug that can be removed when the trough is to be emptied. The shaft is carried in self-oiling and self-adjusting boxes, and is thoroughly protected from the excessive wear that is common to the usual arrangement.

PRICES.

Price of frame for 36-inch stone, with shaft, boxes and pulley, 20 in. diam., 4 in. face.....$35.00
Price of frame for 48-inch stone, with shaft, boxes and pulley, 22 in. diam., 4 in. face.....$45.00

GRINDSTONE DRESSING MACHINE.

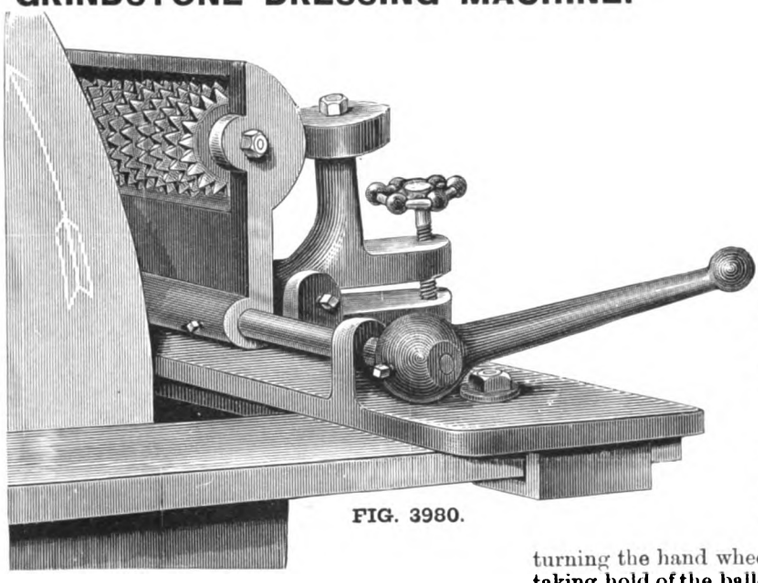


FIG. 3980.

DESCRIPTION, FIG. 3980.

The discs or spurs are placed in gangs on a rod held in a fixture, and brought into contact with the stone. The spurs revolve independently, and pick the surface instead of scraping it, thereby preventing dust, and at the same time the work is done much quicker than with the rod, or even than with the carbon point.

The great point to be gained in a machine shop is the truing of the grindstone without making a dust.

The machine presented herewith is simply a new application of an old principle, and will be readily understood by any mechanic who will examine the cut.

The carrier—which is pivoted—is fed against the stone by turning the hand wheel with one hand, while it is moved backward and forward by taking hold of the balled lever with the other hand.

When not in use the spurs are held off the stone by the weight of the lever.

	PRICES.	WEIGHT.
No. 1. For 6 in. face and under	$15.00	60 lbs.
No. 2. For 6½ to 14 in. face	30.00	140 "
Extra spurs	1.00 per set.	

MOUNTED GRINDSTONES.

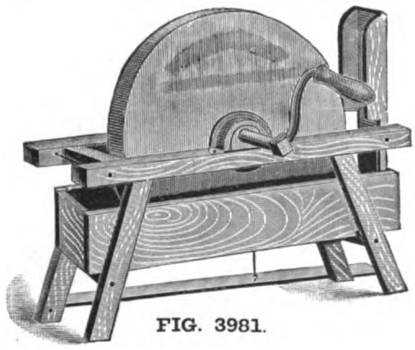


FIG. 3981.

ON OAK FRAMES, WITH FOOT TREADLE, CRANK AND WATER BOXES.

PRICES, INCLUDING STONE.

50 lbs.,	18 in.	diam. x 2½ to 3 in.	face,		$5.50
60 "	20 "	"	"		5.75
70 "	21 "	"	"		6.00
80 "	22 "	"	"		6.25
90 "	23 "	"	"		6.50
100 "	24 "	"	"		7.00
110 "	25 "	"	"		7.25
120 "	26 "	"	"		7.50
130 "	27 "	"	"		7.75
140 "	28 "	"	"		8.00
170 "	30 "	" x 3 in. face			9.00
230 "	30 "	" x 4 in. "			11.00
330 "	36 "	" x 4 in. "			15.00

The above will be knocked down for shipment when required.

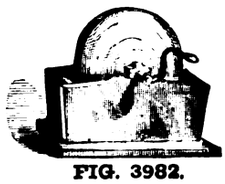


FIG. 3982.

SHIP GRINDSTONES.

12 in	each,	$2.50
14 to 16 in	"	2.75
17 in	"	3.00
18 in	"	3.25

GRINDSTONES.

Berea, Ohio, under 1,000 lbs	per lb.,	cts.
Amherst, " " "	"	"
Independence, Ohio, under 1,000 lbs	"	"
Lake Huron, under 1,000 lbs	"	"
Nova Scotia, " " "	"	"
Newcastle, " " "	"	"
French (White), 12 in. to 36 in	"	
Craigleith, 12 in. to 36 in	"	

When ordering, please state for what purpose stone is required.

Larger sizes, up to 6 feet diameter, always on hand at lowest prices.

All stones over 200 lbs. are sold by measurement weight, less than 200 lbs. by cut weight. "Cut weight" is actual weight on scales as they come from the lathe, and is always cut on the stone. A dry stone on scale will fall below cut weight.

Short rule for finding weight of Ohio grindstones: Square the diameter in inches, multiply by the thickness in inches and multiply the product by the decimal, .06363. For Newcastle and Nova Scotia, use .07000.

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EMERY WET-WHEEL TOOL GRINDERS.

NOS. 8, 7 AND 3.

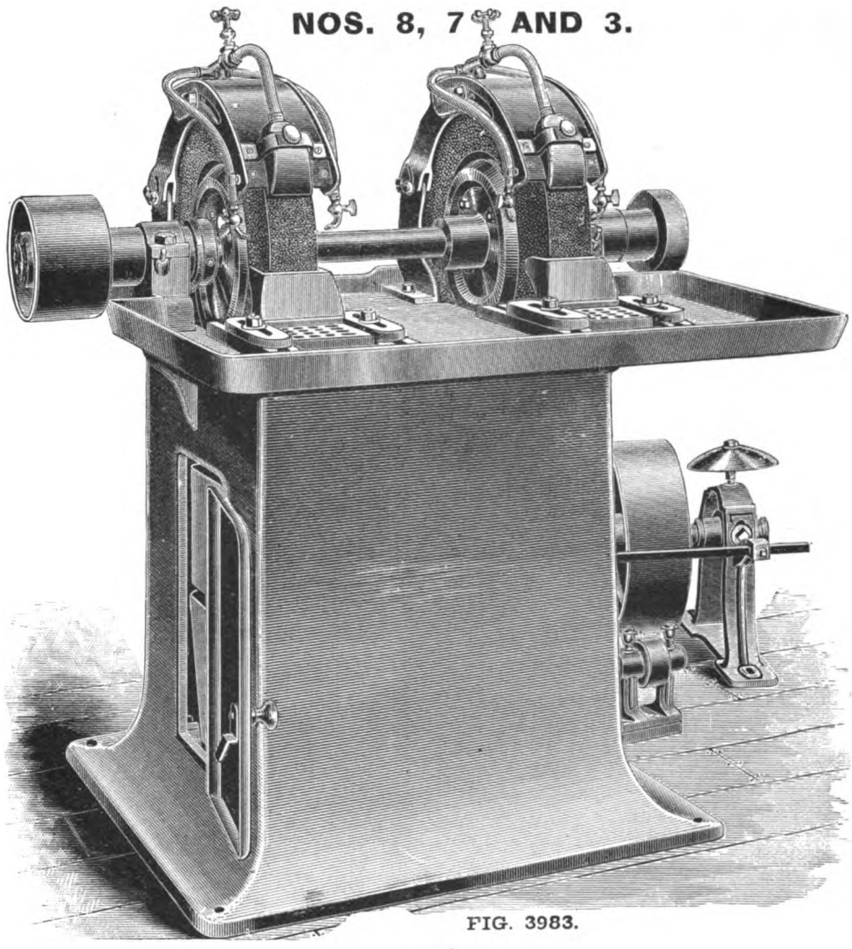


FIG. 3983.

NOS. 4 AND 5.

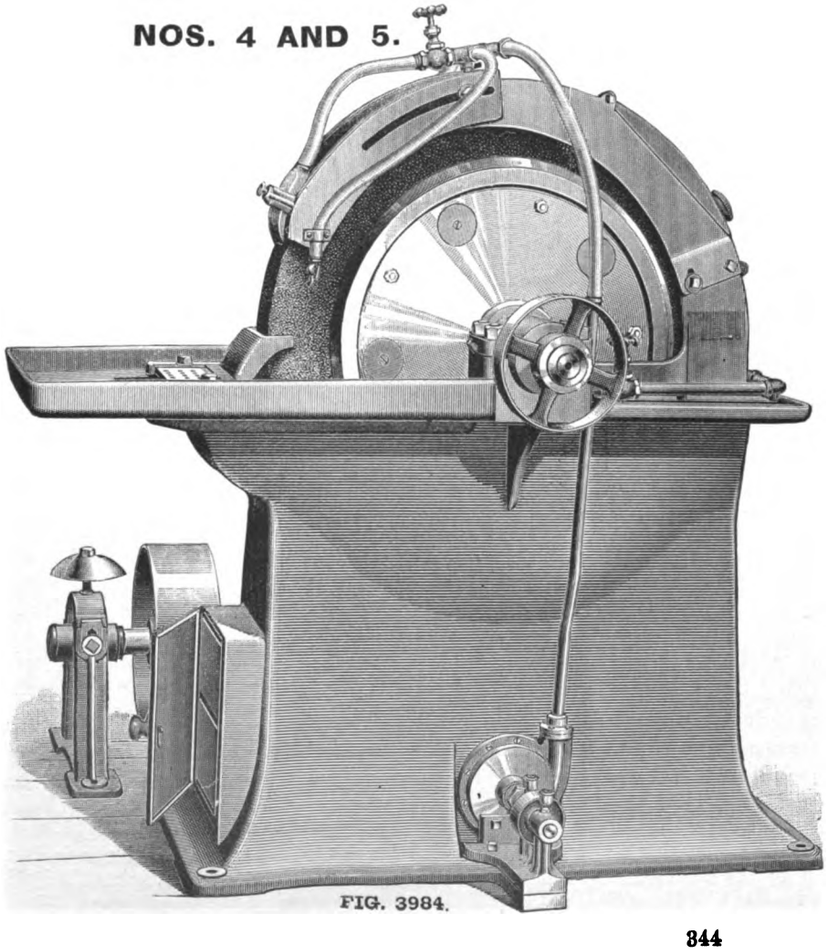


FIG. 3984.

NO. 8 TOOL GRINDER.

Height from floor to center of spindle, 36 inches; length of self-oiling bearings, 8 inches; diameter of spindle, 2¾ inches. Has two emery wheels, each 36 x 4, with 24 inch hole. This machine has tanks located inside of base. Driving pulley on countershaft, 16 x 5½ inches; tight and loose pulley, 12 x 5½ inches, and should run 280 revolutions per minute, thus giving the emery wheel a speed of 375 to 425 revolutions.

PRICE, complete with emery wheels, countershaft, pump and slide rest, **WEIGHT 3,200 LBS., $600.00.**

NO. 7 TOOL GRINDER.

Height from floor to center of spindle, 36 inches; length of self-oiling bearings, 8 inches; diameter of spindle, 2½ inches; distance between wheels, 15 inches. Carries two emery wheels, each 26 x 3 inches, with 12 inch hole. It is usually furnished with wheels of two grades, one being coarse for fast cutting and the other fine for finishing, or both will be furnished of the same grade if preferred. This machine has tanks located inside of base. Driving pulley on countershaft, 16 x 5 inches; tight and loose pulley, 10 x 5 inches, and should run 275 to 300 revolutions per minute, giving the emery wheel a speed of 550 to 600 revolutions per minute.

PRICE, complete with emery wheels, countershaft, pump and slide rest, **WEIGHT 2,200 LBS., $350.00.**

NO. 3 TOOL GRINDER.

Height from floor to center of spindle, 38 inches; length of self-oiling bearings, 6 inches; diameter of spindle, 2 inches; distance between wheels, 16 inches; emery wheels are 20 x 3 inches, with 9 inch hole. This machine has tanks located inside of base. Driving pulley on countershaft, 16 x 5 inches; tight and loose pulley, 10 x 5 inches, and should run 325 to 350 revolutions per minute, giving the emery wheel a speed of 650 to 700 revolutions.

PRICE, complete with emery wheels, countershaft, pump and slide rest, **WEIGHT 1,800 LBS., $280.00.**

NO. 5 TOOL GRINDER.

Height from floor to center of spindle, 36 inches; length of self-oiling bearings, 8 inches; diameter of spindle, 2¾ inches; spindle pulley, 12 x 5½ inches; emery wheel, 36 x 4 inches, with a 24 inch hole, using patent improved collars. Floor space, 24 x 48 inches. This machine has tanks located inside of base. Driving pulley on countershaft, 16 x 5½ inches; tight and loose pulley, 12 x 5½ inches, and should run 280 to 300 revolutions per minute, thus giving the emery wheel a speed of 375 to 425 revolutions.

PRICE, complete with emery wheel, countershaft, pump and slide rest, **WEIGHT 2,250 LBS., $350.00.**

NO. 4 TOOL GRINDER.

Height from floor to center of spindle, 36 inches; length of self-oiling bearings, 8 inches; diameter of spindle, 2½ inches; spindle pulley, 10 x 5 inches; emery wheel, 30 x 4 inches, with 14 inch hole. Machine has a trap door on back of hood for use when grinding large tools. Floor space, 24 x 40 inches; driving pulley on countershaft, 16 x 5 inches; tight and loose pulley, 10 x 5 inches, and should run 300 to 325 revolutions per minute, giving the emery wheel a speed of 480 to 520 revolutions.

PRICE, with emery wheel, countershaft, pump and slide rest, **WEIGHT 1,700 LBS., $320.00.**

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EMERY WET-WHEEL TOOL GRINDERS.

NO. 2 TOOL GRINDER.

Height from floor to center of spindle, 36 inches; length of self-oiling bearings, 8 inches; diameter of spindle, 2½ inches; spindle pulley, 8 x 5 inches; emery wheel, 26 x 4 inches, with a 12 inch hole. Floor space, 24 x 40 inches; driving pulley on countershaft, 16 x 5 inches; tight and loose pulley, 10 x 5 inches, and should run 275 to 300 revolutions per minute, giving the emery wheel a speed of 550 to 600 revolutions.

PRICE, complete with emery wheel, countershaft, pump and slide rest, **WEIGHT 1,550 LBS., $270.00.**

NO. 1 TOOL GRINDER.

Height from floor to center of spindle, 38 inches; length of self-oiling bearings, 6 inches; diameter of spindle, 2 inches; spindle pulley, 8 x 4 inches; emery wheel, 20 x 3 inches, with 9 inch hole. Floor space, 22 x 33 inches; driving pulley on countershaft, 16 x 4 inches; tight and loose pulley, 9 x 4 inches, and should run 325 to 350 revolutions per minute, giving the emery wheel a speed of 650 to 700 revolutions.

PRICE, complete with emery wheel, countershaft, pump and slide rest, **WEIGHT 1,200 LBS., $200.00.**

NO. 1 1-2 TOOL GRINDER.

Same as No. 1 in size and price, and is open for grinding on both front and back. Same as No. 2½, Fig. 3988. **WEIGHT, 1,250 LBS.**

NOS. 2, 1, 1 1-2, 0 AND 00.

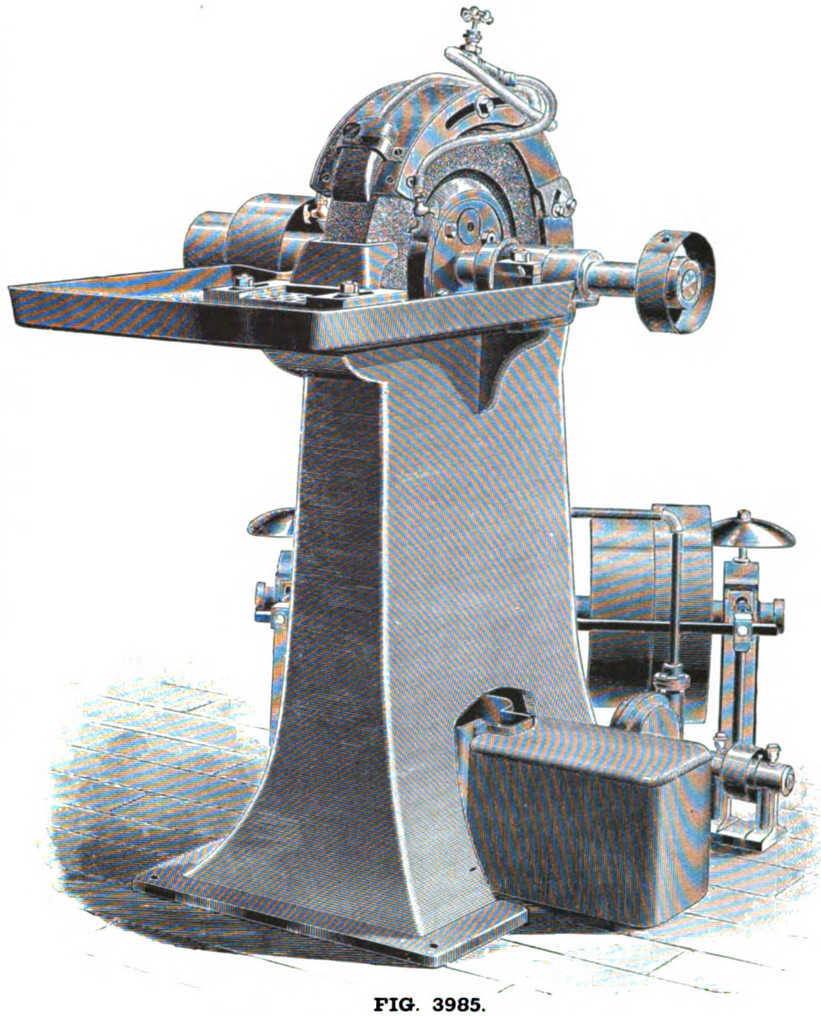


FIG. 3985.

NO. 000.

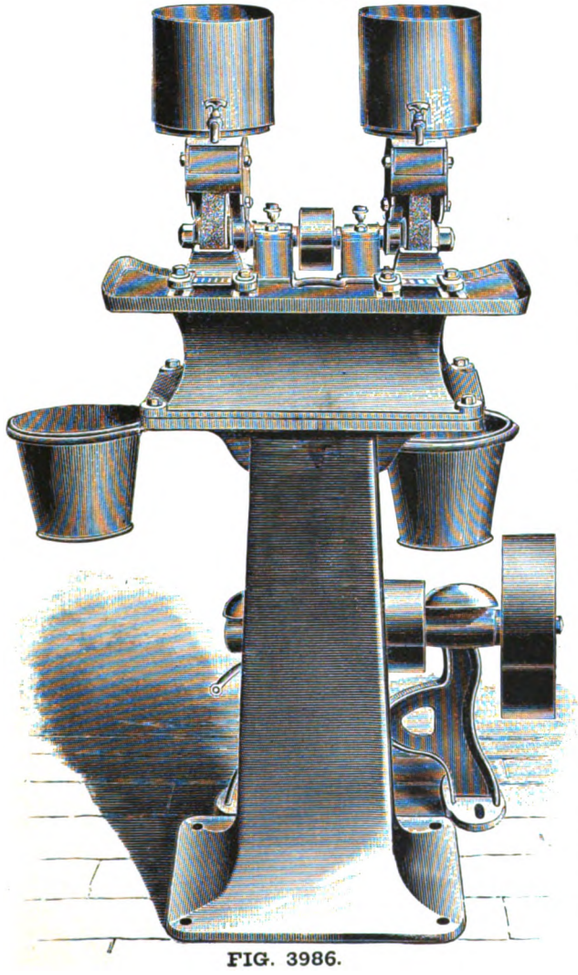


FIG. 3986.

NO. 0 TOOL GRINDER.

Height from floor to center of spindle, 39 inches; length of bearings, 5 inches; diameter of spindle, $1\frac{7}{16}$ inches; spindle pulley, 4½ x 3 inches; emery wheel, 14 x 2½ inches, with a 6 inch hole. Floor space, 18 x 27 inches; driving pulley on countershaft, 12 x 3 inches; tight and loose pulley, 6 x 4 inches, and should run 280 to 300 revolutions per minute, giving the emery wheel a speed of 750 to 800 revolutions.

PRICE, complete with emery wheel, countershaft, pump and slide rest, **WEIGHT 650 LBS., $140.00.**

NO. 00 TOOL GRINDER.

Height from floor to center of spindle, 39 inches; length of bearings, 4 inches; diameter of spindle in bearings, 1¼ inches; diameter of spindle between flanges, 1¼ inches; spindle pulley, 4½ x 3 inches; emery wheel, 12 x 2 inches. Floor space, 18 x 27 inches; driving pulley on countershaft, 12 x 3 inches; tight and loose pulley, 6 x 4 inches, and should run 350 revolutions per minute, giving the emery wheel a speed of 1,050 revolutions.

WEIGHT, 575 LBS.; WITHOUT BASE, 225 LBS.

PRICE, with emery wheel, countershaft and pump (no slide rest) $85 00
" without pump 65.00
" without countershaft 52.00

NO. 000 TOOL GRINDER.

Height from floor to center of spindle, 39 inches; length of bearings, 3 inches; diameter of spindle in bearings, $\frac{13}{16}$ inch; diameter of spindle between flanges, ¾ inch; distance between wheels, 10½ inches; spindle pulley, 3½ x 2 inches. Carries two emery wheels, 9 x 1 inch. Floor space, 20 x 23 inches; driving pulley on countershaft, 12 x 2 inches; tight and loose pulley, 4½ x 4 inches, and should run 475 revolutions per minute, giving the emery wheel a speed of 1,400 revolutions. **WEIGHT, 375 LBS.**

PRICE, with emery wheels, countershaft and base (not furnished with pump or slide rest) $50.00
" without countershaft 40.00

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WET EMERY WHEEL TOOL GRINDERS.

DOUBLE GRINDER.

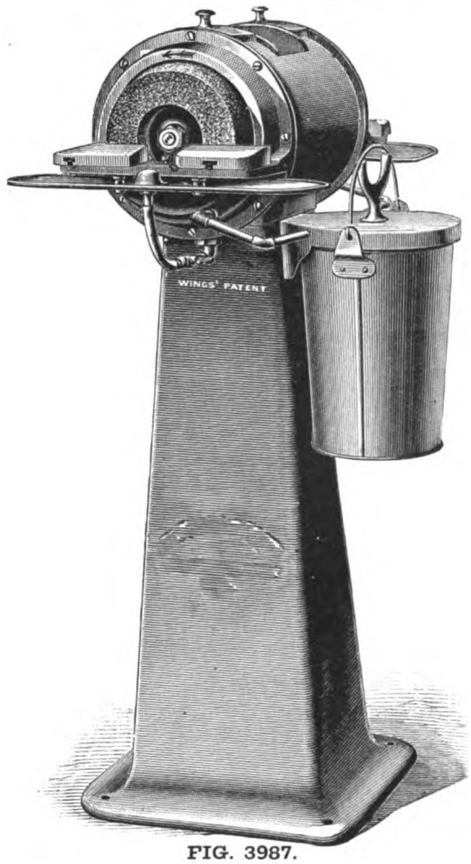


FIG. 3987.

This machine carries two grinding wheels, 8 in. by 1¾ in., one at each end of arbor. Arbor is of steel, one inch in diameter, and runs in removable, self-oiling bronze bushings.

The water is carried to wheels from tank by head force, and back again into tank by centrifugal force, keeping a continuous circulation as long as enough water is kept in tank to cover supply pipes. **PRICE,** with both wheels, **$50.00.**

BENCH TOOL GRINDER.

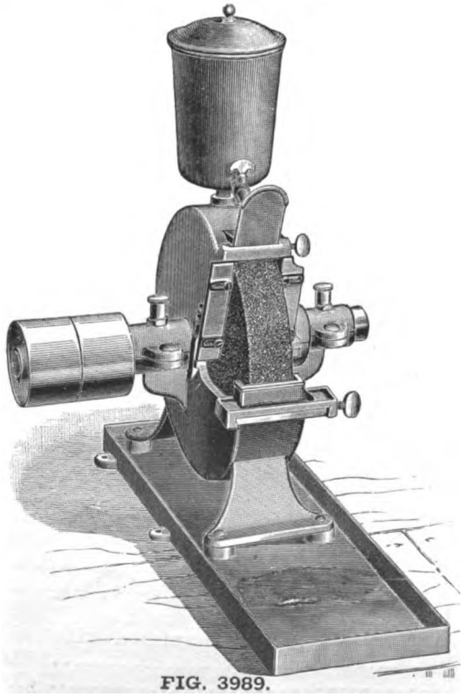


FIG. 3989.

NOS. 2 1-2 AND 4 1-2 GRINDER.

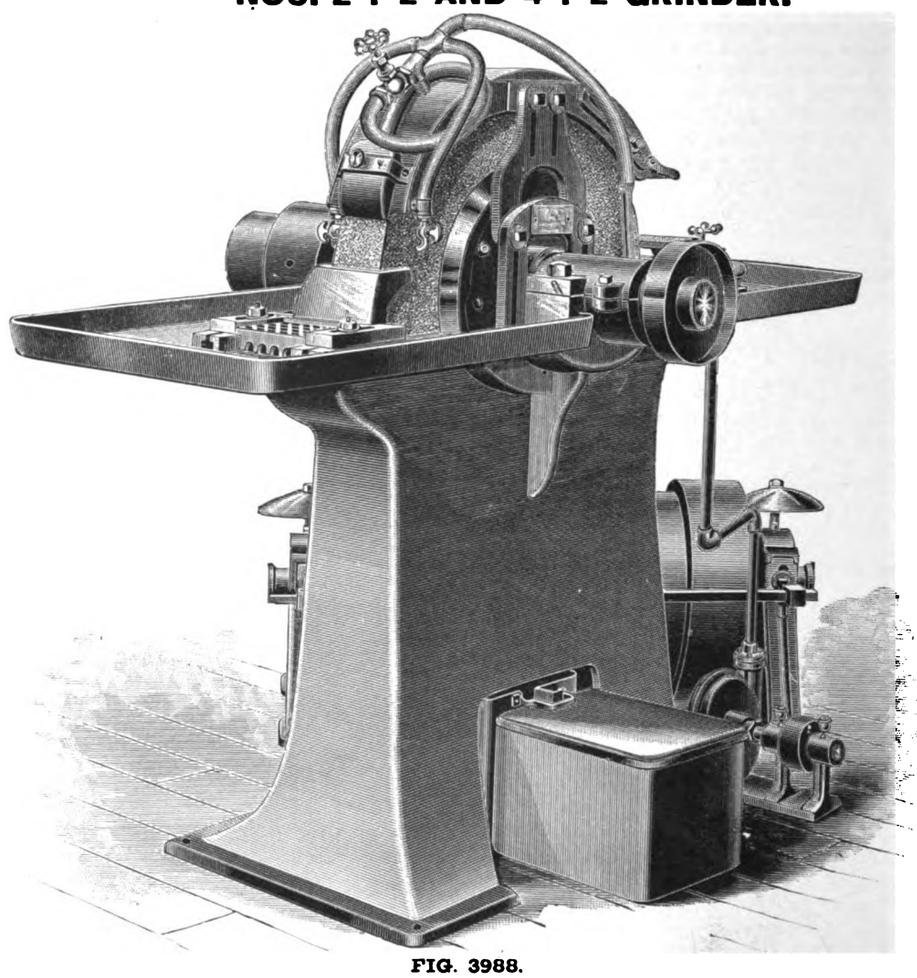


FIG. 3988.

NO. 2 1-2 TOOL GRINDER.

Height from floor to center of spindle, 36 inches; length of self-oiling bearings, 8 inches; diameter of spindle, 2½ inches; spindle pulley, 8 x 5 inches; emery wheel, 26 x 4, with 12 inch hole. Floor space, 24 x 40 inches; driving pulley on countershaft, 16 x 5 inches; tight and loose pulley, 10 x 5 inches, and should run 275 to 300 revolutions per minute, giving the emery wheel a speed of 550 to 600 revolutions.

PRICE, complete with emery wheel, countershaft, pump and rest, **WEIGHT 1,600 LBS., $270.00.**

NO. 4 1-2 TOOL GRINDER.

Same as No. 4 (Fig. 3984) in size and price, but is open for grinding on front and back, same as No. 2½, shown above. **WEIGHT 1,750 LBS.**

BENCH TOOL GRINDER, FIG. 3989.

For sharpening chisels and other hardened tools.

The bench tool grinder is designed to sharpen machinists' and carpenters' tools of all kinds, running a corundum wheel in water, the grade of wheel varying to suit the kind of work to be done. The particles of corundum composing the wheel are hard and sharp, and will cut many times faster than the ordinary grindstone. It is cleaner, and is the cheapest general tool grinder ever produced. This machine can be set up anywhere, taking up bench room of only 22 x 12 inches, thus allowing several to be located on a floor in large shops, having them conveniently situated for the men, so as to avoid walking long distances to sharpen a tool. The saving of time in this way alone will soon pay for the small cost of the grinder. We have adopted for use in this grinder a special corundum wheel, which by reason of its porous nature is constantly moist, and in consequence all danger of drawing the temper from tools is avoided.

Set the grinder on bench or stand, slightly pitched to the front, the near edge of pan projecting over the bench. The water runs to the front through a hole into a bucket or pail, which can be swung from a hook, provided underneath the pan. A waste pipe can be attached to run the water off, if desired. Speed of wheel, 700 to 900 revolutions per minute.

PRICES.

With 10 x 1 inch wheel, single or double pulleys	$25.00
With 10 x 2 inch wheel, single or double pulleys	30.00
Countershaft, extra	12.00
Adjustable angle rest	1.50

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WET EMERY WHEEL TOOL GRINDERS.

The machine has tanks located inside of column, easily accessible. A patented arrangement for drawing the water by syphon from the upper to the lower tank. Boxes protected at each end by patented dust-excluding device.

The water is distributed on the wheel directly in front of the tool when being ground. The hood inside has a raised surface cast, which is the outside diameter of the flanges used, and which leads all spray or water from the inside of the hood to the column, keeping it entirely from the spindle and boxes. The rests are movable to and from the wheel, without the use of wrench.

NO. 2 GRINDER.

EMERY WHEEL, 18 X 2 1-2 INCHES, 1 3-4 HOLE.

Size of base, 24 x 27 inches. Height from floor to center of spindle, 38 inches. Length of bearings, 7 inches each. Diameter of spindle in bearings, 1½ inches. Diameter of spindle between flanges, 1¾ inches.

PRICES.

WEIGHT, 800 LBS., including wheel, countershaft, and "diamond" tool holder.....**$150.00.**

NO. 3 TOOL GRINDER.

EMERY WHEEL, 26 X 3 1-2 INCHES.

Size of base, 26 x 40. Height from floor to center of spindle, 36 inches. Diameter of spindle in bearings, 2 inches; between bearings, 2½ inches. Cone pulley on spindle, 8 and 9 inches x 5 inches.

Our patented and special arrangements shown and described for No. 2 tool grinder are found in this machine and all of our other sizes.

WEIGHT, 1,500 LBS., PRICES, complete with countershaft and truing device.. .....**$262.50.**

NO. 4 TOOL GRINDER.

EMERY WHEEL, 30 X 4 INCHES.

Floor space, 26 x 40 inches. Height from floor to center of spindle, 36 inches. Diameter of spindle, 3 inches. Cone pulley on spindle, 9 and 10 x 5 inches.

WEIGHT, 1,700 LBS., PRICES, complete with countershaft and truing device for wheel, **$325.00.**

NO. 5 TOOL GRINDER.

EMERY WHEEL, 36 X 4 INCHES.

Floor space, 26 x 50 inches. Height from floor to center of spindle, 36 inches. Diameter of spindle, 3½ inches. Cone pulley on spindle, 11 and 12 inches x 6 inch face.

WEIGHT, 2,000 LBS., PRICES, complete with countershaft and truing device.....**$360.00.**

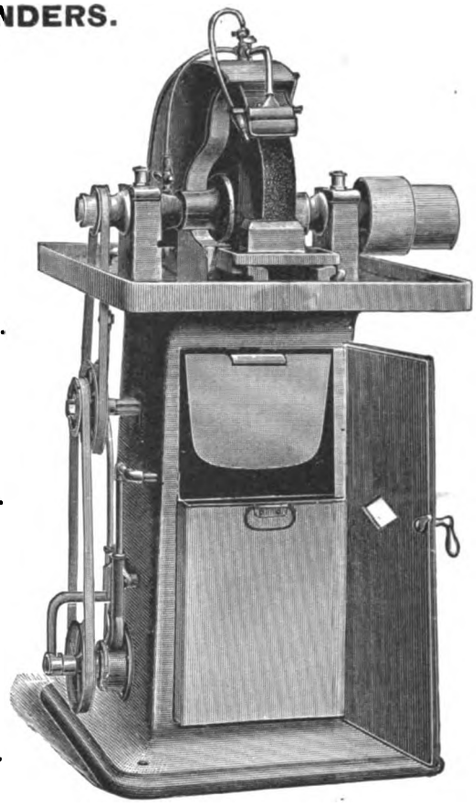


FIG. 3990.

GOUGE AND CUTTER GRINDER.



FIG. 3991.

DESCRIPTION, FIG. 3991.

This tool is for grinding gouges, cutters and all concave surface tools. It has a continuous supply of water, can be made double.

PRICES, with wheel.
Single.....**$12.00**
Double.....

WATER ATTACHMENT FOR GRINDERS.

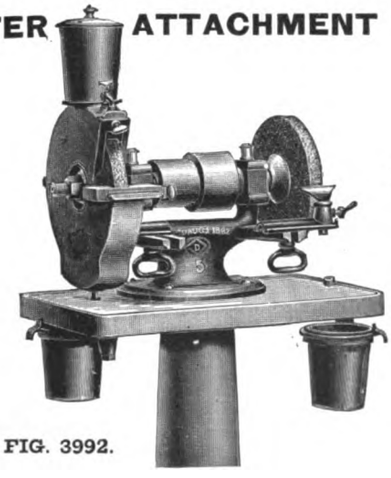


FIG. 3992.

FIG. 3992 REPRESENTS NOS. 5, 4, 3 AND 2 EMERY GRINDERS WITH WATER ATTACHMENT.

PRICE, $15.00.

CORUNDUM TOOL GRINDER.

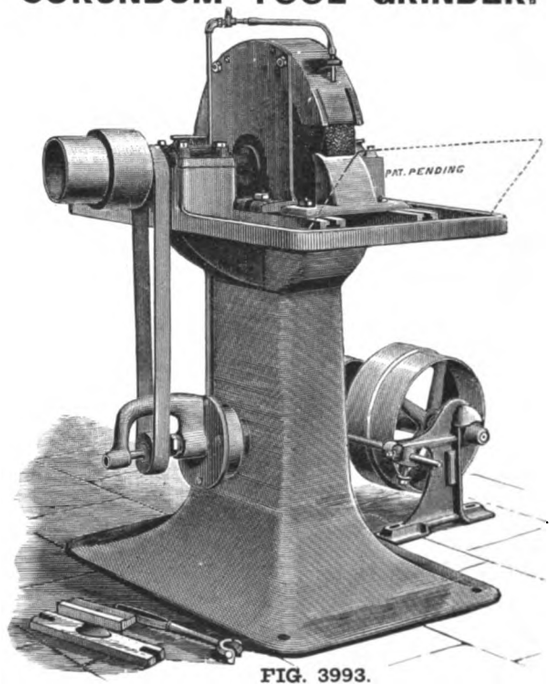


FIG. 3993.

Diameter of wheel.	Face of wheel.	Counter pulleys.	Revolut's per minute.	Weight.	PRICES.
14 in.	2 in.	7 x 2½ in.	280	550 lbs.	$90.00
18 "	3 "	10 x 3 "	240	850 "	125.00
20 "	3 "	10 x 3 "	220	950 "	140.00

An attachment applicable to the above machines allows it to be removed when desired, thus combining in one machine the use of emery wheels either in water or dry; it can be placed upon one or both ends of the spindle; it has a recess cast on the inside of the attachment that effectually prevents the throw of the water, leading it directly to the bottom of the attachment through the pipe into the waterpot below.

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EMERY GRINDERS.

NO. 8.

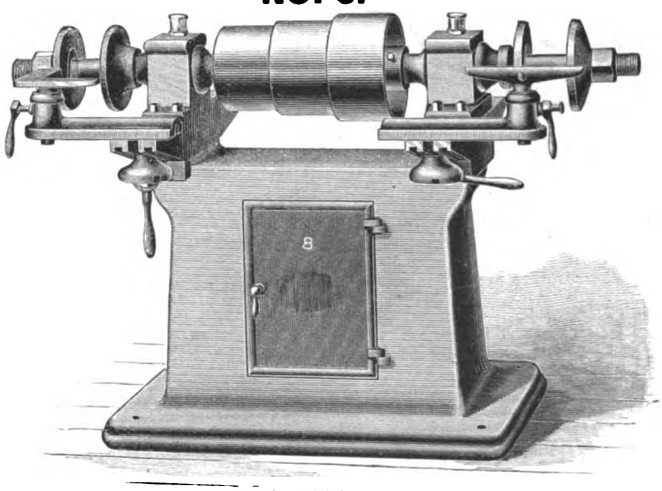


FIG. 3994.

This machine is designed to run two wheels up to 34 inches in diameter, 4½ face. It is a heavy machine for large work. Has steel spindle, arms for rests both front and back, each rest being provided with wrench, permanently attached to its proper place. A surface attachment to use on this machine is provided when desired.

Weight of No. 8 machine, with countershaft	1,100 lbs.
Distance between wheels	40 inches.
Diameter of spindle in bearings	2⅛ "
Diameter of spindle between flanges	2 "
Height from floor to center of spindle	32 "
Size of cone on spindles	8, 9 and 10 x 5¼ "
Size of tight and loose pulleys on countershaft	10 x 5¼ "
Speed of countershaft	350 revolutions per minute.

PRICES.

Machine, including countershaft	$200.00
Machine surface attachment	80.00

NO. 7, FIG. 3995.

Runs 2 wheels 20 inches diameter by 4 inch face.

PRICE, grinder column and countershaft $112.00

NO. 6, FIG. 3995.

Runs 2 wheels up to 16 inches diameter by 4 inch face.

PRICE, grinder column and countershaft $82.00

NO. 5, FIG. 3995.

Runs 2 wheels up to 14 inches diameter by 2½ inch face.

NOS. 7, 6 AND 5.

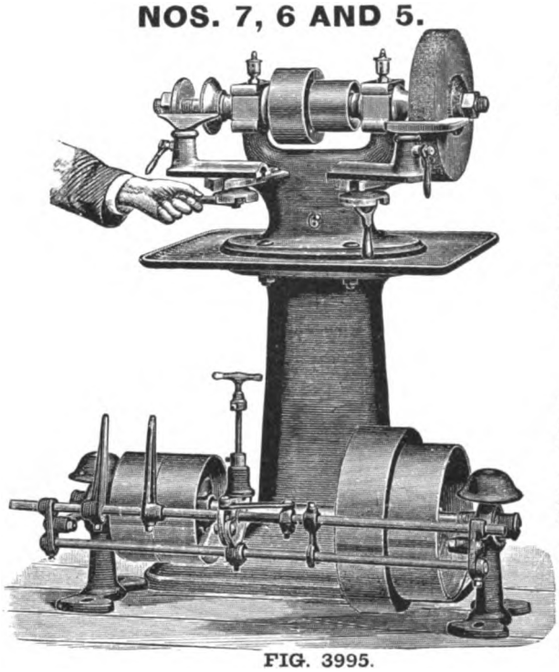


FIG. 3995.

PRICES.

Grinder	$35.50
Iron column and table and water pot,	15.00
Countershaft and patent belt shifter,	17.00

PRICES, NO. 4.

It will run 2 wheels up to 12 inches diameter by 2½ inch face.

Grinding machine, stand, and countershaft, as shown	$60.00
Grinding machine (head)	28.00
Frame, with waterpot attached.	17.00
Driving shaft and patent belt shifter attached; or Hadley's patent countershaft, for overhead use..	15.00

PRICES, NO. 3.

Weight of No. 3 machine	36 lbs.
Size of base	10 x 6½ inches.
Height from base to center of spindle	7 "
Entire length of spindle	16½ "
Length of bearings	3½ "
Diameter of spindle between flanges	¾ "
Runs wheels	10 x 2 "
Size of pulley on spindle,	3 x 2¾ "
Distance between wheels	12 "

PRICE, $17.50.

Countershaft $12.00

NO. 4.

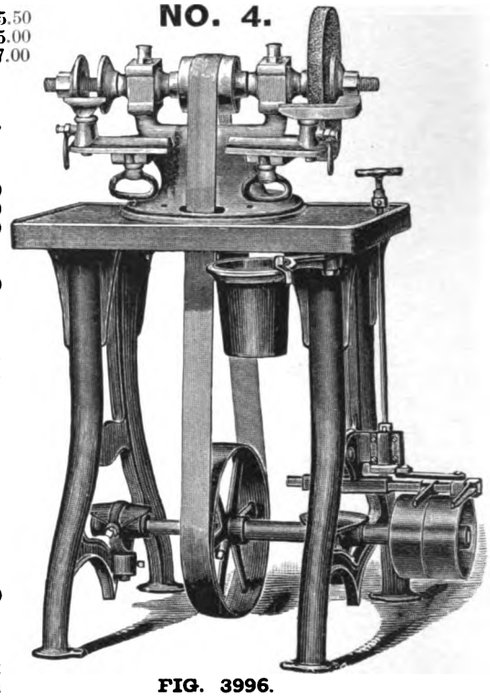


FIG. 3996.

NO. 3.

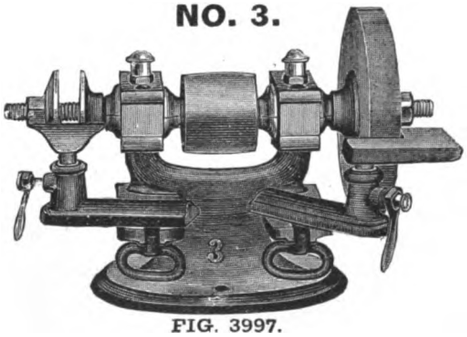


FIG. 3997.

PRICES, NO. 2.

This machine will run two wheels up to six inches in diameter. Has steel spindle with two rests.

Weight of No. 2 grinding machine	16 lbs.
Diameter of base	5½ inches.
Height from bench to center of spindle	5¼ "
Length of bearings	1⅞ "
Runs wheels	6 x 2 "
Diameter of spindle between flanges	½ "
Size of pulley on spindle	2 x 1½ "
Distance between wheels	7 "

PRICE, grinding machine	$11.00
" countershaft	12.00

NO. 2.

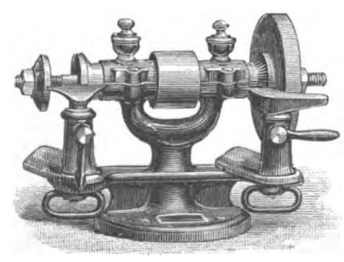


FIG. 3998.

PRICES, NO. 1.

This machine as shown is designed to run two wheels up to six inches in diameter. It has steel spindles, and split boxes with set screws for taking up the wear; can be furnished to belt from below.

Weight of No. 1 grinding machine	10 lbs.
Diameter of base	5½ inches.
Height from bench to center of spindle	5¼ "
Length of bearings	1⅞ "
Runs wheels	6 x 2 "
Diameter of spindles between flanges	½ "
Size of pulley on spindle	2 x 1½ "
Distance between wheels	7 "

PRICE, grinding machine	$8.00
" countershaft	12.00

NO. 1.

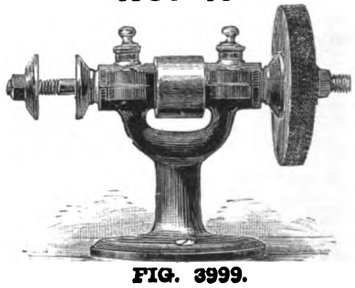


FIG. 3999.

SEE FIG. 3992 FOR ATTACHMENTS FOR NOS. 5, 4, 3 AND 2.

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NOS. D AND H EMERY GRINDERS.

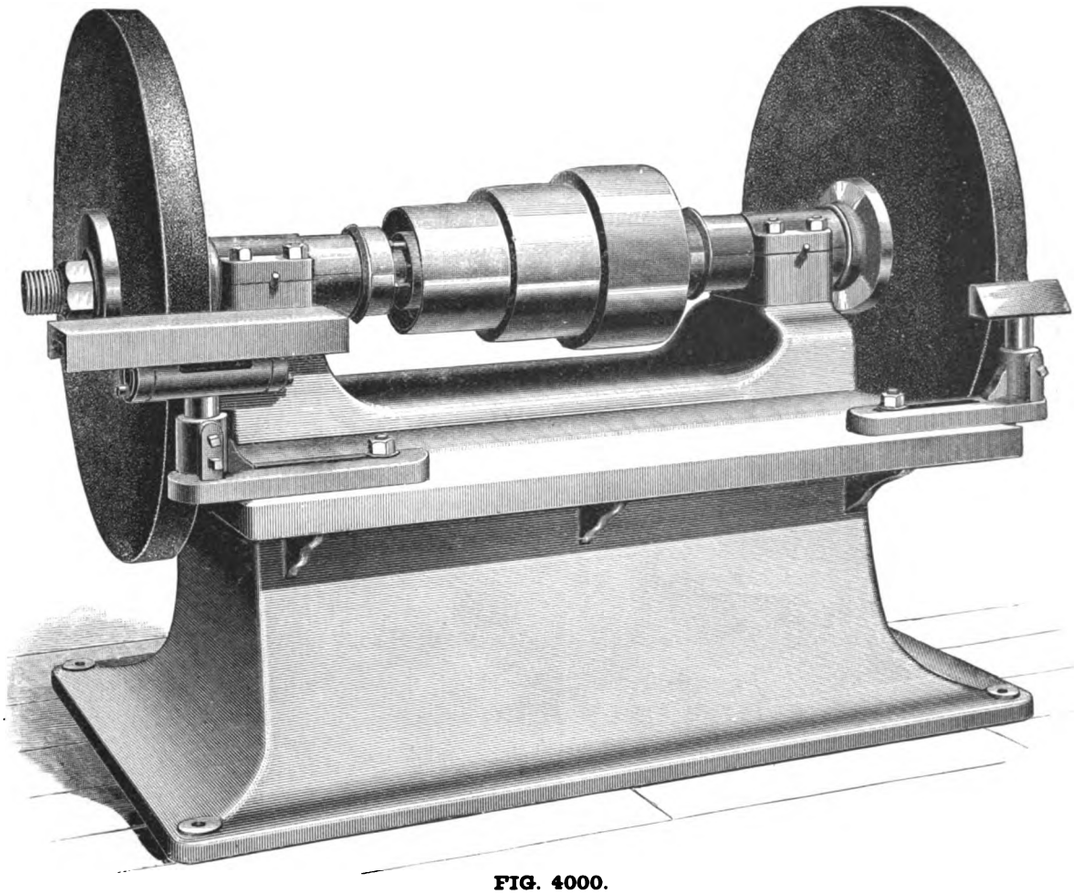


FIG. 4000.

NO. H GRINDER.

Square base with sufficient flare to give it a solid floor foundation, which prevents vibration when being used.

Height from floor to center of spindle, 31½ inches; length of self-oiling bearings, 12 inches; diameter of spindle in bearings, 3 inches; diameter of spindle between flanges, 2¾ inches; distance between wheels, 59 inches; entire length of spindle, 72 inches; spindle cones, 9, 11 and 13 x 6½ inches. Carries two wheels up to 40 inches in diameter. Tight and loose pulley, 14 x 8 inches.

WEIGHT, 2,500 LBS.

PRICES, H GRINDER.

Price, complete, without wheels, **$300.00**

Price, without countershaft, **$275.00**

NO. D GRINDER.

Height from floor to center of spindle, 34 inches; length of self-oiling bearings, 8 inches; diameter of spindle in bearings, 2 inches; diameter of spindle between flanges, 1¾ inches; entire length of spindle, 48 inches; spindle cones, 5 and 7½ x 4 inches, or can furnish three cones 5, 6¼ and 7½ x 4 inches. Carries two wheels up to 26 inches diameter. Tight and loose pulley, 8½ x 4 inches. **WEIGHT, 800 LBS.**

PRICES, D GRINDER.

Price, complete, without wheels	$135.00
Price, without countershaft	117.00

NO. 5 GRINDER.

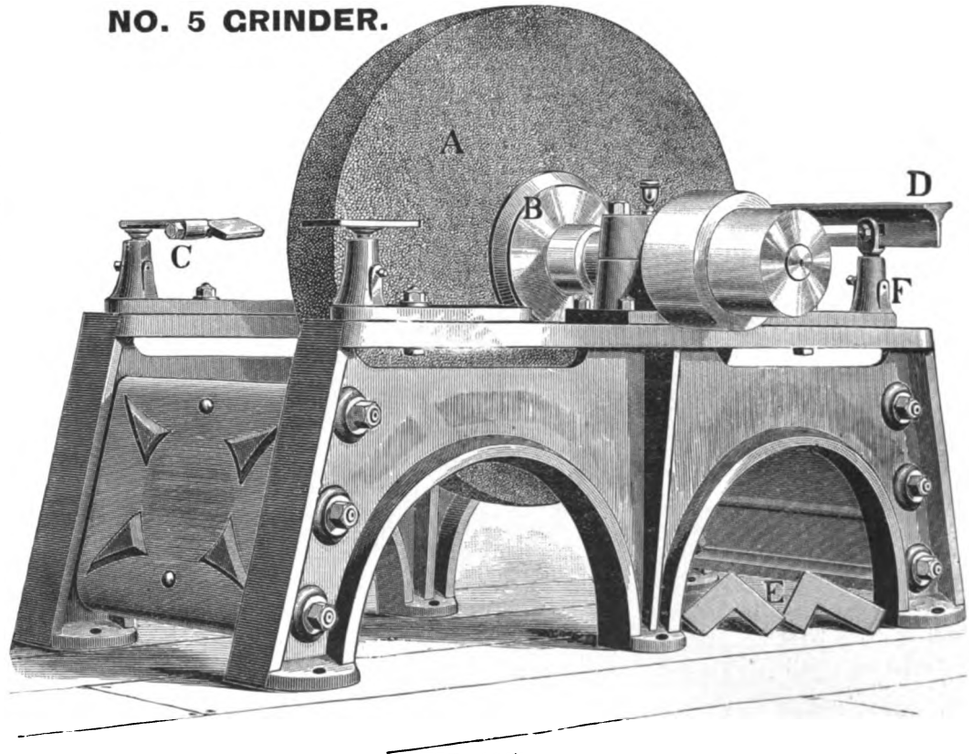


FIG. 4001.

Carries wheels of 36 inches in diameter. Height from floor to center of spindle, 27¾ inches; floor space, 30 x 72; length of spindle, 45 inches; diameter of spindle in bearings, 3 inches; diameter of spindle between flanges, 3 inches; diameter of flanges, 10¼ inches; size of cone pulley on spindle, 10 and 8½ x 5⅛ inches; size of cone pulley on countershaft, 14⅝ and 13⅛ x 5⅛; size of tight and loose pulleys on countershaft, 10 x 6½.

WEIGHT, 2,300 LBS.

PRICE, including countershaft, **$325.00**

Emery wheels extra.

We also make a two-wheeled machine of same pattern. **PRICE, $350.00.** Illustration and fuller details sent on application.

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EMERY GRINDERS.

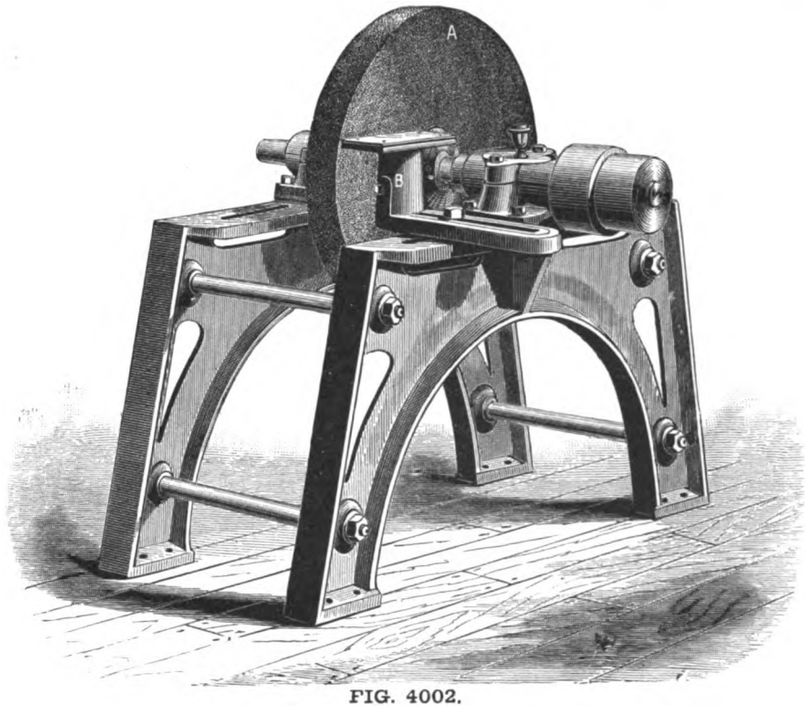


FIG. 4002.

This machine carries wheels up to 24 inch diameter, and is furnished with reversible rest arms, which admit of unusual variation in height of rests. Few wooden floors are firm enough for a 24-inch wheel running at the rate of a mile in a minute. To properly run wheels of such size the machines should be mounted on piers of masonry or concrete, beneath which are beams through which iron bolts project, so as to reach above the piers and allow of the machines being attached to them. Machines are too often set upon floors so unsteady that the wheels act like hammers.

Height from floor to center of spindle, 27½ inches; floor space, 24 x 48; length of spindle, 37 inches; diameter of spindle in bearings, 1⅞ inches; diameter of spindle between flanges, 2 inches; diameter of flanges, 7 inches; size of cone pulley on spindle, 7⅛ and 5⅝ x 5 inches; size of cone pulley on countershaft, 14⅝ and 13⅛ x 5; size of tight and loose pulleys on countershaft, 10 x 6½. **WEIGHT, 900 LBS. PRICE, $_____**

D, C, B FLOOR GRINDERS.

NO. D.

Height from floor to center of spindle, 34 inches; length of self-oiling bearings, 8 inches; diameter of spindle in bearings, 1¾ inches; diameter of spindle between flanges, 1½ inches; distance between wheels, 36 inches; entire length of spindle, 48 inches; spindle cones, 5 and 7½ x 4 inches. Floor space, 27 x 27 inches. Carries two wheels up to 20 inches diameter. Countershaft cones, 16 and 13½ x 4 inches; tight and loose pulley, 8½ x 4 inches. **WEIGHT, 600 LBS.**

PRICES.

Price, complete, without wheels..... $110.00
Price, without countershaft, $92.00

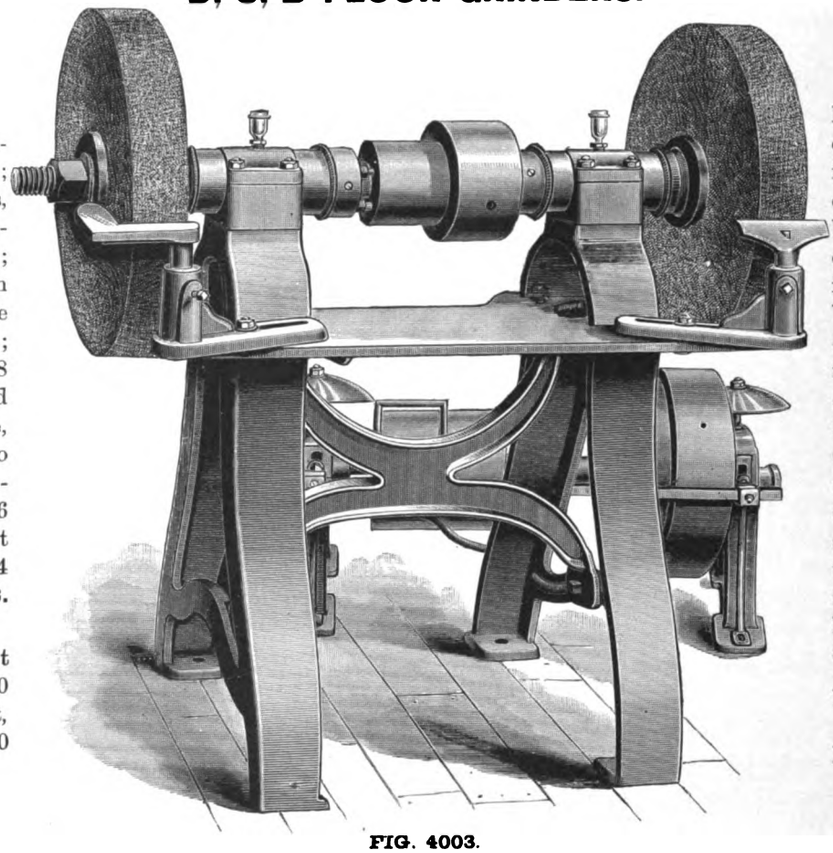


FIG. 4003.

NO. C.

Machine mounted on table. Height from table to center of spindle, 12 inches; height from floor to center of spindle, 40 inches; length of bearings, 5 inches; diameter of spindle in bearings, $1\frac{7}{16}$ inches; diameter of spindle between flanges, 1¼ inches; distance between wheels, 23 inches; entire length of spindle, 34 inches; spindle cones, 3½ and 5½ x 3½ inches. Carries two wheels as above up to 16 inches in diameter, or four thin wheels. Floor space, 24 x 24 inches; countershaft cones, 16 and 14 x 4 inches; tight and loose pulley, 8½ x 4 inches. **WEIGHT, 550 LBS.**

PRICES.

Price, complete, without wheels.....$75.00
Price, without countershaft, $60.00

NO. B.

Machine mounted on table. Height from table to center of spindle, 8 inches; height from floor to center of spindle, 36 inches; length of bearings, 4½ inches; diameter of spindle in bearings, 1¼ inches; diameter of spindle between flanges, 1 inch; distance between wheels, 21 inches; thimble between wheels, 2 inches; entire length of spindle, 32 inches; floor space, 24 x 24 inches; spindle pulley, 4½ x 3 inches, or can furnish cone pulley, 4½ and 3 x 2 inches. Carries two wheels up to 14 inches, or four thin wheels. Countershaft pulley, 12 x 3 inches; tight and loose pulley, 6 x 4 inches. **WEIGHT, 400 LBS.**

PRICES.

Price, complete, without wheels.....$60.00
Price, without countershaft..... 47.00

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SQUARE BASE EMERY GRINDERS.

NO. E GRINDER.

Height from floor to center of spindle, 38 inches; length of self-oiling bearings, 6 inches; diameter of spindle in bearings, 2 inches; diameter of spindle between flanges, 1¾ inches; distance between wheels, 23 inches; entire length of spindle, 34 inches; spindle cones, 3½ and 5½ x 3½ inches. Carries two wheels up to 20 inches diameter, or 4 thin wheels; tight and loose pulley, 8½ x 4 inches. **WEIGHT, 700 LBS.**

PRICES.

Price, complete, without wheels $90.00
Price, without countershaft 75.00

NO. C GRINDER.

Height from floor to center of spindle, 36 inches; length of bearings, 5 inches; diameter of spindle in bearings, 1 7/8 inches; diameter of spindle between flanges, 1¼ inches; distance between wheels, 23 inches; entire length of spindle, 34 inches; spindle cones, 3½ and 5½ x 3½ inches. Carries two wheels up to 16 inches diameter; tight and loose pulley, 8½ x 4 inches. **WEIGHT, 600 LBS.**

PRICES.

Price, complete, without wheels $75.00
Price, without countershaft 60.00

NO. B GRINDER.

Square base with sufficient flare to give it a solid foundation, which prevents vibration when being used. Height from floor to center of spindle, 36 inches; length of bearings, 4½ inches; diameter of spindle in bearings, 1¼ inches; diameter of spindle between flanges, 1 inch; distance between wheels, 21 inches; entire length of spindle, 32 inches; spindle pulley, 4½ x 3 inches. Carries two wheels up to 14 inches diameter, or 4 thin wheels; tight and loose pulley, 6 x 4 inches. **WEIGHT, 500 LBS.**

PRICES.

Price, complete, without wheels $60.00
Price, without countershaft 47.00

NO. A 1-2 GRINDER.

Height from floor to center of spindle, 37 inches; length of bearings, 3 inches; diameter of spindle in bearings, 1⅛ inches; diameter of spindle between flanges, 1 inch; distance between wheels, 13⅜ inches; entire length of spindle, 18⅜ inches; spindle pulley, 4½ x 3 inches. Carries two wheels up to 10 x 1 inch diameter. Floor space, 20 x 16 inches; driving pulley on countershaft, 18 x 3 inches; tight and loose pulley, 4½ x 4 inches. **WEIGHT, 325 LBS.**

PRICES.

Price, complete, without wheels $48.00
Price, without countershaft 38.00
Price, without pedestal 30.00
Price, without pedestal and countershaft, to set on bench 20.00

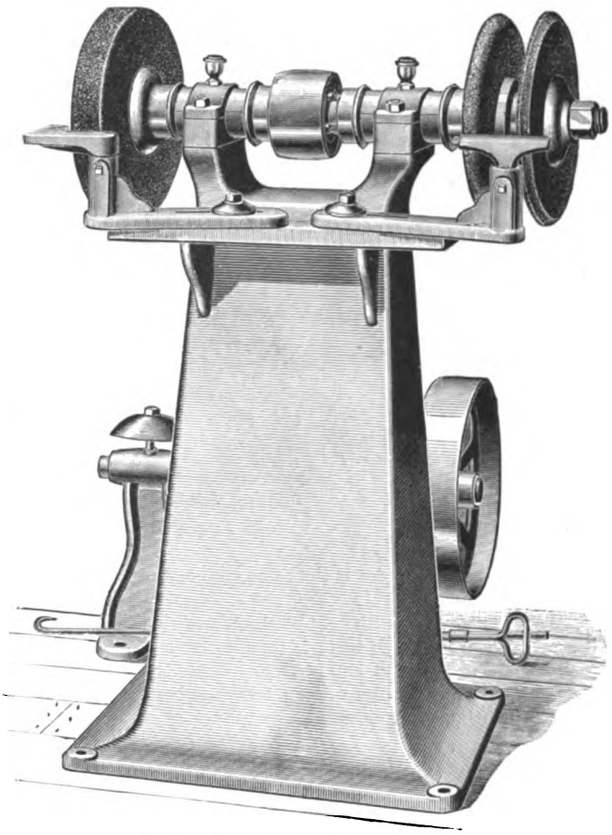


FIG. 4004, E, C, B AND A 1-2.

BENCH EMERY GRINDERS.

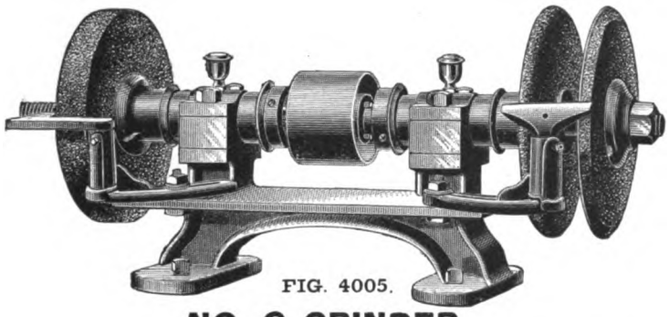


FIG. 4005.

NO. C GRINDER.

Height from bench to center of spindle, 12 inches; length of bearings, 5 inches; diameter of spindle in bearings, 1 7/8 inches; diameter of spindle between flanges, 1¼ inches; distance between wheels, 23 inches. Carries two wheels up to 16 inches diameter, or 4 thin wheels. Tight and loose pulley, 8½ x 4 inches. **WEIGHT, 260 LBS.**

PRICES.

Price, complete, without wheels $55.00
Price, without countershaft 40.00

NO. B GRINDER.

Height from bench to center of spindle, 8 inches; length of bearings, 4½ inches; diameter of spindle in bearings, 1¼ inches; diameter of spindle between flanges, 1 inch; distance between wheels, 21 inches. Carries two wheels up to 14 inches, or 4 thin wheels. Tight and loose pulley, 6 x 4 inches. Furnished with cone pulley for two inch belt if preferred, at the same price. **WEIGHT, 180 LBS.**

PRICES.

Price, complete without wheels $45.00
Price, without countershaft 32.00

NO. A GRINDER.

Height from floor to center of spindle, 7½ inches; length of bearings, 7 inches; diameter of spindle in bearings, 1¼ inches; spindle pulley, 4½ x 3 inches. Size of base, 12 x 6 inches; countershaft pulley, 12 x 3 inches; tight and loose pulley, 6 x 4 inches. Carries one emery wheel up to 12 inches in diameter. **WEIGHT, 135 LBS.**

PRICES.

Price, complete, without wheel $30.00
Price, without countershaft 17.00

NO. A 1-2 GRINDER.

Height from bench to center of spindle, 7 inches; length of bearings, 3 inches; diameter of spindle in bearings, 1⅛ inches; diameter of spindle between flanges, 1 inch; distance between wheels, 13⅜ inches. Carries two wheels up to 10 x 1 inch diameter; tight and loose pulley, 4½ x 4 inches. **WEIGHT, 160 LBS.**

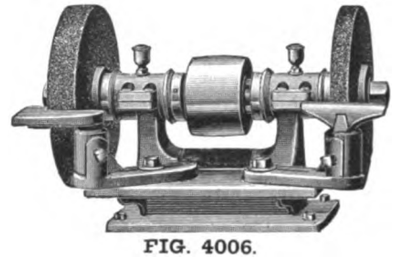


FIG. 4006.

PRICES.

Price, without wheels $30.00
Price, without wheels and countershaft 20.00

NO. A GRINDER.

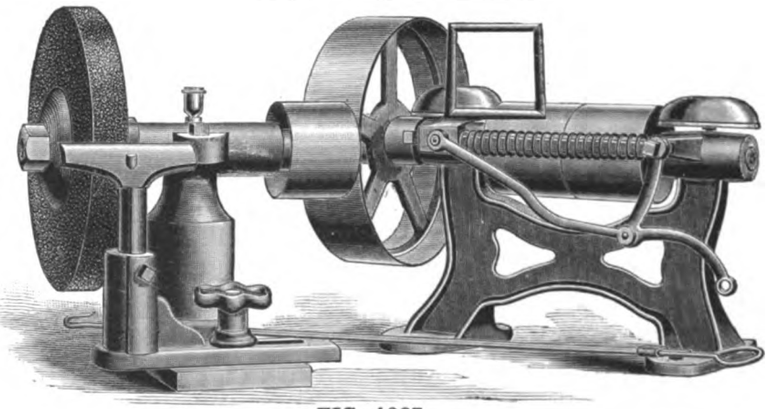


FIG. 4007.

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NINE AND FIVE WHEEL FLOOR GRINDER.

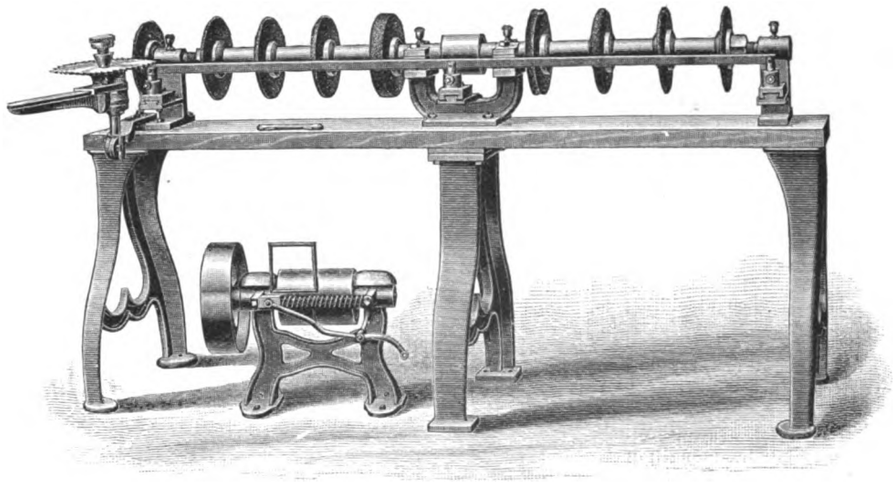


FIG. 4008.

Height from bench to center of spindle, 7¼ inches; length of bearings, 4 inches; diameter of spindle in bearings, 1½ inches; spindle for saw gumming wheel, 1 inch; length of thimble between wheels, 6 inches; entire length of spindle, 74 inches. Floor space, 74 x 24 inches; spindle pulley, 4½ x 4 inches. **WEIGHT, 410 LBS.**

PRICES.

Price includes saw gumming attachment for saws up to 30 inches in diameter, and nine emery wheels, each 9 inches in diameter in the following thicknesses: one 1½ inch, one 1 inch, one ¾ inch, one ½ inch, three ⅜ inch, two ¼ inch thick.

Price, as above, with countershaft $103.00
Price, without countershaft..... 90.00

FIVE WHEEL GRINDER.

The five wheel grinder is the same as the above machine, except in the number of wheels, and having two bearings instead of three. Entire length of spindle, 47½ inches.

Prices, complete, with countershaft, saw gumming attachment, mounted on legs, and five wheels, each 9 inches in diameter in the following thicknesses: one each 1 inch, ¾ inch, ½ inch, ¼ inch, ⅜ inch, - - - - - - - - - - - - - - - $83.00
Price, as above with counter, - - - - - - - - - - - - - - - - - - 70.00
Price, without counter or legs, to set on bench, - - - - - - - - - - - - - - 55.00
Price, without countershaft, saw gumming attachment, or legs, - - - - - - - - - - - - - - 40.00

SINGLE WHEEL GRINDER.

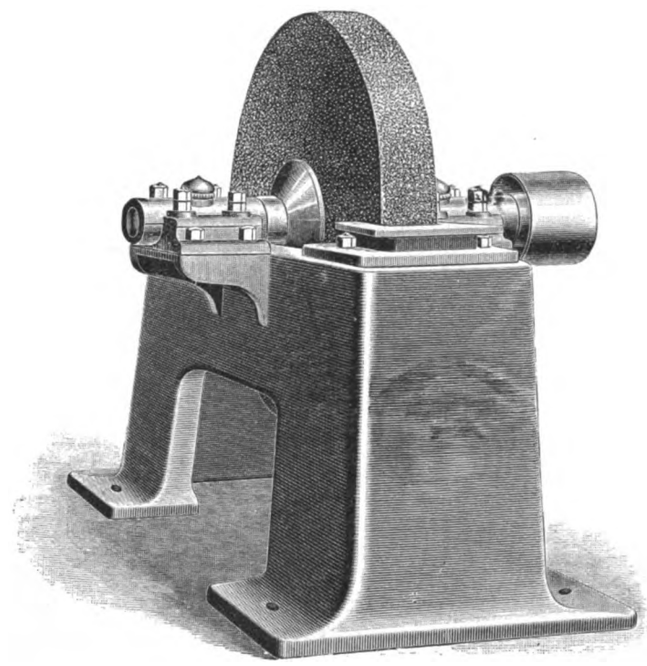


FIG. 4009.

PRICES.

Weight, 800 lbs., will run wheel, 24 x 4 inches, with countershaft, $100.00

NOS. 2, 1 1-2 AND 1 INCH.

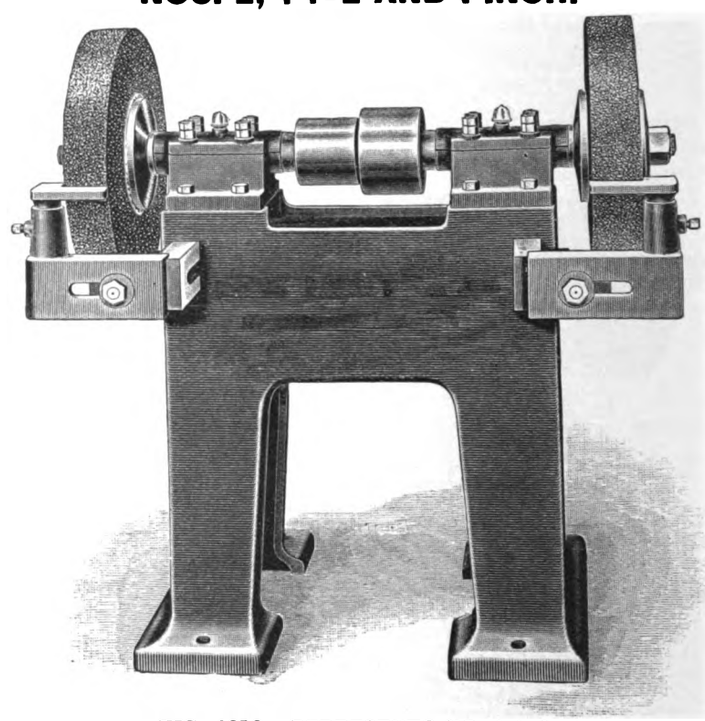


FIG. 4010. **REPRESENTS NO. 1 1-2.**

PRICES.

2 inch, with counter, $180.00; weight 1,000 lbs., deduct for C. S., $22.00
1½ " " " 110.00; " 700 " " " " " 18.00
1 " " " 60.00; " 400 " " " " " 14.00

DIMENSIONS, 4010.

SIZE.	NO. 2.	NO. 1 1-2.	NO. 1.
Distance between wheels	40 in	32 in	21¾ in.
Entire length of spindle	55 "	44 "	29 "
Height from floor to center of spindle	29½ "	33 "	37½ "
Length of bearings	12 "	9 "	6½ "
Diameter of spindle in bearings	2 1/16 "	1 9/16 "	1 1/16 "
Diameter of spindle between flanges	2 "	1½ "	1 "
Diameter of flanges	10 "	8 "	4¼ "
Size of cone pulleys on spindle	5¼ and 7 x 5½ "	4¾ and 6¼ x 4¼ "	4½ and 2⅞ x 2¾ "
Size of tight and loose pulleys on countershaft	8 x 5¼ "	7 x 4¼ "	7 x 3¼ "
Size of cone pulleys on countershaft	16½ and 18 x 5¼ "	16½ and 15⅛ x 4¼ "	15¼ and 13¾ x 2¾ "
Will run wheels in thickness	24 x 4 "	20 x 3½ "	14 x 2 "
Revolutions of the countershaft	400	450	500

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NOS. 1, 3-4, 5-8 AND 1-2 INCH SPINDLE BENCH GRINDERS.

PRICES.

Size No.	Price.	Price of countershaft.	Weight, with countershaft.	Size of emery wheels
1	$28.00	$14.00	180 lbs.	14 x 2 in.
3/4	18.50	12.50	100 "	12 x 1 1/2 in.
5/8	12.50	12.50	85 "	10 x 1 in.
1/2	10.00	10.00	75 "	8 x 3/4 in.

SPEEDS OF COUNTERSHAFTS.

1 500 revolutions per minute.
3/4 400 " " "
5/8 400 " " "
1/2 400 " " "

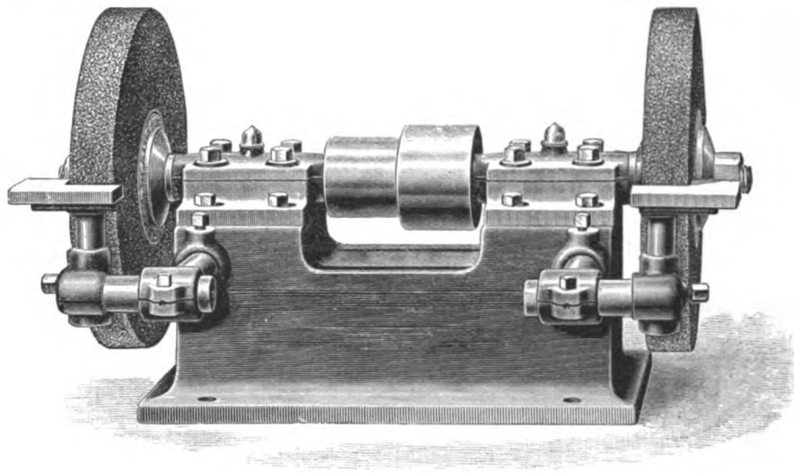


FIG. 4011.

DIMENSIONS.

SIZE.	1 INCH.	3-4 INCH.	5-8 INCH.	1-2 INCH.
Distance between wheels	21 3/4 in.	14 7/8 in.	12 in.	9 7/8 in.
Entire length of spindle	29 "	20 1/4 "	16 "	13 "
Height from bench to center of spindle	7 3/4 "	6 1/2 "	5 1/4 "	4 1/4 "
Length of bearings	6 1/2 "	4 1/2 "	3 1/4 "	3 "
Diameter of spindle in bearings	1 1/16 "	12/16 "	11/16 "	9/16 "
Diameter of spindle between flanges	1 "	3/4 "	5/8 "	1/2 "
Diameter of flanges	4 1/4 "	3 "	2 "	1 3/4 "
Size of cone pulleys on spindle	4 1/2 and 2 7/8 x 2 3/4 "	2 5/16 and 3 1/16 x 2 1/8 "	1 3/4 and 2 1/2 x 1 5/8 "	2 x 1 5/8
Size of tight and loose pulleys on countershaft	7 x 3 1/4 "	4 3/4 x 2 1/2 "	4 3/4 x 2 1/2 "	4 3/4 x 2 1/2 "
Size of cone pulleys on countershaft	15 1/4 and 13 3/4 x 2 3/4 "	14 5/8 and 14 x 2 3/16 "	14 5/8 and 14 x 2 3/16 "	13 3/4 x 2 3/16 "

PEDESTAL FOR FIG. 4011.

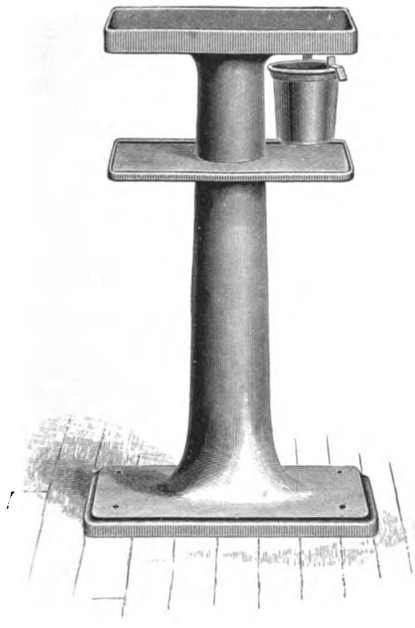


FIG. 4012.

This iron table and column is designed for grinders, Fig. 4011.

Weight of column ..... 100 lbs.
Size of iron table ..... 16 x 10 in.
Size of base of column ..... 16 x 13 "
Height from floor ..... 34 "
Price of iron column, with water pot attached $12.00

BELT STRAPPING MACHINE.

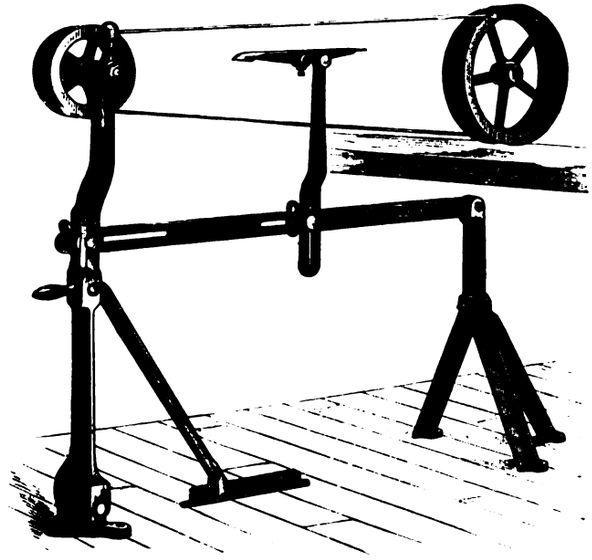


FIG. 4013.

The belt strapping attachment shown can be fastened to any part of the floor. Arrangements for bracing are shown which stiffen it. The lever shown with projecting handle through the upright jointed standard has a steel point on the end, which, when the operator tightens, the upright standard drops into the teeth of rack shown fastened to the floor, holding it firmly. Pressing on the handle of the lever (projecting through the upright standard) will release it instantly from the teeth, when the jointed standard swings forward and releases the belt. The lever is provided with ears that fit into grooves cast in each side of the toothed rack on the floor, thereby keeping it always in place. The flanged pulleys are turned inside and out, and carefully balanced to run true.

Price includes two flanged pulleys, 12 and 6 inches diameter, 1 inch hole, 2 1/2 inches between flanges, $25.00.

We make in this design a *larger, heavier, strapping machine*, using flange pulleys, 4 x 8 inches, 1 1/4 hole, 3 1/2 to 6 inches between flanges. Weight, 350 lbs. Price, including flange pulleys, 14 and 6 x 4 inches, $50.00.

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SPRING SUSPENDED EMERY GRINDER.

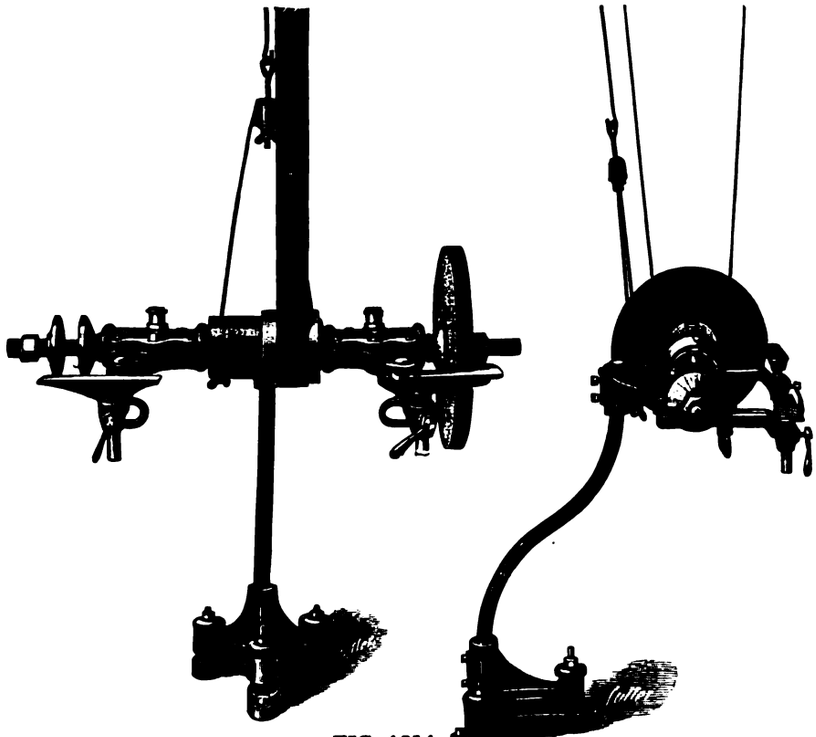


FIG. 4014.

FRONT VIEW. SIDE VIEW.

The machine as shown is hung in cushions or springs, and suspended between ceiling and floor by wires or spring-rods in such a manner that the emery wheels revolve on their center of gravity, doing away with all noise or unpleasant vibrations, so that a solid wheel under the work feels soft as a cushion, and does away with the wavy appearance on surface work. A great part of the polishing or cutting down heretofore done on leather-covered wheels can be done on solid wheels. With the new machines emery wheels last longer and cut much faster because the work passes smoothly over the wheel, every particle of emery doing its share of the work. The work does not bump and stutter over the wheel, crushing the grains of emery and tearing them out without allowing them to cut, as on other machines. The new machine has no cumbersome frame or base in the way, and allows the workman to get at all parts of the wheels and to grind all heavy work on a barrow under the wheel so that he can see what he is doing.

Various styles of machines for all kinds of grinding, polishing and buffing will be kept in stock or made to order.

For solid wheels, machines will have rest brackets front and rear. Buffing and polishing machines will have no rest brackets, but will be made in the most convenient form for all kinds of polishing, including a special line of heavy plow polishing machines.

The machines are of the very best workmanship; the spindles and connecting parts and suspending wires or rods are steel; they have longer spindles with longer dust-proof bearings than other machines; they will be furnished with solid iron or babbitt bearings, as parties desire.

PRICES, FIG. 4014.

No.	Height from floor to center of spindle.	Length of bearings.	Diameter of spindle in bearings.	Diameter of spindle between flanges.	Distance between wheels.	Size of pulley on spindle.	Will run wheels up to	Price of machine.	Price of machine with countershaft.
	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.		
23	36	2½	1 1/16	½	9	2 x 2	6	$28.00	$40.00
24	36	4½	⅞	¾	16	3 x 3½	9	36.00	48.00
25	36	5	1 1/16	1	19	4 x 3½	12	55.00	70.00
26	36	6	1¼	1	24	4½ x 3½ x 3¼	14	63.00	80.00
27	36	7	1½	1¼	28	5 & 6 x 4	16	72.00	90.00
28	36	9	1¾	1½	32	6 & 7 x 5	20	107.00	132.00
29	33	10	2	1¾	38	6 & 7 x 6	24	120.00	145.00
30	32	12	2¼	2	44	8 & 9 x 6	30	150.00	185.00

SWING FRAME GRINDER AND POLISHER.

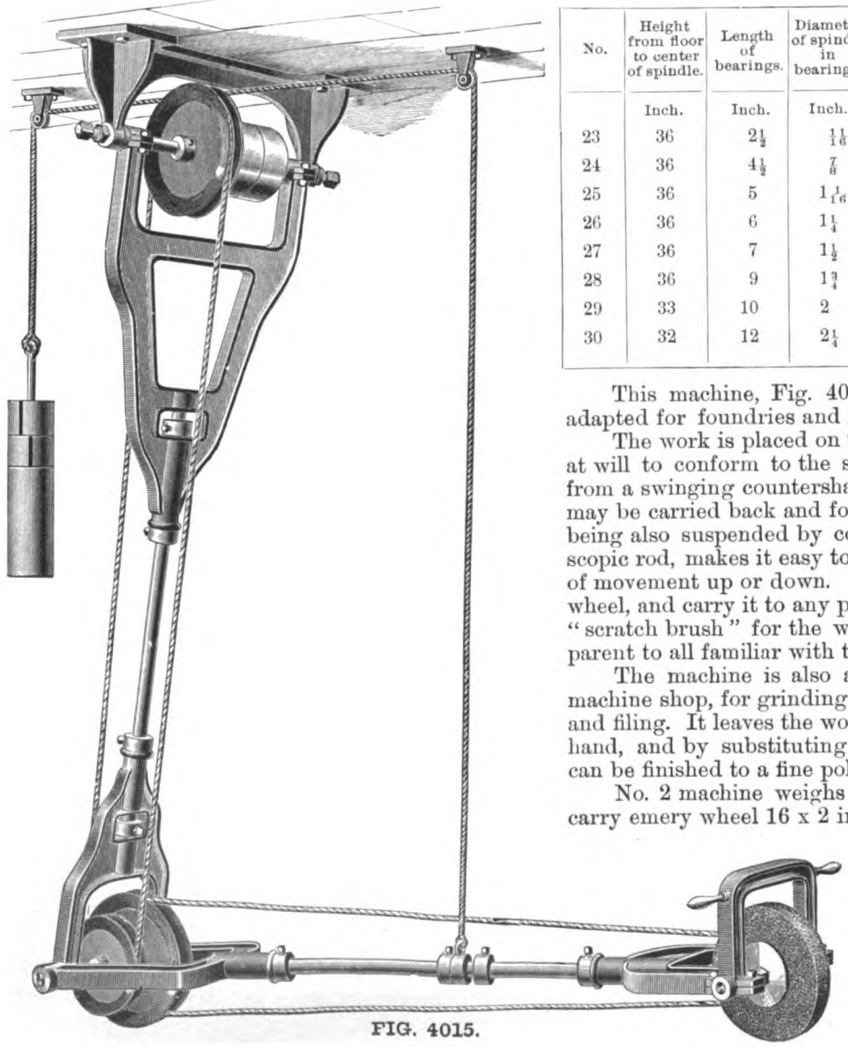


FIG. 4015.

This machine, Fig. 4015, is to be suspended from overhead, and is specially adapted for foundries and large machine shops.

The work is placed on the floor, bench, or truck, and the emery wheel swung at will to conform to the straight or uneven surface. The wheel, being driven from a swinging countershaft suspended by a telescopic rod with a universal joint, may be carried back and forth or swung at will, and the frame carrying the wheel, being also suspended by counterpoise weights jointed to a similar horizontal telescopic rod, makes it easy to twist the wheel over to any angle, or give it any range of movement up or down. The operator can seize the handles on each side of the wheel, and carry it to any portion of the work desired. By substituting a circular "scratch brush" for the wheel, its value in the cleaning room of a foundry is apparent to all familiar with the old laborious hand process.

The machine is also a valuable accession to the machinery of any general machine shop, for grinding off fins, spurs and imperfections, instead of chipping and filing. It leaves the work looking better and it may be performed by a cheaper hand, and by substituting a polishing wheel for the grinding wheel the work can be finished to a fine polish.

No. 2 machine weighs 625 lbs., has a spindle 1½ inches diameter, and will carry emery wheel 16 x 2 inches.

PRICES.

Price of No. 1, with belts, complete, without wheel..... $110.00

Price of No. 2, with belts, complete, without wheel..... 135.00

We make a rest to stand on the floor and support the two handles, thus making a good stationary grinder, at $25.00 extra to above prices.

In ordering give height of stud to shop.

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EMERY WHEEL SURFACE PLANERS.

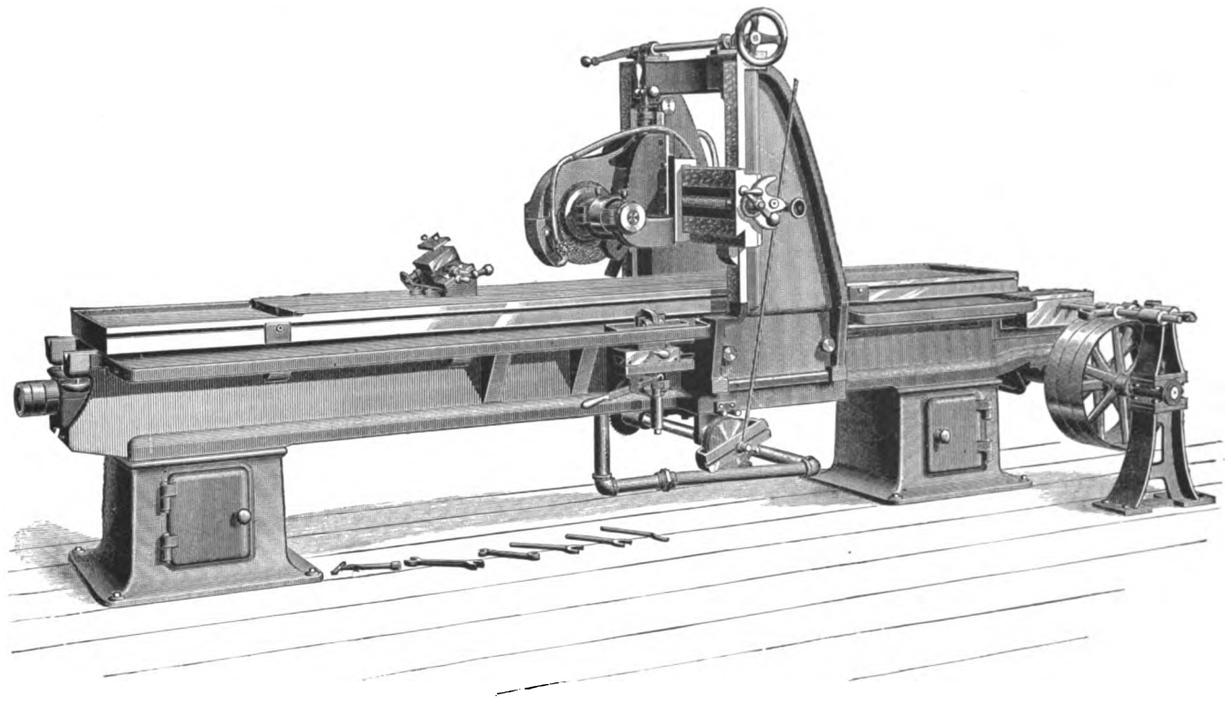


FIG. 4016. REPRESENTS RATCHET FEED.

It is intended for doing with an emery wheel a portion of the work usually done with a file, planer, shaper, milling machine, or similar tool.

It will do flat and true surface grinding and finishing.

It is especially adapted for surfacing iron in the rough where but a small amount is taken off, and for finishing and cutting down work where the material is of a hard nature, as the surfaces of hard iron, chilled iron, steel, dies, punches, etc.

On tempered work it saves drawing the temper and rehardening, and it is true when done; while, if finished on an iron planer, on hardening it will spring, warp and twist out of shape. It is also adapted to finishing work that has been roughened off on a planer where it is desired to take out the tool marks.

The emery wheel cuts as fast when carriage is running backward as when running forward, while an iron planer cuts only one way. It will grind the very hardest castings made.

The work can be fastened to a carriage by the ordinary method used on iron planers. A folding hood nearly surrounds the wheel, which prevents the water flying off, and is adjustable to the wearing away of the wheel. A centrifugal pump is attached to each machine piped with a valve to regulate the flow of water on the wheel.

The bed is closed in at the bottom, making it much more rigid, and acts as a reservoir for holding water to supply the pump.

The carriage is fed by a lead screw through center of bed engaging with a clamp nut, said lead screw being fed by a powerful worm and worm gear running in oil tank to prevent wear. The two shortest sizes have a bed of usual depth, and all of the others have an extra heavy bed 18 inches deep; the carriage to each size is 24 inches wide, taking in work 27 inches between uprights, and about 18 inches high with wheel about 14 x 2 inches. Carriage is three inches longer than list, has pockets 24 inches long, thus effectually covering the ways from emery and dust.

The emery wheel on cross head has a very fine down feed by means of a fine worm, which mashes into a fine worm gear on the end of feed screw or can be fed fast by throwing the worm out of mash.

The machine has an improved system of idlers to be fastened to ceiling for keeping the belt that drives the wheel at a proper tension. As the emery wheel is raised or lowered for work of different thicknesses, the idlers are run in and out by a system of bevel gears and screws, operated by a hand wheel within easy reach. It has our patent belt shipper for the carriage motion, which is arranged to start one belt enough in advance of the other to prevent all screeching of belts when reversing the motion of the carriage.

We make these machines with emery wheel 14 x 2 inches, carried along on a cross beam with a rapid ratchet feed the same as on an iron planer.

PRICES.

Size.	Height, with 14 in. x 2 in. wheel.	Weight.	Price, with ratchet feed.	
27 in. wide for work up to 4 ft. long.....	18 inches.	5,500 lbs.	$1,300.00	
" " " " 7 "	" "	6,000 "	1,450.00	Made higher and wider to order.
" " " " 9 "	" "	10,400 "	1,650.00	
" " " " 12 "	" "	12,250 "	1,850.00	
" " " " 15 "	" "	14,150 "	2,050.00	
" " " " 18 "	" "	16,000 "	2,350.00	

We make an additional head to use on these machines, turning them into iron planers with automatic down feed to swivel at any angle, and graduated. It takes but a few minutes to change this head.

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SURFACING OR GUIDE BAR GRINDER.

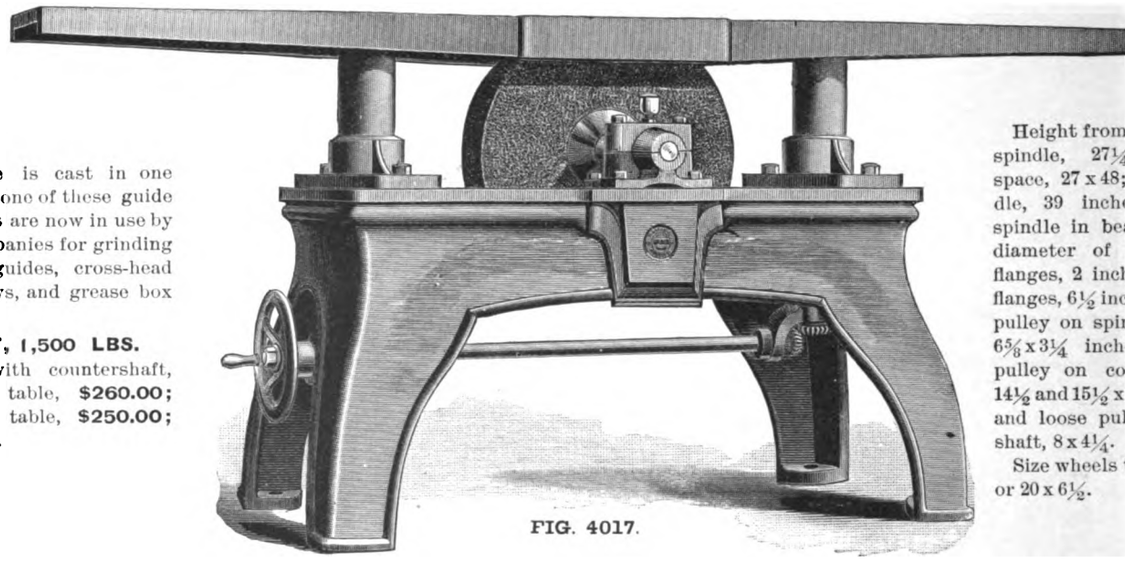


FIG. 4017.

The frame is cast in one piece. Fifty-one of these guide bar machines are now in use by railroad companies for grinding cross-head guides, cross-head keys, rod keys, and grease box tops.

WEIGHT, 1,500 LBS.

PRICES, with countershaft, with 7 ft. table, **$260.00**; with 5 ft. table, **$250.00**; wheels extra.

Height from floor to center of spindle, 27¼ inches; floor space, 27 x 48; length of spindle, 39 inches; diameter of spindle in bearings, 2 inches; diameter of spindle between flanges, 2 inches; diameter of flanges, 6½ inches; size of cone pulley on spindle, 4⅝, 5⅝ and 6⅝ x 3¼ inches; size of cone pulley on countershaft, 13½, 14½ and 15½ x 3¼; size of tight and loose pulleys on countershaft, 8 x 4¼.

Size wheels to be used, 20 x 4, or 20 x 6½.

NO. F SPECIAL GRINDER, WITH EITHER SINGLE OR DOUBLE TABLES.

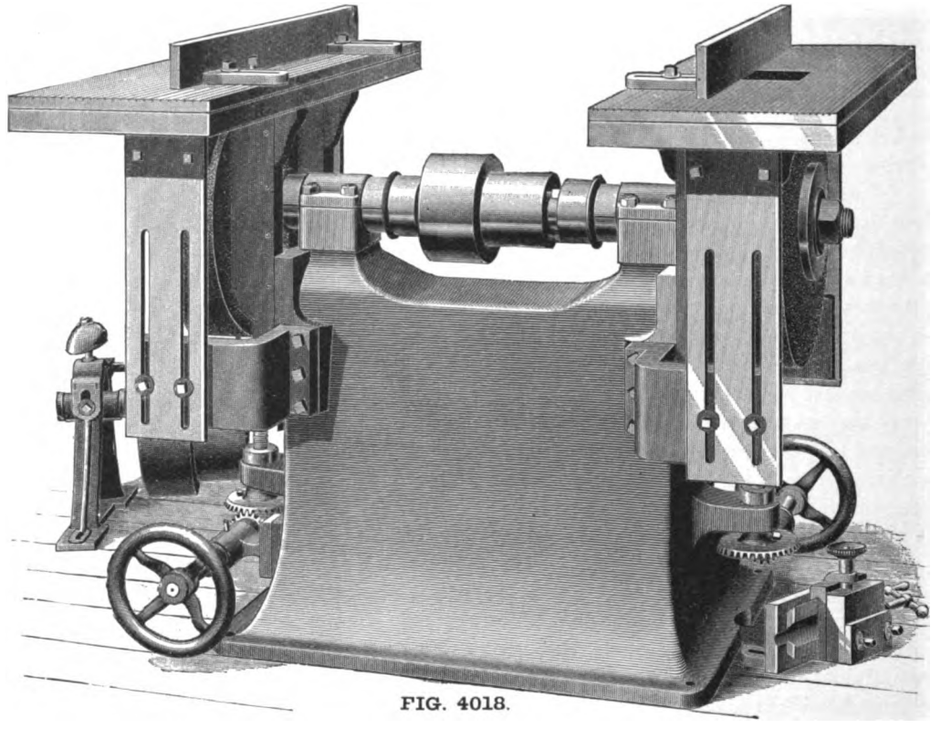


FIG. 4018.

This machine is often used with a solid emery wheel on one end for surfacing work, and with a wood polishing wheel at the other end for polishing the same. The regular table is 40 inches long by 15 inches wide, with an adjustable side guide. The ends of the table have perpendicular supports extending downward, each with two slots through which bolts pass to securely hold the table when set, and prevent it from springing when under heavy weight. The table is raised or lowered by a screw worked by bevel gears, and is kept in line by having side guides running over dovetail track on the end of base. The machine is used with solid emery or wood-covered wheels, it being but little work to change from one style of wheel to the other, with the end of spindle tapering to hold the wheels on by friction, or with tight and loose collar and nut. The spindles are made either way, as may be desired, or with one end made with tapering spindle for wood polishing wheel and the other end with tight and loose collar and nut for solid emery wheels. This machine has steel spindle long enough for a man to work at each end at the same time.

DESCRIPTION OF DOUBLE TABLE MACHINE.

Height from floor to center of spindle, 30½ inches; height from floor to top of table, when wheel is full size, 41 inches; length of self-oiling bearings, 8 inches; diameter of spindle in bearings, 2¼ inches; diameter of spindle between flanges, 2 inches, when made with tight and loose collar; distance between wheels, 40 inches; entire length of spindle, 52 inches. Floor space of base, 36 x 26 inches; spindle cone, 5 and 7½ x 4 inches; carries wheels under surfacing table up to 20 inches diameter, 4 inches thick; has removable cast-iron facing over top of surfacing table, that can be easily replaned when worn out of true; countershaft cones, 16 and 13½ x 4 inches; tight and loose pulley, 10 x 5 inches, and should run so as to give the wheel the speed called for on emery wheel price list, which varies according to size of wheel used.

WEIGHT, 2,000 LBS. PRICES, DOUBLE TABLE.

With countershaft, with 2 tables 60 inches long, without wheels	$365.00
With countershaft, with 2 tables 40 inches long, without wheels	325.00

WEIGHT, 1,300 LBS. PRICES, SINGLE TABLE.

With countershaft, with table 60 inches long, without wheels	$270.00
With countershaft, with table 40 inches long, without wheels	250.00

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NOS. D AND C SPECIAL SURFACING GRINDERS.

NO. D SPECIAL GRINDER.

An emery wheel surfacing machine arranged for surfacing flat work over top of wheel at one end of the machine. Table 32 inches long by 9 inches wide, with adjustable side guide to hold work against. It is arranged at one end so that it is adjustable to the wearing away of the wheel. The opposite end of the machine is left open for miscellaneous work.

Height from floor to center of spindle, 34 inches; length of self-oiling bearings, 8 inches; diameter of spindle in bearings, 1¾ inches; diameter of spindle between flanges, 1½ inches; distance between wheels, 36 inches; entire length of spindle, 48 inches; floor space, 27 x 27 inches; spindle cones, 5 and 7½ x 4 inches; carries two wheels up to 20 inches diameter; countershaft cones, 16 and 13⅓ x 4 inches; tight and loose pulley, 8½ x 4 inches, and should run so as to give the wheel the speed called for on emery wheel price list, which varies according to size of wheel used. **WEIGHT, 800 LBS.**

PRICES.

Price, complete, without wheels $175.00
Price, without countershaft or wheels 157.00

WITH DOUBLE TABLE.

Description as above, but has surfacing table over each end of arbor. **WEIGHT, 1,000 LBS.**

Price, complete, without wheels $240.00

NO. C SPECIAL GRINDER.

Arranged for surfacing flat work over wheel at one end of the machine. Table 20 inches long by 7 inches wide, with adjustable side guides to hold work against.

Height from table to center of spindle, 12 inches; height from floor to center of spindle, 40 inches; length of bearings, 5 inches; diameter of spindle in bearings, $1\frac{7}{16}$ inches; diameter of spindle between flanges, 1¼ inches; distance between wheels, 23 inches; entire length of spindle, 34 inches; floor space, 24 x 24 inches; spindle cones, 3½ and 5½ x 3½ inches; carries wheels up to 16 inches diameter; countershaft cones, 16 and 14 x 4 inches; tight and loose pulley, 8½ x 4 inches. **WEIGHT, 625 LBS.**

PRICES.

Price, complete, without wheels $105.00
Price, without countershaft 90.00
Price, without table and legs 85.00
Price, without table, legs or countershaft 70.00

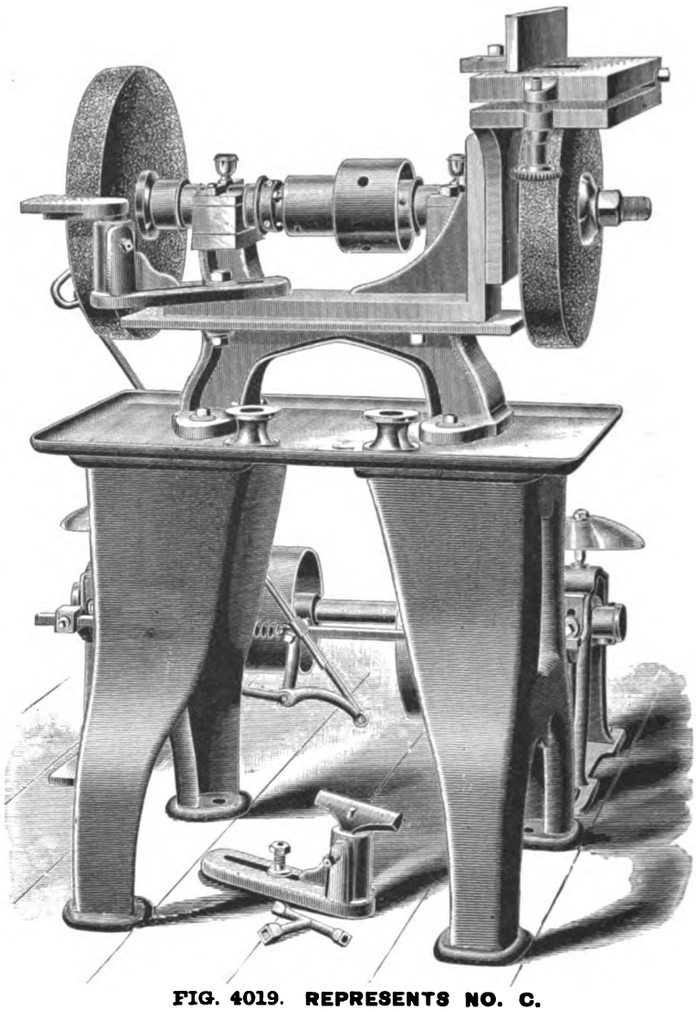


FIG. 4019. REPRESENTS NO. C.

NO. 9 GRINDER, 42 INCH WHEELS WITH SURFACING ATTACHMENT.

This machine is designed to run two wheels up to 42 inches in diameter. It is shown with surface grinding attachment, designed to fasten to the arms from the back of machine. It can be raised and lowered at the will of the operator, and when not in use turned away from the wheel. It has right and left hand rest, also an extra large elbow table rest, the same extending past the center, thus enabling the operator to use the side of the wheel as well as the face.

Countershaft has cone pulley 16, 14 and 12 inches in diameter, 6¼ inch face. Tight and loose pulley, 10 inch diameter, 6¼ inch face. Drop of hangers, 12 inches. Length of shaft, 50 inches; diameter, 1¾ inches. Boxes, 1⅜ x 5 inches.

Countershaft should run 400 revolutions per minute; this gives to the slowest speed, 400 revolutions; to the quickest speed, 900 revolutions per minute.

Weight of No. 9 machine ..... 2,400 lbs.
Distance between wheels ..... 39 inches.
Length of bearings ..... 10 "
Diameter of spindle in bearings ..... 2⅝ "
Diameter of spindle between flanges ..... 2½ "
Height from floor to center of spindle ..... 30 "
Size of cone pulley on spindle ..... 8, 10 and 12 x 6¼ "

PRICES.

Price of No. 9 grinding machine, including countershaft $275.00
Price of No. 9 grinding machine surface attachment, 100.00
Price of special elbow table rest 25.00

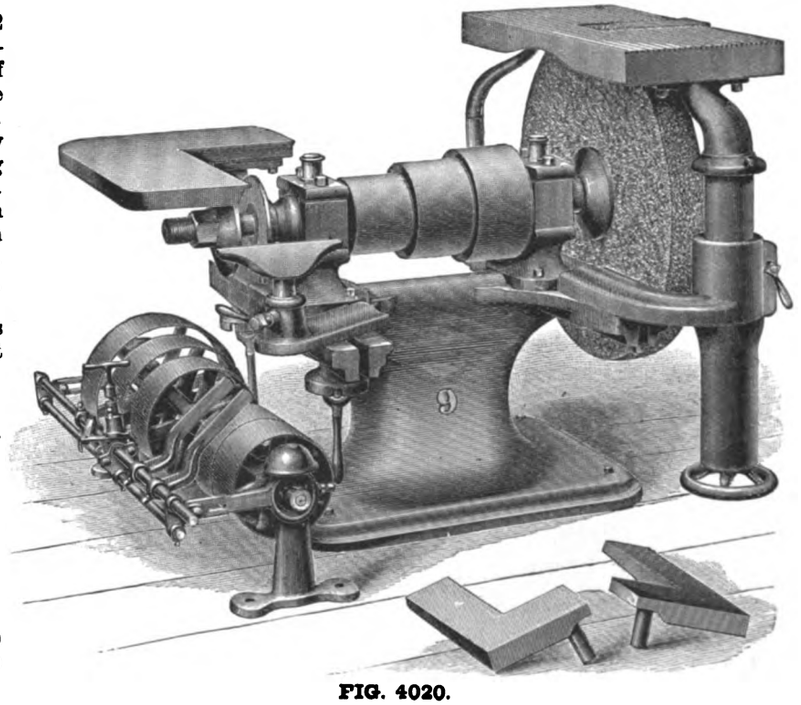


FIG. 4020.

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ADJUSTABLE SURFACE GRINDING AND POLISHING MACHINE.

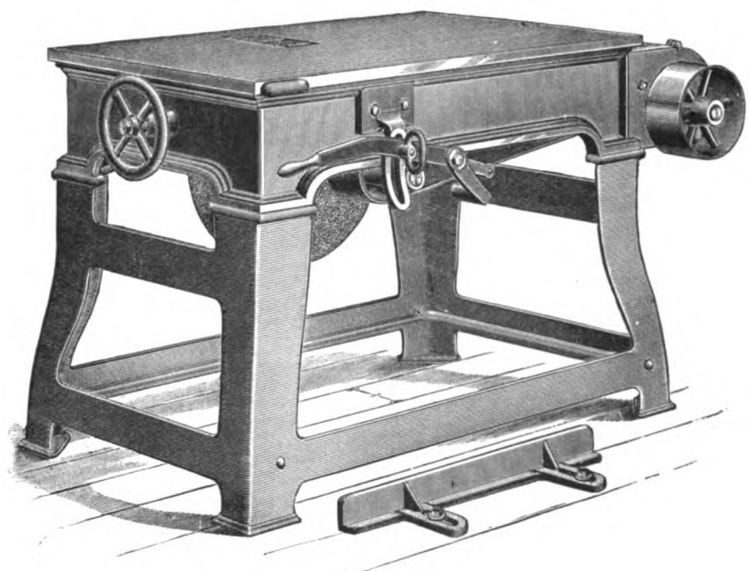


FIG. 4021.

This machine is designed to grind or polish the surfaces of large work requiring a roomy table, strength and stiffness in the frame.

The solid or wood wheel is placed between flanges upon 1½ inch steel spindle running in two boxes with bearing surface in each 8 inches long. It is suspended between strong iron standards, which are hung upon the shaft at the rear of the machine. When the wheel is to be raised or lowered it can be moved quickly by the use of lever shown at the side of frame. When the wheel is close to the work, a sensitive adjustment is had in the arrangement for lowering and raising, by the use of screw connected to hand wheel in front of machine; this raising of the wheel in the manner described secures a more even adjustment over the manner of lowering a heavy piece of work to the wheel.

Solid or wood wheels covered with leather and emery are used up to 18 inches diameter, 4 inch face. They can be worn down to the flanges, narrower and smaller wheels can be used, and all open space closed up each side of the wheel by a patented arrangement of ours.

The table measures 30 x 40 inches. The height of frame from floor to top is 33 inches. The knee shown is provided with slots which extend 8 inches in length. It can be set close to the wheel and assists in guiding the work to be polished or ground.

A solid emery wheel 18 inches diameter on this machine should run 750 revolutions per minute.

An 18 inch wood wheel covered with leather and emery should run from 1,500 to 2,000 revolutions per minute.

In grinding surfaces on our machines use a wheel that cuts freely at a slow rate of speed, not one required to run fast and heat or burn the work. The weight of machine is 1,000 lbs.

PRICES.

Machine and counter.....**$200.00**

Wheels extra.

NO. 12 UPRIGHT GRINDER.

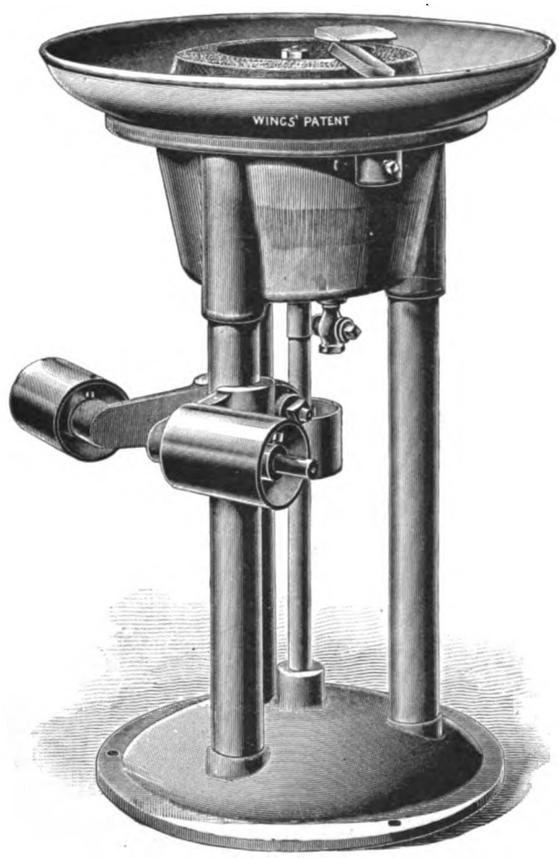


FIG. 4022.

This machine carries a single wheel, 12 inches in diameter by 2 inches thick, and is mounted on a steel arbor 1¼ inches in diameter, running in removable bronze bushings.

The grinding face of wheel is slightly beveled to accommodate the grinding of long knives which have to lie across the wheel from one side to the other. It is designed for grinding all kinds of tools having straight edges like planes, chisels, knives, etc., and is also effective for grinding machinists' and kindred tools.

The water is brought onto and carried over the surface of wheel and back to tank again by centrifugal force alone, and so continuously as long as water is kept in tank.

PRICE.....**$45.00**

UPRIGHT GRINDER.

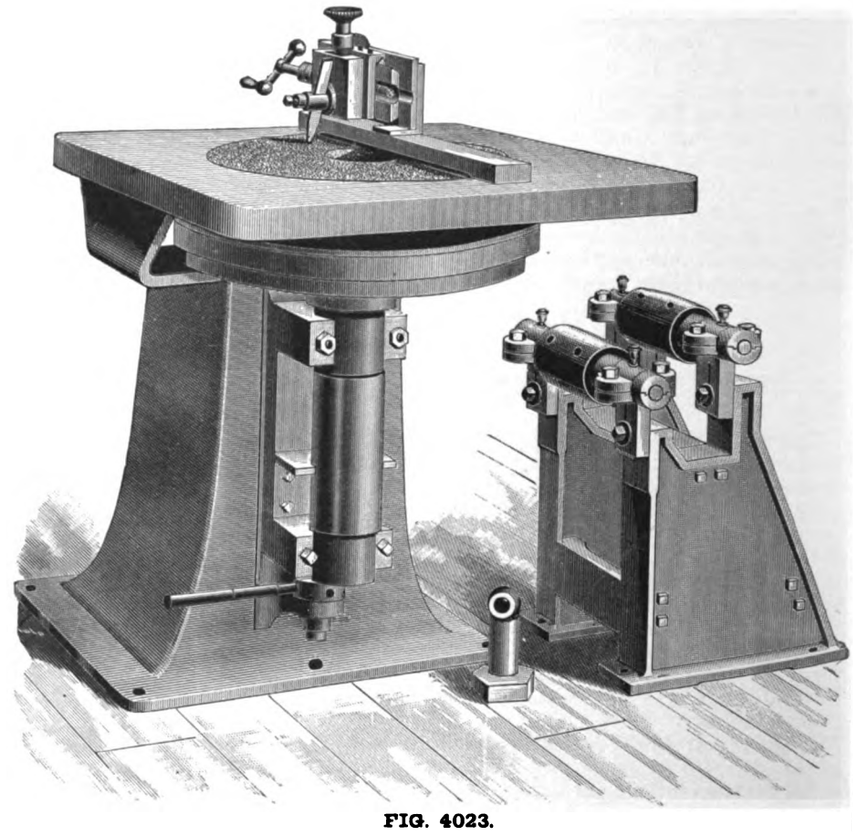


FIG. 4023.

Height from floor to top of table, 38 inches; diameter of spindle, 2½ inches; spindle pulley, 5 x 11 inches; emery wheel is 20 inches diameter, 6½ inches deep, with rim 7½ inches wide, and should run 900 revolutions per minute; table, 30 inches square; floor space, 26 x 30 inches. This machine is especially adapted for light work that can be held in the hand; in many cases the time required for finishing being less than would be necessary to secure the pieces to a face plate, angle iron, or to put them in a chuck. The cut shows a slide rest set in position for diamond tool, which is used in truing the wheel. It is easily removed when not in use, and the cross bar to which it is attached is useful in steadying the work. The emery wheel is mounted on a steel spindle secured to a gibbed carriage running over dovetail track, and is raised by a screw as the wheel wears away. **WEIGHT, 1,800 LBS.**

PRICES.

Complete, with countershaft, floor idlers, and slide rest for truing wheel, **$350.00**

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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AUTOMATIC KNIFE GRINDERS.

FACE WHEEL.

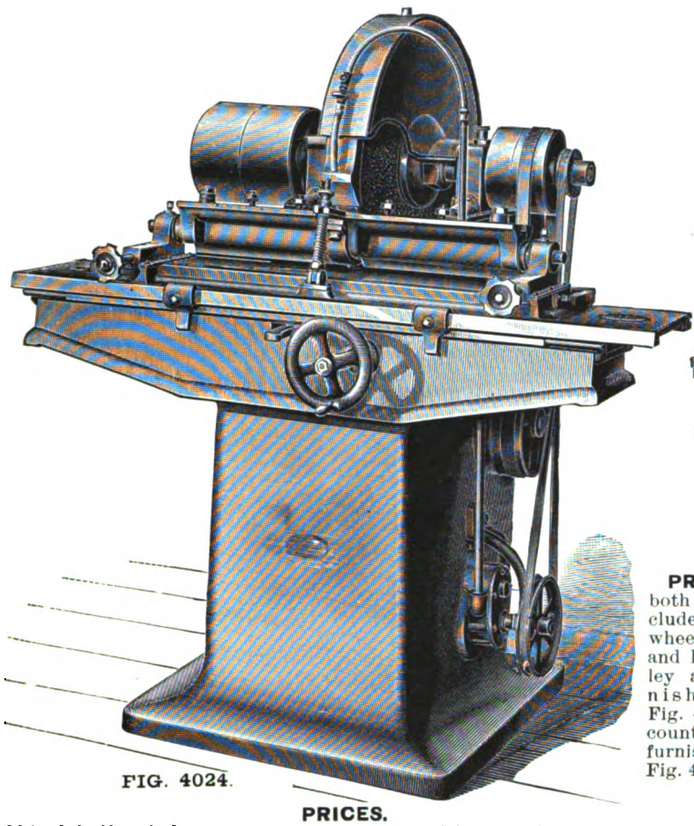


FIG. 4024.

PRICES.

26 inch knife grinder	Weight,	1,000	lbs.,	$175.00
30 " " "	"	1,200	"	200.00
36 " " "	"	1,400	"	250.00
50 " " "	"	1,600	"	300.00
60 " " "	"	2,500	"	350.00
80 " " "	"	3,000	"	450.00

Add $37.50 to list prices given for automatic lateral feed of the wheel to the work.

Add $25.00 to list price for automatic pump and connections. Price of countershaft for this machine, $18.00.

PRICES for both styles include emery wheel. Tight and loose pulley are furnished with Fig. 4024, and countershaft is furnished with Fig. 4025.

CUP WHEEL.

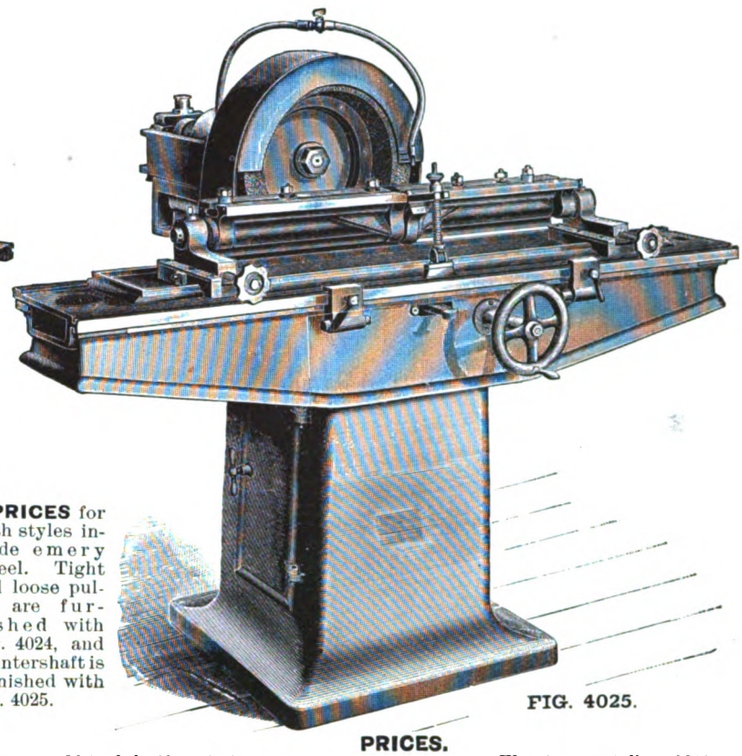


FIG. 4025.

PRICES.

26 inch knife grinder	Weight,	1,000	lbs.,	$200.00
30 " " "	"	1,200	"	225.00
36 " " "	"	1,400	"	275.00
50 " " "	"	1,600	"	350.00
60 " " "	"	2,500	"	400.00
80 " " "	"	3,400	"	500.00

Add $25.00 to list price for automatic pump and connections.

Add $37.50 additional to list price for automatic lateral feed of the wheel to the work.

LONG HEAVY AUTOMATIC KNIFE GRINDER—REAR VIEW.

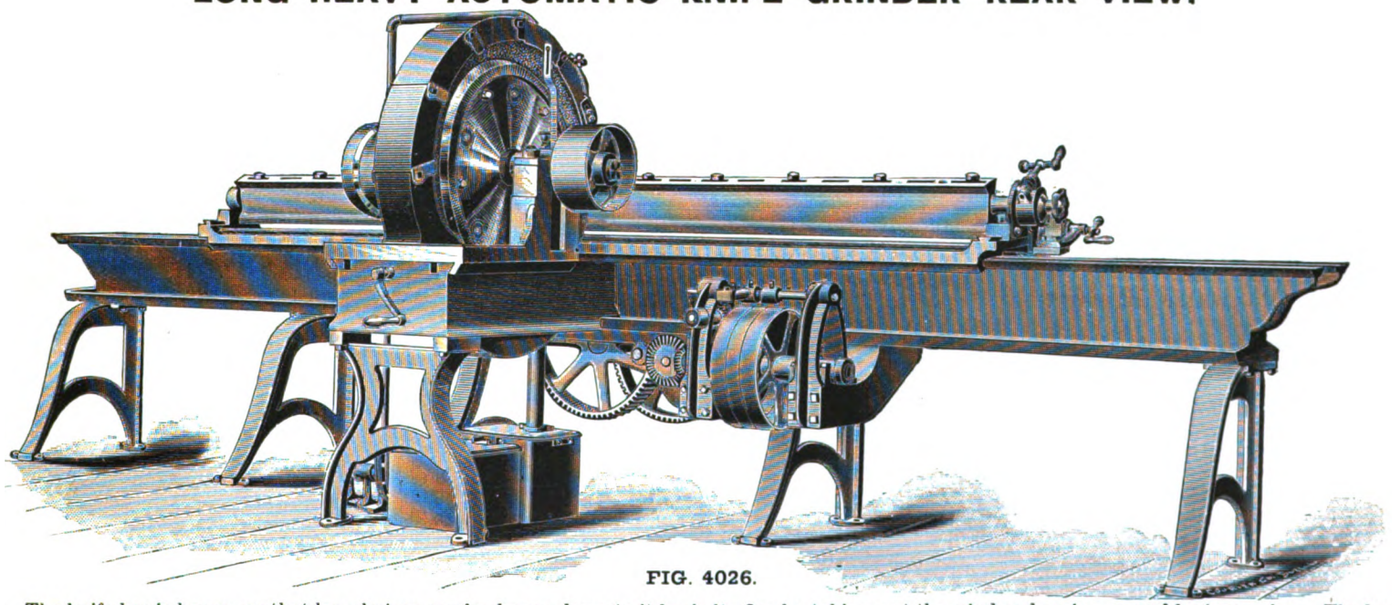


FIG. 4026.

The knife bar is heavy, so that long knives can be drawn down to it by bolts firmly, taking out the wind and spring caused by tempering. The bar is securely held on the carriage and arranged to feed automatically toward the wheel by a ratchet and pawl that is easily regulated to give the desired amount of cross feed motion. The emery wheel is 36 inches in diameter and 4 inches thick, has a hole in its center 24 inches in diameter, to lessen the cost of future wheels, as it represents that part of the wheel that, were the wheel made solid, would be thrown away as being too small and giving too much of a concave surface to the bevel of the knife. It is mounted on a steel spindle, 2½ inches in diameter, running in boxes 8 inches long, is driven by a 5-inch belt at each end of the spindle. The pump furnishes a large supply of water, which prevents heating and drawing the temper, and the grinding can be done rapidly. By using water there is no emery dust to settle on the working parts, giving the machine a much longer life than if run dry. Driving pulleys on spindle, 16 x 5 inches; counter-driving pulleys, 24 x 5 inches; tight and loose pulley, 16 x 8 inches.

PRICES.

For knives 120 inches long..... WEIGHT, 6,000 LBS., $1,050.00 **For knives 144 inches long.....WEIGHT, 7,000 LBS., $1,300.00**

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CUP WHEEL AUTOMATIC VARIETY GRINDER.

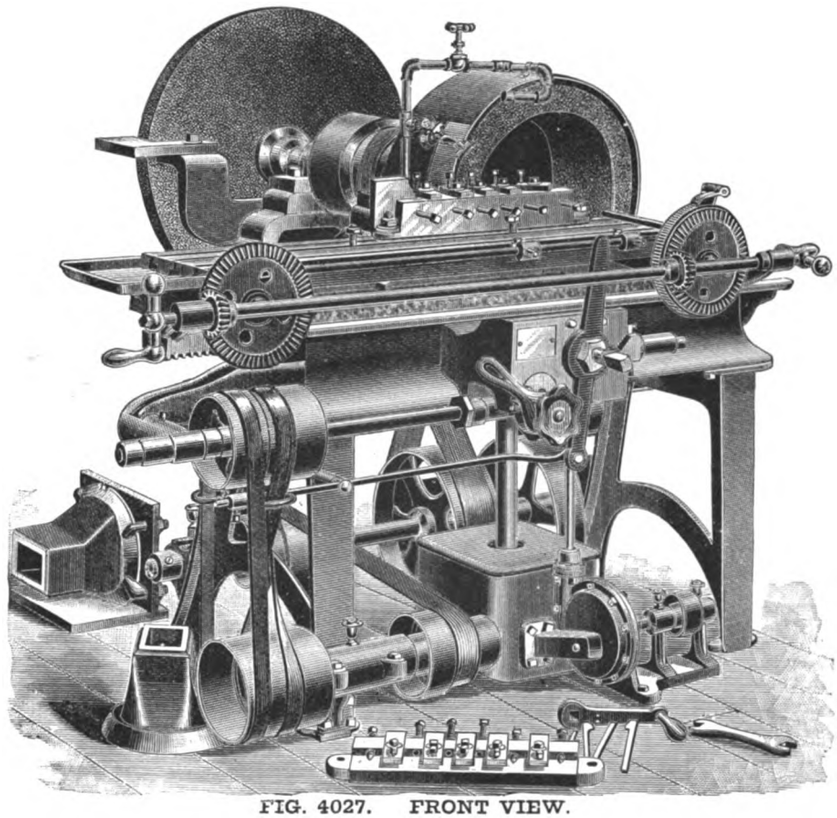


FIG. 4027. FRONT VIEW.

For grinding flat surfaces of moderate width, such as steel dies of great variety, and articles with straight edges.

It has 1¾ inch steel spindle, bearings 8 inches long, pulley 8½ x 5 inches. The emery wheel is 16 inches in diameter, 8½ inches deep, outside measure with 2 inch rim, and is large for this style of wheel, being equal to one 26 inches in diameter x 1½ inches thick of the common kind. The grinding is done on the front edge or rim of the wheel, and grinds the work flat. The machine has a table 9 inches wide with a three T slot. Chucks, angle irons, and various arrangements can be put on this table, adapting it to a large variety of work. Both ends of the table are advanced equally or fed forward at the same time.

Spindle is made so a plain wheel can be used on back end of it, or with collar and check nut to take up for end wear, as may be preferred. If a plain wheel is furnished it is additional to the following prices. Chucks shown are extra to prices below.

Overhead countershaft goes with each grinder, with driving pulley 16 inches in diameter, 10 inch face (the extra width of face to make it so the emery wheel below can be fed forward as it wears away and belt carry along accordingly). Tight and loose pulley, 10 x 5 inches. The emery wheel should run 600 revolutions per minute.

	WEIGHT.	PRICE.
For knives up to 30 inches	1,875 lbs.,	$375.00
" " " 40 "	1,925 "	415.00
" " " 50 "	2,500 "	500.00
" " " 60 "	2,800 "	565.00
" " " 70 "	3,400 "	615.00
" " " 90 "	3,800 "	725.00
" " " 120 "	5,900 "	1,050.00
" " " 144 "	6,400 "	1,300.00

PRICES FOR CUP WHEEL KNIFE GRINDER, DETAIL COUNTER, ETC., SAME AS FOR VARIETY GRINDER.

AUTOMATIC KNIFE GRINDER.

This machine is used for grinding the knives used on planing machines, trimming presses, paper machines, leather splitting machines, tobacco cutters, shears, etc. Will grind a knife in one-third the time needed on any other machine, as water prevents glazing, so wheel cuts faster. Being wet there is no emery dust, and machine will last four times as long as a consequence. The automatic cross feed can be adjusted so precisely that it will grind one six-thousandth part of an inch at each traverse of the carriage and as much more as is desired, and it will stop feeding and grinding at any point; hence, when properly adjusted and set in motion, no attendant is required, a saving in itself that will soon pay for the machine. Both ends of the knife are advanced or fed forward equally at the same time, an advantage that can only be obtained by an automatic cross feed.

There is a graduated dial at the end of the knife bar, so that the bar can be quickly set and the knife ground to the same degree or bevel as when previously ground. The emery wheel is 26 x 1½ inches, with 13 inch hole, making a saving in the cost of future wheels.

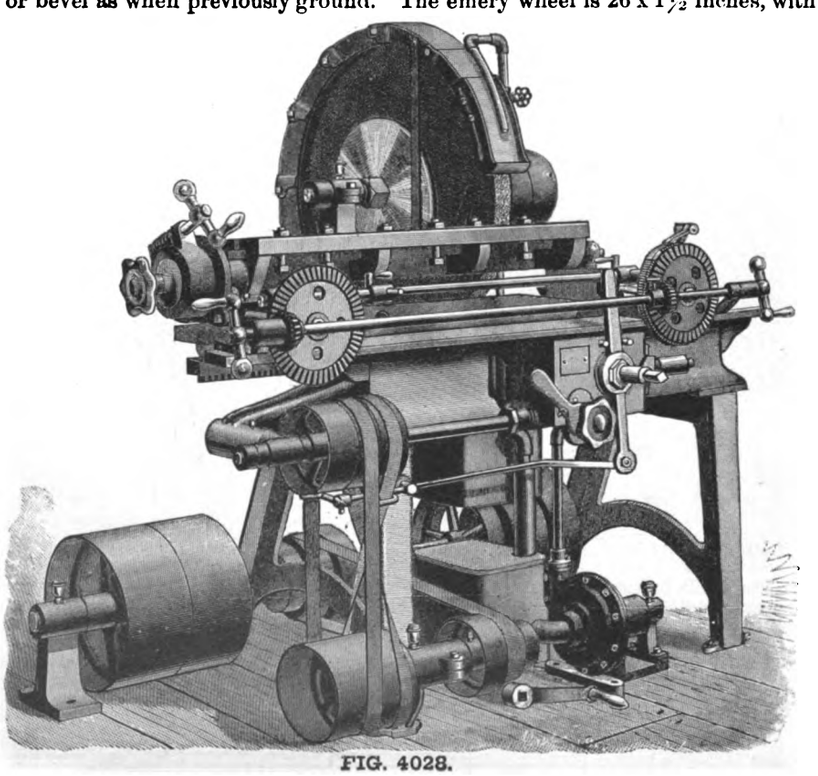


FIG. 4028.

It is hung in a swinging frame easily adjusted by a forward movement to the wearing away of the wheel, and cone pulleys increase the speed correspondingly. The tight and loose pulley on countershaft is 12 inches diameter, by 5 inch face, and should run 315 revolutions per minute, thus giving the emery wheel a speed of about 360 revolutions per minute. It is impossible to grind straight with a dry wheel, as in grinding the knife heats, expands, and grinds more in the center than at the end, leaving it hollowing when ground, all of which is avoided in this machine by using a plentiful supply of water. A galvanized iron pan on the carriage catches the water and carries it to the tank. A centrifugal pump is attached to each machine, properly piped, with a valve to regulate the flow, and it furnishes a large supply of water, and prevents heating and drawing the temper.

	WEIGHT.	PRICE.
For knives up to 30 inches	1,200 lbs.,	$300.00
" " " 40 "	1,250 "	340.00
" " " 50 "	1,500 "	425.00
" " " 60 "	1,700 "	490.00
" " " 70 "	2,000 "	540.00
" " " 90 "	2,400 "	650.00
" " " 120 "	6,000 "	1,050.00
" " " 144 "	6,500 "	1,300.00

When desired, we make this machine with wheel 36 x 2 with 24 inch hole. Price, mounted on heavy back extension with 2 inch arbor, $75.00 additional to above prices.

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32, 30 AND 26 INCH AUTOMATIC KNIFE GRINDER.

Designed to grind knives of all lengths up to 32 inches, as used in planing mills, etc. Once in motion it requires no attention. The base and bed being one casting, with its weight and large floor space, makes it very rigid and free from vibration when being used. The water tanks are located in the base of machine out of the way, one above the other. A centrifugal pump takes water from the lower tank and sends it through pipe connections directly on to the knife where it is being ground, keeping it cool and preventing all glazing of the wheel. An adjustable folding hood nearly surrounds the wheel, preventing the water flying. The water and waste ground off run into the upper tank, under the table, where the sediment settles, and the clear water overflows to the lower tank. The emery wheel is 26 x 1½ inches, with 13 inch hole, making a saving in the cost of future wheels. It is hung in a swinging frame easily adjusted to the wearing away of the wheel. Tight and loose spindle pulleys are 10 x 5 inches, and should run 360 to 400 revolutions per minute. By means of the worm and worm gear that turn the knife bar, the knife can be quickly set to any degree of bevel desired, the degree being indicated by a graduated dial at one end of the knife bar, and all future knives can be ground at exactly the same degree of bevel, if desired. The carriage can be instantly stopped by throwing the arrow point out of position without shipping any belts or stopping the wheel, a convenience in putting on and taking off knives. The automatic cross feed can be adjusted so precisely that it will grind one six-thousandth part of an inch at each traverse of the carriage, and as much more as desired, and it will stop feeding and grinding at any point. Both ends of the knife are advanced or fed forward equally at the same time. Floor space, 24 x 32 inches.

PRICES.

26, complete, with pump, automatic feed and emery wheel	$200.00
30, " " " " " " " "	225.00
32, " " " " " " " "	240.00

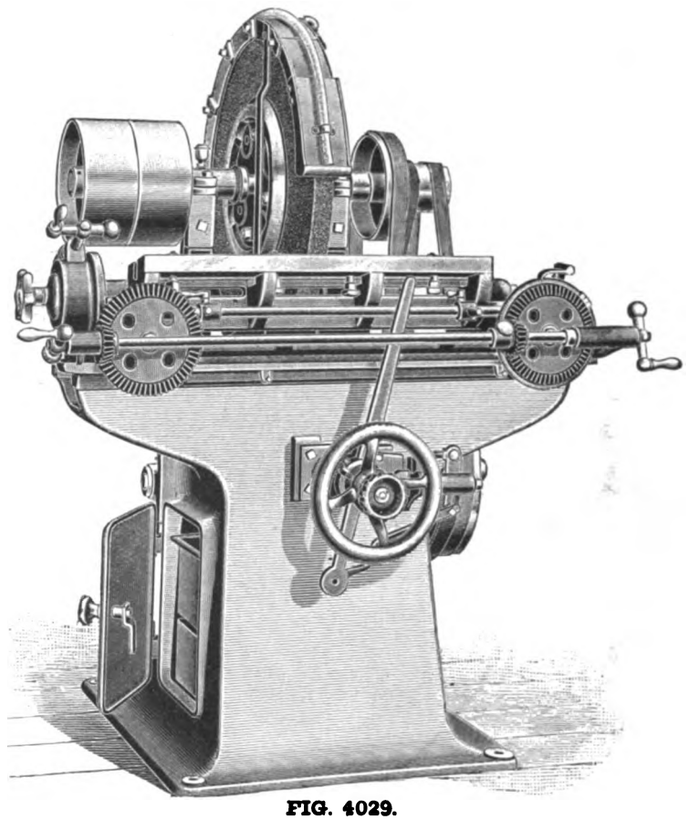


FIG. 4029.

NO. 1 UNIVERSAL GRINDING MACHINE.

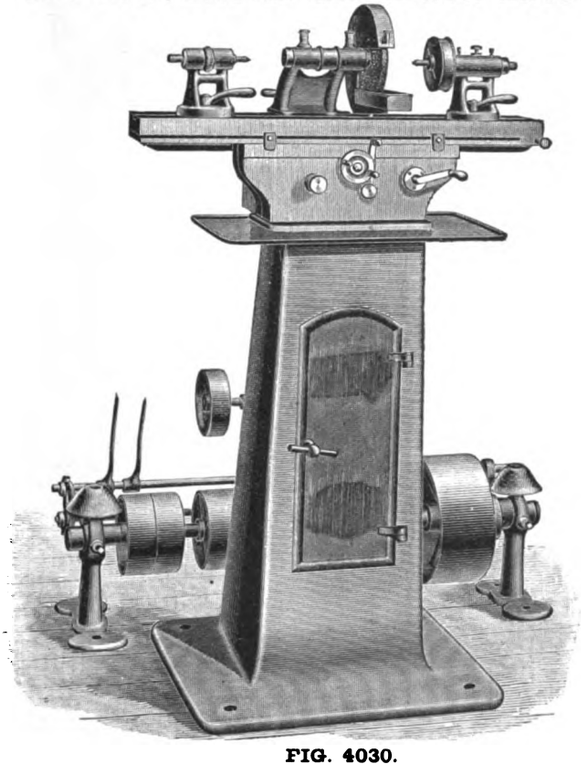


FIG. 4030.

Distance between centers	20 inches.
Length of traverse	16 "
Swing	8 "
Height from floor to center of spindle	43 "
Size of base	18 x 23 "
Will use emery wheel up to	8 "
Size of driving pulley on countershaft	10 x 5 "
Size of tight and loose pulleys on countershaft	6 x 2½ "
Size of drum on countershaft	16 in. long by 6 in. in diameter.
Size of feed pulley on countershaft	5 x 1½ inches.
Speed of countershaft	450 revolutions per minute.
Weight of machine, complete, with countershaft	600 lbs.

PRICES.

Price of machine No. 1, complete, with countershaft	$300.00
Price of chuck, extra, fitted to machine	25.00

An automatic cross feed, arranged to stop at any given point, is supplied with this machine when ordered.

Price of automatic cross feed, extra	$25.00

Large sizes made to order.

AUTOMATIC KNIFE-GRINDING MACHINE.



FIG. 4031.

This machine is furnished with an emery wheel especially adapted to dry grinding.

Emery wheel, 26 x 1½ in. Speed, about 250 revolutions per minute.

PRICES, INCLUDING EMERY WHEEL.

For knives, 24 in. long	$125.00
" " 30 " "	135.00
" " 36 " "	145.00
" " 50 " "	165.00
" " 60 " "	180.00
" " 80 " "	200.00

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CAR BOX GRINDING MACHINE.

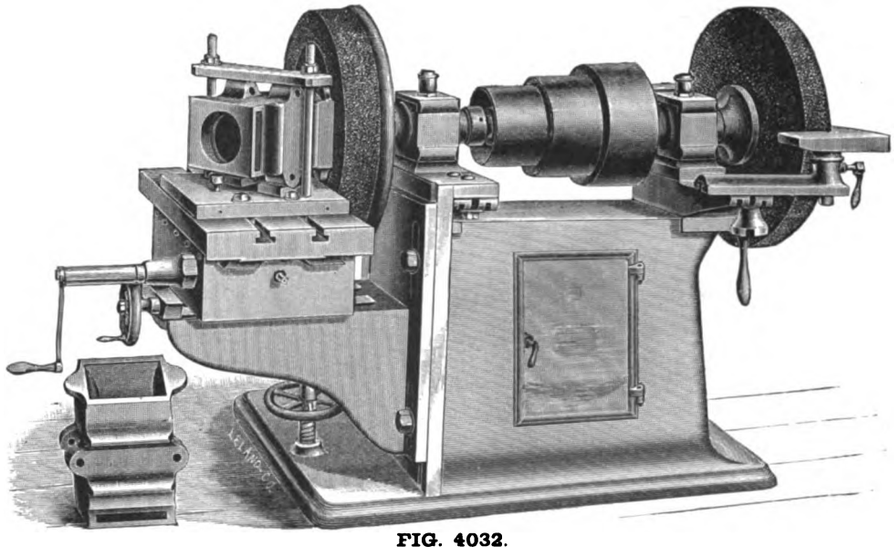


FIG. 4032.

The machine is designed to run two wheels, as shown. Cup wheel is 22 inches in diameter and 5-inch face. Emery wheel can be used on the other end of spindle, 34 inches in diameter and 6-inch face.

It is made to grind car boxes or other straight surfaces.

The table measures 36 inches long by 13 inches wide. The length of parallel traverse is 18 inches. The end or cross traverse is 6 inches. The rise and fall to the knee is 8 inches. The movements of the table are by hand wheels, as shown.

A surface attachment to use on this machine can be provided when desired.

Weight of car box machine with countershaft	2,000 lbs.
Distance between wheels	40 inches.
Length of bearings	9 "
Diameter of spindle in bearings	2¼ "
Diameter of spindle between flanges	2 "
Height from floor, the center of spindle	32 "
Diameter of flanges	8 "
Size of cones on spindles	8, 9 and 10 x 5¼ "
Size of base	26 x 38 "
Size of tight and loose pulleys on countershaft	10 x 5¼ "
Size of cone pulley on countershaft	14, 15 and 16 x 5¼ "
Speed of countershaft	350 revolutions per minute.

PRICES.

Machine, including countershaft	$400.00
Surface attachment	80.00

CAR BOX GRINDING MACHINE.

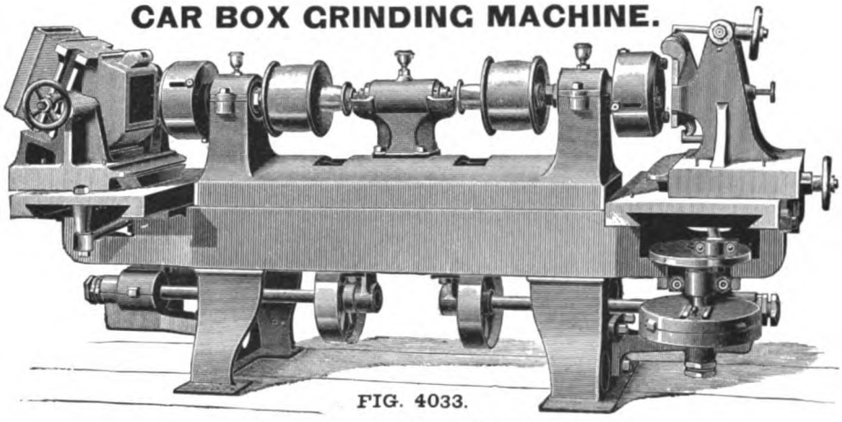


FIG. 4033.

DESCRIPTION, FIG. 4033.

The carriage moves over dovetail ways gibbed to take up wear, having a reciprocating motion by means of a crank pin and disk moving at right angles across the face of the wheel, said crank pin and disk being fed by worm and worm gear.

The machine has an automatic feed toward the wheel by means of a feed screw actuated by a ratchet wheel and pawl, and can be adjusted to feed any desired speed, or the pawl can be thrown out and the carriage fed backward or forward by means of the hand wheel on the end of feed screw. The work is held in chuck on the reciprocating table between upright standards from which screws project to adjust and firmly hold the work.

The emery wheel chuck contains three emery plugs, which are held tight against the outside edge of chuck by means of a cam. The emery plugs rest against a block which is held by a screw and can be fed forward as the plugs wear away.

Weight, 2,065 lbs. Height from floor to center of spindle, 30 inches; length of bearings, 5 and 3½ inches; diameter of spindle, 1⅜ inches; spindle pulleys, 7½ inches; diameter and length of emery plug, 1¼ x 3¾ inches. Floor space, 30 x 73½ inches; driving pulley on countershaft, 28 x 8 inches; tight and loose pulley, 10 x 6 inches; length of chuck, 4 inches, and will take in work 7 x 7 inches.

PRICE, complete, with countershaft..... $.....

CAR BRASS GRINDER.

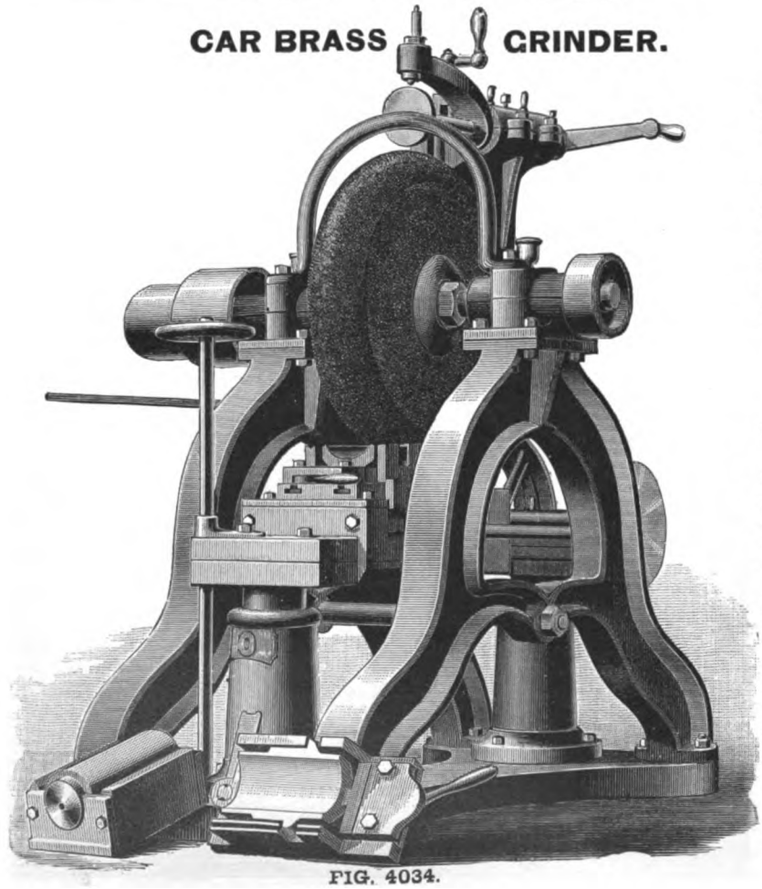


FIG. 4034.

DESCRIPTION, FIG. 4034.

The brass is held in a chuck, which is shown in position. A separate view of the chuck is also given. The brass is clamped between the jaws of the chuck by a cam motion actuated by a handle. The chuck fits into planed guides and thus travels exactly square with the motion of the wheel. The table is moved horizontally by the crank and connecting rod, and also rises and falls on planed ways, being pressed up by springs. The hand wheel gives vertical adjustment to the bed by means of a chain beneath the base of machine. There is a pulley by which a suction fan, to remove dust, etc., may be driven. The machine will finish from 150 to 500 car brasses per day.

Height from floor to center of spindle, 36 inches; floor space, 47 x 24; length of spindle, 42 inches; diameter of spindle in bearings, 2 inches; diameter of spindle between flanges, 2 inches; diameter of flanges, 7 inches; size of cone pulley on spindle, 5⅝ and 7⅛ x 5 inches; size of cone pulley on countershaft, 14⅝ and 13⅛ x 5; size of tight and loose pulleys on countershaft, 12 x 7. Carries wheel, 22 inches diameter.

WEIGHT, 2,000 LBS.

PRICE, with countershaft, suction fan and diamond tool-dresser..... **$600.00**

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NO. 3 PUNCH AND DIE GRINDER.

This machine is designed for grinding and finishing hardened punches and dies. It is well adapted for use on any work that can be held in a chuck. It has two spindles at right angles to each other in the same horizontal plane, one carrying the chuck, the other the cutting wheel. The chuck spindle runs in a head bolted rigidly to the column, and has a cone pulley for a 2½-inch belt, giving two changes of speed. The spindle is 1⅜ inches in diameter in the boxes, and is arranged to carry a chuck up to 10 inches diameter. It has check nuts which provide for taking up any wear or end movement to the spindle. The emery wheel spindle is 1 1/16 inches in the boxes, 1 inch between flanges, and will take wheels up to 12 inch diameter. It has a 5-inch flange pulley, and is driven by a 2½-inch quarter turn belt. It runs in a head which has a longitudinal movement of three inches by hand. The head slides upon a plate which has a lateral movement of 4¼ inches by hand, and is adjustable about a central pivot, thus providing a means of grinding conoidal surfaces. The feed works, slides, and all bearings in this machine are well protected from emery dust. A stop can be put on the machine, so that any number of pieces can be ground to same thickness.

Weight of machine is 850 lbs.

PRICES.

Including chuck, countershaft, emery wheel 10 x 1 in., wrenches, etc. **$275.00**

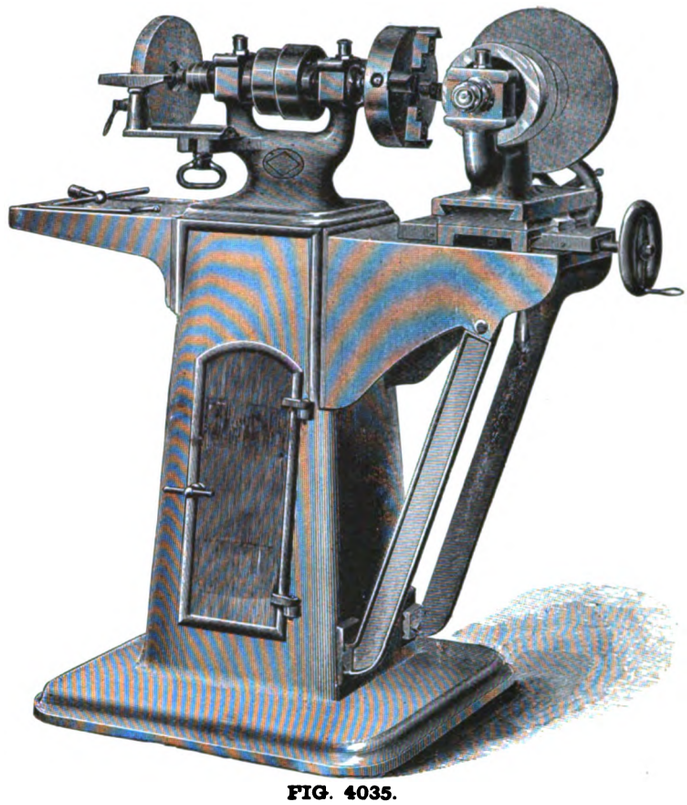


FIG. 4035.

NOS. 2 AND 1 PUNCH AND DIE GRINDER.

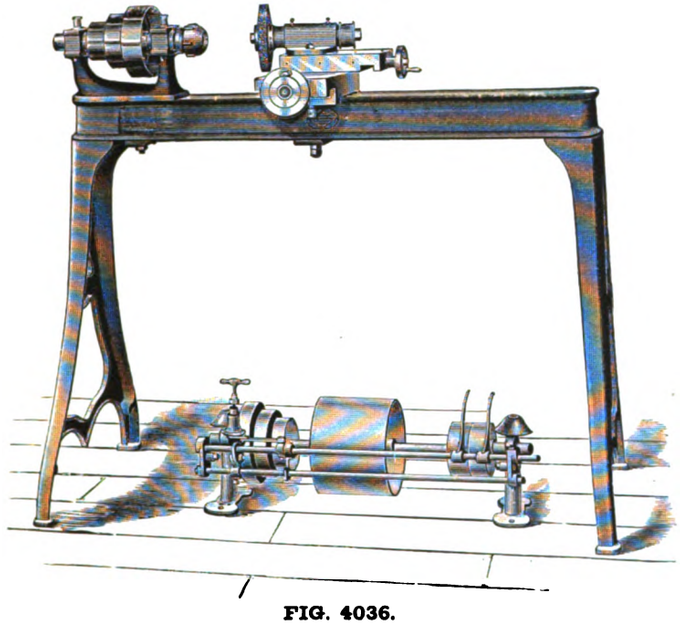


FIG. 4036.

The machine has 10-inch swing and 4 foot bed and is designed to grind small punches and dies, used among bridge builders, bolt and nut manufacturers.

It has in the head arrangements for holding punches.

The emery wheel, revolving upon an adjustable swivel carriage which is graduated, can be set at any angle, the wheel being fed parallel to the head, back and forth, by the hand wheel shown, also fed at right angles across the lathe by the hand wheel shown in front. This machine has every adjustment required to do the work in a perfect and rapid manner.

PRICES.

No. 1 machine, with emery wheel and countershaft ... **$150.00**

NO. 2 PUNCH AND DIE GRINDER

Has head with 16-inch swing; lathe bed 4 or 5 ft. long; carriage heavier and wider, with all the swivel and hand movements shown in the smaller machines. It will carry an emery wheel 12 inch diameter, and is in all respects a perfect machine for the larger dies and punches, which are held in a chuck attached to the head.

PRICES.

No. 2 machine, with emery wheel, countershaft and chuck..... **$225.00**

SAW GUMMER OR SHARPENER.

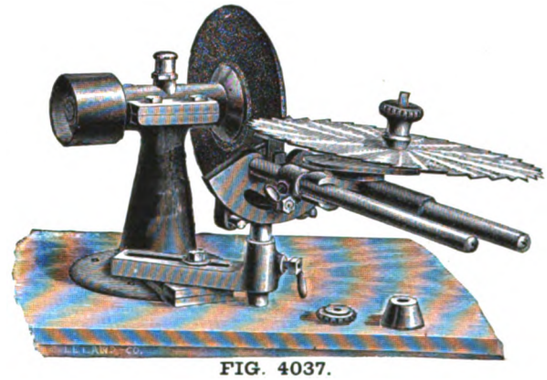


FIG. 4037.

It will sharpen all kinds of saws up to 30 inches diameter.

A self center holds the saw firmly in position. The attachment can be tilted so as to give any desired bevel to a crosscut saw. By means of the stop, shown in the cut, any desired depth of incision can be made in the saw.

PRICE, with emery wheel and countershaft..... $40.00
" with emery wheel, without countershaft..... 30.00
" of saw gumming attachment, alone, will fit any machine..... 18.00

SAW GUMMER.

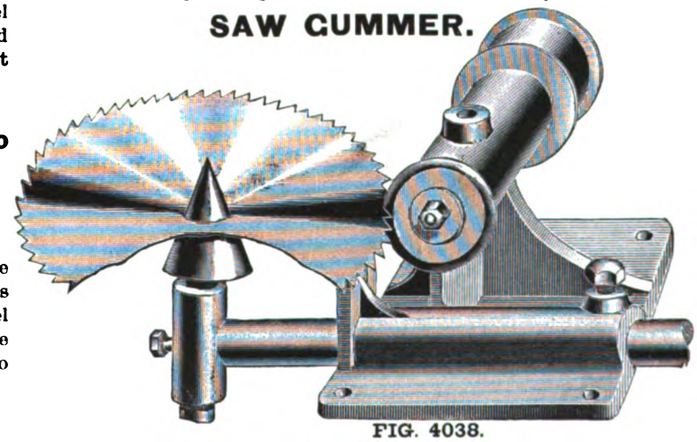


FIG. 4038.

PRICE, with emery wheel and countershaft..... **$18.00**

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SAW GUMMERS.

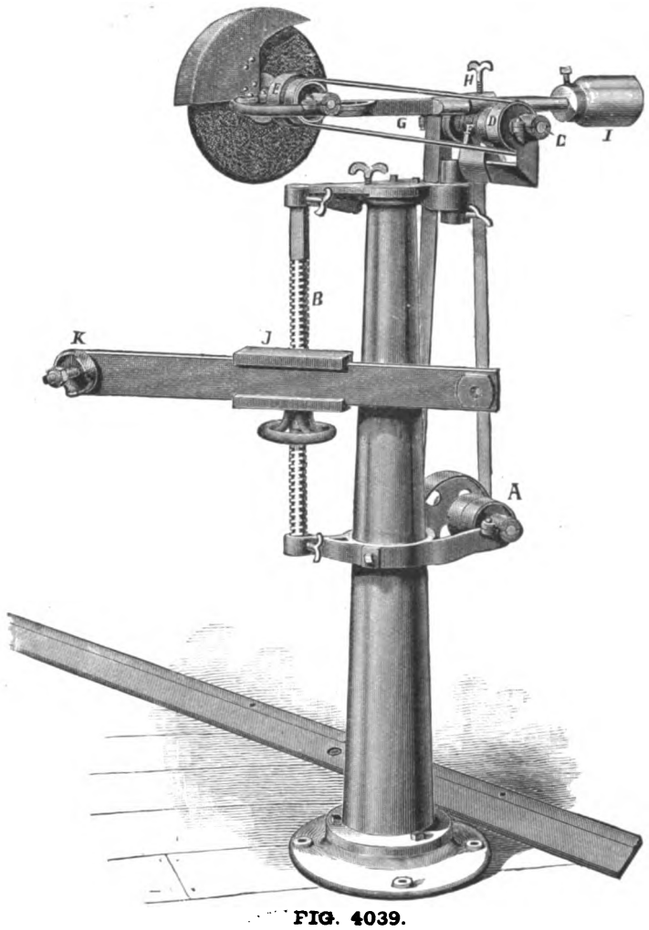


FIG. 4039.

DESCRIPTION, FIG. 4039.

Height from floor to center of spindle, 57 inches; floor space, 15½ x 15½; length of spindle, 13¼ inches; diameter of spindle in bearings, $\frac{13}{16}$ inch; diameter of spindle between flanges, ¾ inch; diameter of flanges, 3½ inches; size of cone pulley on spindle, 3¼ and 4 x 1¼ inches; size of pulley on countershaft, $6\frac{5}{16}$ x 2⅝; size of tight and loose pulleys on countershaft, 4 x 3. **WEIGHT, 312 LBS.**

PRICES.

Machine for circular saws $110.00
Machine for circular and long saws 115.00

Wheels extra. Carries a wheel 12 inches diameter.

CROSS-CUT AND RIP CIRCULAR SAW SHARPENER.

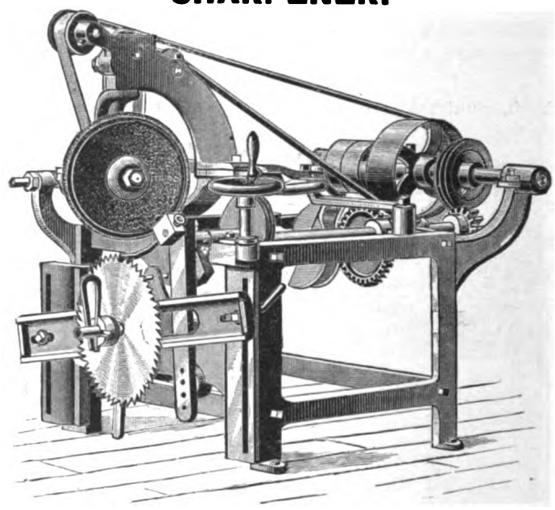


FIG. 4040. **REPRESENTS SMALL SIZE.**

GENERAL DESCRIPTION, FIG. 4040.

The feed work is the most accurate and positive that has ever been put on a circular saw sharpener, and is so constructed that any lost motion caused by wearing can be taken up instantly.

The emery wheel gate is so constructed that it is impossible to wear a shoulder on the face-side of the emery wheel. This is accomplished by tipping the emery wheel arbor at an angle other than a right angle to the gate. With this gate motion there is less liability of case-hardening the points of the teeth, as the emery wheel does not touch the point of tooth when it is in the throat of tooth.

It will sharpen circular rip saws from 14 to 72 inches in diameter.

It is extra heavy at all straining points. All wearing parts are made of steel; all shafts are of steel and have long bearings.

It is adjustable to any shape of tooth. Will give any desired pitch to the tooth. It is adjustable in every way.

Tight and loose pulleys on countershaft are 6 inches diameter, and should run 800 to 850 per minute, for the two largest machines.

Tight and loose pulleys on countershaft are 4 inches diameter, and should run 650 to 700 per minute, for the two smallest machines.

PRICES.

Large size, with automatic beveling attachment $225.00
Large size, improved 200.00
Medium size, for railroad use 175.00
Small size, for saws 6 to 36 inches, and automatic beveling 150.00

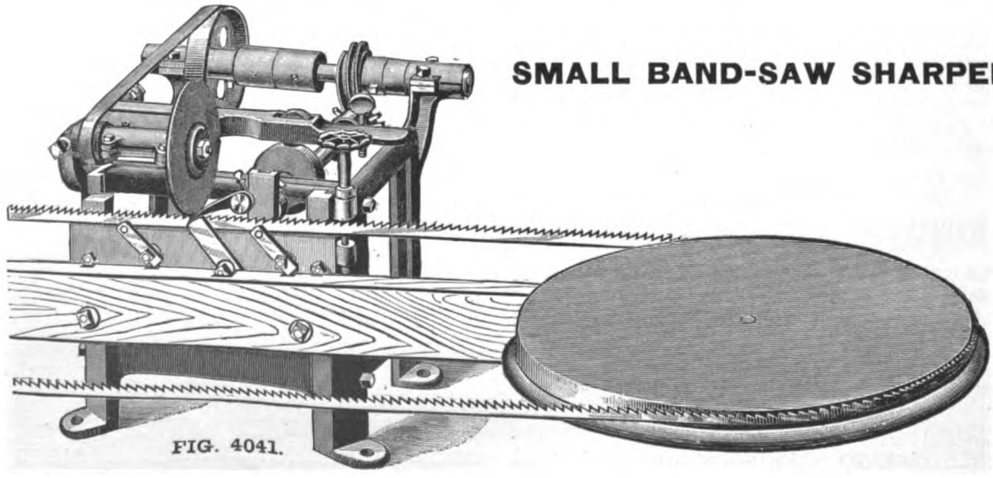


FIG. 4041.

SMALL BAND-SAW SHARPENER.

This machine has been fully tested, and will sharpen 100 to 110 teeth per minute; it is very accurate and will leave the saw in perfect shape, with every tooth exactly alike and the saw perfectly jointed.

The countershaft on rear of machines should run 1,200 revolutions per minute.

It is well made, simple and durable.

PRICE OF MACHINE, $60.00, complete with one emery wheel.

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DRILL GRINDERS.

HAND TWIST DRILL GRINDERS.

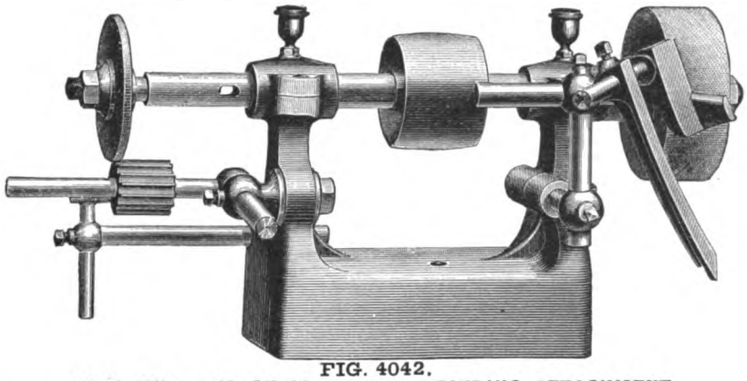


FIG. 4042.
WITH MILL AND SHELL REAMER GRINDING ATTACHMENT.

PRICES.

No. 1, for sizes to ½ inch, including emery wheel.....$11.00
" 2, " ⅜ to 2 inches, with one emery wheel, and without mill attachment..... 34.00
No. 2, for sizes ⅜ to 2 inches, with mill attachment and emery wheels..... 48.00

AUTOMATIC DRILL GRINDER.

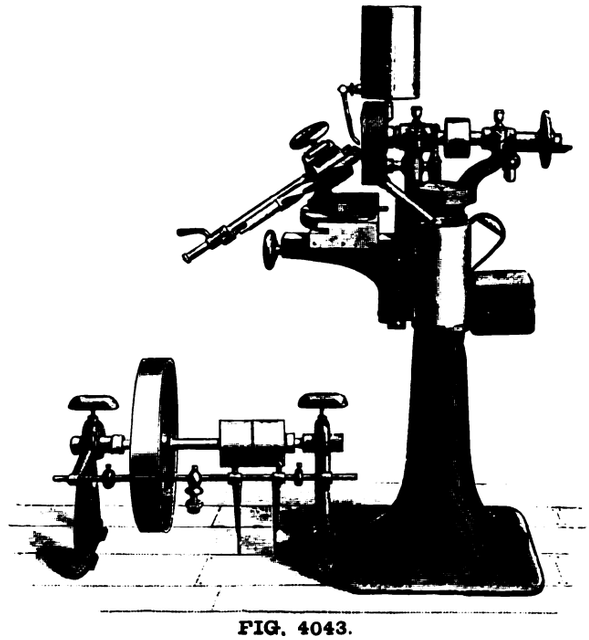


FIG. 4043.

This machine is adapted for grinding, to a proper angle and with a suitable clearance, the cutting lips of twist drills. As desired, it may be adjusted to give a greater or less angle to the cutting lips, as well as more or less clearance. The machine is of thorough workmanship, and substantial in all its parts. One end of the spindle is furnished with an emery wheel for general purposes, and for reducing the thickness of the points of the drills as required. The machine is arranged for drills ½ to 2 inches in diameter. With extra jaws, smaller drills to ¼ inch in diameter can be ground. Tight and loose pulleys, 5 inch diameter, 3¼ inch face. 900 revolutions. Weight, 465 lbs.

PRICE, WITH COUNTERSHAFT, $175.00.

NO. 2.—STYLE C GRINDER.

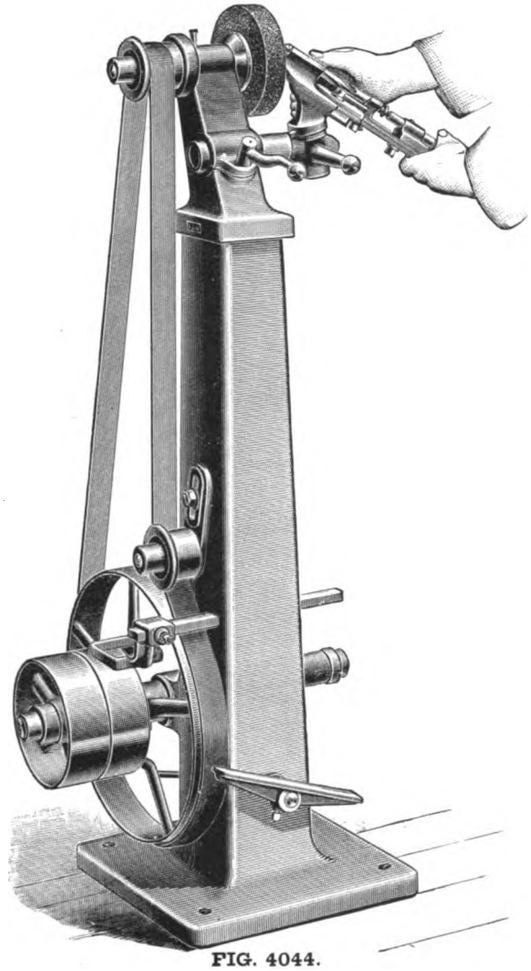


FIG. 4044.

STYLE A GRINDER.

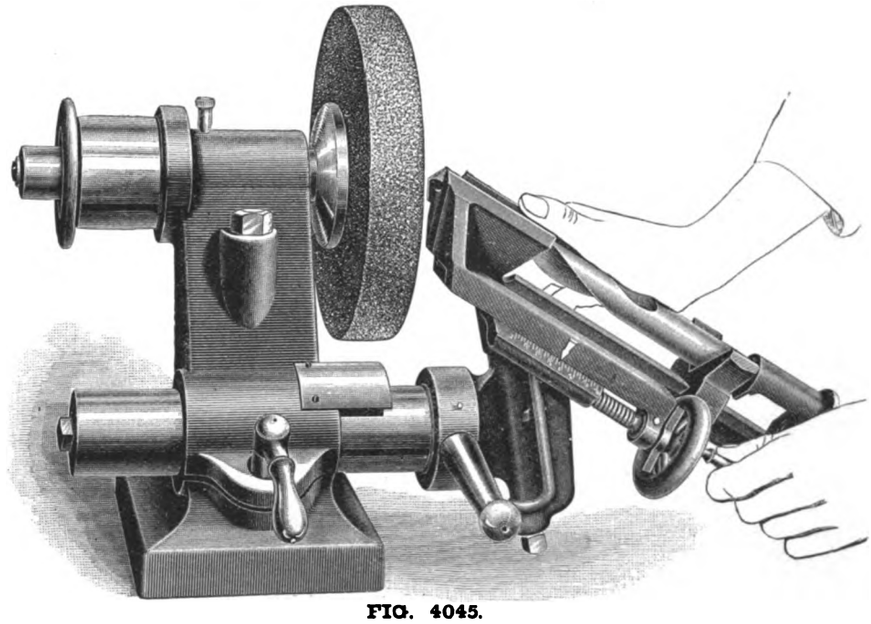


FIG. 4045.

PRICES, FIGS. 4044 AND 4045.

	Price, including emery wheel.	
	No. 1 machine grinds drills from 2 to ¼ inch.	No. 2 machine grinds drills from ⅞ to ⅛ inch.
Style A. Plain bench machine.		
Price, without countershaft	$55.00	$45.00
" with countershaft for same	10.00	10.00
Style B. Mounted on plain pedestal.		
Price, without countershaft	60.00	50.00
" with countershaft for same	10.00	10.00
Style C. Mounted on pedestal with countershaft combined. Has improved device for shipping belt by foot, also arrangement for conveying the waste oil from loose pulleys and bearings to the base of the pedestal	75.00	65.00

EXTRAS.—Point thinning attachment, including wheel, $3.00. Attachment for 3 lip drills, $3.00.

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WET WHEEL TWIST DRILL GRINDERS.

GRINDS 3-8 TO 1 1-2 IN.

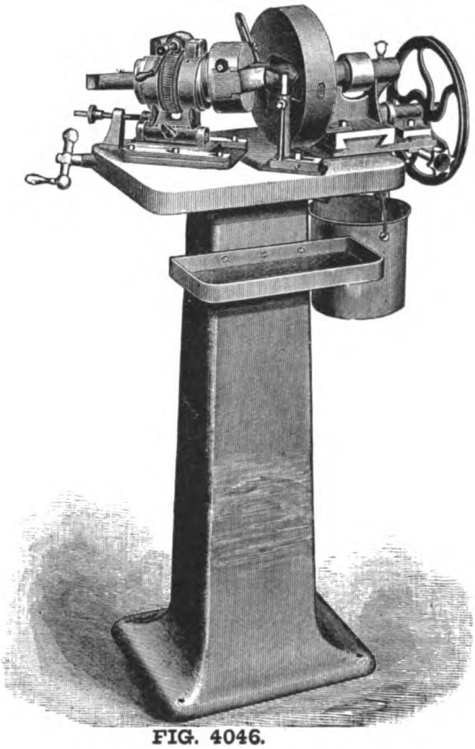


FIG. 4046.

DESCRIPTION, FIG. 4046.

This tool has an emery wheel 7 inches in diameter, and has a reciprocating movement of ¾ of an inch to make the wheel wear true.

Wheel should make 2,700 revolutions, and speed of counter is 450 revolutions.

PRICE, $125.00.

DESCRIPTION, FIG. 4047.

Machine shown with emery wheel, countershaft and No. 1 twist drill, grinding attachment grinds drills from ⅛ to 1⅛ inches.

PRICE, $90.00.

Machine shown with emery wheel, countershaft and No. 2 twist drill, grinding attachment grinds drills from ¼ to 2 inches.

PRICE, $105.00.

SEND FOR DISCOUNT SHEET.

GRINDS 1-4 TO 2 INCHES.

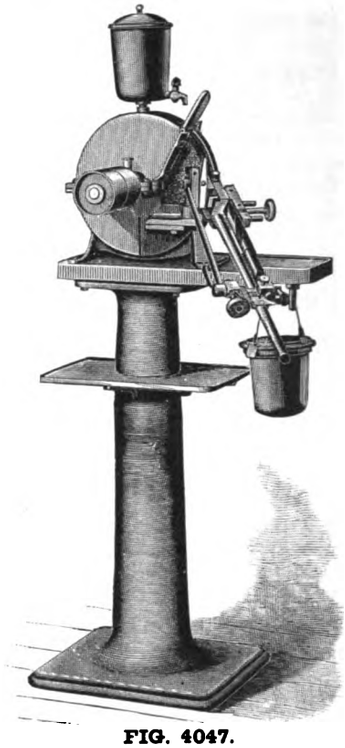


FIG. 4047.

BUFFING OR POLISHING LATHES.

NO. 0 SIZE.

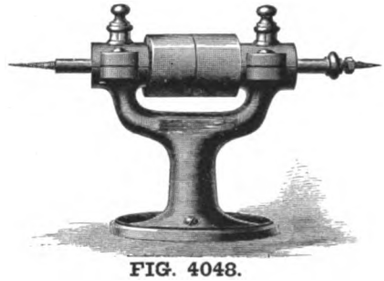


FIG. 4048.

NO. 1 SIZE.

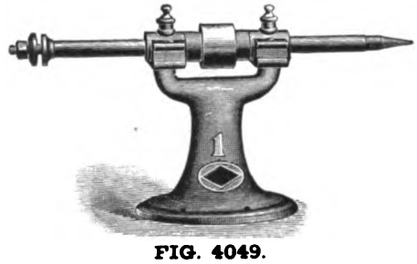


FIG. 4049.

DESCRIPTION AND PRICES.

	Fig. 4048.	Fig. 4049.
Size of base	7 x 5 in.	7 x 5 in.
Height from base to center of spindle	5¼ "	7½ "
Diameter of spindle in boxes	¾ "	¾ "
Diameter of spindle between flanges.	½ "	½ "
Length of spindle	14 "	17 "
Length of bearings	2 "	2 "
Size of pulley	2 x 1½ "	2 x 1½ "
Weight	12 lbs.	15 lbs.
PRICE, with spindle and double pulley	$10.00	$10.00
" with spindle and single pulley	8.00	12.00
" countershaft	12.00	12.00

NO 1 1-2 SIZE.

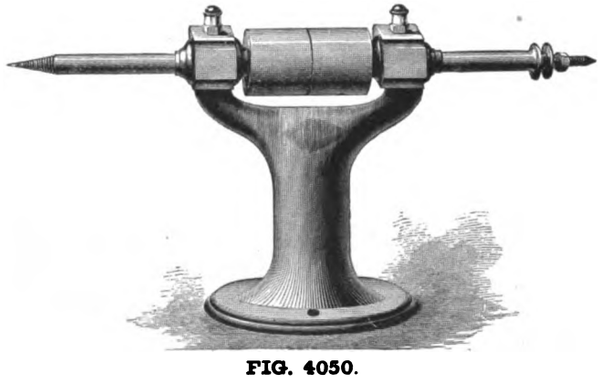


FIG. 4050.

This machine stands 12 inches high from base to center of spindle. Has babbitt boxes 4 inches long with patent oil cups. Any spindle, as shown in Fig. 4052, can be used in this head at a reduction of $2.50 from list given.

PRICES.

No. 1½ head, with A spindle and single pulley	$17.50
No. 1½ head, with D spindle shown, tight and loose pulley	20.00
No. 1½ head, with G spindle and cone pulley	22.50
Countershaft	15.00

NO. 2 SIZE.

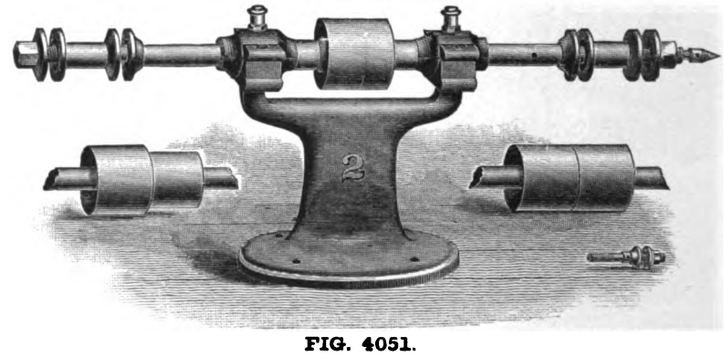


FIG. 4051.

A taper attachment is provided which screws into the end of the spindle; a small arbor is also made to fit where the taper screw is used. Prices given for No. 2 polishing heads and spindles do not include the small arbor, which latter is $2.50 extra.

Size of base	12 x 9 in.	Length of spindle	36 in.
Height from base to center of spindle	12 "	Size of single pulley	4 x 4 "
		" cone pulley	3½ x 4½ x 3½ "
Diam. of spindle in boxes	1¼ "	Length of cast iron bearings	4 "
" " " bet. flanges,	1 "	Weight	100 lbs.

PRICE, with spindle shown, and single pulley	$25.00
" with spindle shown, tight and loose pulley	27.50
" with spindle shown, cone pulley	30.00
" countershafts	15.00

FOR STANDS, SEE PAGE 367.

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STEEL SPINDLES FOR BUFFING LATHES.

The spindles shown are made of steel, with all collars turned perfectly true, square thread cut, nuts milled and squared up. They are made 36 inches long, diameter between flanges is 1 inch, and in boxes 1¼ inch; diameters of single, tight and loose pulleys are 4 inches; of cone pulleys, 3½ and 4½ inches; they will run belts 3 inches wide; the end of the spindle, where the buffing wheels are used, is drilled and tapped to receive a taper screw which goes with all the buffing machines; we also make to use in the same place a small arbor with flanges, to use small wheels. See Fig. 4051.

Price of arbor to run in end of spindle, for small wheels, $2.50.

PRICES.

With head, Fig. 4051, including taper attachment.

A, single pulley	$20.00	F, tight and loose pulley	$27.50
B, " "	22.50	G, cone pulley	25.00
C, " "	25.00	H, " "	27.00
D, tight and loose pulley	22.50	I, " "	30.00
E, " "	25.00		

Countershaft with single pulley ..... $.....
" " double " .....
" " cone " .....

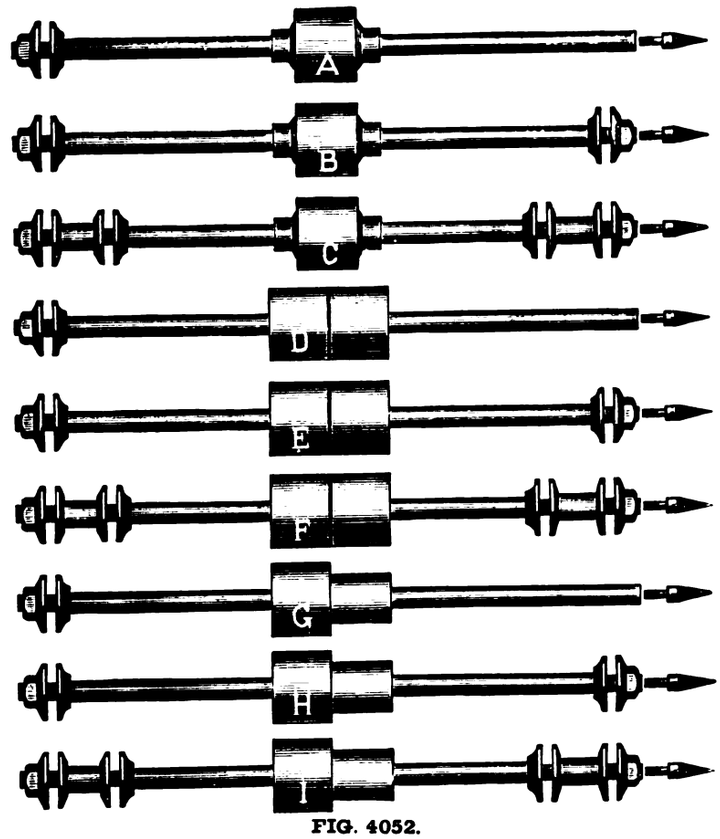


FIG. 4052.

STAND FOR FIG. 4051.



FIG. 4053.

DESCRIPTION, FIG. 4053.

Column stands 34 ins. high; size top of table, 25 x 14 inches.

WEIGHT, 160 LBS.
PRICE, $15.00.

NO. 1 BUFFING LATHE.

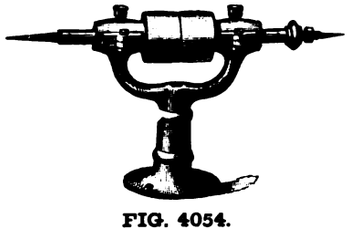


FIG. 4054.

This lathe stands 7¾ ins. high, and has a spindle 17½ inches long by ¾ inch diameter.

PRICES.

No. 1 lathe $9.00
Countershaft 5.25

NOS. 2 & 3 BUFFING LATHE.

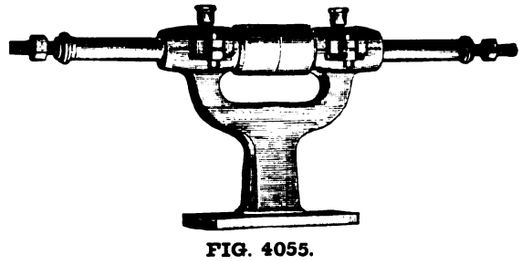


FIG. 4055.

No. 2 lathe stands 12 inches high, and has spindles 2 feet 9 inches long, 1¼ inches in diameter, between collars, ¾ x 2, and weighs about 50 lbs.

No. 3 lathe stands 12½ inches high, and has a spindle 1¾ inches in diameter and 3 feet 3 inches long, with self-oiling babbitted bearings, 5½ inches long, and weighs about 90 lbs.

PRICES.

No. 2 lathe	$16.00	No. 3 lathe	$25.00
No. 2 countershaft	12.00	No. 3 countershaft	17.50

CAST IRON STANDS FOR FIGS. 4054 TO 4057.

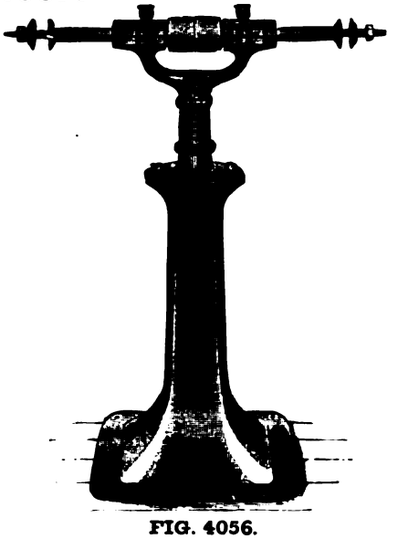


FIG. 4056.

PRICES, FIG. 4056.

No. 2 is 27 in. high, and the top is the same size as bottom of No. 2 lathe ... $8.50
No. 3 is 27 inches high, and the top is same as No. 3 lathe 8.75
No. 4 is 27 inches high, and top is 12 x 15 ins. 9.50
No. 5 is 27 inches high, and top is 15 x 27 ins. 11.50
No. 2A is 33 in. high .. 9.00
No. 3A is 33 in. high .. 9.25
No. 4A is 33 in. high .. 10.00
No. 5A is 33 in. high .. 12.00

The use of these stands allows the workman to pass freely around the lathe and allows the lathe to be placed in situations in which a bench could not be easily erected. The base is shaped to give great steadiness to the lathe and is 18 x 18 inches. The stand is made with four sizes of top and two heights, 27 and 33 inches.

NO. 4 BUFFING LATHE.

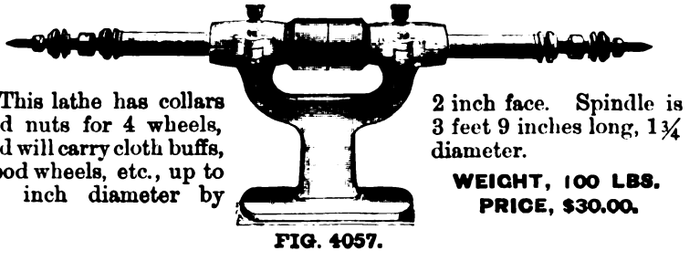


FIG. 4057.

This lathe has collars and nuts for 4 wheels, and will carry cloth buffs, wood wheels, etc., up to 12 inch diameter by 2 inch face. Spindle is 3 feet 9 inches long, 1¼ diameter.

WEIGHT, 100 LBS.
PRICE, $30.00.

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POLISHING OR BUFFING LATHES.

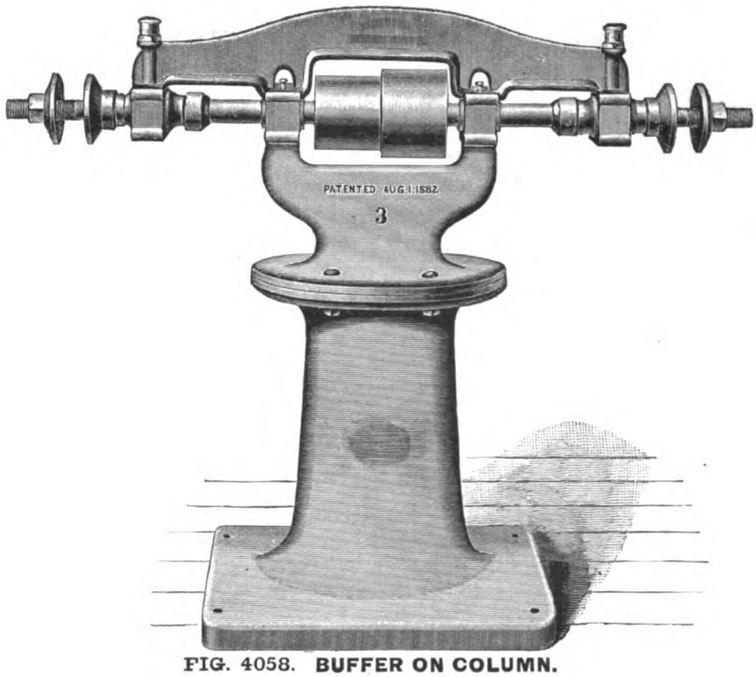


FIG. 4058. BUFFER ON COLUMN.

STANDARD MACHINE.

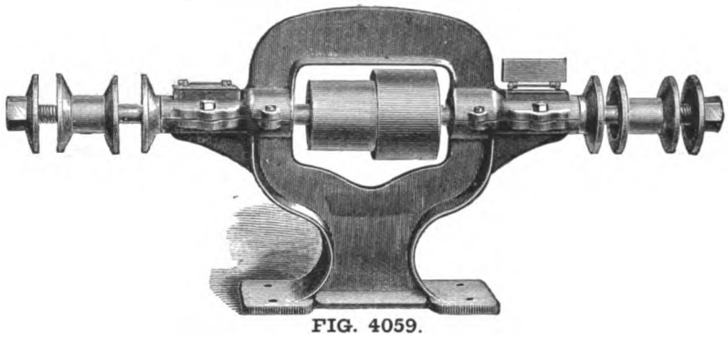


FIG. 4059.

Length of spindle	36 inches.
Height from base to center of spindle	10 "
Diameter of spindle in boxes	1 1/16 "
Diameter of spindle between flanges	1 "
Size of base	13 x 5 "
Length of bearings	4 1/2 "
Size of single pulley	4 x 4 "
Size of cone	5 x 4 x 3 1/2 "

PRICES.

With spindle shown "C," and single pulley, see page 367	$20.00
With spindle shown "F," tight and loose pulley, see page 367	22.50
With spindle shown "I," cone pulley, see page 367	25.00

PROJECTING POLISHING LATHE.

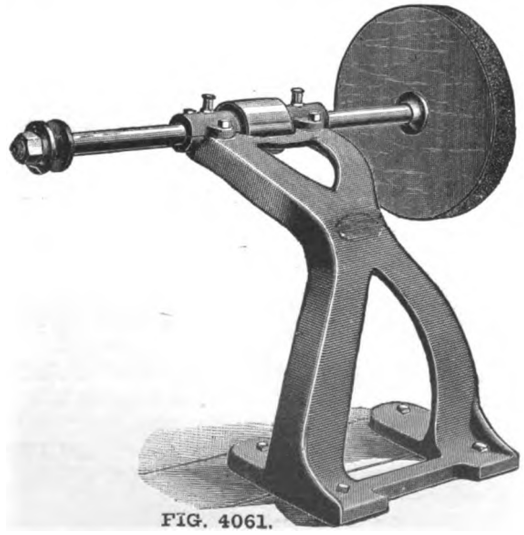


FIG. 4061.

DESCRIPTION, FIG. 4058.

NO. 3 ON COLUMN AND OVER-HANGING ARM.

It can be furnished with single, tight and loose, or cone pulley. This polishing lathe can be supplied with any of the styles of spindles shown on page 367. Spindle, 52 inches long, 1¼ inches diameter, stands 12 inches high.

DIMENSIONS.

Size of base	17 x 11 inches.
Height from base to center of spindle	12 "
Diameter of spindle in boxes	1 1/2 "
Diameter of spindle between flanges	1 1/4 "
Length of spindle	52 "
Size of single pulley	6 x 6 "
Size of cone pulley	5 x 6 x 4 1/2 "
Length of bearings	10 "
Weight	200 lbs.

DIMENSIONS OF COLUMN.

Weight of column on which No. 3 machine is placed,	160 lbs.
Height from floor to top of iron table	24 inches.
Dimensions of top of column	16 1/2 x 10 "
Dimensions of base of column	20 x 24 "
Weight of machine and column shown	320 lbs.

PRICES.

No. 3 polishing lathe, with column	$70.00
Column only	16.00
Countershaft	18.00
No. 3 polishing lathe and single pulley	50.00
No. 3 polishing lathe, tight and loose pulley	55.00
No. 3 polishing lathe, cone pulley	60.00

COUNTERSHAFT FOR NO. 3 LATHE.

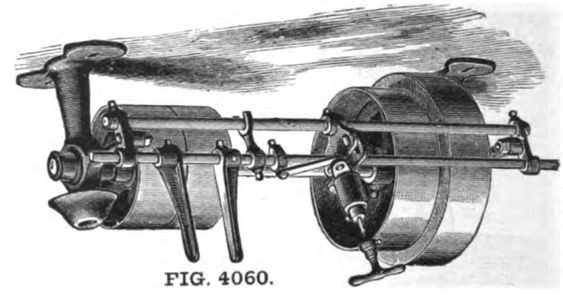


FIG. 4060.

PRICES.

Countershaft	$18.00
Belt-shifter device, applied to any countershaft	3.00

DOUBLE COLUMN POLISHING LATHE.

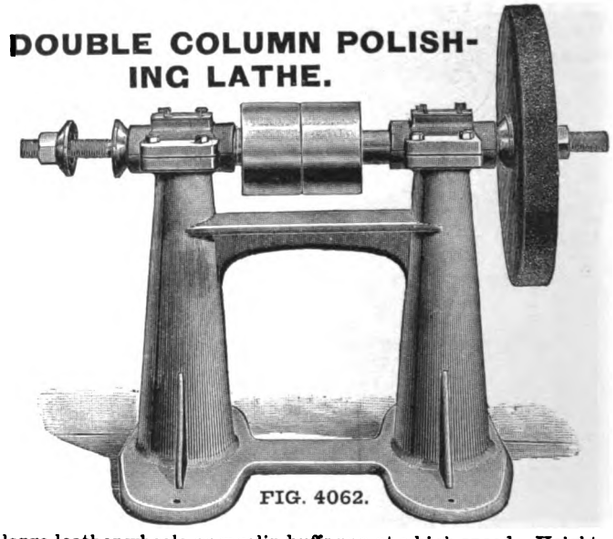


FIG. 4062.

This is intended for large leather wheels or muslin buffs run at a high speed. Height, 22 inches to spindle; steel spindle, 38 inches long, 1¼ inches diameter between flanges; bearings, 7 inches long; tight and loose pulleys, each 6 x 4; weight, 209 pounds.

PRICES.

With tight and loose pulley	$30.00
With single pulley	25.00

DESCRIPTION, FIG. 4061.

This machine bows over toward the workman, throwing the wheels away from bench. It stands 20 inches high, projects 20 inches; has a spindle 30 inches long, 1¼ inches in bearings, 1 inch diameter between flanges. Single pulley, 6 x 4 inches; weight, 100 pounds. These are largely used for polishing tubes, cylinders, hollow ware, etc.

PRICE, $25.00.

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BUFFING AND STRAPPING LATHE ON COLUMN.

The head stands 7½ inches from base to center of spindle. It can be furnished with single or cone pulley on spindle. Diameter of spindle between flanges is 1 inch, the length of which will be made 36 inches unless otherwise ordered. The strap polishing attachment can be removed and buff or solid wheels used on both ends if desired. Flanged pulleys are furnished from 1½ to 6 inches wide, 12 and 6 inches diameter, with ¾, 1 and 1¼ inch hole; they are turned and balanced to run perfectly true. Price given for strapping attachment ($25.00) includes two flange pulleys, 12 and 6 inches diameter, 2½ inch face and 1 inch hole, unless otherwise ordered.

PRICES.

Complete, as shown, Fig. 4063	$65.00
Buffing head, shown with A spindle and single pulley, see page 367	17.50
Buffing head, shown with D spindle and tight and loose pulley, see page 367	20.00
Buffing head, shown with G spindle and cone pulley, see page 367	22.50
Hood shown	2.50
Iron column for buffing head	15.00
Strap polishing attachment "A" shown	25.00
Countershaft with single pulley	15.00
Countershaft with cone pulley	17.00

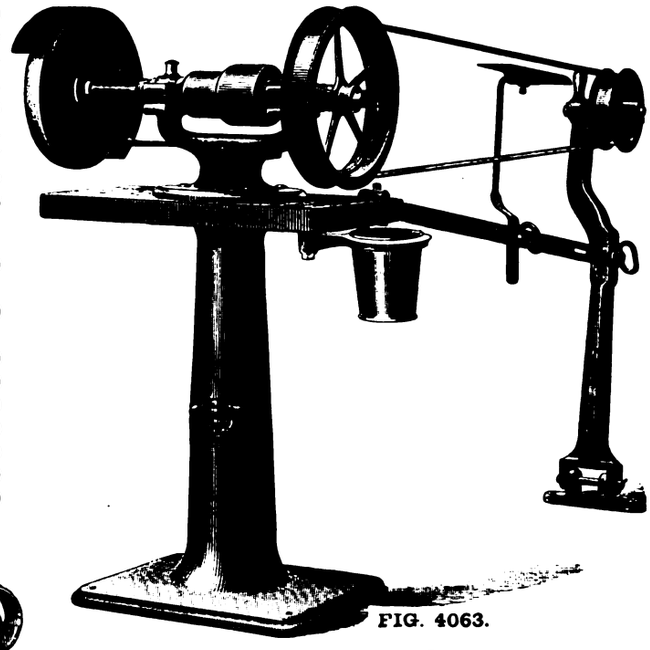


FIG. 4063.

NO. 0 BELT MACHINE.

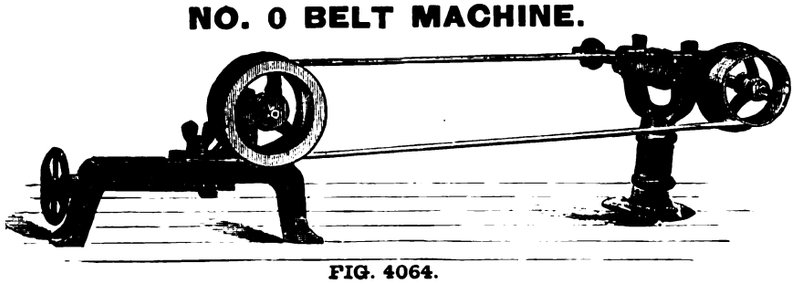


FIG. 4064.

Has No. 2 lathe, Fig. 4055, with 24 inch spindle. Flange pulleys are 6 inches diam. Double flange one is for 2 inch belt; the single flange is 3 inch face.

PRICES.

Complete, without belt	$32.00
Tightening end and pulleys	16.00
Pulleys for 3 inch belt, extra	1.50

NO. 3 BELT MACHINE.

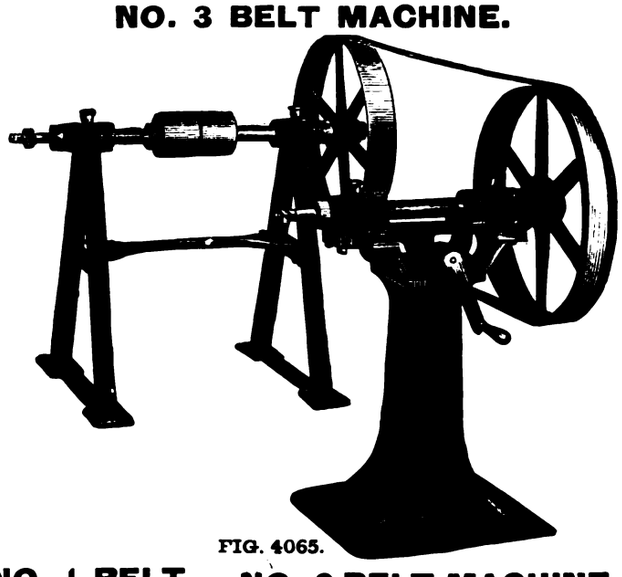


FIG. 4065.

NO. 4 BELT MACHINE.

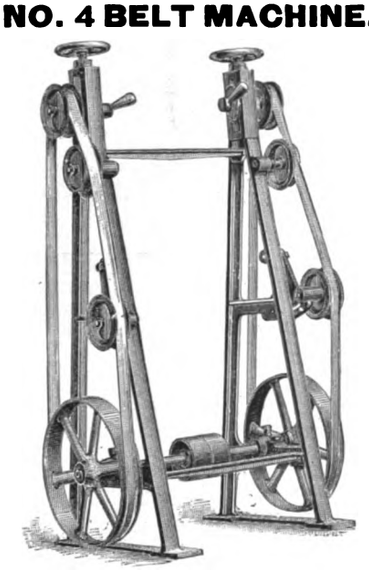


FIG. 4066.

DESCRIPTION, FIG. 4065.

Complete, with solid web pulleys, no flange	$100.00
Complete, with arm pulleys, with flange	100.00
Complete, with arm pulleys, no flange	90.00
Tightening end and web pulleys	75.00
Tightening end and flanged arm pulleys	75.00

Countershafts and belts not included.

PRICES, FIG. 4066.

This machine is adapted for crooked outside work and limited floor space. It requires only 30 x 40 inches floor space, and stands 6 ft. 6 in. high.

Driving pulleys, 5 in. diameter by 4 in. face. The large pulleys are 20 in. diameter.

Weight.....425 lbs.
Price, without belts....$125.00

PRICES, FIG. 4067.

Single machine, complete	$44.00
Tightening end and pulleys	20.00
Without No. 2 stand	36.00
Pulleys for 3 inch belt, extra	1.50

PRICES, FIG. 4068.

Complete, as single machine	$58.00
Without No. 3 stand	50.00
Tightening end and pulleys	25.00

NO. 1 BELT MACHINE.

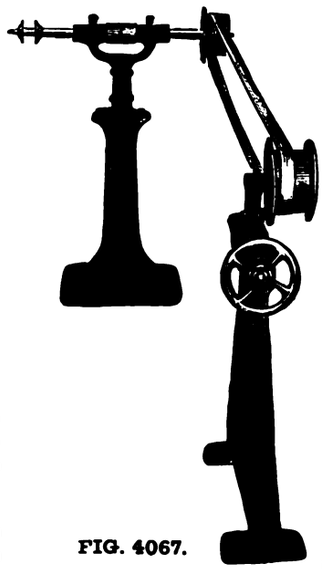


FIG. 4067.

RIGHT HAND MACHINE.

NO. 2 BELT MACHINE.

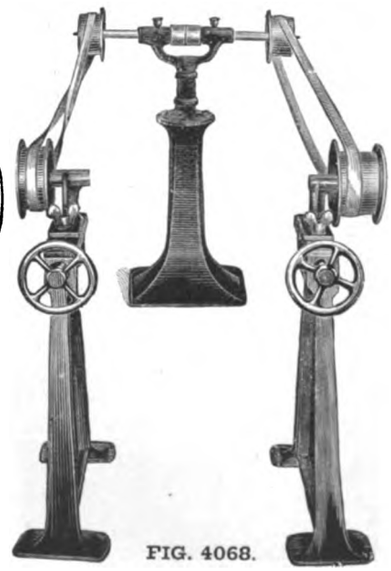


FIG. 4068.

RIGHT AND LEFT HAND MACHINE.
LEFT HAND ONE WITH CROSS BELT.

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CORUNDUM AND EMERY WHEELS.

The following price list is the standard of the various emery wheel manufacturers, though some of the manufactories on some sizes vary their list in details. Our quotations will be based on each manufacturer's list. The right hand columns give speeds various makers advise to be used for their special make of wheels.

PRICES.

Diam. in inches.	Thickness of wheels in inches.														Diam. in inches.	Revs. per minute.		
	½	⅝	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4		Vitrified.	Sterling.	Norton.
1½	$0.40	.45	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	1.00	1.10	1½	12,000	18,000	18,000
2	.50	.55	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00	1.10	1.20	2	10,000	14,000	14,000
2½	.65	.70	.75	.85	.95	1.05	1.15	1.25	1.35	1.45	1.55	1.65	1.85	2.05	2½	8,500	10,000	11,000
3	.75	.85	.95	1.10	1.25	1.35	1.45	1.60	1.85	1.85	2.00	2.10	2.60	3.00	3	7,400	8,500	8,800
4	1.10	1.25	1.35	1.60	1.90	2.20	2.50	2.75	2.85	3.25	3 35	3.85	4.60	5.00	4	5,450	7,000	7,400
5	1.40	1.60	1.80	2.10	2.60	3.00	3.45	3.80	4.20	4.65	5 00	5.40	6.40	7.40	5	4,400	6,035	6,300
6	1.75	2.15	2.50	3.05	3.70	4.30	5.00	5.60	6.25	6.90	7.45	8.25	9.50	11.00	6	3,600	5,300	5,500
7	2.30	2.75	3.15	3.95	5 00	5.60	6.40	7.25	8.10	8.90	9.70	10.55	11.10	12.60	7	3,150	4,700	4,900
8	2.60	3.10	3.60	4.50	5.70	6.40	7.60	8.30	9.60	10.20	11.60	12.05	14.00	16.00	8	2,750	4,200	4,400
9	3.15	3.50	3.85	4.90	6.80	8.05	9.25	10.50	11.25	12.95	13.75	15.40	19.00	21.75	9	2,450	3,500	3,700
10	3.70	4.40	5.10	6.60	8.10	9.50	11.00	12.40	14.25	15.35	17.25	18.15	21.00	23.80	10	2,200	3,000	3,160
12	4.00	5.00	6.00	7.40	9 00	10.70	12.75	14.00	15.70	17.40	19.00	20.75	24.25	27.50	12	1,850	2,600	2.770
14	6 20	7.45	8.70	10.70	13.25	15 20	17.80	19.50	21.80	24.20	26.30	26.75	28.70	30.70	14	1,600	2,300	2,460
16	.....	.....	11.00	13.70	16.90	19.40	22.00	25.00	27.90	30 80	33.50	36.50	43.00	48.75	16	1,400	2,100	2,210
18	.....	.....	13.75	17.00	21.75	24.50	28.75	32.00	35.75	39.50	43.25	47.00	54.50	62.00	18	1,250	1,750	1,850
20	.....	... .	.....	20 00	25.00	29 00	34.00	38.00	42.50	47.00	51.50	56.00	66.00	75.00	20	1,100	1,500	1,580
22	.....	... ...	.....	.....	29.87	35.50	41.12	46.75	52.00	58.00	63.50	69.25	80.50	91.75	22	1,000	1,300	1,380
24	.....	.....	.....	.....	.....	43.00	50.00	57.00	64.00	71.00	78.00	85.00	99.00	113.00	24	925	1,150	1,230
26	.... .	.....	.....	.....	... ...	49.00	58.00	65.00	73.50	82.00	90.00	98.00	114.00	130.00	26	825	1,050	1,100
30	.....	... ...	.....	.....	.....	66.00	77.50	87.50	98.25	109.00	120.00	131.00	153.00	175.00	30	735	950	1,000
36	.....	.....	.....	.....	.....	95.00	110.00	125.00	140.50	156.00	172.00	188.00	219.00	250.00	36	550	850	920
																	775	850
																	740	735
																	705	
																	520	

In ordering be sure to state what kind of work the wheel will be used for. Also carefully give the diameter, thickness, size of hole.

Take notice, that wheels should be hung with flanges slightly concaved, of good size, using rubber or leather washers. Great care should be taken to keep the wheels perfectly true, and in mounting they should slip easily on the mandrel, and have flanges screwed only tight enough to prevent slipping.

SHAPES OF WHEELS FOR ABOVE LIST.

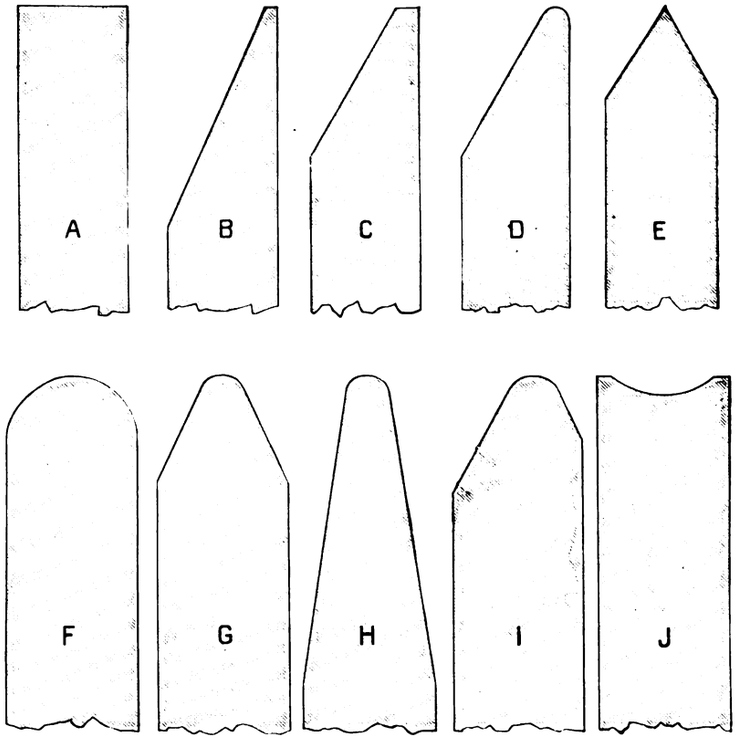


FIG. 4069. DISCOUNT ACCORDING TO SHAPE.

EMERY CYLINDERS AND CUP WHEELS.

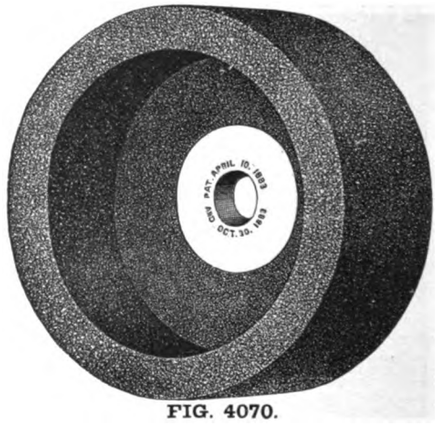


FIG. 4070.

Diam. ins.	Thickness of rim.						
	1	1½	2	2½	3	3½	4
8	$15.50						
9	16.50	22.00					
10	17.75	24.25	29.50				
12	18.75	26.25	33.00	38.75	44.00		
14	22.50	31.00	38.50	45.50	51.50	57.50	61.50
16	26.00	35.75	44.60	53.00	60.25	67.60	73.00
18	28.80	40.25	51.40	61.40	71.00	79.00	86.90
20	30.90	44.00	56.25	67.40	78.50	87.60	97.00
22	35.00	49.75	65.00	79.40	91.50	103.90	115.50
24	37.50	54.25	70 50	86.25	99.50	113.60	126.60
26	39.75	59.80	77.00	93.00	109.25	124.75	139.25

Above list is figured on a basis of cylinders 7 inches long; other lengths at proportionate rates.

To obtain price of cup wheels add the price of a regular wheel; whole diameter is the inside diameter of the cylinder, and thickness whatever is required.

HUNTINGTON WHEEL DRESSER.



FIG. 4071.

For truing, shaping, sharpening and removing glaze from solid emery wheels running at full speed.

PRICES, FIG. 4071.

Patent emery wheel dresser; two sets of cutters.....$2.50
Extra cutters, per set..... .30

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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EMERY WHEEL DRESSERS AND CHUCKS.

IRON CHUCKS FOR EMERY CENTERS.

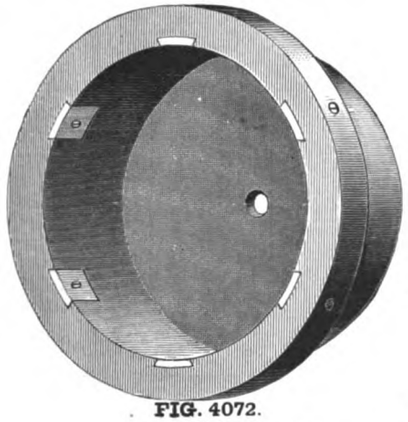


FIG. 4072.

PRICES, FIG. 4072.

10 inch	$12.00
12 "	15.00
14 "	18.00
16 "	21.00
18 "	24.00
20 "	27.00

STANDARD EMERY WHEEL DRESSER.



FIG. 4073.

PRICES.

Tool complete, with extra cutter, boxed	$2.00 each.
Extra cutters	.60 "

LATHE TOOL DRESSER.

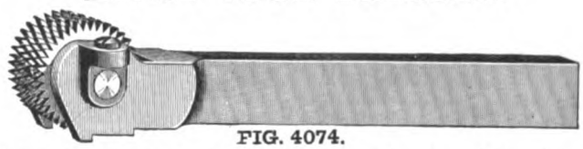


FIG. 4074.

This dresser is intended for flat face wheels and is not practical to use in shaping the face of emery wheels used for saw gumming and moulding tools.

PRICES.

Patent emery wheel dresser, with extra set of cutters	$4.00
Extra cutters, per set	.60

EMERY WHEEL DRESSER.

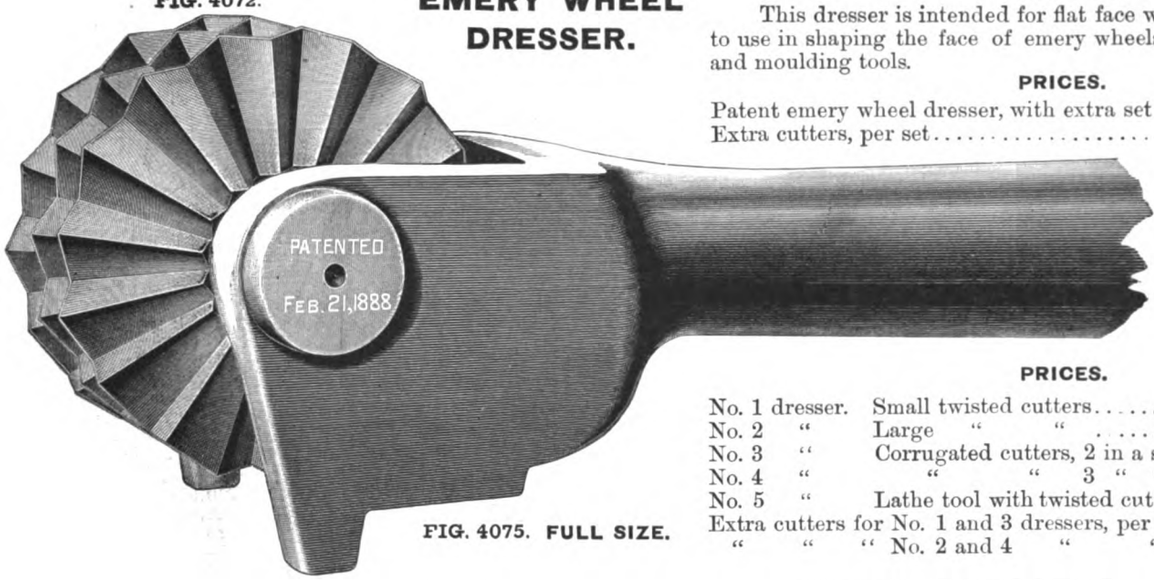


FIG. 4075. FULL SIZE.

PRICES.

No. 1 dresser.	Small twisted cutters	$1.25
No. 2 "	Large " "	1.50
No. 3 "	Corrugated cutters, 2 in a set	1.50
No. 4 "	" " 3 " "	1.75
No. 5 "	Lathe tool with twisted cutters	1.50
Extra cutters for No. 1 and 3 dressers, per set		.24
" " " No. 2 and 4 " "		.36

DIAMOND POINTED EMERY WHEEL DRESSERS.



FIG. 4076.

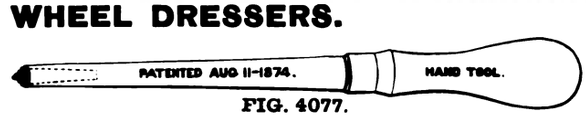


FIG. 4077.



FIG. 4078.



FIG. 4079

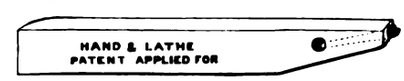


FIG. 4080.

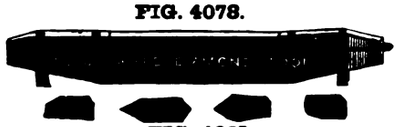


FIG. 4081.

DIAMOND POINTS.

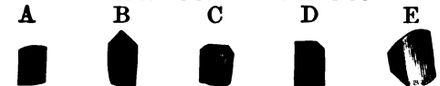


FIG. 4081A.

PRICES.

Set permanently for truing emery wheels, Fig. 4076	$5.00	X point,	$7.00	XX points,	$10.00	and upward.		
Set in adjustable stem, " 4077	8.00	"	10.00	"	12.00	"	"	
Set permanently, B Point, " 4078	10.00	"	12.00	"	14.00	"	"	
" " A " " 4079	12.00	"	14.00	"	16.00	"	"	
Set in adjustable stem, " 4080	12.00	"	14.00	"	16.00	"	"	
" " " B Point, " "	15.00	"	18.00	"	20.00	"	"	
Patent adjustable holder, with point, " 4081	18.00	"	25.00	"	30.00	"	"	
" " " without point, " "	3.00							
Patent shaped points, for emery wheels and large grindstones, without holder } Fig. 4081A	15.00	25.00	30.00	35.00	40.00	"	"	

When shifting or inserting above points into the holder, be particular not to screw clamps A A too tight, and allow but a small portion of the points to project. Diamonds or carbon, being very hard and brittle, are apt to break or crumble by overpressure ; on the other hand, they will stand any amount of friction. When applying them to grindstones, use water ; to emery wheels or calender rollers they may be used dry. Be particular in holding the point at an upward angle ; if inclined downward you are apt to break or have your point torn out. Above all, feed your tool lightly to your grindstone.

Points for the calender, chilled iron, or hardened steel rollers are made with sharp cutting edges, and require care in giving them a slow, light feather feed.

CONDITIONS OF SALE.

Diamonds are a natural formation, their combination and temper being beyond human knowledge. In view of the above, we do not "guarantee or assume any responsibility" as to their hardness. Diamond and carbon points shaped to order, re-turned, re-ground, or re-set with promptness and accuracy.

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BENNETT EMERY WHEEL DRESSER.



FIG. 4082.

For truing and sharpening solid and covered emery wheels when running at full speed.

PRICES.

Complete, with extra cutter.....$2.00
Extra cutters.....per dozen, 3.00

EMERY WHEEL SHAPER.



FIG. 4083.

PRICES, FIG. 4083.

Emery wheel shaper, with 1 dozen cutter wheels.....$1.50
Extra cutters.....per dozen, .30
Extra pins.....each, .03

EMERY GRAINS, ETC.

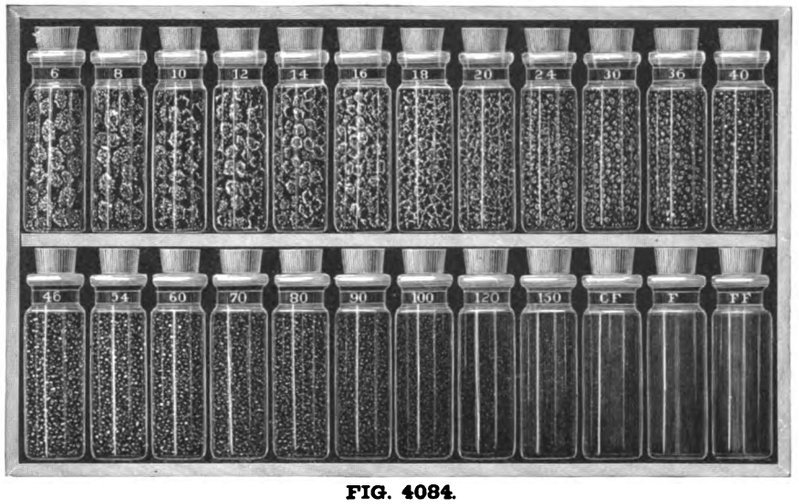


FIG. 4084.

PRICES, FIG. 4084.

	GRAIN.		FLOUR.
	Nos. 4 to 46, inclusive. Per lb.	Nos. 54 to 180, inclusive. Per lb.	CF, F & FF Per lb.
In kegs of about 290 lbs.	cts.	cts.	cts.
½ " " " 135 "	"	"	"
¼ " " " 65 "	"	"	"
10 lb. tin cans, 10 in case.	"	"	"
10 " less than " "	"	"	"

Crocus at same prices as the fine grain.

EMERY CLOTH, SANDPAPERS, ETC.

PER REAM.

CARNET PAPER.

Nos. 00 to 1½ and assorted.....$5.50
No. 2.....6.00
No. 2½.....6.50
No. 3.....7.50

FLINT PAPER—OUR BEST.

Nos. 00 to 1½.....$4.50
Nos. 2 to 3.....5.00

FLINT PAPER.

All numbers.....$3.75

EMERY PAPER.

Nos. 00 to 1½.....$6.50
No. 2.....7.50
No. 2½.....9.50
No. 3.....11.50

EMERY CLOTH.

Nos. FF to 1½.....$18.00
No. 2.....20.00
No. 2½.....24.00
No. 3.....26.00
Crocus cloth.....18.00

EMERY CLOTH, SANDPAPER, ETC.

PER ROLL OF 50 YARDS LENGTH.

CARNET PAPER.

Nos.	Width 24 in.	Width 30 in.	Width 36 in.	Width 40 in.
00 to 1½	$6.00	$9.00	$11.00	$13.00
2	6.50	10.00	12.00	14.00
2½	7.25	11.00	13.00	15.00
3	8.25	12.00	14.00	16.00

EXTRA FLINT PAPER.

Nos.	Width 24 in.	Width 30 in.	Width 36 in.	Width 40 in.
00 to 1½	$5.00	$8.00	$10.00	$12.00
2	5.50	9.00	11.00	13.00
2½	6.00	10.00	12.00	14.00
3	6.50	11.00	13.00	15.00
3½	7.50	13.00	15.00	17.00
4	8.50	15.00	17.00	20.00

EMERY PAPERS.

Width 23½ inches.

Nos. 00 to 1½.....$6.50
No. 2.....7.50
No. 2½.....9.00
No. 3.....11.50

EMERY CLOTH.

Nos.	9 inches wide.	18 inches wide.
00 to 1½	$7.50	$15.00
2	9.00	18.00
2½	10.50	21.00
3	12.50	25.00

SAND CLOTH.

Width 14 inches.

Nos. 00 to 2.....$10.00 Nos. 2½ and 3.....$12.50

WOOD POLISHING WHEELS.

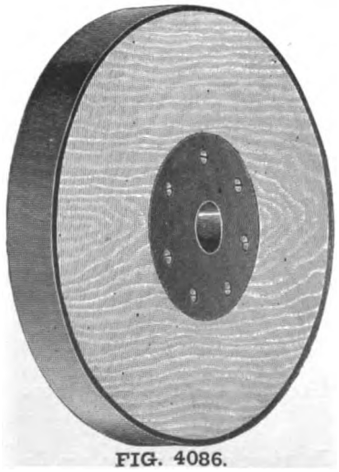


FIG. 4086.

Covered with oak leather ready for use.

Double flange, 50 cents extra. Tapered wheels, 10 per cent. extra. Any size of wheel made to order at special price. Prices for wheels with bushings for ¾ or 1 inch spindle; bushings for 1¼ inch spindle, 25 cents extra. Uncovered wheels ⅓ less. Special covering put on when ordered, price of which depends on material ordered.

PRICES, FIG. 4086.

Diam. in ins.	THICKNESS IN INCHES. 1	1½	2	2¼	2½	2¾	3	3½	4	4½	5	6
8	$2.25	$2.50	$2.80									
9	2.50	2.80	3.10	$3.25	$3.50							
10	2.80	3.10	3.25	3.50	3.75	$4.00	$4.25	$4.50	$4.90	$5.50		
12	3.00	3.25	3.50	3.75	4.00	4.25	4.50	5.00	5.50	6.00	$6.60	
14	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.50	6.00	6.50	7.10	$8.10
16	4.00	4.25	4.50	4.75	5.00	5.25	5.50	6.00	6.50	7.00	7.60	8.75
18	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.50	7.00	7.50	8.10	9.50
20	5.00	5.25	5.50	5.75	6.25	6.50	6.75	7.10	7.50	8.00	8.75	10.50
22	5.50	5.75	6.00	6.25	7.00	7.25	7.50	8.00	8.50	9.25	9.75	11.50
24	6.00	6.25	6.50	6.75	8.00	8.40	8.75	9.25	10.00	10.75	11.50	13.50
26	6.50	6.75	7.00	7.25	8.50	8.75	9.00	9.50	10.50	11.00	12.00	14.00
28	7.00	7.25	7.50	7.75	9.00	9.25	9.50	9.75	11.00	11.50	12.50	15.00
30	7.50	7.75	8.00	8.25	9.50	9.75	10.00	10.25	11.50	12.00	13.00	16.00

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POLISHINC WHEEL CLEANER.

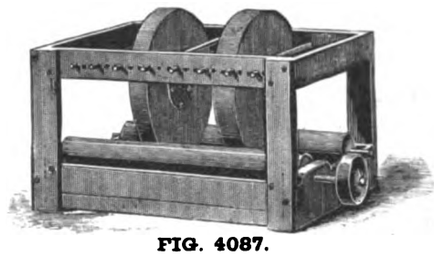


FIG. 4087.

By placing the worn wheel in this machine, and letting it run a few minutes with the water just touching the rollers, all of the glue and emery will be removed without damaging or loosening the leather covering.

This machine has two rows of movable rods, only one shown in cut, to keep the wheels from falling over. The idle roller also has two positions for different diameters of wheels.

Size inside, 24 x 26 inches.

PRICE, $12.00.

ENDLESS POLISHINC BELTS.

DUCK.

These belts are made of two thicknesses of duck cemented together, and made endless with a layer of vulcanized rubber between. We carry in stock all widths, but only in lengths of 12 feet. Any length and width made to order at one week's notice.

	Per foot.		Per foot.		Per foot.
1 inch.....	10 cts.	4 inches....	36 cts.	10 inches..	90 cts.
2 "	19 "	6 "	54 "	12 " ..	$1.08
3 "	27 "	8 "	72 "		

LEATHER.

These belts are made endless, and cemented with water-proof cement, any length or width required.

	Per foot.		Per foot.		Per foot.
1 inch....	10 cts.	3 inches....	36 cts.	5 inches...	63 cts.
1½ " ...	17 "	4 "	50 "	5½ " ...	70 "
2 "	23 "	4½ "	56 "	6 " ...	76 "
2½ "	30 "				

GRAY AND WHITE, COARSE AND FINE FRENCH FELT POLISHINC WHEELS.

Furnished from stock 9 to 18 inches in diameter, 1 to 2 inches thick. **PRICE, $.....PER LB.**

SOLID LEATHER POLISHINC WHEELS.

All sizes, 3 to 20 inches diameter, ¼ to 4 inches thick. Prices on application.

SOLID WALRUS WHEELS.

Width	⅜	½	⅝	¾	⅞	1	1¼	1½	2	2¼	2½	3	3½	4
DIAM.	ONE THICKNESS.						MORE THAN ONE THICKNESS.							
1½	.10	.12	.14	.15	.18	.20	.25	.30	.40	.45	.50	.60	.70	.80
2	.15	.20	.23	.25	.30	.35	.45	.50	.70	.80	.90	1.00	1.20	1.40
2½	.25	.30	.35	.40	.45	.50	.60	.80	1.00	1.10	1.20	1.60	1.80	2.00
3	.40	.50	.55	.60	.65	.90	1.15	1.40	1.80	2.00	2.30	2.80	3 20	3.60
4	.45	.60	.75	1.00	1.10	1.25	1.60	2.00	2.50	2.90	3.20	4.00	4.50	5.00
5	.65	.80	1.00	1.25	1.50	2.00	2.25	2.50	4.00	4.75	5.00	5.75	6.50	8.00
6	.90	1.20	1.50	2.00	2.50	3.00	3.50	4.00	6.00	6.50	7.00	8.00	10.00	12.00
7	1.25	1.50	1.75	2.50	3.00	3.50	4.50	5.00	7.00	8.00	9.00	10.00	11.50	14.00
8	1.60	2.00	2.50	3.00	3.50	4.00	5.50	6.00	8.00	9.50	11.00	12.00	14.00	16.00
9	1 75	2.25	3.25	3.75	4.25	5.00	6.50	7.50	10.00	11.50	13.00	15.00	17.50	20.00
10	2.00	3.00	4.00	4.75	5.00	6.00	7.50	9.50	12.00	13.50	15.00	19.00	21.50	24.00
12	2.50	3.50	4.50	5.75	6.50	7.25	9.50	11.50	14.50	15.75	19.00	23.00	26.00	29.00

UNBLEACHED MUSLIN BUFFS.

Diameter.	Pieces thick.	Prices 3 sewings, per doz.	Prices each 1 sewing and all 18 pieces thick.
2	30	$1.25	
2½	30	1.50	
3	35	1.75	
4	42	2.00	$0.06
6	50	3.50	.07
8	55	6.00	.08
9	60	8.00	.12
10	65	10.00	.13
12	70	12.00	.19
14	70	16.00	.28
16			.33
18			.40

CIRCULAR BRISTLE BRUSHES.

FOR LARGE, HEAVY AND COARSE WORK.

Number of brush.	Number of rows.	Size of center block.	Diameter of brush.	Length of bristle.	Quality.	Style.	Prices, per doz.
101	4	3 in.	6 in.	1½ in.	Tampico	Upright	$3.10
102	4	3 "	6 "	1½ "	Bristle	"	6.20
103	5	5 "	8 "	1½ "	Tampico	"	7.30
104	5	5 "	8 "	1½ "	Bristle	"	17.00
105	5	6 "	8 "	1 "	Tampico	"	7.70
106	5	6 "	8 "	1 "	Gray bris.	"	15.60
107	5	6½ "	10 "	1¾ "	Tampico	"	10.50
108	5	6½ "	10 "	1¾ "	Bristle	"	24.00
109	6	4¾ "	8 "	1⅝ "	Tampico	"	8.15

COMMON BRUSHES FOR SAME PURPOSES AS ABOVE.

Number of brush.	Number of rows.	Size of center block.	Diameter of brush.	Length of bristle.	Quality.	Style.	Prices, per doz.
115	4	2⅛ in.	5¼ in.	1⅜ in.	Tampico	Pointed	$3.00
116	6	2⅛ "	5¾ "	1¾ "	"	"	4.30
117	7	2⅛ "	6½ "	2 "	"	"	5.65
118	7	2½ "	7 "	2 "	"	"	6.20
119	4	4 "	7 "	1½ "	"	Upright	4.60
120	6	5¼ "	8¼ "	1½ "	"	"	8.35
121	6	7 "	9½ "	1¼ "	"	"	10.50
122	5	9 "	12 "	1½ "	"	"	14.30
123	6	12 "	15 "	1½ "	"	"	23.00

CIRCULAR SCRATCH BRUSHES.

Fig. 4096 made from brass and steel wires, centers filled with lead for heavy use.

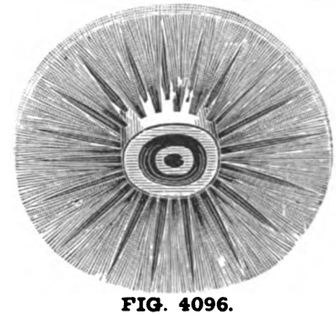


FIG. 4096.

PRICES, PER DOZEN.

Diameter, inches.	1 row.	2 row.	3 row.	4 row.	5 row.
2½	$2.50	$3.75	$5.00	$7.00	$9.00
3	3.00	4.50	6.00	8.00	10.00
3½	4.50	7.00	9.00	12.00	15.00
3¾	5.00	8.00	11.00	14.00	18.00
4	6.00	9.00	12.00	16.00	21.00
4¼	6.50	10.50	13.50	18.50	24.00
4½	7.00	11.50	14.50	20.50	27.00
4¾	7.50	12.00	15.00	22.00	29.00
5	8.00	13.00	16.50	24.00	32.00
5½	9.00	15.00	18.50	27.00	36.00
6	10.50	16.50	21.50	30.00	39.00
6½	11.00	19.00	24.00	36.00	42.00
7	12.00	21.00	27.00	40.00	48.00
7½	13.00	24.00	30.00	44.00	54.00
8	14.00	25.00	33.00	48.00	60.00

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TURNED STEEL AND IRON SHAFTING.

POLISHED, KEY-SEATED AND FITTED FOR COUPLINGS.

Diameter.	15/16	1 3/16	1 5/16	1 7/16	1 11/16	1 15/16	2 3/16	2 7/16	2 11/16	2 15/16	3 7/16	3 15/16	4 7/16	4 15/16	5 3/8	5 7/8
Price per foot.....	$0.50	$0.55	$0.60	$0.70	$0.85	$0.95	$1.10	$1.40	$1.65	$1.90	$2.90	$3.70	$5.40	$7.20	$9.00	$11.00
Extra charge for each journal or shoulder.	.50	.55	.60	.70	.85	.95	1.00	1.10	1.25	1.40	1.65	1.75	2.00	2.25	2.50	3.00
* Extra charge for each key-way within one foot in length. (*)	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.80	.90	1.00	1.25	1 50	2.00

* Key-ways are charged only when not pertaining to couplings, Figs. 4113 and 4115. Shafting is boxed, when so ordered.

COLD-ROLLED STEEL AND IRON SHAFTING.

Diam.	Weight per foot.	Price per lb. for iron.	Price per lb. for steel.	Diameter.	Weight per foot.	Price per lb. for iron.	Price per lb. for steel.	Diameter.	Weight per foot.	Price per lb. for iron.	Price per lb for steel.	Diameter.	Weight per foot.	Price per lb. for iron.	Price per lb. for steel.
4 1/2 in.	54.11	5 1/2	5 1/2	2 5/8 in.	18.41	5	5	1 1/2 in.	6.01	5	5	15/16 in.	2.35	5 1/4	5 1/4
4 7/16 "	52.62			2 9/16 "	17.55			1 53/100 "	5.60			31/32 "	2.20		
4 1/4 "	48.26			2 1/2 "	16.70			1 7/16 "	5.52			7/8 "	2.05		
4 "	42.75			2 7/16 "	15.89			1 43/100 "	5.26			27/32 "	1.94		
3 15/16 "	41.04			2 3/8 "	15.07			1 3/8 "	5.05			13/16 "	1.77		
3 3/4 "	37.57			2 1/4 "	13 52			1 5/16 "	4.61	5	5	3/4 "	1.50		
3 1/2 "	32.73			2 3/16 "	12.80			1 41/100 "	4.24			11/16 "	1.26		
3 7/16 "	31.58			2 1/8 "	12.07			1 29/100 "	4.20			23/32 "	1.17	5 3/4	5 3/4
3 3/8 "	30.43	5 1/4	5 1/4	2 1/16 "	11.35	5	5	1 1/4 "	4.17			5/8 "	1.05		
3 1/4 "	28.22			2 "	10.69			1 21/100 "	3.86			9/16 "	.845		
3 3/16 "	27.16			1 15/16 "	10.03			1 3/16 "	3.77			1/2 "	.667		
3 1/8 "	26.09			1 7/8 "	9.39			1 1/8 "	3.38			19/32 "	.586	6 1/2	6 1/2
3 "	24.05			1 13/16 "	8.78			1 3/32 "	3.20			7/16 "	.511		
2 15/16 "	23.06			1 3/4 "	8.18			1 5/64 "	3.11			1/2 "	.506		
2 7/8 "	22.09	5	5	1 11/16 "	7.61			1 1/16 "	3.02	5 1/4	5 1/4	3/8 "	.375	7 1/2	7 1/2
2 13/16 "	21.15			1 5/8 "	7.06			1 "	2.68			5/16 "	.260	10	10
2 3/4 "	20.21			1 9/16 "	6.52			31/32 "	2.52			1/4 "	.167	13	13
2 11/16 "	19.31														

One cent per lb. extra for pump and piston rods.

The shafts are kept on hand at the mill, in lengths of 24 feet, and are cut to any length desired.

For many purposes long key seats in shafts are required. We have key-seated many thousands of our cold-rolled shafts their entire length, and in no instance have they failed to show their superiority over turned shafts key-seated. The charge for doing this work is moderate.

LARGE FORGED SHAFTS.

We keep in stock at mill turned and polished shafts of sizes given below, of both steel a d iron, in 8, 12, 16 and 24 feet lengths.

Exact diameter.	Weight per foot.	Price per pound, fitted for coupling.	Exact diameter.	Weight per foot.	Price per pound, fitted for coupling.
4 3/4 in.	60.28	6 1/2	5 1/2 in.	80.82	7
5 "	66.79		5 3/4 "	88.33	
5 1/4 "	73.64		6 "	96.18	

We are also prepared to furnish, at short notice, large shafts of any diameter up to 12 inches, and of any length to 30 feet.

Price quoted on application.

PATENT COLD-ROLLED SQUARES.

Square.	Weight per foot.	Price per lb. iron.	Price per lb. steel.	Square.	Weight per foot.	Price per lb. iron.	Price per lb. steel.
4 in.	54.42	6	6	1 1/16 in.	3.85	5 1/2	5 1/2
3 3/4 "	47.84			1 "	3.40		
3 1/2 "	41.67	5 3/4	5 3/4	15/16 "	2.99		
3 1/4 "	35.92			7/8 "	2.60		
3 "	30.61			13/16 "	2.25		
2 3/4 "	25.72			3/4 "	1.92		
2 1/2 "	21.26			11/16 "	1.61		
2 1/4 "	17.25			5/8 "	1.34		
2 "	13.60			9/16 "	1.08		
1 3/4 "	10.41	5 1/2	5 1/2	1/2 "	.850		
1 5/8 "	8.98			7/16 "	.652		
1 1/2 "	7.66			3/8 "	.479		
1 3/8 "	6.43			5/16 "	.332		
1 1/4 "	5.31			9/32 "	.270		
1 1/8 "	4.30			1/4 "	.213		

CALENDERED STEEL AND IRON SHAFTING.

Diameter in inches.	Weight per foot for iron.	Width and depth of key seat.	Price per lb., cut to length.	Diameter in inches.	Weight per foot for iron.	Width and depth of key seat.	Price per lb., cut to length.	Diameter in inches.	Weight per foot for iron.	Width and depth of key seat.	Price per lb., cut to length.
5/8	1.02	1/8 x 1/16	18c.	1 1/16	7.45	3/8 x 3/16	10c.	2 3/4	19.79	5/8 x 5/16	9c.
11/16	1.25	1/8 x 1/16		1 1/8	8.01	3/8 x 3/16		2 13/16	20.71	5/8 x 5/16	
3/4	1.47	3/16 x 3/32	15c.	1 3/16	8.60	3/8 x 3/16		2 7/8	21.63	3/4 x 3/8	
13/16	1.74	3/16 x 3/32		1 1/4	9.20	1/2 x 1/4		2 15/16	22.60	3/4 x 3/8	
7/8	2.00	1/4 x 1/8	13c.	1 15/16	9.83	1/2 x 1/4		3	23.56	3/4 x 3/8	
15/16	2.30	1/4 x 1/8		2	10.47	1/2 x 1/4		3 1/8	25.60	3/4 x 3/8	9c.
1	2.61	1/4 x 1/8	11 1/2c.	2 1/16	11.15	1/2 x 1/4		3 3/16	26.62	3/4 x 3/8	
1 1/16	2.96	1/4 x 1/8		2 1/8	11.82	1/2 x 1/4		3 1/4	27.65	3/4 x 3/8	
1 1/8	3.31	1/4 x 1/8		2 3/16	12.54	1/2 x 1/4		3 3/8	29.82	7/8 x 1/4	
1 3/16	3.70	5/16 x 5/32	10 1/2c.	2 1/4	13.25	1/2 x 1/4		3 7/16	30.95	7/8 x 1/4	
1 1/4	4 09	5/16 x 5/32		2 5/16	14.00	1/2 x 1/4	9c.	3 1/2	32.07	7/8 x 1/4	
1 5/16	4.50	5/16 x 5/32		2 3/8	14.76	5/8 x 5/16		3 5/8	34.40	7/8 x 1/4	
1 3/8	4.95	3/8 x 3/16		2 7/16	15.57	5/8 x 5/16		3 11/16	35.60	7/8 x 1/4	
1 7/16	5.41	3/8 x 3/16		2 1/2	16.37	5/8 x 5/16		3 3/4	36.81	7/8 x 1/4	
1 1/2	5.89	3/8 x 3/16	10c.	2 9/16	17.20	5/8 x 5/16		3 7/8	39.31	1 x 1/2	10c.
1 9/16	6.40	3/8 x 3/16		2 5/8	18.03	5/8 x 5/16		3 15/16	40.59	1 x 1/2	
1 5/8	6.91	3/8 x 3/16		2 11/16	18.91	5/8 x 5/16		4	41.88	1 x 1/2	

Iron only.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SHAFTING STRAIGHTENERS.

3 AND 2 1-4 INCH.

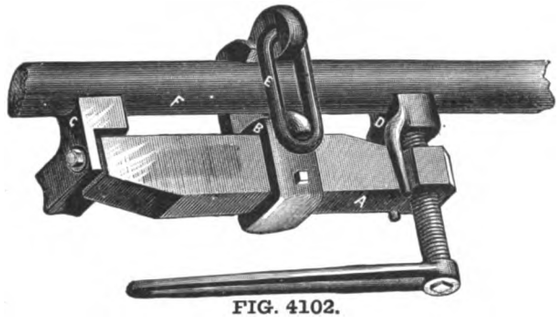


FIG. 4102.

DESCRIPTION, FIG. 4103.

This cut represents a 4 inch straightener; screws steel, very large, having fine threads. The followers are steel and are fastened to the screw. For use on lathes they can be mounted on wheels.

PRICES.

4 inch.....$60.00
3½ inch..... 50.00

Weight of 4 inch, 360 lbs.

Is the most simple and convenient machine yet devised for straightening or bending shafting, bars or tubes in any position. It will take in and straighten round iron of the sizes in the list, or any size smaller, in the shortest possible time. The hook "B" slides on the stock "A" and may be set near the dog "C" when the shaft needs straightening near the end. The follower "D" is fastened to the screw and held in position by its arms. The stock is wrought iron; the wrench, screw, follower, hook and dog are steel. All parts are well made.

PRICES.

2¼ inch.....$34.00 | 3 inch.....$45.00

4 AND 3 1-2 INCH.

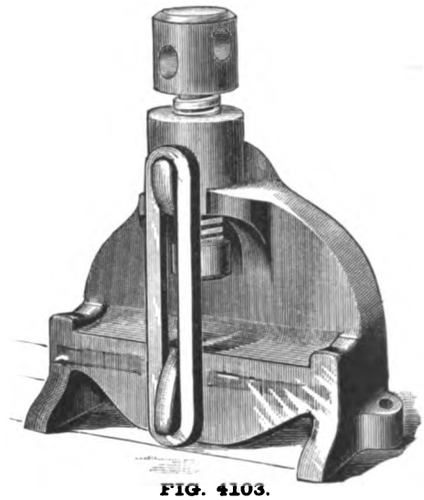


FIG. 4103.

COMBINATION STRAIGHTENERS AND CENTERS.

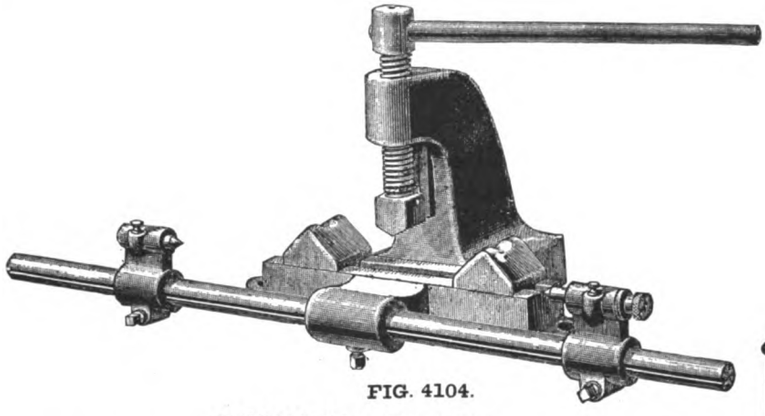


FIG. 4104.

DESCRIPTION, FIG. 4104.

The blocks upon which the work rests are kept in line by tongues which fit the groove shown, and are movable to or from the screw. The screw is 1⅜ inch diameter, 4 pitch, of steel, and powerful enough to bend a shaft 1¾ inch diameter The shaft upon which the centering heads are fitted is cold rolled, 1¼ inch diameter, 49 inches long. It is movable through the arm which supports it, and is held in any desirable position by the set screw shown. The centering heads are clamped in any position on the shaft by the binding screws. The center at the right is pressed forward by a spring and has a knurled head for drawing it back; both centers are provided with small oil wells, with brass fittings, for convenience in oiling centers. The body of the machine has three lugs cast upon it for bolting to the bench.

WEIGHT, 130 LBS. PRICE, $50.00.

HYDROSTATIC LEVEL.

DESCRIPTION, FIG. 4105.

In lining up shafting, finding levels at long distances, over obstructions or around corners, more can be accomplished in one hour with this instrument than can be done in a day with an ordinary spirit level. It not only tells that points are out of level, but shows, in inches and fractions of an inch, how much they are out of level. Any workman can use it. Accurate for all distances.

HOW TO USE IT.

When leveling two points a gauge is placed on each, the stop-cocks are opened, and when the water comes to rest, closed again, thus confining it to the exact height indicated. The instrument may then be picked up and carried to the light, if necessary, and the exact position of the water located on the scales. Any length of hose desired may be used between the gauges and accurate levels taken over any distance that the hose will permit.

To prevent freezing add about 10 per cent. of glycerine with the water before filling the level.

There is no annoyance from overflow or loss of the liquid in using. If the stop-cocks should be left open, little float valves located in the cups close the vent holes automatically when the water rises to the top of the gauges.

PRICES.

No. 1 is suitable for leveling on machinery, shafting, etc., and shows a variation from level line of 3½ inches and can be used with 25 feet of hose. **PRICE, $10.00,** including 12 feet rubber tube laid upon spiral brass wire, one coupling and case. Extra tubing, 12 cents per foot.

No. 2 is same as above, except larger, showing a variation of 6 inches, and can be used with 100 feet of hose. **PRICE, $15.00,** including 25 feet of tube, one coupling and case. Extra tube, 15 cents per foot.

These levels are each put up in a handsome hardwood box, which is included in the price given above.

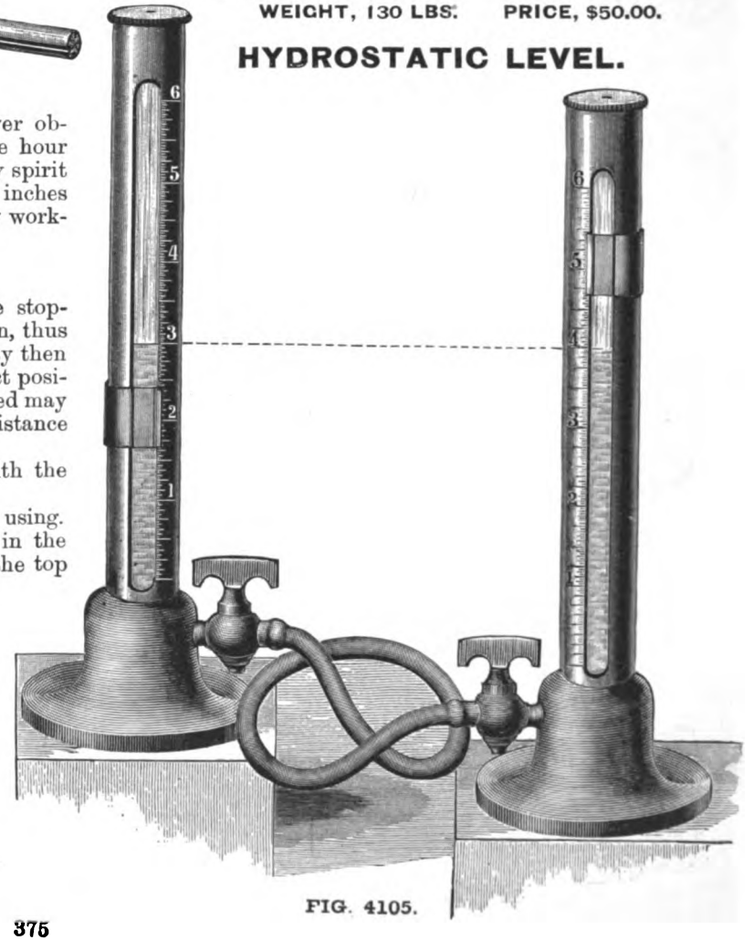


FIG. 4105.

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CENTER RHYMER.

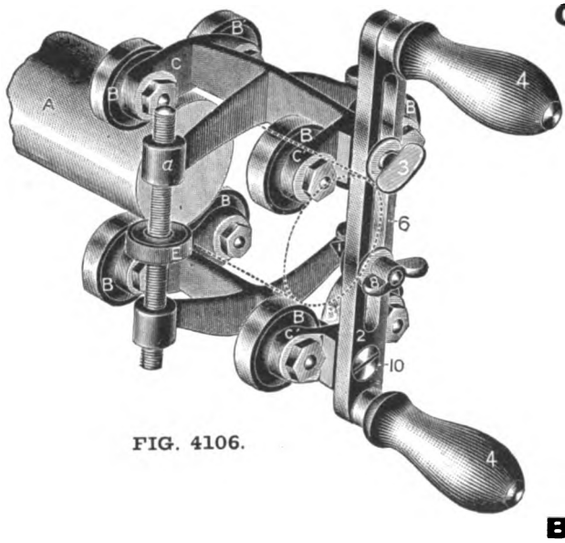


FIG. 4106.

A new and simple machine for finding and correcting the center of shafts, spindle gudgeons or other cylindrical objects.

TO OPERATE THE MACHINE.

1st Adjust the working jaws, which are composed of the link C C′ and connected by axles D D′, and bring face of rollers B B′ in contact with the work engaged, which, in this case, is shaft A, as shown on cut.

2d. Adjust cutting tool 1 to the center in shaft or other work and secure to carrying bar 2 by means of thumb screw 8.

3d. Revolve the machine by means of the handles 4, and press lightly endways against the work engaged until the true center is obtained.

PRICES.

No. 1 rhymer takes from 1¼ in. to 4 in. diameter inclusive.....$25.00
No. 2 rhymer takes from 4 in. to 8 in. diameter inclusive..... 35.00

BALANCING WAYS.

NO. 3.

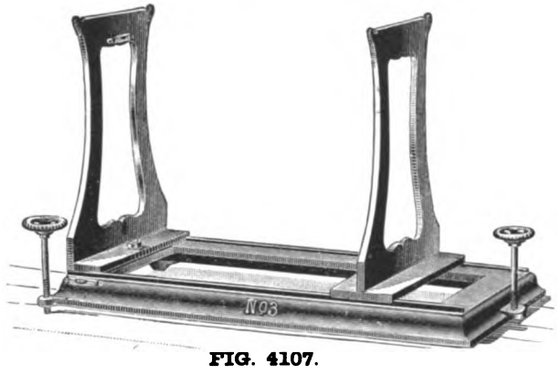


FIG. 4107.

NO. 2.

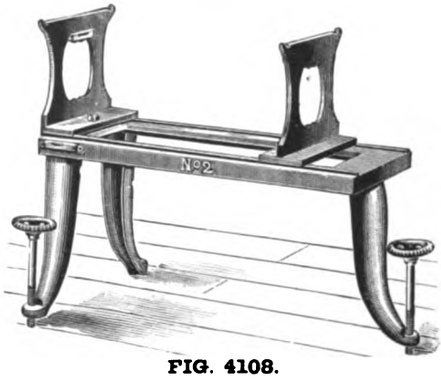


FIG. 4108.

NO. 1.



FIG. 4109.

This tool consists of a frame or bed, with two planed ways, on which are mounted two standards. One of these standards is fixed, and the other is movable, the same as the tail block of a lathe. The top edges of the standards are planed true and form the "ways," on which the work is rested while being tested for "balance."

The frame is supported by three legs or feet, consequently always stands firmly. One leg or foot is fixed, and a little longer than the other two, which are adjustable by means of the screws shown. A spirit level is secured to the fixed standard, and also one on the bed, so that both lateral and cross levels can be accurately determined. The way is used in balancing all kinds of work, such as cutter-heads, pulleys, armatures, etc.

PRICES.

No. 3. Rests on the floor and intended for large work, though the standards will come sufficiently close together to accommodate the smallest work. Length of bed, 42 ins. Height of standards, 24½ ins. Weight, 260 lbs. **PRICE, $40.00.**

No. 2. Adapted to stand on the floor, and intended for general shop use and medium sized work. Length of bed, 32 inches. Height of standards, 12½ ins. Weight, 135 lbs. **PRICE, $28.00.**

No. 1. Intended to set on the bench, and for light work, such as shaper heads, small pulleys, armatures, etc. Length of bed, 24 ins. Height of standards, 9½ ins. Weight, 55 lbs. **PRICE, $18.00.**

STANDARDS OF SPECIAL HEIGHT MADE TO ORDER.

WROUGHT IRON COLLARS.

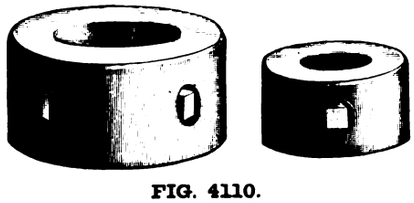


FIG. 4110.

FLUSH HEAD SET SCREWED.

Diameter of shaft,	1 1/16	1 3/16	1 5/16	1 7/16	1 11/16	1 15/16	2 3/16	2 7/16	2 11/16	2 15/16	3 7/16	3 15/16	4 7/16	4 15/16	5 3/8	5 7/8
PRICE, for each,	.60	.80	.90	$1.00	$1.25	$1.60	$1.90	$2.40	$2.70	$3.00	$3.50	$4.60	$5.60	$7.00	$7.60	$9.20

COLLARS IN HALVES.

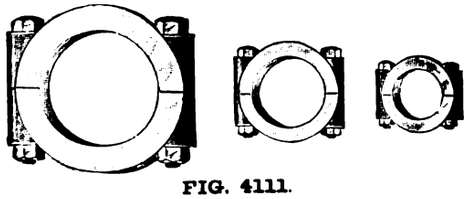


FIG. 4111.

Size.	Price.	Size.	Price.	Size.	Price.
1	$0.80	2½	$1.90	5	$6.00
1¼	.90	2⅝	2.15	5½	7.25
1⅜	.95	2¾	2.20	6	8.60
1½	1.05	2⅞	2.30	6½	10.15
1⅝	1.25	3	2.45	7	11.90
1¾	1.30	3¼	2.75	7½	13.80
1⅞	1.40	3½	3.10	8	15.90
2	1.45	3¾	3.50	8½	18.15
2⅛	1.50	4	3.90	9	20.40
2¼	1.65	4½	4.85	9½	22.80
2⅜	1.75				

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INTERNAL CLAMP COUPLINGS.

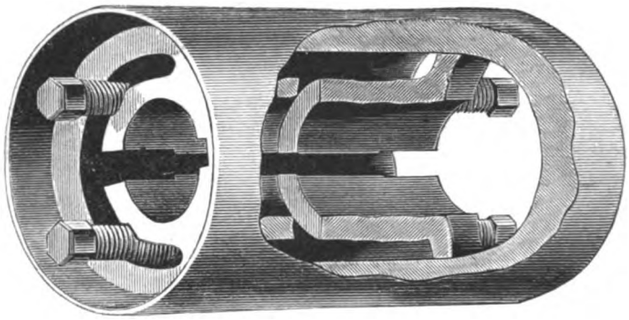


FIG. 4112.

Size.	Prices, each.	Size.	Prices, each.
1 3/16 in.	$4.75	3 1/16 in.	$26.00
1 7/16 "	5.50	3 5/16 "	30.00
1 1/16 "	6.25	4 7/16 "	42.00
1 5/16 "	8.00	4 5/16 "	55.00
2 3/16 "	9.00	5 7/16 "	65.00
2 7/16 "	10.75	5 5/16 "	76.50
2 1/16 "	13.00	6 7/16 "	105.00
2 5/16 "	16.50	6 5/16 "	125.00
3 3/16 "	20.00	7 7/16 "	155.00
3 7/16 "	23.00	7 5/16 "	175.00

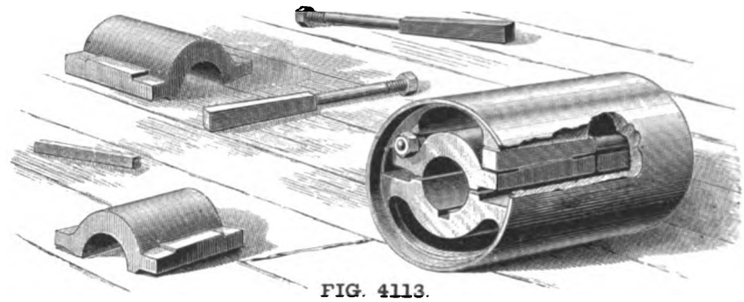


FIG. 4113.

Diam. of shaft.	1 5/16	1 3/16	1 5/16	1 7/16	1 1/16	1 5/16	2 3/16	2 7/16
Prices, each....	$4.25	$4.75	$5.25	$5.75	$6.50	$8.25	$10.00	$12.00

Diam. of shaft.	2 1/16	2 5/16	3 7/16	3 5/16	4 7/16	4 5/16	5 3/8	5 7/8
Prices, each....	$14.75	$17.50	$24.00	$32.00	$41.75	$53.25	$65.00	$76.50

COMPRESSION COUPLING.

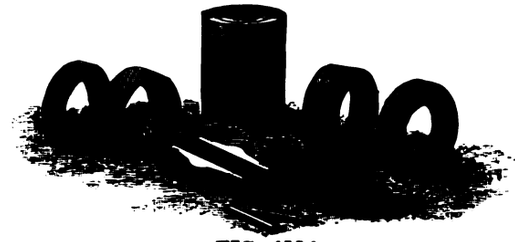


FIG. 4114.

Size.	Prices.	Size.	Prices.	Size.	Prices.
1 inch.	$2.40	2 inch.	$5.40	3 inch.	$12.35
1 1/8 "	2.60	2 1/8 "	6.10	3 1/4 "	15.00
1 1/4 "	2.85	2 1/4 "	6.75	3 1/2 "	18.05
1 3/8 "	3.15	2 3/8 "	7.45	3 3/4 "	21.75
1 1/2 "	3.40	2 1/2 "	8.20	4 "	24.80
1 5/8 "	3.75	2 5/8 "	9.10	4 1/4 "	28.10
1 3/4 "	4.25	2 3/4 "	10.00	4 1/2 "	33.15
1 7/8 "	4.85	2 7/8 "	11.00	4 3/4 "	37.50

FLANGE FACED OR PLATE COUPLING.

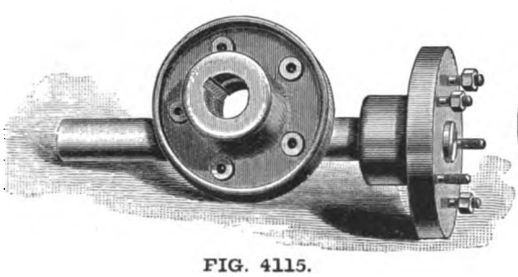


FIG. 4115.

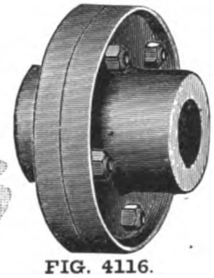


FIG. 4116.

Diam. of shaft	1 5/16	1 3/16	1 5/16	1 7/16	1 1/16	1 5/16	2 3/16	2 7/16	2 1/16	2 5/16	3 7/16	3 5/16	4 7/16	4 5/16	5 3/8	5 7/8
Prices per pair fitted to shaft Fig. 4115.	$6.50	$6.75	$7.00	$7.25	$7.50	$9.00	$10.50	$12.50	$15.50	$18.50	$25.00	$32.50	$42.00	$53.50	$63.50	$77.00
Prices per pair not fitted. Fig. 4116.	3.50	3.75	4.00	4.25	4.50	6.00	7.00	8.50	11.00	13.50	18.00	24.00	33.00	43.00	50.00	60 00

FLANGE COUPLING.



FIG. 4117.

Size.	Prices.	Size.	Prices.
1 inch.	$3.75	4 inch.	$27.15
1 1/4 "	4.25	4 1/4 "	30.50
1 1/2 "	4.90	4 1/2 "	35.65
1 3/4 "	5.85	5 "	37.50
2 "	7.00	5 1/2 "	41.00
2 1/4 "	8.40	6 "	43.75
2 1/2 "	9.90	6 1/2 "	59.00
2 3/4 "	11.80	7 "	62.50
3 "	14.25	8 "	96.25
3 1/4 "	17.00	9 "	153.00
3 1/2 "	20.15	10 "	215.00
3 3/4 "	24.00	12 "	330.00

CLUTCH COUPLING.

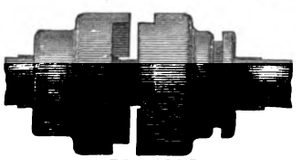


FIG. 4118.

Size of shaft.	Prices of coupling.	Prices of shipper.	Size of shaft.	Prices of coupling.	Prices of shipper.
1 1/2 in.	$8.00	$8.00	3 1/2 in.	$24.50	$11.00
2 "	9.00	8.40	4 "	33.25	12.00
2 1/2 "	11.50	9.25	4 1/2 "	45.00	13.00
3 "	16.25	10.00			

UNIVERSAL COUPLING.

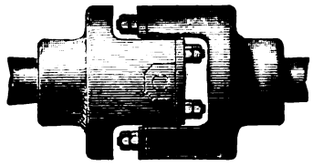


FIG. 4119.

Size.	Prices.	Size.	Prices.
2 inch.	$33.60	4 inch.	$68.75
2 1/2 "	38.75	4 1/2 "	86.75
3 "	45.50	5 "	113.50
3 1/2 "	56.00		

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RIGHT ANGLE COUPLING.

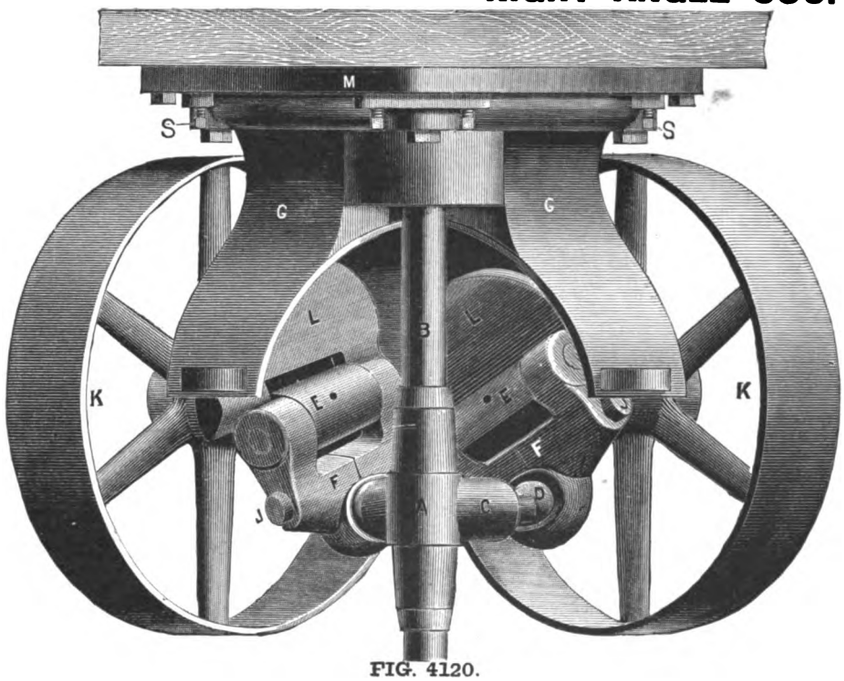


FIG. 4120.

Right angle couplings only are furnished.

The power transmitted is proportional to diameter of shaft and its speed.

Each coupling is furnished with two pulleys, as per sizes below.

One quart of oil will run a coupling for several months without renewal.

The cut is shown with lower half of the oil retaining frame removed.

PRICES.

	Shaft diameter.	Maximum speed.	Size of pulleys.	PRICES.
No. 1.	1¼ in.	500 revs.	12 x 4 in.	$40.00
" 2.	1½ "	300 "	16 x 6 "	60.00
" 3.	1 1/8 "	250 "	20 x 9 "	125.00

BALL AND SOCKET ADJUSTABLE HANGERS.



FIG. 4121.

These hangers are made either whole, or solid, or parting, as shown in Fig. 4122.

Unless otherwise stated, orders will be filled with the whole hanger.



FIG. 4122.

PRICES, EITHER STYLE.

Size.	6-inch drop.	8-inch drop.	10-inch drop.	12-inch drop.	13-inch drop.	16-inch drop.	20-inch drop.	25-inch drop.	30-inch drop.	36-inch drop.	42-inch drop.	46-inch drop.
1 3/16 in.	$3.00	$3.25	$3.50	$3.75	$3.90	$4.20	.....	.....	.....	.....	.....	.....
1 7/16 "	3.50	3.50	3.75	4.00	4.15	4.50	$5.00	.....	.....	.....	.....	.....
1 11/16 "	4.00	4.00	4.40	4.70	4.95	5.50	6.50	$7.50	.....	.....	.....	.....
1 15/16 "	5.00	5.00	5.50	6.00	6.25	6.75	8.25	9.75	.....	.....	.....	.....
2 3/16 "	6.25	6.25	6.75	7.25	7.50	8.00	9.50	10.75	$12.00	.....	.....	.....
2 7/16 "	8.25	8.25	8.50	9.00	9.25	9.75	11.25	12 75	14.75	.....	.....	.....
2 11/16 "	10.00	10.00	10.50	.....	11.25	12.50	14.00	15.50	17.25	.....	.....	.....
2 15/16 "	11.50	11.50	12.25	.....	13.50	15.00	16.50	18.00	19.50	$22.75	.....	.....
3 3/16 "	13.50	13.75	15 00	.....	16.50	19.00	20.50	22.00	23.50	26.50	.....	.....
3 7/16 "	.....	16.00	17.75	.....	20.00	22.25	24.50	26.75	30.00	33.50	.....	.....
3 15/16 "	.....	21.50	23.25	.....	26.00	28.75	31.50	34.50	37.50	40.75	.....	$55.00
4 7/16 "	.....	34.00	36.00	.....	38.75	40.75	43.50	46.25	50.00	55.00	$67.00	.....
4 15/16 "	.....	.....	50.00	.....	55.00	60.00	65.00	70.00	75.00	.....	.....	.....
5 7/16 "	.....	.....	75.00	.....	80.00	85.00	90.00	96.00	107.00	.....	.....	.....
5 15/16 "	.....	.....	.....	.....	88.00	94.50	101.00	107.50	116.00	.....	.....	.....
6 7/16 "	.....	.....	.....	.....	.....	102.00	108.00	116.00	127.00	.....	.....	.....
6 15/16 "	.....	.....	.....	.....	.....	.....	118.00	128.00	140.00	.....	.....	.....

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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DOUBLE BRACED BALL AND SOCKET HANGERS.



FIG. 4123.

PRICES, FIG. 4123.

Diam. of shaft.	Drop of hanger, in inches.						
	10	13	16	20	25	30	36
1 7/16	$4.75	$5.25	$5.75	$6.50	.....	.....	.....
1 11/16	4.75	5.25	5.75	6.50	.....	.....	.....
1 15/16	6.00	6.60	7.25	8.00	$8.90	$9.85	.....
2 3/16	7.50	8.20	8.85	9.75	11.00	12.00	.....
2 7/16	9.25	10.25	10.75	11.65	13.30	14.70	.....
2 11/16	11.30	12.25	13.25	14.55	16.15	17.80	$19.80
2 15/16	13.65	14.75	15.85	17.35	19.25	21.15	23.45
3 3/16	16.80	17.25	18.50	20.25	22.40	24.50	27.20
3 7/16	.....	22.45	24.00	26.10	28.70	31.35	34.50
3 11/16	.....	24.50	26.00	28.00	30.75	33.40	36.75
3 15/16	.....	27.15	28.75	31.00	33.75	36.60	40.00
4 3/16	.....	29.50	32.00	34.50	37.25	40.00	43.50
4 7/16	.....	.....	37.00	39.50	42.40	45.35	49.00
4 15/16	.....	.....	43.00	46.00	49.00	52.25	56.00

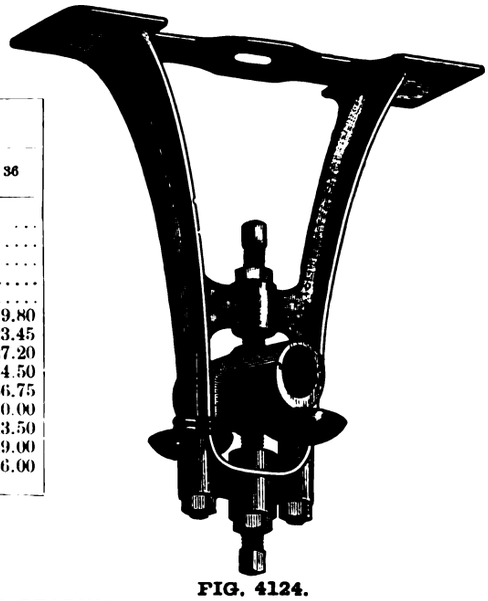


FIG. 4124.

PRICES, FIG. 4124, WITH SELF-OILING BABBITTED BEARINGS.

Diameter of shaft.	15/16	1 3/16	1 7/16	1 7/16	1 11/16	1 15/16	2 3/16	2 7/16	2 11/16	2 15/16	3 3/16	3 7/16	3 15/16	4 7/16	4 15/16	5 3/8	5 7/8
6 inch drop.....	$2.25	$2.50	$2.75	$3.25	$4.00	$5.25	$6.50	$8.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
9 " "	2.75	3.25	3.50	3.75	4.25	5.50	6.75	8.25	$10.25	$12.25	$14.50	.....	.....	.....	.....	.....	.....
12 " "	3.50	3.75	4.00	4.25	4.75	6.00	7.50	8.75	11.00	13.25	15.50	$20.00	$24.50	.....	.....	.....	.....
15 " "	4.00	4.25	4.50	4.75	5.25	6.50	8.00	9.50	12.00	14.25	16.75	21.50	26.00	.....	.....	.....	.....
18 " "	.....	.....	4.75	5.00	5.50	7.00	8.50	10.25	12.50	15.00	17.50	22.50	27.00	$34.25	$40.00	.....	.....
21 " "	.....	.....	5.00	5.25	5.75	7.50	9.00	11.00	13.25	15.75	18.50	23.50	28.00	35.50	42.50	$53.00	$63.00
24 " "	.....	.....	.....	5.75	6.50	8.00	10.00	12.00	14.75	17.25	20.00	25.75	30.50	37.00	46.00	57.00	67.00
30 " "	.....	.....	.....	.....	.....	9.00	11.50	13.25	16.50	19.25	22.00	28.25	33.50	41.50	54.00	68.00	79.00
36 " "	.....	.....	.....	.....	.....	.....	.....	16.00	18.00	21.00	24.50	31.00	36.00	44.00	60.00	75.00	90.00

PRICES, FIG. 4125, WITH SELF-OILERS AND BABBITTED BEARINGS, BOXES FACED OFF.

Diameter of shaft.	15/16	1 3/16	1 5/16	1 7/16	1 11/16	1 15/16	2 3/16	2 7/16	2 11/16	2 15/16	3 7/16	3 15/16	4 7/16	4 15/16	5 3/8	5 7/8
6 inch drop	$2.25	$3.00	$3.50	$3.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7½ " "	2.50	3.25	3.75	4.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9 " "	2.75	3.50	4.00	4.25	$5.00	$6.00	$7.75	$9.00	$11.25	$13.50	.....	.....	.....	.....	.....	.....
12 " "	3.50	4.00	4.25	4.50	5.25	6.50	8.25	9.75	12.25	14.75	$22.00	$27.00	.....	.....	.....	.....
15 " "	4.00	4.25	4.50	4.75	5.50	7.00	9.00	10.50	13.25	16.00	23.50	28.50	$36.00	$41.00	.....	.....
18 " "	.....	.....	4.75	5.00	5.75	7.50	9.50	11.25	14.25	17.25	25.00	30.50	38.00	43.00	.....	.....
21 " "	.....	.....	5.00	5.25	6.00	8.00	10.00	12.00	15.25	18.25	26.50	32.00	40.00	45.00	$63.00	$70.00
24 " "	.....	.....	.....	.....	.....	8.50	10.50	12.75	16.25	19.25	28.00	33.50	42.00	47.00	66.50	74.00
27 " "	.....	.....	.....	.....	.....	.....	.....	13.50	17.25	20.25	29.50	35.00	44.00	49.00	70.00	78.00
30 " "	.....	.....	.....	.....	.....	.....	.....	14.25	18.25	21.25	31.00	36.50	46.00	51.00	73.50	82.00
33 " "	.....	.....	.....	.....	.....	.....	.....	15.00	19.25	22.25	32.50	38.00	48.00	53.00	77.00	86.00
36 " "	.....	.....	.....	.....	.....	.....	.....	15.75	20.25	23.25	34.00	40.00	50.00	55.00	80.50	90.00

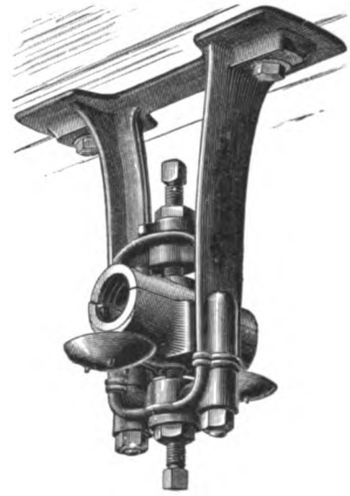


FIG. 4125.

Shifter arms from 50 cents to $1.00 extra. For prices without self-oilers, see Fig. 4128.

ADJUSTABLE SWIVEL HANGERS.

PRICES, FIGS. 4126 AND 4127.

Diameter of shaft.	Drop.	Prices.	Diameter of shaft.	Drop.	Prices.	Diameter of shaft.	Drop.	Prices.
4 inch.	20 inch.	$25.00	2½ inch.	12 inch.	$6.00	1¾ inch.	16 inch.	$3.60
4 "	18 "	22.00	2¼ "	30 "	7.50	1¾ "	14 "	3.40
3½ "	30 "	21.50	2¼ "	24 "	6.75	1¾ "	12 "	3 20
3½ "	24 "	19.50	2¼ "	20 "	6.00	1¾ "	10 "	3.00
3½ "	20 "	18.00	2¼ "	18 "	5 60	1½ "	20 "	3.75
3½ "	18 "	17.00	2¼ "	16 "	5.20	1½ "	18 "	3.50
3 "	32 "	15.50	2¼ "	14 "	4.80	1½ "	16 "	3.00
3 "	30 "	14.50	2¼ "	12 "	4.50	1½ "	14 "	2.80
3 "	28 "	13.50	2 "	20 "	6 00	1½ "	12 "	2.70
3 "	24 "	12.50	2 "	18 "	5.50	1½ "	10 "	2.60
3 "	20 "	10.50	2 "	16 "	4.20	1¼ "	26 "	4.00
3 "	18 "	10.00	2 "	14 "	4.00	1¼ "	20 "	3.50
3 "	16 "	9.50	2 "	12 "	3.80	1¼ "	18 "	3.00
2½ "	30 "	9.50	2 "	10 "	3.70	1¼ "	16 "	2.85
2½ "	24 "	8.00	1¾ "	30 "	5.00	1¼ "	14 "	2.75
2½ "	20 "	7.50	1¾ "	26 "	4.50	1¼ "	12 "	2.50
2½ "	18 "	7.00	1¾ "	24 "	4.25	1¼ "	10 "	2.40
2½ "	16 "	6.60	1¾ "	20 "	4.10	1¼ "	8 "	2.20
2½ "	14 "	6.20	1¾ "	18 "	3.80			

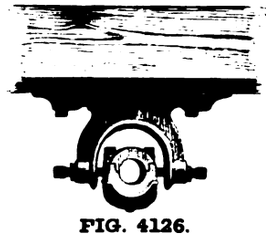


FIG. 4126.
SHOWS SHORT DROPS.



FIG. 4127.

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RING OILING ADJUSTABLE BALL AND SOCKET HANGERS.

WITH BABBITTED BEARINGS.—Length of bearings=5 diameters of shaft.

PRICES.

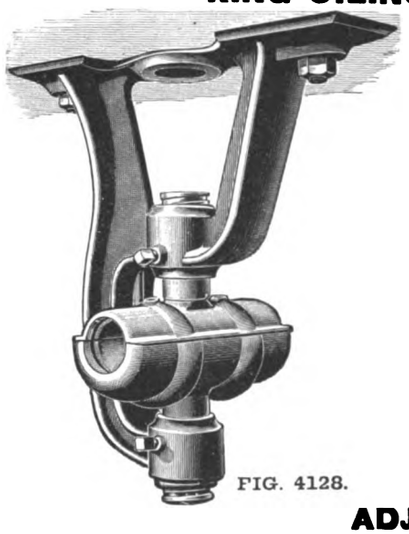


FIG. 4128.

Size.	8 in. drop.	9 in. drop	10 in. drop	12 in. drop	13 in. drop	15 in. drop	18 in. drop	21 in. drop	24 in. drop	30 in. drop	Size.
1¼ in.	$3.55	$3.60	$3.65	$3.70	$3.75	$3.90	$4.05	$4.20	$4.40	$5.00	1¼ in.
1⅜ "	3.65	3.70	3.75	3.85	3.90	4.10	4.25	4.40	4.70	5.40	1⅜ "
1½ "	3.90	4.00	4.05	4.15	4.20	4.40	4.55	4.80	5.20	5.70	1½ "
1⅝ "	4.05	4.20	4.40	4.65	4.80	4.90	5.05	5.50	5.50	6.00	1⅝ "
1¾ "	4.15	4.30	4.50	4.80	4.90	5.05	5.25	5.40	5.65	6.55	1¾ "
1⅞ "	4.70	4.90	5.10	5.30	5.50	5.70	5.90	6.15	6.40	7.35	1⅞ "
2 "	4.85	5.00	5.25	5.50	5.70	5.85	6.20	6.35	6.75	7.80	2 "
2⅛ "	5.10	5.25	5.50	5.75	5.95	6.15	6.35	6.70	7.10	8.20	2⅛ "
2¼ "	5.40	5.55	5.80	6.05	6.30	6.45	6.60	7.10	7.45	8.50	2¼ "
2⅜ "	6.15	6.30	6.55	7.20	7.55	7.90	8.35	8.65	9.00	10.00	2⅜ "
2½ "	6.30	6.50	6.70	7.45	7.80	8.15	8.65	8.95	9.30	10 30	2½ "
2⅝ "	6.60	6.80	7.00	7.80	8.20	8.50	9.00	9.35	9.70	10.80	2⅝ "
2¾ "	6.95	7.15	7.40	8.15	8.50	9.00	9.45	9.90	10.30	11.40	2¾ "
2⅞ "	9.05	9.25	9.50	9.90	10.30	10.80	11.20	11.50	12.10	13.80	2⅞ "
3 "	9.35	9.60	9.85	10.40	10.75	11.10	11.45	11.80	12.35	14.60	3 "
3⅛ "	9.95	10.20	10.50	11.10	11.50	11.90	12.30	12.70	13.30	15.60	3⅛ "
3¼ "	10.80	11.10	11.40	12.00	12.50	12.90	13.40	13.80	14.40	16.80	3¼ "
3½ "				15.30	15.80	16.80	17.40	18.20	18.60	21.60	3½ "
3¾ "				15.90	16.90	18.00	18 60	19.00	19.80	22.90	3¾ "
4 "				19.20	19.85	20.70	21 30	22.20	22.80	26.25	4 "
4½ "				28.80	29.60	30.60	31 60	32.65	33.70	35.30	4½ "

ADJUSTABLE BALL AND SOCKET HANGERS.

WITH BABBITTED BEARINGS.—Length of bearings=4 diameters of shaft.

PRICES.

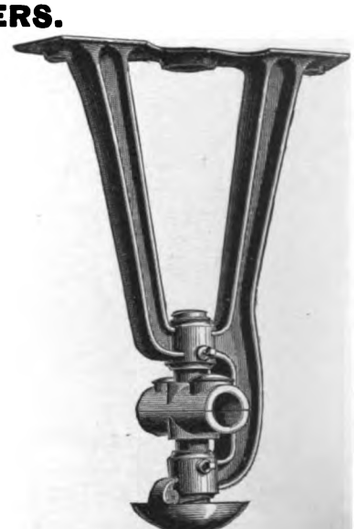


FIG. 4129.

Size.	8 in. drop	9 in. drop	10 in. drop	12 in. drop	13 in. drop	15 in. drop	18 in. drop	21 in. drop	24 in. drop	30 in. drop	Size.
1¼ in.	$2.55	$2.60	$2.65	$2.70	$2.75	$2.90	$3.05	$3.20	$3.40	$4.00	1¼ in.
1⅜ "	2.65	2.70	2.75	2.85	2.90	3.10	3.25	3.40	3.70	4.40	1⅜ "
1½ "	2.90	3.00	3.05	3.15	3.20	3.40	3.55	3.80	4.20	4.70	1½ "
1⅝ "	3.05	3.20	3 40	3.65	3.80	3.90	4.05	4.30	4.50	5.00	1⅝ "
1¾ "	3.15	3.30	3.50	3.80	3.90	4.05	4.25	4.40	4.65	5.55	1¾ "
1⅞ "	3.70	3.90	4.10	4.30	4.50	4.70	4.90	5.15	5.40	6.35	1⅞ "
2 "	3.85	4.00	4.25	4.50	4.70	4.85	5.00	5.30	5.60	6.55	2 "
2⅛ "	4.10	4.25	4.50	4.75	4.95	5.10	5.25	5.60	5.90	6.90	2⅛ "
2¼ "	4.40	4.55	4.80	5.05	5.20	5.35	5.50	5.90	6.20	7.20	2¼ "
2⅜ "	5.10	5.25	5.45	6.00	6.30	6.60	6.95	7.20	7.50	8.25	2⅜ "
2½ "	5.25	5.40	5.60	6.20	6.50	6.80	7.20	7.45	7.75	8.60	2½ "
2⅝ "	5.50	5.65	5.85	6.50	6.80	7.10	7.50	7.80	8.10	9.00	2⅝ "
2¾ "	5.80	5.95	6.15	6.80	7.10	7.50	7.90	8.20	8.50	9.50	2¾ "
2⅞ "	7.55	7.70	7.90	8.25	8.60	9.00	9.30	9.60	10.10	11.50	2⅞ "
3 "	7.80	8 00	8.20	8.70	8.95	9.25	9.50	9.80	10.30	12.00	3 "
3⅛ "	8.30	8.50	8.75	9.25	9.60	9 90	10.25	10.60	11.10	13.00	3⅛ "
3¼ "	9.00	9.25	9.50	10.00	10.40	10.75	11.15	11.50	12.00	14.00	3¼ "
3½ "				12.75	13.15	14.00	14.50	15.00	15.50	18.00	3½ "
3¾ "				13.20	14.10	15.00	15.50	16.00	16.50	19.10	3¾ "
4 "				16.00	16.55	17.25	17.75	18.50	19.00	21.90	4 "
4½ "				24.00	24.65	25.50	26.35	27.20	28.10	29.40	4½ "

RING OILING BALL AND SOCKET HEAD SHAFT HANGERS.

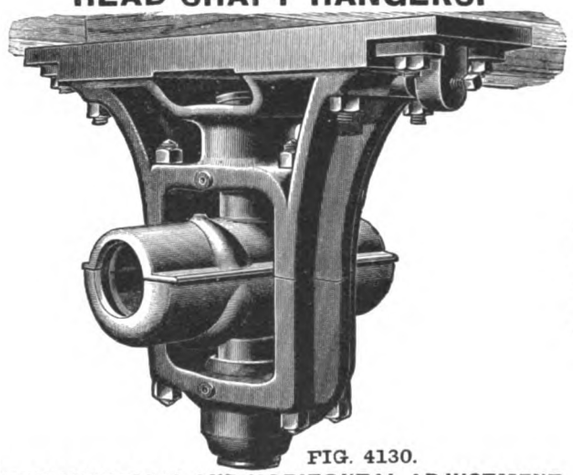


FIG. 4130.

WITH VERTICAL AND HORIZONTAL ADJUSTMENT. BEARINGS LINED WITH GENUINE BABBITT.

Length of bearings=5 diameters of shaft.

PRICES.

Size.	8 inch drop.	10 inch drop.	Size.	10 inch drop.	13 inch drop.
2 in.	$9.10	$9.70	3½ in.	$23.70	
2⅛ "	9.25	10.00	3¾ "	28.70	
2¼ "	9.40	10.25	4 "	29.75	
2⅜ "	9.60	10.70	4¼ "	37.80	
2½ "	9.80	14.70	4½ "	39.00	
2⅝ "	10.00	15.10	4¾ "	40.50	
2¾ "	10.25	15.60	5 "	62.40	
2⅞ "		16.80	5½ "	64.50	
3 "		22.80	6 "	72.00	
3⅛ "			7 "		$147.50
3¼ "					

DESCRIPTION, FIG. 4131.

It has vertical and horizontal adjustment. Bearings are lined with genuine babbitt. Lengths of bearings equal 4 diameters of shaft.

BALL AND SOCKET HEAD SHAFT HANGERS.



FIG. 4131.

PRICES.

Size.	8 in. drop.	10 in. drop.	Shoe 2 inch thick.	Shoe 3 inch deep.	Shoe 5 inch deep.	Shoe 8 inch deep.	Size.	8 in. drop.	10 in. drop.	Shoe 2 inch thick.	Shoe 3 inch deep.	Shoe 5 inch deep.	Shoe 8 inch deep.
2 in.	$7.60		$3.00	$4.25	$5.40	$8.10	3¼ in.		$19.00	$5.00	$6.30	$8.40	$11.00
2⅛ "	7.70						3½ "		19.75				
2¼ "	7.80	$8.10					3¾ "		23.90	6.75	7.75	9.50	13.50
2⅜ "	7.90	8.30					4 "		24.80				
2½ "	8.10	8.55	3.15	4.50	5.75	8.35	4¼ "		31.50				
2⅝ "	8.25	8.90					4½ "		32.55	7.50	9.75	12.50	16.25
2¾ "	8.50	12.25					4¾ "		33.75				
2⅞ "		12.60					5 "		52.00				
3 "		13.05	4.15	5.00	6.85	9.60	5½ "		53.75	10.50	11.65	14.75	19.00
3⅛ "		14.00					6 "		60.00				
							7 "	13 in. drop.	122.50	12.35	13.50 19.25	16.75	21.00

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FLOOR STANDS.

PRICES, FIG. 4132. BABBITTED BEARINGS.

Diameter of shaft.	1⅛	1 3/16	1 5/16	1 7/16	1 9/16	1 11/16	2 3/16	2 7/16	2 11/16	2 15/16	3 7/16	3 15/16	4 7/16	4 15/16	5 3/16	5 7/16
6 in. drop.	$2.15	$2.85	$3.30	$3.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7½ " "	2.40	3.10	3.55	3.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9 " "	2.65	3.35	3.80	4.00	$4.75	$5.50	$7.25	$8.50	$10.50	$12.50	.....	.....	.....	.....	.....	.....
12 " "	3.40	3.85	4.05	4.25	5.00	6.00	7.75	9.25	11.50	13.75	$20.00	$24.50	.....	.....	.....	.....
15 " "	3.90	4.10	4.30	4.50	5.25	6.50	8.50	10.00	12.50	15.00	21.50	26.00	$33.50	$38.00	.....	.....
18 " "	.....	....	4.55	4.75	5.50	7.00	9.00	10.75	13.50	16.25	23.00	28.00	35.50	40.00	.....	.....
21 " "	.....	.....	4.80	5.00	5.75	7.50	9.50	11.50	14.50	17.25	24.50	29.50	37.50	42.00	$59.00	$65.00
24 " "	.....	.....	.....	.....	.....	8.00	10.00	12.25	15.50	18.25	26.00	31.00	39.50	44.00	62.50	69.00
27 " "	.....	.....	.....	.....	.....	.....	....	13 00	16.50	19.25	27.50	32.50	41.50	46.00	66.00	73 00
30 " "	.....	.....	.....	.....	.....	.....	.....	13.75	17.50	20.25	29.00	34.00	43.50	48.00	69.50	77.00
33 " "	.....	.....	.....	.....	.....	.....	.....	14.50	18.50	21.25	30.50	35.50	45.50	50.00	73.00	81.00
36 " "	.....	.....	.....	.....	.....	.....	.....	15.25	19.50	22.25	32.00	37.50	47.50	52.00	76.50	85.00

Shifter arms from 50 cents to $1.00 extra. For prices with self-oilers, see Fig. 4125.

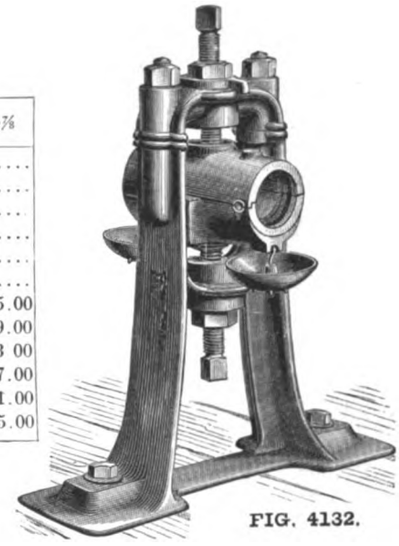


FIG. 4132.

FLOOR STAND.

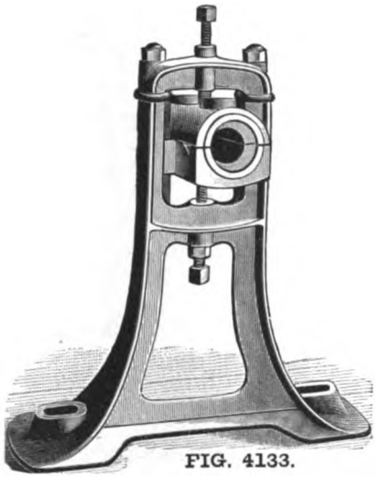


FIG. 4133.

PRICES SAME AS FIG. 4124.

CIRDER CLAMP.

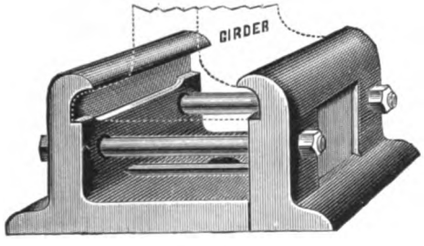


FIG. 4135.

FOR ANY SIZE CIRDER TO SUIT HANGERS.

PRICES.

For any size girder up to 4½ inches, and for hangers to 2 15/16 inches inclusive.....$5.50 per pair.

For any size girder above 4½ inches, and for any hangers from 2 15/16 to 3 15/16 inches.....$6.50 per pair.

The prices for the pillow block for Fig. 4134 will be found on page 383, Fig. 4144.

For prices of the stand, see Fig. 4137.

BEAM CLAMPS.

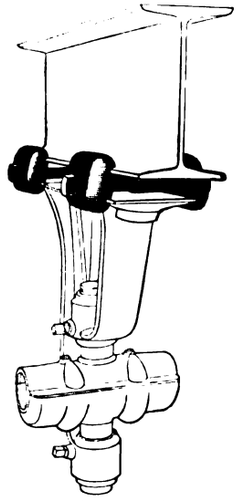


FIG. 4136.

Size of hanger.	Prices of clamps, per set.
2 in.	$1.50
2½ "	2.30
3 "	3.10
3½ "	3.80
4 "	4.90
4½ "	6.20

ADJUSTABLE FLOOR STAND, WITH PILLOW BLOCK.

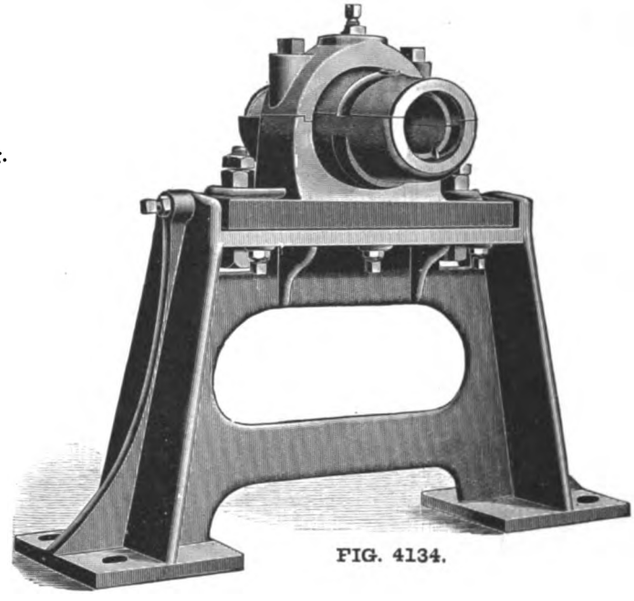


FIG. 4134.

ADJUSTABLE FLOOR STAND.



FIG. 4137.

MADE TO ORDER ONLY. PRICES ON APPLICATION.

Floor bolts and bolts shown by dotted lines are extra, therefore are only furnished when specified in orders and an additional charge is made for the same.

Designed for heavy shafting, 3½ and larger diameter. They are very strong and rigid, and either rigid or adjustable pillow blocks may be used upon them.

Distance from floor to center of box, 24 in. and upward.

The eight adjusting bolts, of which but five are visible in the cut above shown, permit of a close adjustment, both laterally and vertically, and enable the shafting to be very accurately aligned.

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PEDESTALS AND PILLOW BLOCKS.

RING OILING BALL AND SOCKET.

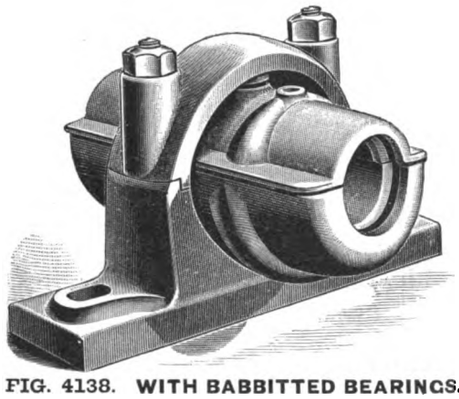


FIG. 4138. WITH BABBITTED BEARINGS.
Length of bearings = 5 diameters of shaft.

Size.	Prices, Fig. 4138.	From base of pillow block to center of shaft.	From bottom of shoe or wall frame to center of shaft.
1¼ inch.	$3.10	2 3/16 inch.	2 13/16 inch.
1 3/8 "	3.25	2 7/16 "	3 5/8 "
1½ "	3.35	2 7/8 "	3 5/8 "
1 5/8 "	3.55	3 5/16 "	4 3/16 "
1¾ "	3.65	3 5/16 "	4 3/16 "
1 7/8 "	4.55	3 3/4 "	4 3/4 "
2 "	4.65	3 3/4 "	4 3/4 "
2 1/8 "	5.25	4 5/16 "	5 7/16 "
2 1/4 "	5.35	4 5/16 "	5 7/16 "
2 3/8 "	6.55	4 5/8 "	5 7/8 "
2½ "	6.70	4 5/8 "	5 7/8 "
2 5/8 "	8.15	5 1/16 "	6 7/16 "
2 3/4 "	8.40	5 1/16 "	6 7/16 "
2 7/8 "	10.50	5½ "	7 "
3 "	10.80	5½ "	7 "
3 1/8 "	12.60	5 15/16 "	7 7/16 "
3 1/4 "	12.90	5 15/16 "	7 7/16 "
3½ "	16.50	6 3/8 "	8 1/8 "
3 3/4 "	18.90	6 13/16 "	8 11/16 "
4 "	21.30	7 1/4 "	9 1/4 "
4 1/4 "	24.60	8 1/8 "	10 3/8 "
4½ "	28.50	8 1/8 "	10 3/8 "
5 "	37.20	9 "	11½ "
5½ "	51.00	9 7/8 "	12 5/8 "
6 "	64.80	10 3/4 "	13 3/4 "
6½ "	81.60	11 5/8 "	15 5/8 "
7 "	97.20	12½ "	16 "
7½ "	113.10	13 3/8 "	17 5/8 "
8 "	135.00	14 1/4 "	18 1/4 "
9 "	160.00	16 "	20½ "

BALL AND SOCKET.

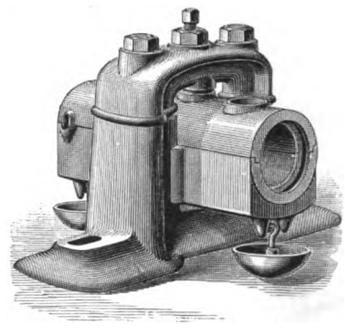


FIG. 4139

PRICES.

SELF-OILING AND BABBITTED BEARINGS.

Diameter of shaft.	Prices.
1 5/16 inch.	$2.50
1 3/16 "	3.00
1 5/16 "	3.50
1 7/16 "	4.00
1 11/16 "	4.50
1 15/16 "	5.50
2 3/16 "	7.00
2 7/16 "	8.50
2 11/16 "	10.50
2 15/16 "	12.50
3 7/16 "	19.00
3 15/16 "	28.00
4 7/16 "	36.00
4 15/16 "	46.00
5 3/8 "	56.00
5 7/8 "	70.00

PLAIN BORED PILLOW BLOCKS.

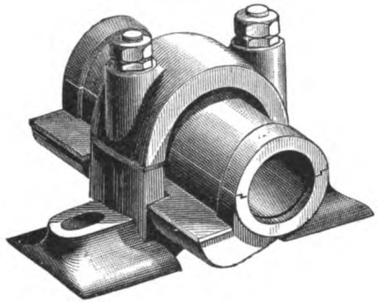


FIG. 4140.

Diameter of shaft.	Height, to center.	Prices, each.	Diameter of shaft.	Height, to center.	Prices, each.
1 7/16 in.	3 in.	$3.25	3 3/16 in.	5¼ in.	$11.30
1 11/16 "	3 "	3.45	3 7/16 "	5¼ "	13.50
1 15/16 "	4 "	4.40	3 11/16 "	6 "	15.00
2 3/16 "	4 "	5.25	3 15/16 "	6 "	18.75
2 7/16 "	4½ "	6.50	4 7/16 "	6 "	26.50
2 11/16 "	4½ "	7.25	4 15/16 "	6 "	39.75
2 15/16 "	5¼ "	9.60			

For Babbitted boxes, add 25 per cent. to above prices.

BALL AND SOCKET PEDESTALS.

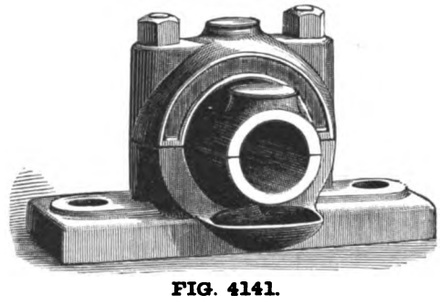


FIG. 4141.

Diameter of boxes in inches.	Length of boxes in inches.	PRICES. Plain boxes.	PRICES. Babbitt boxes.
1 7/16	6	$4.25	$5.50
1 11/16	7	5.00	6.25
1 15/16	8	6.25	7.75
2 3/16	9	7.75	10.00
2 7/16	10	9.25	13.00
2 11/16	11	11.25	15.75
2 15/16	12	13.75	19.00
3 3/16	13	15.00	20.50
3 7/16	14	20.00	26.25
3 11/16	15	22.75	30.00
3 15/16	16	25.50	34.00
4 3/16	17	31.00	40.00
4 7/16	18	36.00	46.00
4 15/16	20	46.00	56.50
5 7/16	22	56.00	70.00
5 15/16	24	70.00	85.00
6 7/16	26	90.00	110.00
6 15/16	28	110.00	135.00
7 7/16	30		
7 15/16	32		

PRICES, FIG. 4139.

BABBITTED BEARINGS ONLY.

Diameter of shaft.	Prices.
1 5/16 inch.	$2.40
1 3/16 "	2.85
1 5/16 "	3.30
1 7/16 "	3.80
1 11/16 "	4.25
1 15/16 "	5.00
2 3/16 "	6.50
2 7/16 "	8.00
2 11/16 "	9.75
2 15/16 "	11.50
3 7/16 "	17.00
3 15/16 "	24.50
4 7/16 "	33.50
4 15/16 "	43.00
5 3/8 "	52.00
5 7/8 "	65.00

RIGID PILLOW BLOCKS.

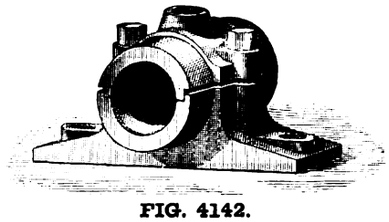


FIG. 4142.

BABBITTED BEARINGS.

Diameter of shaft.	Prices.	Diameter of shaft.	Prices.
1 5/16 inch.	$2.25	2 15/16 inch.	$11.25
1 3/16 "	2.75	3 3/16 "	13.00
1 5/16 "	3.00	3 7/16 "	16.00
1 7/16 "	3.25	3 11/16 "	17.50
1 11/16 "	3.75	3 15/16 "	20.00
1 15/16 "	5.00	4 7/16 "	28.75
2 3/16 "	6.25	4 15/16 "	36.50
2 7/16 "	7.50	5 3/8 "	44.75
2 11/16 "	9.00	5 7/8 "	55.75

CLAMP BOXES.

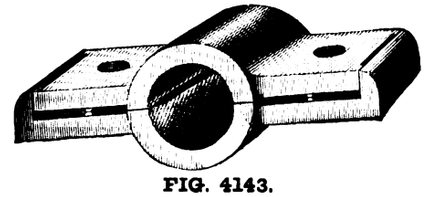


FIG. 4143.

PRICES, FIG. 4143.

Diameter of shaft.	Prices.
1 5/16 inch.	$1.00
1 3/16 "	1.25
1 7/16 "	1.75
1 11/16 "	2.25
1 15/16 "	2.75
2 3/16 "	3.50
2 7/16 "	4.50
2 11/16 "	5.50
2 15/16 "	6.50
3 3/16 "	7.50
3 7/16 "	8.50
3 11/16 "	9.50

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PILLOW BLOCKS.

ADJUSTABLE SELF-OILING.

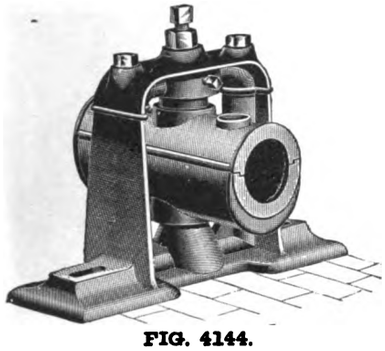


FIG. 4144.

BOXES BABBITTED.

Diameter of shaft.	Prices.	Diameter of shaft.	Prices.
$1\frac{5}{16}$ in.	$2.40	$3\frac{3}{16}$ in.	$14.50
$1\frac{3}{16}$ "	2.85	$3\frac{7}{16}$ "	17.00
$1\frac{5}{16}$ "	3.30	$3\frac{11}{16}$ "	20.50
$1\frac{7}{16}$ "	3.80	$3\frac{15}{16}$ "	24.50
$1\frac{11}{16}$ "	4.25	$4\frac{3}{16}$ "	29.00
$1\frac{15}{16}$ "	5.00	$4\frac{7}{16}$ "	33.50
$2\frac{3}{16}$ "	6.50	$4\frac{15}{16}$ "	43.00
$2\frac{7}{16}$ "	8.00	$5\frac{7}{16}$ "	52.00
$2\frac{11}{16}$ "	9.75	$5\frac{15}{16}$ "	65.00
$2\frac{15}{16}$ "	11.50		

ADJUSTABLE SWIVEL.

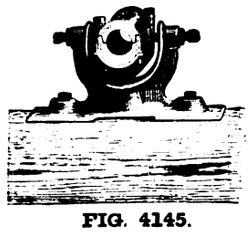


FIG. 4145.

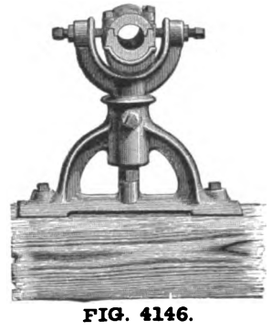


FIG. 4146.

PRICES, FIGS. 4145 AND 4146.

Diameter of shaft.	Height from floor or top of beam to center of shaft.	Prices.
4 in.	10 in.	$12.00
$3\frac{1}{2}$ "	9 "	9.50
3 "	8 "	6.50
$2\frac{1}{2}$ "	7 "	4.50
$2\frac{1}{4}$ "	$6\frac{1}{2}$ "	3.75
2 "	6 "	3.25
$1\frac{3}{4}$ "	$5\frac{1}{2}$ "	2.75
$1\frac{1}{2}$ "	5 "	2.25
$1\frac{1}{4}$ "	$4\frac{1}{2}$ "	2.00

BASE PLATES FOR PEDESTALS.

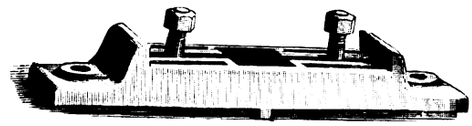


FIG. 4147.

Including bolts for securing pedestal to base plate.

Size.	Prices.	Size.	Prices.
$1\frac{5}{16}$ in.	$4.50	$3\frac{15}{16}$ in.	$12.00
$2\frac{3}{16}$ "	4.50	$4\frac{3}{16}$ "	12.00
$2\frac{7}{16}$ "	5.75	$4\frac{7}{16}$ "	14.50
$2\frac{11}{16}$ "	5.75	$4\frac{15}{16}$ "	14.50
$2\frac{15}{16}$ "	7.50	$5\frac{7}{16}$ "	20.00
$3\frac{3}{16}$ "	7.50	$5\frac{15}{16}$ "	20.00
$3\frac{7}{16}$ "	9.50	$6\frac{7}{16}$ "	23.00
$3\frac{11}{16}$ "	9.50	$6\frac{15}{16}$ "	23.00

Prices pillow blocks to fit this plate, see Fig. 4141.

RIGID PILLOW BLOCK.

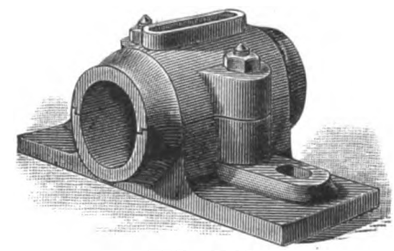


FIG. 4148.

BABBITTED.

Length of bearings=3 diameters of shafts.

Size.	Prices.	From bottom of pillow block to center of shaft.	From bottom of shoe or wall frame to center of shaft See Fig. 4151.
$1\frac{1}{4}$ in.	$1.70	$1\frac{1}{4}$ in.	$1\frac{7}{8}$ in.
$1\frac{1}{2}$ "	1.90	$1\frac{1}{2}$ "	$2\frac{1}{4}$ "
$1\frac{3}{4}$ "	2.25	$1\frac{3}{4}$ "	$2\frac{5}{8}$ "
2 "	2.90	2 "	3 "
$2\frac{1}{4}$ "	3.55	$2\frac{1}{4}$ "	$3\frac{3}{8}$ "
$2\frac{1}{2}$ "	4.45	$2\frac{1}{2}$ "	$3\frac{3}{4}$ "
$2\frac{3}{4}$ "	5.60	$2\frac{3}{4}$ "	$4\frac{1}{8}$ "
3 "	7.20	3 "	$4\frac{1}{2}$ "
$3\frac{1}{4}$ "	8.60	$3\frac{1}{4}$ "	$4\frac{7}{8}$ "
$3\frac{1}{2}$ "	10.20	$3\frac{1}{2}$ "	$5\frac{1}{4}$ "
$3\frac{3}{4}$ "	12.60	$3\frac{3}{4}$ "	$5\frac{5}{8}$ "
4 "	14.20	4 "	6 "
$4\frac{1}{4}$ "	16.40	$4\frac{1}{4}$ "	$6\frac{3}{8}$ "
$4\frac{1}{2}$ "	19.00	$4\frac{1}{2}$ "	$6\frac{3}{4}$ "
5 "	24.80	5 "	$7\frac{1}{2}$ "
$5\frac{1}{2}$ "	34.00	$5\frac{1}{2}$ "	$8\frac{1}{4}$ "
6 "	43.20	6 "	9 "

The above is our standard rigid pillow block. We have also a large variety of special patterns up to 10 in., for which we will give description and prices on application.

PEDESTAL BRACKETS.



FIG. 4149.

Including bolts for securing pedestal to bracket.

Size.	Prices.	Size.	Prices.
$1\frac{7}{16}$ in.	$4.00	$3\frac{3}{16}$ in.	$7.50
$1\frac{11}{16}$ "	4.00	$3\frac{7}{16}$ "	9.00
$1\frac{15}{16}$ "	4.50	$3\frac{11}{16}$ "	9.00
$2\frac{3}{16}$ "	4.50	$3\frac{15}{16}$ "	10.75
$2\frac{7}{16}$ "	5.75	$4\frac{3}{16}$ "	10.75
$2\frac{11}{16}$ "	5.75	$4\frac{7}{16}$ "	13.75
$2\frac{15}{16}$ "	7.50	$4\frac{15}{16}$ "	13.75

WALL BOX.

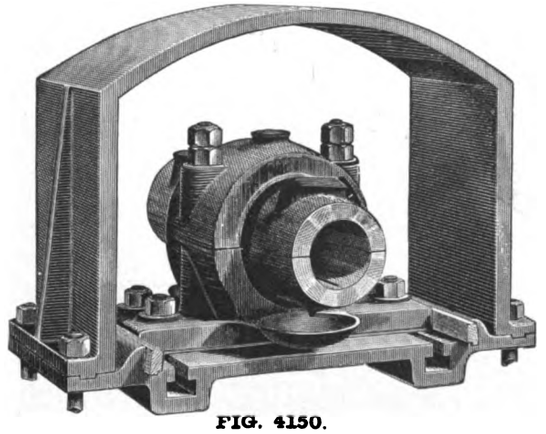


FIG. 4150.

Prices for this pillow block, see Fig. 4141.

Prices for wall boxes without pedestals, but including bolts for securing pedestal to wall box.

PRICES, FIG. 4150.

Size.	Prices.	Size.	Prices.
$1\frac{7}{16}$ in. } $1\frac{11}{16}$ " }	$13.00	$3\frac{7}{16}$ in. } $3\frac{11}{16}$ " }	$32.50
$1\frac{15}{16}$ " } $2\frac{3}{16}$ " }	15.00	$3\frac{15}{16}$ " } $4\frac{3}{16}$ " }	42.00
$2\frac{7}{16}$ " } $2\frac{11}{16}$ " }	18.50	$4\frac{7}{16}$ " } $4\frac{15}{16}$ " }	56.50
$2\frac{15}{16}$ " } $3\frac{3}{16}$ " }	24.00	$5\frac{7}{16}$ " } $5\frac{15}{16}$ " }	70.00

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WALL FRAMES AND POST HANGERS.

WALL FRAME.

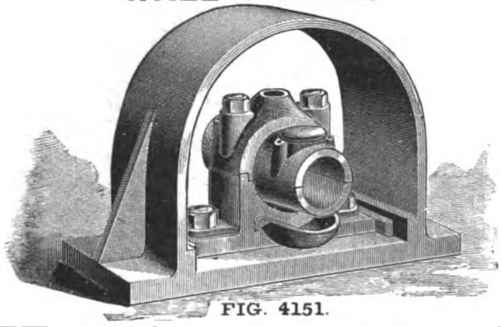


FIG. 4151.

Size.	Prices of wall frame only.	Size.	Prices of wall frame only.	Size.	Prices of wall frame only.
1¼ in.	$1.90	2½ in.	$4.65	4¼ in.	$17.25
1⅜ "	1.95	2⅝ "	5.75	4½ "	20.00
1½ "	2.00	2¾ "	5.80	5 "	29.75
1⅝ "	2.30	2⅞ "	7 55	5½ "	37.50
1¾ "	2.35	3 "	7.60	6 "	45.00
1⅞ "	2.55	3⅛ "	9.45	6½ "	53.50
2 "	2.60	3¼ "	9.50	7 "	63.50
2⅛ "	3.00	3½ "	11.70	7½ "	75.00
2¼ "	3.05	3¾ "	14.85	8 "	87.50
2⅜ "	4.60	4 "	16.20		

SHOE OR BASE PLATE FOR PILLOW BLOCKS.



FIG. 4152.

Size.	Prices.	Size.	Prices.	Size.	Prices.
1¼ in.	$1.00	2½ in.	$3.25	4¼ in.	$9.70
1⅜ "	1.20	2⅝ "	3.75	4½ "	10.90
1½ "	1.25	2¾ "	3.90	5 "	13.50
1⅝ "	1.55	2⅞ "	4.60	5½ "	16.50
1¾ "	1.60	3 "	4.80	6 "	22.70
1⅞ "	1.85	3⅛ "	5.40	6½ "	26.40
2 "	1.90	3¼ "	5.50	7 "	34.00
2⅛ "	2.40	3½ "	6.50	7½ "	42.00
2¼ "	2.50	3¾ "	7.50	8 "	51.20
2⅜ "	3.15	4 "	8.60		

BABBITTED BALL AND SOCKET POST HANGERS.

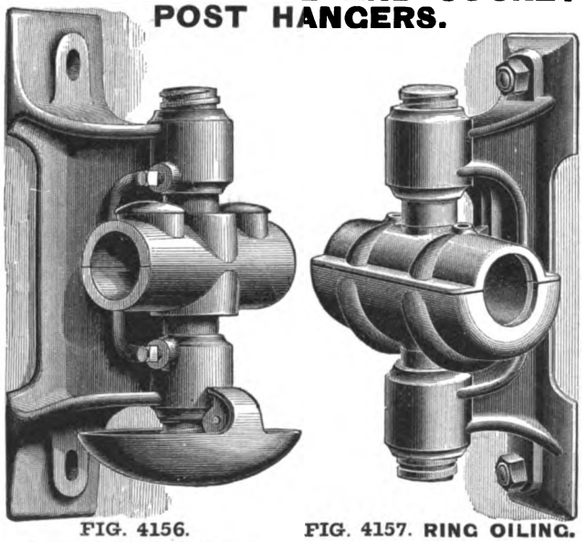


FIG. 4156. Length bearing, 4 diams.

FIG. 4157. RING OILING. Length bearing, 5 diams.

Size.	Prices, Fig. 4156.	Prices, Fig. 4157.	From post to center of shaft.	Size.	Prices, Fig. 4156.	Prices, Fig. 4157.	From post to center of shaft.	Size.	Prices, Fig. 4156.	Prices, Fig. 4157.	From post to center of shaft.
1¼ inch.	$2.10	$3.10	6 inch.	2⅜ inch.	$5.75	$6.90	6 inch.	3¾ inch.	$16.10	$19.30	8 inch.
1½ "	2.25	3.25		2½ "	5.90	7.10		4 "	16.50	19.80	
1⅝ "	2.35	3.35		2⅝ "	6.20	7.45		4½ "	26.00	31.20	10 "
1¾ "	2.50	3.50		2¾ "	6.60	7.90		5 "	40.00	48.00	
1⅞ "	3.65	4.65		2⅞ "	7.80	9.35		5½ "	55.00	66.00	13¼ in.
2 "	3.75	4.75		3 "	8.10	9.70		6 "	57.00	68.40	
2⅛ "	3.90	4.90		3¼ "	11.50	13.80		6½ "	100.00	120.00	
2¼ "	4.15	5.15		3½ "	11.75	14.10		7 "	102.00	122.40	

WALL FRAME.

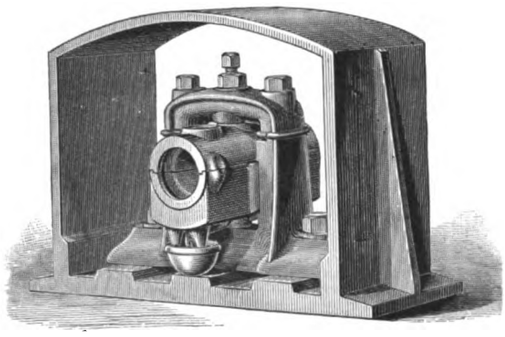


FIG. 4153.

Diameter of shaft.	Width of frames.	Prices, without pillow blocks.
1 7/16 inch.	6 inches.	$4.25
1 11/16 "	6 "	4.75
1 15/16 "	6 "	5.25
2 3/16 "	6 "	6.00
2 7/16 "	7½ "	7.00
2 11/16 "	7½ "	8.50
2 15/16 "	9 "	10.25
3 7/16 "	10 "	13.60
3 15/16 "	12 "	19.35
4 7/16 "	12 "	28.25
4 15/16 "	12 "	37.20
5⅜ "	16 "	44.00
5⅞ "	16 "	50.80

PRICES, FIG. 4158.

Distance from foot to center of box, in inches.	Diameter of boxes in inches.	Length of boxes in inches.	Prices.	
			Plain boxes.	Babbitt boxes.
6	1 7/16	6	$3.50	$4.75
6	1 11/16	7	4.25	5.50
6	1 15/16	8	5.25	6.75
6	2 3/16	9	6.25	8.50
6	2 7/16	10	8.25	12.00
6	2 11/16	11	10.25	14.75
6	2 15/16	12	12.25	17.50
6	3 3/16	13	15.00	20.50
6	3 7/16	14	19.00	25.25
6	3 11/16	15	22.50	29.75
8	3 15/16	16	25.50	34.00
8	4 3/16	17	31.00	40.00
8	4 7/16	18	36.00	46.00
8	4 15/16	20	46.00	56.50
8	5 7/16	22	56.00	70.00
8	5 15/16	24	70.00	85.00
8	6 7/16	26	90.00	110.00
8	6 15/16	28	110.00	135.00

POST HANGER.

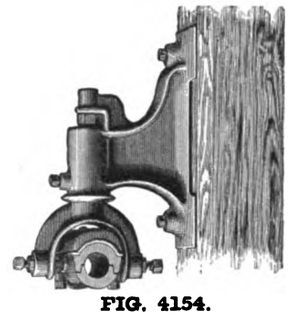


FIG. 4154.



FIG. 4155.

Diam. of shaft.	Distance from post or wall to center of shaft.	Prices.
4 inch.	12 inch.	$15.00
3½ "	10½ "	12.00
3 "	9 "	9.00
2½ "	7½ "	6.20
2¼ "	7½ "	4.80
2 "	7½ "	4.20
2 "	17 "	5.50
1¾ "	6 "	3.50
1½ "	6 "	2.80
1¼ "	6 "	2.40

POST HANGER.

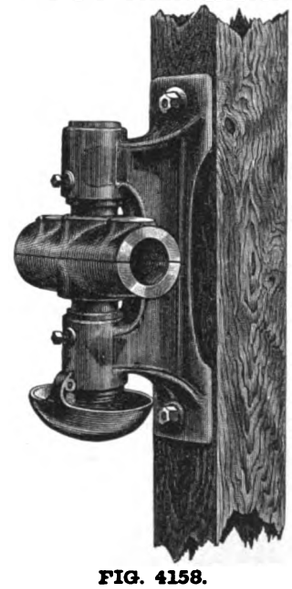


FIG. 4158.

THESE HANGERS ARE MADE WITH BALL AND SOCKETS, ALSO PLAIN AND BABBITTED.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ADJUSTABLE POST HANGERS.

PRICES, FIG. 4159, WITH SELF-OILING AND BABBITTED BOXES.

Diameter of shaft.	Prices.	Diameter of shaft.	Prices.
15/16	$2.50	2 1/16	$12.50
1 3/16	3.00	2 1/8	14.50
1 5/16	3.50	3 7/16	21.50
1 7/16	4.25	3 1/8	32.50
1 11/16	5.00	4 7/16	45.00
1 15/16	6.00	4 1/8	55.00
2 3/16	7.75	5 3/8	72.00
2 7/16	9.25	5 7/8	82.00

PRICES, FIG. 4159, WITH BABBITTED BEARINGS.

Diameter of shaft.	Prices.	Diameter of shaft.	Prices.
15/16	$2.40	2 1/16	$11.75
1 3/16	2.85	2 1/8	13.50
1 5/16	3.30	3 7/16	19.50
1 7/16	4.00	3 1/8	30.00
1 11/16	4.75	4 7/16	42.50
1 15/16	5.50	4 1/8	52.00
2 3/16	7 25	5 3/8	68.00
2 7/16	8.75	5 7/8	77.00

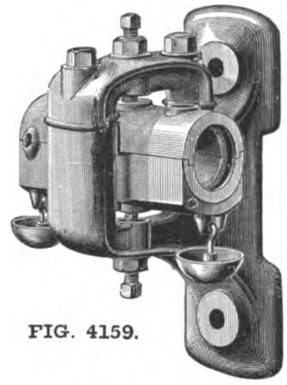


FIG. 4159.

BALL AND SOCKET POST HANGER.

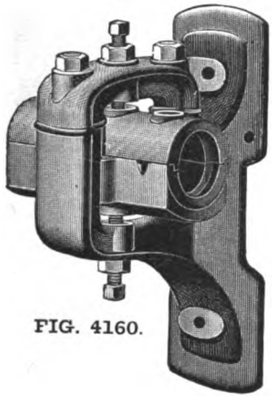


FIG. 4160.

WITH SELF-OILING BABBITTED BEARINGS.

Diameter of shaft.	Prices.	Diameter of shaft.	Prices.
1 3/16 inch.	$3.00	3 3/16 inch.	$15.50
1 7/16 "	4.00	3 7/16 "	20.00
1 11/16 "	4.50	3 15/16 "	32.50
1 15/16 "	5.25	4 7/16 "	40.00
2 3/16 "	6.50	4 15/16 "	50.00
2 7/16 "	8.50	5 3/8 "	65.00
2 11/16 "	11.25	5 7/8 "	80.00
2 15/16 "	12.75		

VERTICAL SHAFT BOX.

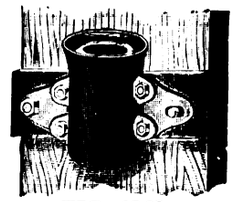


FIG. 4161.

Rigid, babbitted, not self-oiling.

Diameter of shaft.	Prices.
1 3/16	$2.75
1 7/16	3.25
1 11/16	3.75
1 15/16	5.00
2 3/16	6.25
2 7/16	7.50
2 11/16	9.00
2 15/16	11.25
3 3/16	13.00
3 7/16	16.00

UPRIGHT SHAFT FLOOR BEARING.

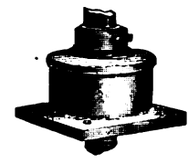


FIG. 4162.

Self-oiling.

Diameter of shaft.	Prices.
1 7/16 inch.	$4.75
1 11/16 "	5.00
1 15/16 "	5.50
2 3/16 "	6.00
2 7/16 "	7.00
2 11/16 "	8.00
2 15/16 "	10.00
3 3/16 "	12.00
3 7/16 "	14.00
3 11/16 "	15.00
3 15/16 "	16.00

ADJUSTABLE STEP FOR UPRIGHT SHAFT.

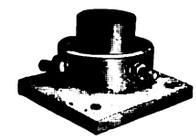


FIG. 4163.

Diameter of shaft.	Prices.	
	With brass bush.	With iron bush.
2 7/16 inch.	$10.00	$8.40
2 11/16 "	13.70	11.20
2 15/16 "	15.50	14.00
3 3/16 "	20.25	18.25
3 7/16 "	24.50	21.80
3 11/16 "	28.75	24.00
3 15/16 "	35.25	30.00

STATIONARY MULE STAND.



FIG. 4164.

PRICES, FIG. 4164.

For 2 inch belt, with 2 pulleys.....10 x 3 in.....$22.50
" 3 " " " 2 " .....10 x 4 " 25.00
" 4 " " " 2 " .....12 x 5 " 30.00
" 5 " " " 2 " .....12 x 6 " 32.00
" 6 " " " 2 " .....16 x 7 " 37.50
" 7 " " " 2 " .....16 x 8 " 40.00
" 8 " " " 2 " .....24 x 10 " 45 00
" 10 " " " 2 " ..... 24 x 12 " 55.00
" 12 " " " 2. " .....30 x 14 " 65.00

PRICES, FIG. 4165.

For 4 inch belt, with 2 pulleys.....12 x 5 in.....$60.00
" 5 " " " 2 " .....12 x 6 " 62.00
" 6 " " " 2 " .....16 x 7 " 65.00
" 7 " " " 2 " .....16 x 8 " 68.00
" 8 " " " 2 " .....24 x 10 " 72.00
" 10 " " " 2 " .....24 x 12 " 75.00
" 12 " " " 2 " .....30 x 14 " 100.00

ADJUSTABLE MULE PULLEY STAND.

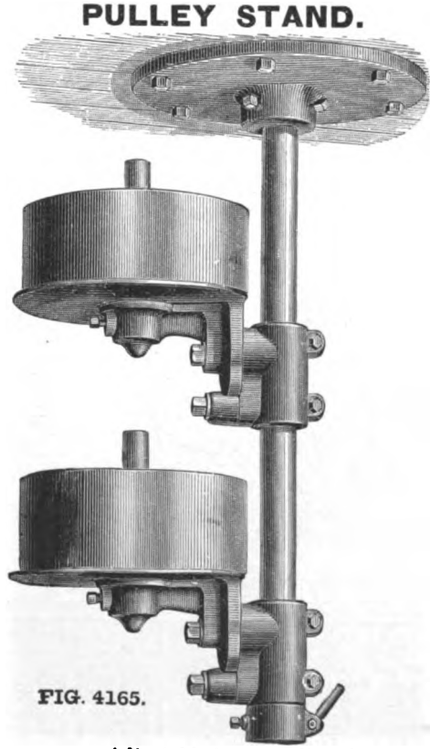


FIG. 4165.

Adjustable in every direction.

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MULE PULLEY STANDS AND BINDER FRAMES.

MULE PULLEY STAND.

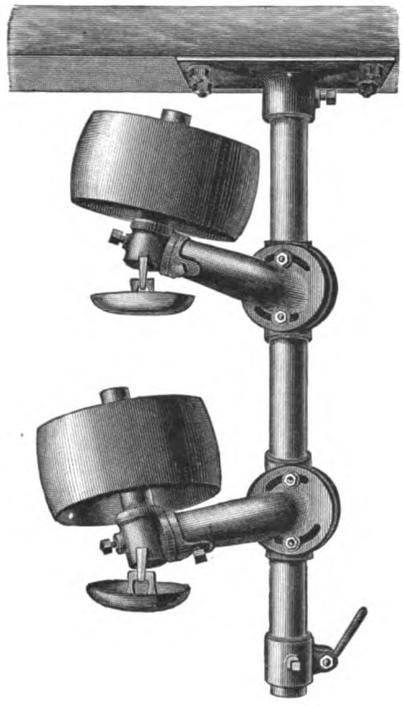


FIG. 4166.

WITH UNIVERSAL ADJUSTMENT.

Width of belt.	Size of pulleys.	Prices.	Width of belt.	Size of pulleys.	Prices.
2–3 in.	12 x 4 in.	$50.00	8–9 in.	14 x 10 in.	$90.00
4 "	12 x 5 "	55.00	10 "	16 x 12 "	100.00
5 "	12 x 6 "	60.00	12 "	16 x 14 "	125.00
6 " 7 "	12 x 8 "	66.00			

GUIDE OR CALLOWS PULLEY AND FRAME.

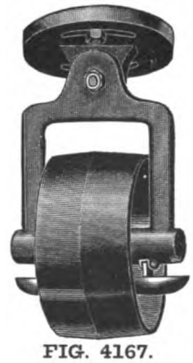


FIG. 4167.

WITH BABBITTED BEARINGS.

Width of base.	Bottom of base to center of pulley.	Width of frame over all.	Diameter of pulley.	Face of pulley.	Prices.
9½ in.	13¼ in.	12½ in.	10 in.	4 to 6 in.	$12.00
9½ "	13¼ "	12½ "	12 "	6 to 8 "	15.00

ADJUSTABLE BINDER FRAME.

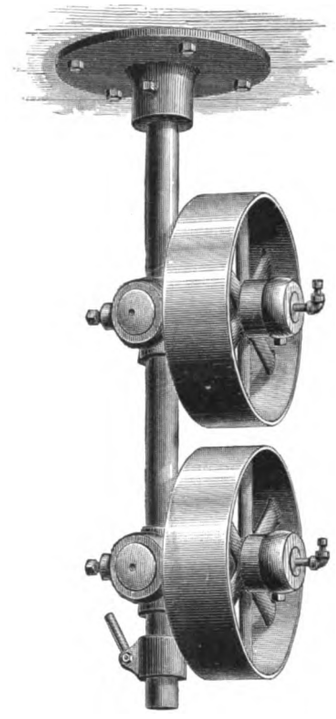


FIG. 4168.

ADJUSTABLE IN EVERY DIRECTION.

PRICES.

For 3 inch belt, with 2 pulleys, 8 x 5 in. ... $40.00
" 4 " " " 2 " 10 x 6 " ... 45.00
" 5 " " " 2 " 12 x 7 " ... 46.00
" 6 " " " 2 " 14 x 8 " ... 48.00

PRICES FOR LARGE SIZES FURNISHED ON APPLICATION.

DOUBLE BRACED BINDER FRAMES.

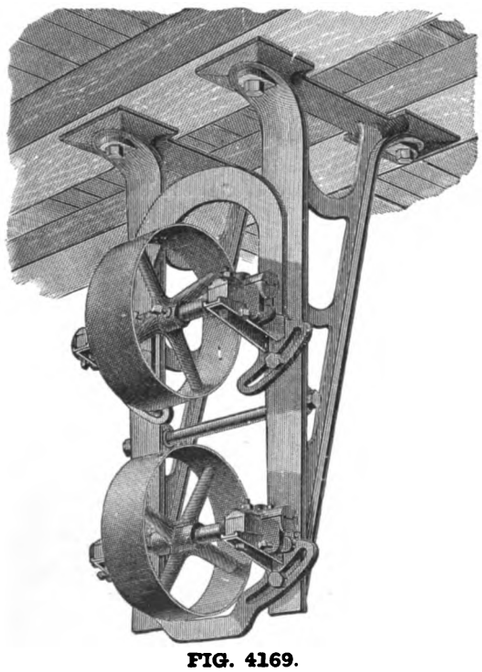


FIG. 4169.

PRICES.

		Single belt.	Double belt.
No. 3.	For 6 to 8 inch belt.	$87.00	$96.00
No. 4.	" 9 to 11 " "	96.00	107.00
No. 5.	" 12 to 15 " "	107.00	149.00
No. 6.	" 16 to 19 " "	149.00	215.00
No. 7.	" 20 to 24 " "	215.00	296.00

DESCRIPTION,

FIG. 4169.

Our present patterns for these binder frames give a range of adjustment of 30°. If more is required, please send us a diagram showing the track of the belt, and we will give a price for whatever is necessary to suit the case.

GUIDE PULLEY.

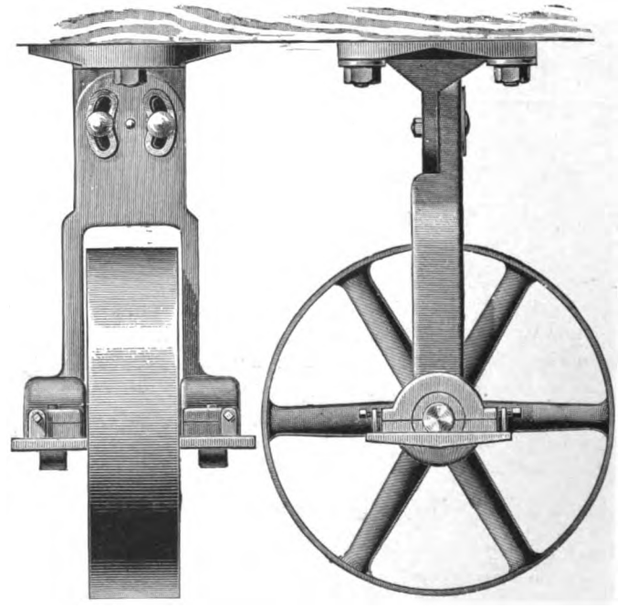


FIG. 4170. WITH SELF-OILING BEARINGS.

PRICES.

For 3 inch belt $6.00
For 4 inch belt 8.50
For 8 inch belt 15.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BELT TIGHTENERS.

ADJUSTABLE BELT CARRIER.

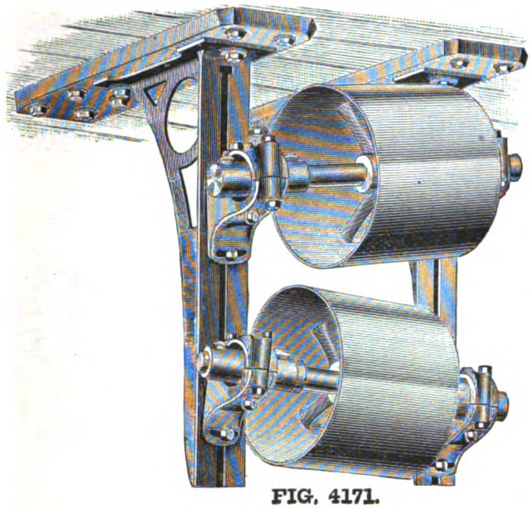


FIG. 4171.

PRICES, FIG. 4171.

For 10-inch belt	$120.00
" 12 " "	160.00
" 14 " "	180.00
" 16 " "	200.00
" 18 " "	220.00
" 20 " "	250.00

The above carriers are fitted up in a most thorough and substantial manner. The bearings are ball and socket, and adjustable to all the required angles. The shafts are steeled on ends and hardened, and run in hardened steel step bearings.

IRON FRAME.

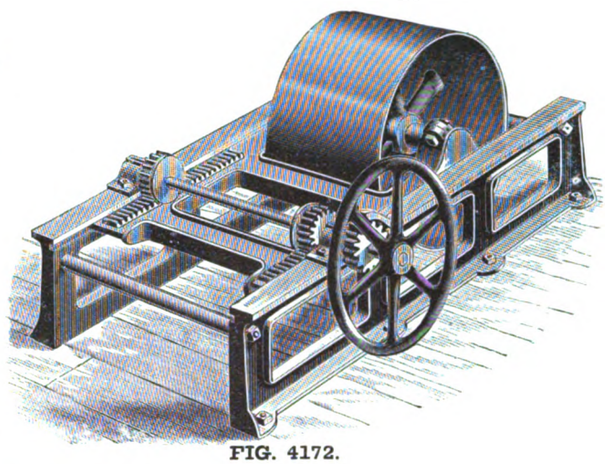


FIG. 4172.

WOOD FRAME.

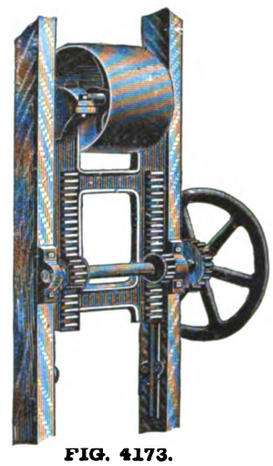


FIG. 4173.

BELT REMOVER.

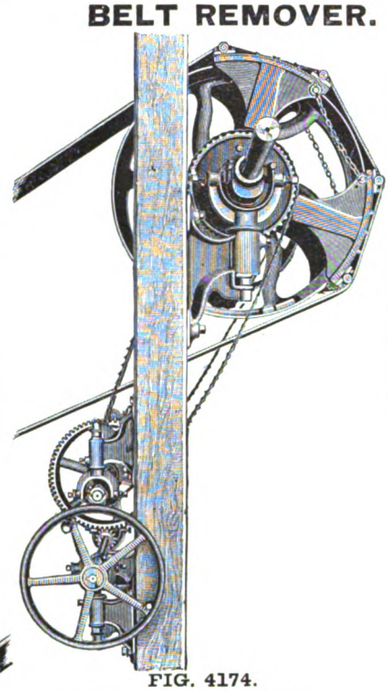


FIG. 4174.

PRICES ON APPLICATION.

PRICES, FIGS. 4172 AND 4173.

Diameter and face of pulley.	Length of adjustment.	Diameter of shaft.	Floor length.	Floor width.	Prices, Fig. 4172.	Prices, Fig. 4173, Iron work only.
12 x 9 in.	18 in.	1 1/4 in.	3 ft. 5 in.	2 ft. 7 1/4 in.	$60.00	$48.00
18 x 11 "	18 "	1 1/16 "	3 " 11 "	2 " 10 1/4 "	80.00	64.00
20 x 14 "	18 "	1 1/16 "	4 " 1 "	3 " 1 1/4 "	100.00	80.00
20 x 16 "	18 "	1 1/16 "	4 " 1 "	3 " 2 1/4 "	110.00	88.00
28 x 18 "	24 "	1 15/16 "	5 " 3 "	3 " 4 1/4 "	120.00	96.00
28 x 20 "	24 "	1 15/16 "	5 " 3 "	3 " 6 1/4 "	140.00	112.00
30 x 22 "	24 "	2 3/16 "	5 " 5 "	3 " 8 1/4 "	160.00	128.00
30 x 24 "	24 "	2 3/16 "	5 " 5 "	3 " 10 1/4 "	200.00	160.00
36 x 28 "	30 "	2 7/16 "	6 " 5 "	4 " 2 1/4 "	250.00	200.00
36 x 32 "	30 "	2 7/16 "	6 " 5 "	4 " 6 1/4 "	320.00	256.00
36 x 36 "	30 "	2 15/16 "	6 " 5 "	4 " 10 1/4 "	400.00	320.00
36 x 40 "	30 "	2 15/16 "	6 " 5 "	5 " 2 1/4 "	500.00	400.00

BELT TIGHTENER.

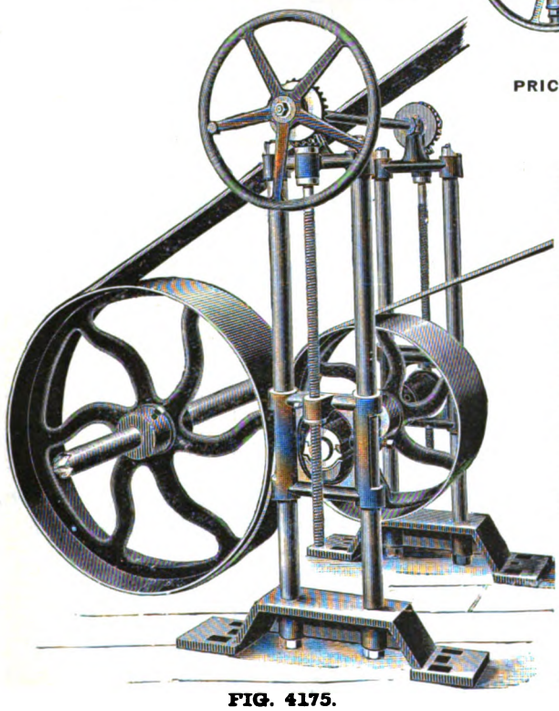


FIG. 4175.

PRICES ON APPLICATION.

CONE BELT SHIFTER.

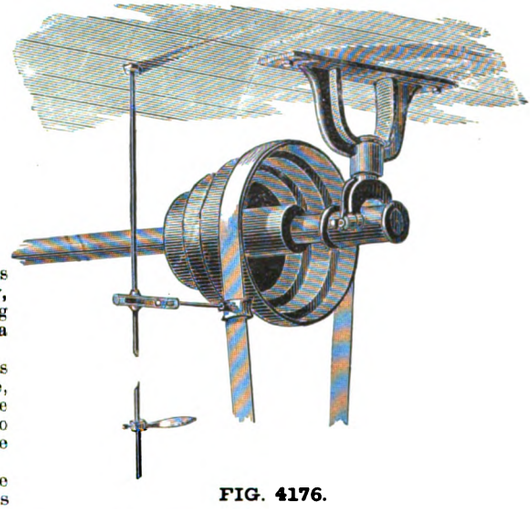


FIG. 4176.

In all places where cone pulleys are used, this shifter is an easy, ready and quick means of changing belts, and will save its cost in a very short time.

The cut shows the belt shifter as applied to a lathe or other machine, with the rod up to the ceiling. The lower end of the rod is intended to rest in a socket attached to the lathe, or it may run to the floor.

Round iron or gas pipe can be used for the upright rod; the prices given do not include the rod.

In ordering, please give the width of belt and extreme length of cone pulley and manner of upper fastening.

This cut represents what is termed the rod shifter, and can be used in all cases where the belt is perpendicular or nearly so, but for the horizontal or angular cone belts we make a shifter operated with cords which is equally effective; as shifters of this kind vary greatly with different positions of the belt, prices can only be given when position and sizes are known.

PRICES.

For 1 inch belt, face of cone pulley 10 inches or less	$3.50
" 1 1/2 to 2 1/2 " " " " " 15 " " "	4.00
" 3 to 3 1/2 " " " " " 20 " " "	4.50
" 4 to 5 " " " " " 30 " " "	5.00

The above prices include the shifter guard and slide, upper and lower sockets, two dogs and handle.

The dogs are designed to be used on the rod near the lower socket, to act as a check to prevent shipping the belt off the cone pulley.

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FRICTION CONE COUNTERSHAFT.

HANGING PATTERN.

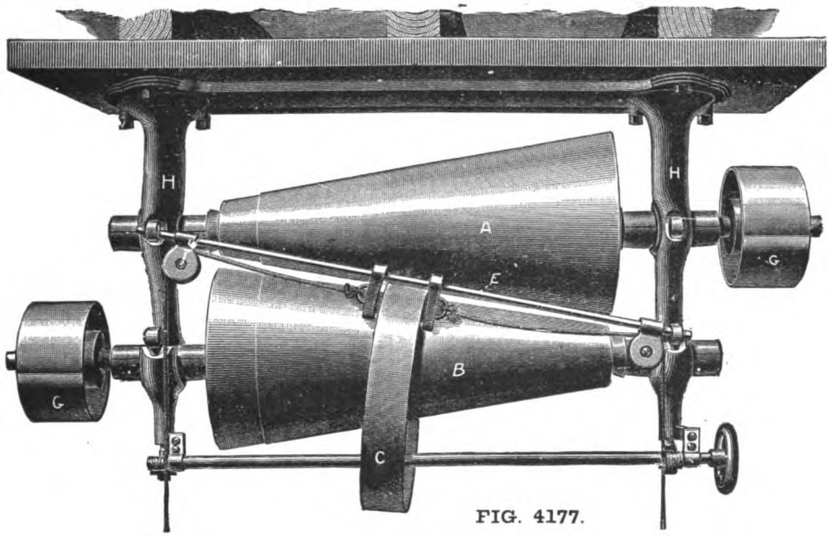


FIG. 4177.

DESCRIPTION, FIG. 4177.

In order to determine the smallest size of cone pulleys to drive any machine, the pulley G on the end of cone B should not be larger in diameter than the middle of cones, and the face of the pulley the same width as the friction belt C. If the diameter is increased for the sake of speed (not power), the width of its face should be decreased in proportion.

HANGING OR STANDING PATTERN.

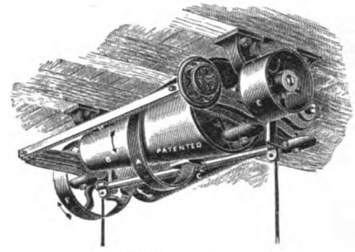


FIG. 4178.

This cut represents a hanging set of cones which are opened and closed by hand wheels. Screw shippers, as well as cords, are furnished, as the case may require. This pattern is intended for heavier work and higher speed than patterns 2 to 8.

These pulleys are made especially for driving machinery from overhead, and to take the place of common countershafts having step cones. A machine driven by these cones can be stopped and started without the use of a loose pulley, and any speed desired may be obtained while the machine is running, by pulling belt C from end to end of cone, by means of cords connected with shipper traveling on rod E, through which belt C revolves. Variations of speed are obtained varying from 120 to 765 revolutions.

No.	Diameter, small end.	Diameter, large end.	Length of cone.	Width of belt.	Drop of cone.	Variation of cones.	Variation of driven cone speed.	Transmitting power equal to pulley. Diameter.	Transmitting power equal to pulley. Face.	Diameter of shaft.	Weight, complete.	Horse-power.	Price, without gov'nor or pulley.
HANGING SIZES. FIG. 4177.													
2	2 in.	6 in.	12 in.	2 in.	5¼ in. and 15 in.	100 to 900	125 to 720	4 in.	2 in.	13/16 in.	100	.50	$30.00
4	3 "	5 "	12 "	2 "	5¼ " " 15 "	180 " 500	195 " 455	4 "	2 "	13/16 "	115	.75	35.00
6	3 "	9 "	16 "	3 "	7¼ " " 21 "	100 " 900	130 " 710	6 "	3 "	1 1/16 "	125	1.25	40.00
8	4 "	8 "	16 "	3 "	7¼ " " 21 "	150 " 600	175 " 520	6 "	3 "	1 1/16 "	130	1.50	45.00
HANGING OR STANDING SIZES. FIG. 4177.													
10	4 in.	12 in.	24 in.	3 in.	9¼ in. and 27½ in.	100 to 900	120 to 765	8 in.	3 in.	1 7/16 in.	350	2.00	$60 00
12	5 "	10 "	24 "	4 "	9¼ " " 27½ "	150 " 600	170 " 530	8 "	4 "	1 7/16 "	375	2.50	60.00
13	6 "	12 "	24 "	4 "	9¼ " " 29½ "	150 " 600	170 " 530	9 "	4 "	1 7/16 "	400	2.75	65.00
14	8 "	12 "	24 "	4 "	9¼ " " 29½ "	200 " 450	215 " 420	10 "	4 "	1 7/16 "	420	3.00	65.00
HANGING OR STANDING SIZES. FIG. 4178.													
10	4 in.	12 in.	24 in.	3 in.	8 in. and 14 in.	100 to 900	120 to 765	8 in.	3 in.	1 7/16 in.	150	2.00	$80.00
12	5 "	10 "	24 "	4 "	8 " " 15 "	150 " 600	170 " 530	8 "	4 "	1 7/16 "	180	2.50	90.00
13	6 "	12 "	24 "	4 "	8 " " 14 "	150 " 600	170 " 530	9 "	4 "	1 7/16 "	220	2.75	100.00
14	8 "	12 "	24 "	4 "	8 " " 14 "	200 " 450	215 " 420	10 "	4 "	1 7/16 "	400	3.00	100.00
16	6 "	16 "	30 "	5 "	10¼ " " 18 "	115 " 800	135 " 665	11 "	5 "	1¾ "	550	6.00	125.00
18	8 "	16 "	40 "	5 "	10¼ " " 18 "	150 " 600	165 " 545	12 "	5 "	1¾ "	900	8.00	150.00
20	8 "	24 "	42 "	6 "	14 " " 26 "	100 " 900	120 " 750	16 "	6 "	2¼ "	1,280	10.00	200.00
22	12 "	24 "	36 "	6 "	14 " " 26 "	150 " 600	170 " 530	18 "	6 "	2¼ "	1,350	15.00	200.00
24	14 "	21 "	30 "	6 "	10¼ " " 23 "	220 " 410	230 " 385	16 "	6 "	1¾ "	1,350	15.00	200.00

Horse-power is rated at 300 revolutions per minute of driver; belt in center of cone.

FRICTION COUNTERSHAFTS, WITH AND WITHOUT CONES.

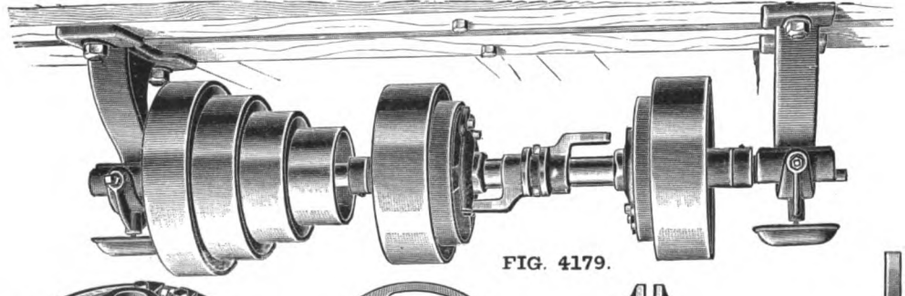
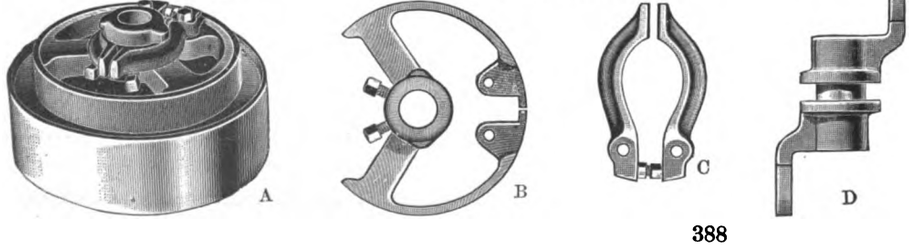


FIG. 4179.



PATENT FRICTION PULLEYS, COMPLETE WITH CLUTCH.

Diameter of pulley.	Face of pulley.	Size of hole.	Price.
7 in.	2 in.	1 3/16 in.	$.....
8 "	2¼ "	1 5/16 "	$.....
10 "	2¾ "	1 7/16 "	$.....
12 "	3½ "	1 9/16 "	$.....
14 "	4 "	1 11/16 "	$.....
16 "	5 "	1 13/16 "	$.....

FRICTION COUNTERSHAFTS, COMPLETE WITHOUT CONE PULLEY.

Diameter of pulley.	Face of pulley.	Size of hole.	Price.
7 in.	2 in.	1 3/16 in.	$.....
8 "	2¼ "	1 5/16 "	$.....
10 "	2¾ "	1 7/16 "	$.....
12 "	3½ "	1 9/16 "	$.....
14 "	4 "	1 11/16 "	$.....
16 "	5 "	1 13/16 "	$.....

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CAST IRON FINISHED PULLEYS.

BORED, TURNED, BALANCED, AND WITH SET SCREWS.

SINGLE ARM.

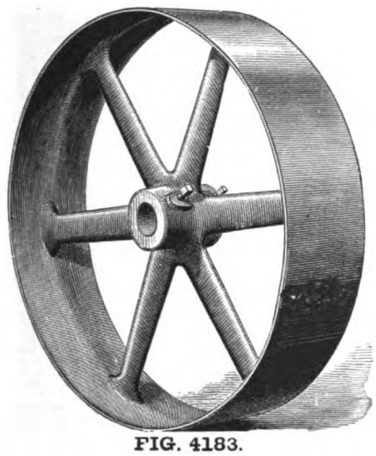


FIG. 4183.

We supply single belt pulleys with one or two set screws according to size.

Double belt pulleys are provided with two set screws or a key-way.

An extra charge will be made when both set-screwed and key-seated.

Pulleys are bored to the Whitworth gauge.

Pulleys, ordered with extra large bore in proportion to their diameter and width of the face, are subject to an extra charge.

Pulleys ordered from ½ to ¾ of an inch wider than quoted in our price list are subject to the next following width.

Pulleys of 36 inches diameter and over may be ordered with two sets of arms, for which an extra charge will be made.

Key-ways, ordered to be cut in single belt pulleys, will be charged extra.

DOUBLE ARM.

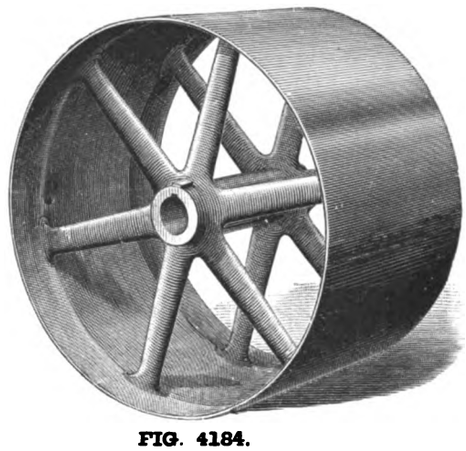


FIG. 4184.

In ordering pulleys, state the exact size (diameter) of shaft, and whether the face is to be round (high) for stationary belt, or straight (flat) for shifting belt. Also state if required for light work (for single belt) or for heavy work (for double belt).

For tight and loose pulleys, the face of each should be rounding.

Diameter in inches.	Width of face.	Prices, single belt.	Diameter in inches.	Width of face.	Prices, single belt.	Diameter in inches.	Width of face.	Prices, single belt.	Prices, double belt.	Diameter in inches.	Width of face.	Prices, single belt.	Prices, double belt.	Diameter in inches.	Width of face.	Prices, single belt.	Prices, double belt.
6	3	1.30	11	3	2.55	15	6	4.70		19	5	5.15	7.10	22	16	16.40	20.35
	4	1.45		4	2.70		7	5.10			6	5.80	7.60		18	19.70	23.90
	5	1.75		5	3.15		8	5.50			7	6.40	8.40		20	23.40	28.00
	6	2.00		6	3.50		9	6.00			8	7.00	9.15				
	7	2.40		7	3.80		10	6.50			9	7.80	10.10	23	4	5.60	7.75
	8	2.75		8	4.40		12	7.50			10	8.30	10.70		5	7.20	8.60
				9	4.70		14	8.80			12	9.70	12.60		6	7.40	9.50
7	3	1.50		10	5.10						14	11.50	14.70		7	8.15	10.40
	4	1.75		12	5.90	16	3	3.50			16	13.40	16.85		8	8.90	11.30
	5	2.00		14	6.80		4	4.00			18	16.10	19.85		9	9.75	12.55
	6	2.35					5	4.50							10	10.60	13.35
	7	2.95	12	3	2.80		6	5.00		20	3	4.55	6.35		12	12.50	16.10
	8	3.35		4	3.10		7	5.50			4	4.90	6.70		14	14.80	18.75
	9	3.75		5	3.40		8	6.00			5	5.55	7.35		16	17.50	21.70
	10	4.25		6	3.70		9	6 50			6	6.20	8.00		18	20.90	25.45
				7	4.30		10	7.00			7	6.85	8.80		20	24.60	29.40
8	3	1.75		8	4.60		12	8.00			8	7.50	9.65				
	4	1.95		9	4.90		14	9.40			9	8.20	10.50	24	4	5.90	8.10
	5	2.40		10	5.40		16	10.80			10	8.90	11.30		5	6.70	8.90
	6	2.80		12	6.20						12	10.30	13.30		6	7.50	9.65
	7	3.30		14	7.30	17	3	3.70			14	12.30	15.65		7	8.45	10.80
	8	3.70					4	4.20			16	14.30	17.90		8	9.40	11.80
	9	4.20	13	3	2.90		5	4.70			18	17.40	21.35		9	10.35	13.00
	10	4.40		4	3.30		6	5.20			20	20.80	25.00		10	11.30	14.00
	12	5.10		5	3.70		7	5.70							12	13.30	16.90
				6	4.15		8	6.20		21	4	5.15	7.00		14	15.70	19.65
9	3	2.00		7	4.50		9	6.80			5	5.80	7.65		16	18.70	22.90
	4	2.30		8	5.00		10	7.40			6	6.50	8.30		18	22.10	26.65
	5	2.50		9	5.40		12	8.50			7	7.20	9.20		20	26.00	30.80
	6	3.00		10	5.80		14	10.00			8	7.90	10.00				
	7	3.40		12	6.60		16	11.70			9	8.65	11.00	25	4	6.50	8.75
	8	3.80		14	7.70						10	9.40	11.80		5	7.40	9.70
	9	4.20				18	3	3.85	5.65		12	11.00	14.15		6	8.30	10.55
	10	4.30	14	3	3.20		4	4.40	6.20		14	13.10	16.55		7	9.10	11.60
	12	5.30		4	3.60		5	4.95	6.75		16	15.30	19.05		8	10.00	12.55
	14	6.10		5	4.20		6	5.50	7.30		18	18.40	22.45		9	10.95	13.70
				6	4.50		7	6.05	8.05		20	22.00	26.35		10	11.90	14.75
10	3	2.30		7	4.90		8	6.60	8.75						12	14.10	17.85
	4	2.60		8	5.20		9	6.85	9.55	22	4	5.30	7.10		14	16.70	20.75
	5	3.00		9	5.70		10	7.90	10.30		5	6.10	7.90		16	19.80	24.15
	6	3.40		10	6.10		12	9.10	11.85		6	6.85	8.65		18	23.30	27.95
	7	3.60		12	7.10		14	10.80	13.80		7	7.75	9.60		20	27.30	32.25
	8	4.10		14	8.30		16	12.50	15.85		8	8.40	10.55				
	9	4.50					18	14.90	18.50		9	9.20	11.40	26	4	6.90	9.30
	10	4.80	15	3	3.30						10	10.00	12.40		5	7.80	10.20
	12	5.60		4	3.80	19	3	4.00	5.85		12	11.80	15.15		6	8.70	11.10
	14	6.40		5	4.30		4	4.50	6.60		14	13.90	17.50		7	9.65	12.30

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CAST IRON FINISHED PULLEYS, FIGS. 4183 AND 4184.

Diameter in inches.	Width of face.	Prices, single belt.	Prices, double belt.	Diameter in inches.	Width of face.	Prices, single belt.	Prices, double belt.	Diameter in inches.	Width of face.	Prices, single belt.	Prices, double belt.	Diameter in inches.	Width of face.	Prices, single belt.	Prices, double belt.	Diameter in inches.	Width of face.	Prices, single belt.	Prices, double belt.
26	8	10.60	13.35	33	7	14.30	17.90	41	16	38.30	46.40	51	6	29.30	37.40	59	10	48.10	59.80
	9	11.65	14.60		8	15.60	19.35		18	43.70	52.40		8	33.90	42.60		12	53.80	66.20
	10	12.70	15.70		9	17.00	20.90		20	50.40	59.70		10	37.70	47.00		14	60.40	73.30
	12	15.00	18 95		10	18.40	22.45						12	42.00	52.00		16	68.40	83.70
	14	17.70	21.90		12	21.50	26.45	42	6	20.30	25.70		14	47.80	58.60		18	76.60	92.50
	16	20.90	25.45		14	24.90	30.35		8	23.90	29.90		16	53.70	66.00		20	86.50	103.00
	18	24.50	29.30		16	28.80	34.50		10	26.90	33.50		18	60.80	74.00		22	97.50	120.00
	20	28.70	33.85		18	32.90	39.00		12	31.10	38.60		20	69.00	82.80		24	110.00	138.40
					20	38.40	45.00		14	35.00	43.20		22	79.00	98.40				
27	4	7 20	9.75						16	39.70	48.10		24	88.80	114.20	60	6	39.50	50 30
	5	8.25	10.85	34	4	10.40	14.00		18	45.30	54.30						8	44.80	56.20
	6	9.30	11.85		5	12.05	15.65		20	52.00	61.60	52	6	30.40	38.80		10	49.50	61.50
	7	10.30	13.00		6	13.70	17.30						8	35.10	44.10		12	55.30	67.90
	8	11.30	14.15		7	15.00	18.60	43	6	21.30	27.00		10	39.00	48.60		14	62.00	75.20
	9	12 40	15.45		8	16.30	20.25		8	25.00	31.30		12	43.30	53.60		16	70.30	85.90
	10	13.50	16.65		9	17.80	21.40		10	28.00	34.90		14	49.30	60.50		18	78.80	95.00
	12	16.00	20 05		10	19.30	23.50		12	32.20	40.00		16	55.30	67.90		20	88.90	105.70
	14	18.70	23.05		12	22.40	27.55		14	36.30	44.70		18	62.40	76.00		22	100.00	122.80
	16	22.00	26.65		14	25.90	31.65		16	41.10	50.00		20	71.30	85.50		24	111.80	141.50
	18	25.60	30.55		16	29.90	35.90		18	46.90	56.40		22	81.00	100.80		26	120.00	162.60
	20	30.10	35.35		18	34.20	40.55		20	53.90	64.00		24	91.00	116.90		28	141.00	184.20
					20	39.80	46.75										30	157.00	207.10
28	4	7.60	10.35					44	6	22.20	28.20	53	6	31.50	40.20				
	5	8.30	11.50	35	4	10.90	14.65		8	26.10	32.70		8	36.30	45.60	61	6	40.70	51.80
	6	9.90	12.65		5	12.65	16.40		10	29.30	36.50		10	40.20	50.00		8	46.00	57.70
	7	10.90	13.80		6	14.40	18.15		12	33.40	41.50		12	44.80	55.40		10	50.80	63.10
	8	11.90	14.90		7	15.80	19.70		14	37.60	46.40		14	50.80	62.30		12	56.80	69.70
	9	13.70	16.20		8	17.20	21.25		16	42.60	52.00		16	56.90	69.80		14	63.50	77.00
	10	14.30	17.65		9	18.70	22.70		18	48.50	58.40		18	64.20	78.00		16	72.00	87.90
	12	16.90	21.10		10	20.20	24.55		20	55.70	66.25		20	73.20	87.50		18	80.70	97.20
	14	19.70	24.25		12	23.40	28.65						22	83.00	104.00		20	90.90	108.00
	16	23.10	27.90		14	27.00	32.85	45	6	23.10	29.40		24	93.60	120.00		22	102.30	125.70
	18	26.90	32.05		16	31.10	37.40		8	27.20	34.10						24	114.20	144.60
	20	31.50	36.90		18	35.40	42.15		10	30.40	37.90	54	6	32.60	41.60		26	128.50	165.70
					20	41.20	48.55		12	34.40	42.80		8	37.50	47.10		28	143.50	187.60
29	4	8.00	10.85						14	39.00	48.20		10	41.50	51.70		30	159.70	210.70
	5	9.25	12.15	36	4	11.50	15.45		16	44.10	54.00		12	46.30	57.20				
	6	10.50	13.35		5	13.30	17.30		18	50.20	60.60		14	52.40	64.20	62	6	42.00	53.40
	7	11.50	14.50		6	15.10	19.05		20	57.60	68.60		16	58.60	71.80		8	47.30	59.30
	8	12.50	15.65		7	16.55	20.65						18	66.00	80.00		10	52.10	64.70
	9	13.80	17.05		8	18.00	22.20	46	6	24.20	30.80		20	75.50	89.90		12	58.30	71.50
	10	15.10	18.45		9	19.55	23.95		8	28.20	35.40		22	85.00	105.70		14	65.20	79.00
	12	17.80	22.15		10	21.10	25.65		10	31.60	39.40		24	96.00	122.80		16	74.00	90.20
	14	20.80	25.45		12	24.40	29.80		12	35.60	44.40						18	82.90	99.70
	16	24.20	29.15		14	28.00	34.00		14	40.30	49.90	55	6	33.70	43.00		20	93.20	110.60
	18	28.00	33.25		16	32.20	38.80		16	45.80	56.00		8	38.70	48.60		22	104.70	128.70
	20	32.90	38.45		18	36.80	44.00		18	51.90	62.70		10	42.80	53.30		24	117.00	148.00
					20	42.70	50.50		20	59.30	70.70		12	47.80	59.00		26	131.50	169 00
30	4	8.50	11.50										14	54.00	66.00		28	146.70	191.40
	5	9.80	12.85	37	6	15.90	20.00	47	6	25.20	32.10		16	60.60	74.10		30	163.00	214.60
	6	11.10	14.10		8	18.90	23.40		8	29.30	36.80		18	68.00	82 50				
	7	12.20	15.40		10	22.00	26.65		10	32.80	40.90		20	77.70	92.70	63	6	43.20	54.90
	8	13.20	16.55		12	25.40	31.10		12	36.70	45.60		22	87.50	108.70		8	48 60	60.90
	9	14.60	18.00		14	29.20	35.50		14	41.70	51.50		24	98.40	125.70		10	53.50	66.40
	10	15.90	19.50		16	33.40	40.30		16	47.40	58.00						12	59.80	73.30
	12	18.70	23.25		18	38.10	45.60		18	53.70	65.00	56	6	34.80	44.40		14	66.80	80.90
	14	21.80	26.60		20	44.10	52.20		20	61.10	72.80		8	39.90	50.10		16	75.90	92.40
	16	25.40	30.55										10	44.00	54.80		18	85.10	102 20
	18	29.20	34.60	38	6	16.70	20.90	48	6	26.20	33.40		12	49.30	60.80		20	95.40	113.10
	20	34.30	40.05		8	19.70	24.50		8	30.40	38.20		14	55.50	67.80		22	107.00	131.30
					10	22.80	28.20		10	34.00	42.40		16	62.70	76.50		24	119.40	150.80
31	4	9.00	12.15		12	26.50	32.50		12	38.00	47.00		18	70.00	84.80		26	134.00	172.10
	5	10.35	13.55		14	30.30	36.90		14	43.20	53.20		20	79.90	95.50		28	140.50	194.80
	6	11.70	14.85		16	34.60	41.80		16	49.00	60.20		22	90.00	111.60		30	165.70	217.90
	7	12.85	16.20		18	39.40	47.20		18	55.50	67.30		24	101.00	129.00				
	8	14.00	17.45		20	45.70	54.10		20	62.90	74.90					64	6	44.50	56.50
	9	15.40	19.05						22	73.00	91.00	57	6	36.00	45.90		8	50.00	62.60
	10	16.80	20.55	39	6	17.70	22.20		24	81.50	105.50		8	41.00	51.50		10	54.90	68.10
	12	19.70	24.35		8	20.80	25.90						10	45.30	56.40		12	61.40	75.20
	14	22.90	27.85		10	23.80	29.50	49	6	27.20	34.70		12	50.80	62.60		14	68.40	82.80
	16	26.60	31.85		12	27.60	34.00		8	31.60	39.70		14	57.00	69.50		16	77.80	94.60
	18	30.50	36.05		14	31.50	38.60		10	35.20	43.90		16	64.50	78.90		18	87.30	104.70
	20	35.70	41.75		16	35.80	43.30		12	39.30	48.80		18	72.10	87.30		20	97.80	115.80
					18	40.80	48.90		14	44.70	55.00		20	82.00	97.90		22	109.60	134.20
32	4	9.40	12.75		20	47.20	55.90		16	50.60	62.20		22	92.40	114.30		24	122.20	154.00
	5	10.85	14.20						18	57.20	69.50		24	103.80	132.20		26	137.00	175.70
	6	12.30	15.65	40	6	18.60	23.40		20	65.00	77.80						28	152.40	198.30
	7	13.55	17.00		8	21.80	27.20		22	75.00	93.50	58	6	37.20	47.40		30	169.00	222.10
	8	14.80	18.40		10	24.80	30.80		24	83.90	108.40		8	42.30	53.10				
	9	16.20	20.00		12	28.80	35.50						10	46.70	58.10	65	6	45.80	58.10
	10	17.60	21.50		14	32.70	40.00	50	6	28.20	36.00		12	52.30	64.40		8	51.40	64.30
	12	20.60	25.40		16	37.10	45.00		8	32.70	41.10		14	58.80	71.40		10	56.30	69.80
	14	23.90	29.05		18	42.30	50.70		10	36.40	45.40		16	66.50	81.50		12	63.00	77.10
	16	27.70	33.10		20	49.00	58.00		12	40.50	50.40		18	74.40	90.00		14	70.20	84.90
	18	31.80	37.55						14	46.20	56.80		20	84.30	100.50		16	79.80	96.90
	20	37.10	43.45	41	6	19.40	24.50		16	52.00	64.00		22	95.00	117.20		18	89.50	107.20
					8	22.80	28.50		18	58.90	71.80		24	106.70	135.50		20	100.00	118.30
33	4	9.90	13.35		10	25.80	32.10		20	66.90	80.50						22	112.00	137.00
	5	11.45	15.90		12	29.90	37.00		22	77.00	96.00	59	6	38.40	48.90		24	124.90	157.20
	6	13.00	16.45		14	33.90	41.75		24	86.30	111.30		8	43.50	54.60		26	139.50	178.80

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CAST IRON FINISHED PULLEYS, FIGS. 4183 AND 4184.

Diameter in inches.	Width of face.	Prices, single belt.	Prices, double belt.
65	28	155.10	201.60
	30	172.00	225.40
66	6	47.10	59.70
	8	52.80	66.00
	10	57.80	71.60
	12	64.00	79.00
	14	72.00	87.00
	16	81.60	99.00
	18	91.80	109.80
	20	102.30	120.90
	22	114.60	140.00
	24	127.40	160.00
	26	142.00	181.90
	28	157.90	205.00
	30	175.00	229.30
67	6	48.40	61.30
	8	54.10	67.60
	10	59.20	73.30
	12	66.30	81.00
	14	73.60	88.90
	16	83 50	101.20
	18	93.90	112.20
	20	104.50	123.40
	22	116.80	142.80
	24	130.00	163.20
	26	145.00	185.50
	28	160.80	208.50
	30	178.00	232.90
68	6	49.70	62.90
	8	55.40	69.20
	10	60.60	75.00
	12	68.00	83.00
	14	75.40	91.00
	16	85.60	103.60
	18	96.10	114.70
	20	107.00	126.20
	22	119.60	146.00
	24	132.80	166.40
	26	148.00	189.10
	28	164.00	212.30
	30	181.00	236.80
69	6	51.00	64.50
	8	56.70	70.80
	10	62.00	76.70
	12	69.50	84.80
	14	77.30	93.20
	16	87.70	106.00
	18	98.50	117.40
	20	109.30	128.80
	22	122.50	149.20
	24	135.50	169.50
	26	150.50	191.90
	28	166.70	215.60
	30	184.00	240.40
70	6	52.40	66.20
	8	58.10	72.50
	10	63.40	78.40
	12	71.10	86.70
	14	79.20	95.40
	16	89.80	108.40
	18	100.70	119.90
	20	112.00	131.80
	22	125.00	152.30
	24	138.20	172.80
	26	153.50	195.50
	28	169.80	219.30
	30	187.00	244.00
71	6	53.80	67.90
	8	59.40	74.10
	10	64.80	80.10
	12	72.60	88.50
	14	80.90	97.40
	16	91.80	110.70
	18	102.80	122.30
	20	114.30	134.40
	22	127.40	155.00
	24	140.70	175.70
	26	156.00	198.60
	28	172.40	222.50
	30	189.80	247.40
72	6	55.30	69.70
	8	60.80	75.80
	10	66.20	81.80
72	12	74.20	90.40
	14	82.80	99.60
	16	93.90	113.10
	18	105.00	124.80
	20	117.00	137.40
	22	129.90	157.80
	24	143.30	178.70
	26	158.80	202.00
	28	175.20	225.90
	30	192.70	251.20
75	10	71.20	87.40
	12	79.50	96.30
	14	88.30	105.70
	16	99.90	119.70
	18	111.50	131.90
	20	124.40	145.40
	22	137.70	166.50
	24	151.50	188.00
	26	167.20	211.90
	28	184.00	236.50
	30	202.00	262.60
76	10	73.10	89.90
	12	81.40	98.80
	14	90.50	108.50
	16	102.00	122.40
	18	113.70	134.70
	20	126.90	148.50
	22	140.10	169.80
	24	153.90	191.50
	26	169.70	215.00
	28	186.50	239.60
	30	204.50	265.50
78	10	76.60	94.00
	12	85.50	103.50
	14	94.70	113.30
	16	106.40	128.00
	18	118.00	140.20
	20	132.00	154.80
	22	145.50	176.10
	24	159.40	197.80
	26	175.40	221.90
	28	192.50	247.10
	30	210.60	273.30
84	10	89.10	108.90
	12	98.00	118.40
	14	108.00	129.00
	16	120.50	143.90
	18	133.00	157.00
	20	146.80	171.40
	22	160.80	193.80
	24	175.40	216.80
	26	192.00	241.80
	28	209.80	268.00
	30	226.50	293.40
90	10	102.50	123.50
	12	112.40	134.00
	14	122.80	145.60
	16	135.70	160.90
	18	148.00	173.80
	20	162.30	188.70
	22	177.00	212.70
	24	192.00	236.40
	26	208.00	261.10
	28	225.60	287.40
	30	243.50	314.30
96	12		149.60
	14		161.60
	16		177.60
	18		192.00
	20		208.80
	22		232.00
	24		256.00
	26		282.40
	28		312.00
	30		336.00
102	12		165.60
	14		178.40
	16		195.20
	18		208.80
	20		228.80
	22		252.00
	24		277.60
	26		304.00
102	28		334.40
	30		360.00
108	12		181.60
	14		195.20
	16		213.60
	18		228.00
	20		249.60
	22		272.00
	24		299.20
	26		325.60
	28		356.80
	30		385.60
114	12		197.60
	14		212.80
	16		232.00
	18		248.00
	20		271.20
	22		294.40
	24		320.80
	26		348.00
	28		380.00
	30		412.00
120	12		214.40
	14		230.40
	16		250.40
	18		268.00
	20		293.60
	22		316.00
	24		343.20
	26		371.20
	28		404.00
	30		439.20

FINISHED SPLIT OR HALVED PULLEYS.

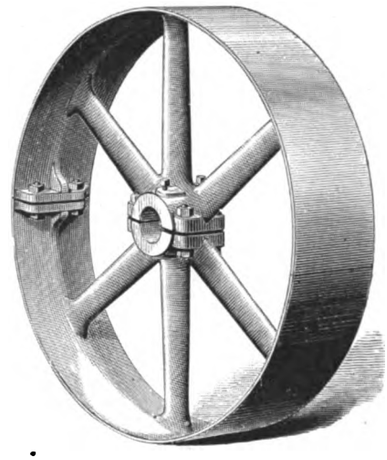


FIG. 4185.

Add the following table to the prices of Figs. 4183 and 4184 to get the prices of split pulleys.

PRICES.

Diameter in inches.	Width of face.	Prices.
6 to 12	3 to 4	1.40
	5 to 6	1.60
	7 to 10	2.00
	11 to 14	2.50
13 to 18	3 to 4	1.50
	5 to 6	2.00
	7 to 10	2.50
	11 to 16	3.50
19 to 23	3 to 4	2.60
	5 to 6	3.20
	7 to 10	4.00
	11 to 14	5.00
	15 to 20	6.60
24 to 30	4 to 6	4.00
	7 to 10	5.00
	11 to 14	6.50
	15 to 20	9.00
31 to 36	4 to 6	5.00
	7 to 10	6.00
	11 to 14	8.50
	15 to 20	11.50
37 to 47	6 to 10	8.00
	11 to 14	12.00
	15 to 20	16.00
48 to 60	6 to 10	12.50
	11 to 14	16.50
	15 to 20	22.50
	21 to 30	30.00
61 to 84	6 to 10	18.00
	11 to 14	23.50
	15 to 20	31.50
	21 to 30	43.00
85 to 120	10 to 14	35.00
	15 to 20	48.00
	21 to 30	63.00
	31 to 40	80.00

FLANGE PULLEYS.

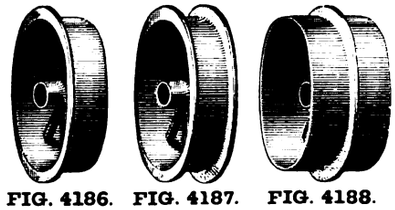


FIG. 4186. FIG. 4187. FIG. 4188.

Made with 1, 2 or 3 flanges.

Add the following table to the prices of Figs. 4183 and 4184 to get the prices of flange pulleys.

PRICES.

Diam. in inches.	Prices for each flange.	Diam. in inches.	Prices for each flange.
6 to 8	2.00	31 to 32	7.70
9 to 10	2.30	33 to 34	8.40
11 to 12	2.60	35 to 36	9.20
13 to 14	2.85	37 to 40	10.40
15 to 16	3.25	41 to 44	11.80
17 to 18	3.60	45 to 48	13.35
19 to 20	4.00	49 to 52	15.00
21 to 22	4.50	53 to 56	16.30
23 to 24	5.00	57 to 60	18.30
25 to 26	5.50	61 to 66	20.80
27 to 28	6.20	67 to 72	23.25
29 to 30	7.00		

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CLAMP HUB PULLEYS.

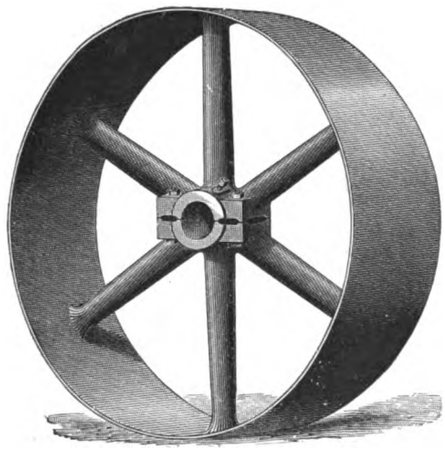


FIG. 4189.

ADDITIONAL PRICE

To be added to prices, Figs. 4183 and 4184, for finished clamp hub pulleys.

Diam. in inches.	Width of face.	Prices.	Diam. in inches.	Width of face.	Prices.	Diam. in inches.	Width of face.	Prices.
6 to 12	3 to 4	$0.85	24 to 30	4 to 6	$2.50	48 to 60	6 to 10	$7.50
	5 to 6	1.00		7 to 10	3.00		11 to 14	10.00
	7 to 10	1.20		11 to 14	4.00		15 to 20	13.50
	11 to 14	1.50		15 to 20	5.40		21 to 30	18.00
13 to 18	3 to 4	.90	31 to 36	4 to 6	3.00	61 to 84	6 to 10	10.80
	5 to 6	1.20		7 to 10	3.60		11 to 14	14.00
	7 to 10	1.50		11 to 14	5.00		15 to 20	19.00
	11 to 16	2.10		15 to 20	7.00		21 to 30	25.80
19 to 23	3 to 4	1.60				85 to 120	10 to 14	21.00
	5 to 6	2.00	37 to 47	6 to 10	5.00		15 to 20	28.80
	7 to 10	2.40		11 to 14	7.50		21 to 30	37.80
	11 to 14	3.00		15 to 20	10.00		31 to 40	48.00
	15 to 20	4.00						

TIGHT AND LOOSE PULLEYS.

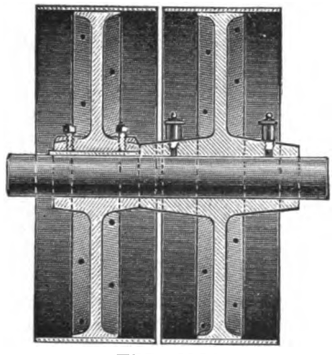


FIG. 4190.

We are providing loose pulleys with special long hubs, faced off on both sides and with oil tubes of proper dimensions.

A very efficient way to prevent loose pulleys from cutting into shafts is to provide such pulleys with loose gun metal bushings, which will revolve freely between the proper hub of the pulley and the shaft.

Quotations for such will be furnished on application.

Loose pulleys intended for high speed should always be ordered with these bushings.

ADDITIONAL PRICE

To be added to prices, Figs. 4183 and 4184, for one pair tight and loose pulleys or one loose pulley.

Diam. in inches.	Prices.	Diam. in inches.	Prices.	Diam. in inches.	Prices.
6 to 8	$1.50	23 to 24	$4.00	41 to 44	$7.00
9 to 10	1.75	25 to 26	4.30	45 to 48	7.75
11 to 12	2.00	27 to 28	4.60	49 to 52	8.40
13 to 14	2.35	29 to 30	5.00	53 to 56	9.00
15 to 16	2.70	31 to 32	5.30	57 to 60	9.70
17 to 18	3.00	33 to 34	5.60	61 to 66	10.50
19 to 20	3.35	35 to 36	6.00	67 to 72	11.50
21 to 22	3.70	37 to 40	6.50		

STEEL RIM PULLEYS.

SINGLE ARM.



FIG. 4191.

PRICES ON APPLICATION.

DOUBLE ARM.



FIG. 4192.

SPLIT OR HALVED.



FIG. 4193.

PRICES ON APPLICATION.

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PULLEYS AND GEARING.

WEB PULLEY.

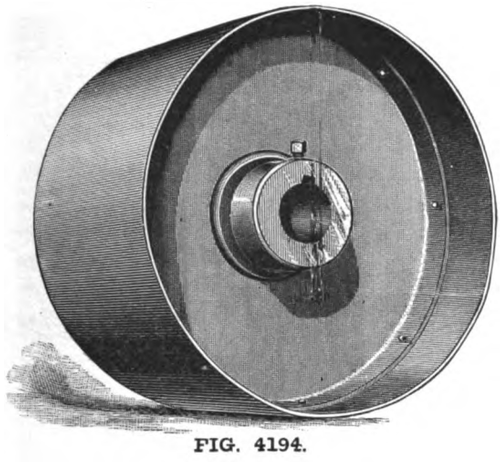


FIG. 4194.

DESCRIPTION, FIG. 4194.

These pulleys are manufactured with cast iron webs and steel rims. They are extensively used on dynamos.

Prices quoted on application.

DESCRIPTION, FIG. 4195.

These pulleys are grooved for manilla or hemp rope.

We are prepared to make these sheaves from 36 inches to 162 inches pitch diameter, with any number of grooves required.

GROOVED PULLEYS.



FIG. 4195.

RAW HIDE SPUR AND BEVEL GEARING.

PINION.

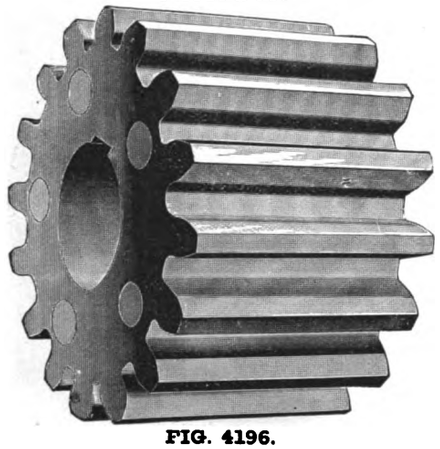


FIG. 4196.

RULE FOR OBTAINING PRICE ON RAW HIDE GEARS.

The diameter determines base price. Multiply base price by the face and the result will be price of rough blank. Add $1.00, which gives price of blank turned, faced and bored.

Cost of cutting is 10 cents per inch on spur gears; no gear cut for less than 50 cents; special prices for cutting bevel gears. To get the inches, multiply the diameter by the face, add this result to price of blank, turned, faced and bored, and you have the price of complete gear.

For example, a spur gear 6 in. diam., 4¼ in. face:

Base price, as below, on 6 in. diam.,	$2.83
Multiplied by face, 4¼ in.—fractions less than ¼ are figured full ¼ . .	4¼
	71
	11.32
Rough blank, ...	$12.03
Add for turning, facing and boring,	1.00
Turned blank, ...	$13.03
6 in. diam. × 4¼ in. face=26 in., × 10 cents for cutting, ...	2.60
Price of gear complete, ...	$15.63

Bear this in mind in making orders for our raw hide gears: Give outside diameter, face, bore, number of teeth, pitch, and size of key-way.

RAW HIDE BLANK.

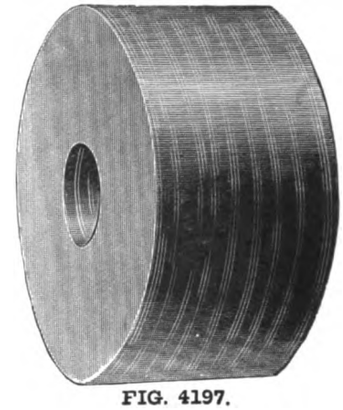


FIG. 4197.

BASE PRICES, FIGS. 4196 AND 4197.

To finish	2	in.	diameter and under,	$0.50	each.	To finish	9¾	in.	diameter and under,	$7.47	each.
"	2¼	"	"	.55	"	"	10	"	"	7.85	"
"	2½	"	"	.60	"	"	10¼	"	"	8.25	"
"	2¾	"	"	.70	"	"	10½	"	"	8.66	"
"	3	"	"	.80	"	"	10¾	"	"	9.08	"
"	3¼	"	"	.90	"	"	11	"	"	9.50	"
"	3½	"	"	1.00	"	"	11¼	"	"	9.94	"
"	3¾	"	"	1.15	"	"	11½	"	"	10.39	"
"	4	"	"	1.30	"	"	11¾	"	"	10.84	"
"	4¼	"	"	1.45	"	"	12	"	"	11.30	"
"	4½	"	"	1.60	"	"	12¼	"	"	11.80	"
"	4¾	"	"	1.75	"	"	12½	"	"	12.30	"
"	5	"	"	1.96	"	"	12¾	"	"	12.80	"
"	5¼	"	"	2.17	"	"	13	"	"	13.30	"
"	5½	"	"	2.38	"	"	13¼	"	"	13.80	"
"	5¾	"	"	2.60	"	"	13½	"	"	14.35	"
"	6	"	"	2.83	"	"	13¾	"	"	14.90	"
"	6¼	"	"	3.07	"	"	14	"	"	15.50	"
"	6½	"	"	3.32	"	"	14¼	"	"	15.95	"
"	6¾	"	"	3.58	"	"	14½	"	"	16.55	"
"	7	"	"	3.85	"	"	14¾	"	"	17.10	"
"	7¼	"	"	4.13	"	"	15	"	"	17.70	"
"	7½	"	"	4.42	"	"	15¼	"	"	18.30	"
"	7¾	"	"	4.72	"	"	15½	"	"	18.90	"
"	8	"	"	5.03	"	"	15¾	"	"	19.50	"
"	8¼	"	"	5.35	"	"	16	"	"	20.15	"
"	8½	"	"	5.67	"	"	16¼	"	"	20.75	"
"	8¾	"	"	6.00	"	"	16½	"	"	21.40	"
"	9	"	"	6.36	"	"	16¾	"	"	22.05	"
"	9¼	"	"	6.73	"	"	17	"	"	22.70	"
"	9½	"	"	7.10	"	"	17¼	"	"	23.40	"

To finish	17½	in.	diameter and under,	$24.10	each.						
"	17¾	"	"	24.80	"						
"	18	"	"	25.50	"						
"	18¼	"	"	26.20	"						
"	18½	"	"	26.90	"						
"	18¾	"	"	27.65	"						
"	19	"	"	28.40	"						
"	19¼	"	"	29.15	"						
"	19½	"	"	29.90	"						
"	19¾	"	"	30.65	"						
"	20	"	"	31.45	"						
"	20¼	"	"	32.25	"						
"	20½	"	"	33.05	"						
"	20¾	"	"	33.90	"						
"	21	"	"	34.70	"						
"	21¼	"	"	35.50	"						
"	21½	"	"	36.35	"						
"	21¾	"	"	37.20	"						
"	22	"	"	38.05	"						
"	22¼	"	"	38.80	"						
"	22½	"	"	39.80	"						
"	22¾	"	"	40.70	"						
"	23	"	"	41.60	"						
"	23¼	"	"	42.50	"						
"	23½	"	"	43.40	"						
"	23¾	"	"	44.35	"						
"	24	"	"	45.25	"						
"	24¼	"	"	46.20	"						
"	24½	"	"	47.15	"						
"	24¾	"	"	48.15	"						
"	25	"	"	49.15	"						

We sell no blanks in the rough. All must be turned to size here, but the cutting of the teeth may be done by the purchaser if he so desires. However, in view of our special facilities for cutting raw hide, we would advise the ordering of complete gears.

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GEARING AND WOOD PULLEYS.

SPUR GEARS.

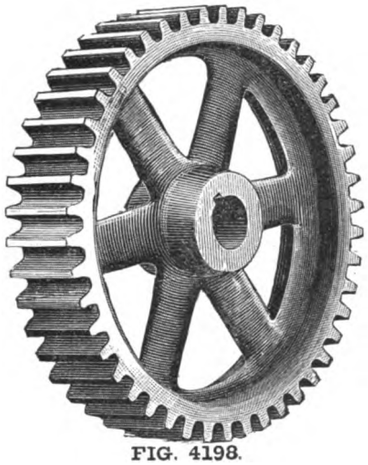


FIG. 4198.

BEVEL AND MITRE GEARS.



FIG. 4199.

HERRING BONE GEARS.



FIG. 4200.

We are prepared to furnish machine moulded gearing of any design of all sizes. Prices on application.

WORM AND WORM GEARS.

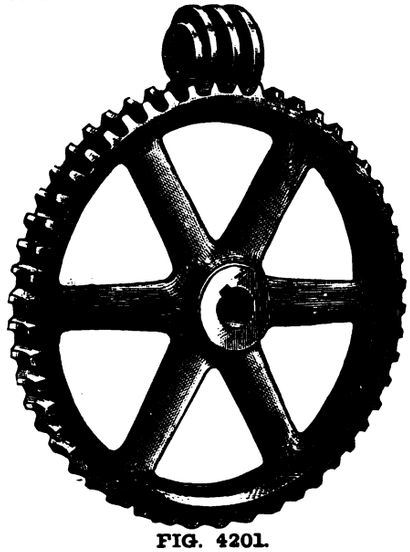


FIG. 4201.

SPUR AND BEVEL MORTISE GEARS.



FIG. 4202.

SOLID OR SPLIT WOOD PULLEYS.

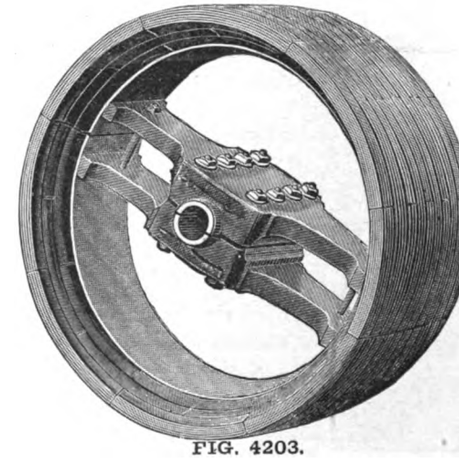


FIG. 4203.

PRICES, FIG. 4203.

EVERY PULLEY WILL FIT 22 DIFFERENT SIZES OF SHAFT, WITH THE BUSHINGS.

Diam. inches.	WIDTH OF FACE—INCHES.																						Diam. inches.
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22	23	24	25	
9	$2.50	$2.65	$2.90	$3.15	$3.28	$3.40	.....	.....	.....	.....	.....	.....	.....	.....									
10	2.60	2.75	3.00	3.25	3.40	3.55	$3.72	$3.90	.....	.....	.....	.....	.....	.....									
11	2.70	2.85	3.10	3.35	3.53	3.70	3.90	4.10	.....	.....	.....	.....	.....	.....									
12	2.80	2.95	3.20	3.55	3.70	3.85	4.08	4.30	$4.70	$5.10	.....	.....	.....	.....									
13	2.90	3.10	3.40	3.75	4.00	4.25	4.53	4.80	5.20	5.60	.....	.....	.....	.....									
14	3.00	3.25	3.65	4.10	4.40	4.70	5.02	5.35	5.68	6.00	$6.30	$6.60	.....	.....									
15	3.10	3.45	3.85	4.35	4.75	5.10	5.48	5.85	6.18	6.50	6.85	7.20	.....	.....									
16	3.30	3.65	4.05	4.60	5.05	5.50	5.90	6.30	6.65	7.00	7.35	7.70	$8.35	.....									
17	3.50	3.85	4.25	4.85	5.35	5.85	6.30	6.70	7.10	7.50	7.88	8 25	9.05	.....									
18	3.70	4.05	4.55	5.10	5.65	6.20	6.65	7.10	7.55	8.00	8.50	9.00	9.80	$10.70									
19	.....	4.25	4.80	5.50	6.13	6.75	7.15	7.50	8.05	8.60	9.20	9.80	10.70	11.70									
20	.....	4.45	5.20	6.00	6.60	7.15	7.60	8.00	8.75	9.50	10.25	11.00	11.80	12.60									
21	.....	4.70	5.60	6.40	6.95	7.50	8.10	8.65	9.55	10.40	11.20	12.00	12.85	13.70									
22	.....	4.95	5.90	6.85	7.45	8.00	8.70	9.40	10.30	11.20	12.10	13.00	13.60	14.20									
23	.....	5.20	6.15	7.05	7.70	8.40	9.20	9.95	11.05	12.00	13.00	14.00	15.10	16.20									
24	.....	5.40	6.35	7.30	8.05	8.80	9.65	10.45	11.55	12.70	13.90	15.10	16.30	17.50									
25	.....	5.80	6.65	7.60	8.40	9.20	9.85	10.90	12.15	13.40	14.80	16.25	17.70	19.10									
26	.....	6.35	7.00	7.95	8.80	9.60	10.05	11.40	12.80	14.20	15.85	17.50	19.15	20.80	$22.45	$24.10	$31.50	$33.50	$35.50	$37.50	$40.00	$43.50	26
27	.....	6.78	7.40	8.27	9.13	9.95	10.63	11.75	13.25	14.72	16.47	18.25	20.17	21.90	23.70	25.50	32.25	34.25	36.25	38.25	40.75	44.00	27
28	.....	7.20	7.80	8.60	9.45	10.30	11.20	12.10	13.70	15.25	17.10	19.00	21.00	23.00	24.95	26.90	33.00	35.00	37.00	39.00	41.50	44.50	28
29	.....	7.60	8 20	9.00	9.95	10.90	11.80	12.67	14.20	15.87	17.92	20.00	22.10	24.20	26.32	28.45	33.75	35.62	37.62	39.62	41.87	45.00	29
30	.....	8.00	8.60	9.40	10.45	11.50	12.40	13.25	14.90	16.50	18.75	21.00	23.20	25.40	27.70	30.00	34.50	36.25	38.25	40.25	42.25	45.50	30
31	.....	8.40	9.00	9.85	11.02	12.20	13.17	14.13	15.68	17.20	19.52	21.87	24.22	26.57	28.85	31.12	35.37	37.25	39.25	41.25	43.25	46.00	31
32	.....	8.80	9.40	10.30	11.60	12.90	13.95	15.00	16.45	17.90	20.30	22.75	25.25	27.75	30.00	32.25	36.25	38.25	40.25	42.25	44.25	46.50	32
33	.....	9.20	9.95	10.90	12.30	13.70	14.85	16.00	17.47	18.95	21.45	23.62	26.25	28.87	31.12	33.37	37.00	39.50	41.50	43.50	45.50	47.75	33
34	.....	9.60	10.50	11.50	13.00	14.50	15.75	17.00	18.50	20.00	22.50	24.50	27.25	30.00	32.25	34.50	38.75	40.75	42.75	44.75	46.75	49.00	34
35	.....	10.10	11.20	12.25	13.75	15.25	16.65	18.05	19.62	21.25	23.50	25.50	28.35	31.20	33.47	35.75	40.12	42.12	44.12	46.12	48.12	51.00	35
36	.....	10.60	11.90	13.00	14.50	16.00	17.55	19.10	20.80	22.50	24.50	26.50	29.45	32.40	34.70	37.00	41.50	43.50	45.50	47.50	49.50	53.00	36
38	.....	13.00	13.75	14.50	16.05	17.60	19.15	20.70	22.70	24.75	26.60	28.50	31.50	34.50	36.90	39.25	45.00	47.00	49.00	51.50	54.00	58.00	38
40	.....	14.00	14.50	16.00	17.50	19.00	20.75	22.50	24.65	26.75	28.85	31.00	33.65	36.25	38.85	41.50	48.00	50.50	52.50	55.00	58.00	63.00	40
42	.....	15.50	16.05	17.50	19.50	21.50	23.25	25 00	27.00	29.00	31.25	33.50	36.00	38.50	41.10	43.75	51.00	53.50	56.00	59.00	63.00	68.00	42
44	.....	17.00	17.50	19.50	21.65	23.75	25.65	27.50	29.50	31.50	33.75	36.00	38.40	40.75	43.35	46.00	54.00	56.50	59.00	62.00	67.00	73.00	44
46	.....	19.00	19.50	22.00	24.00	26.00	28.00	30.00	31.75	33.50	36.00	38.50	40.75	43.00	45.50	48.00	58 00	61.00	64.00	68.00	72.00	78.00	46
48	.....	21.00	22.00	24 50	26.25	28.00	30.50	32.50	34.25	36.00	38.50	41.00	43.00	45.00	47.50	50.00	62.00	66.75	71.50	76.00	80.00	84.00	48

NOTE.—Pulleys under 24 inches in diameter will fit shaft as large as 3 inches without re-boring; above 24 inches diameter, they will fit 3½ inch shaft without re-boring.

Pulleys above 48 inches diameter have four arms; smaller sizes, two arms.

PRICE LIST CONTINUED ON NEXT PAGE.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PRICES, FIG. 4203—CONTINUED.

Diam. inches.	WIDTH OF FACE, INCHES.																					
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22	23	24	25
50	.....	.....	.....	$27.25	$29.50	$31.50	$33.50	$35.50	$37.25	$39.00	$41.50	$44.00	$47.00	$50.00	$53.00	$56.00	$65.00	$69.75	$74.50	$79.50	$85.50	$90.00
52	.....	.....	.....	31.00	32.50	34.00	36.00	38.00	40.00	42.00	44.00	46.00	49.50	52.50	56.50	60.00	68.00	72.50	77.00	81.50	86.25	93.00
54	.....	.....	.....	33.50	35.50	37.50	39.25	41.00	43.00	45.00	47.25	49.50	52.50	55.50	60.00	64.50	73.50	78.25	83.00	87.75	92.50	98.00
56	.....	.....	.....	37.00	38.75	40.50	42.50	44.50	46.50	48.50	51.00	53.50	56.75	60.00	63.75	69.50	84.00	88.50	93.25	98.00	102.50	106.00
58	.....	.....	.....	40.00	41.50	43.50	46.00	47.50	50.00	52.25	55.00	57.75	61.00	64.25	68.50	73.75	87.50	90.50	95.25	100.00	104.50	110.00
60	.....	.....	.....	42.50	44.50	47.00	49.25	51.50	53.75	56.00	59.00	62.00	65.25	68.50	73.25	78.00	91.00	96.00	101.00	106.00	111.00	116.00
66	.....	.....	.....	47.00	49.25	51.50	53.75	57.00	60.00	63.50	67.50	71.50	75.50	80.00	84.50	89.00	103.00	109.00	115.00	122.50	130.00	137.50
72	.....	.....	.....	51.50	53.75	57.00	60.00	64.00	67.50	71.50	75.50	80.00	85.00	90.00	95.00	100.00	115.00	127.00	131.00	136.00	145.00	155.00
78	.....	.....	.....	.....	.....	79.00	83.00	87.00	91.00	95.00	99.00	104.00	109.00	114.00	119.00	124.00	134.00	140.00	146.00	156.00	168.00	180.00
84	.....	.....	.....	.....	.....	95.00	98.00	102.00	106.00	110.00	114.00	119.00	124.00	129.00	134.00	139.00	154.00	162.00	170.00	181.00	193.00	205.00
90	.....	.....	.....	.....	.....	110.00	113.00	117.00	121.00	125.00	129.55	134.00	139.00	144.00	149.00	154.00	174.00	183.00	192.00	204.00	217.00	230.00
96	.....	.....	.....	.....	.....	124.00	127.00	131.00	135.00	140.00	145.00	150.00	155.00	160.00	165.00	170.00	192.00	202.00	212.00	224.00	237.00	250.00
102	.....	.....	.....	.....	.....	130.00	140.00	150.00	160.00	171.00	.....	192.00	.....	213.00	.....	233.00	256.00	.....	279.00	.....	302.00	.....
108	.....	.....	.....	.....	.....	144.00	154.00	165.00	176.00	187.00	.....	209.00	.....	232.00	.....	256.00	280.00	.....	304.00	.....	329.00	.....
114	.....	.....	.....	.....	.....	159.00	170.00	182.00	193.00	205.00	.....	228.00	.....	252.00	.....	277.00	303.00	.....	329.00	.....	356.00	.....
120	.....	.....	.....	.....	.....	172.00	184.00	196.00	208.00	221.00	.....	246.00	.....	271.00	.....	298.00	325.00	.....	353.00	.....	382.00	.....

	WIDTH OF FACE, INCHES.							
	26	28	30	32	34	36	38	40
102	$324.00	$347.00	$370.00	$394.00	$417.00	$440.00	$463.00	$486.00
108	353.00	377.00	402.00	427.00	451.00	476.00	500.00	525.00
114	382.00	408.00	435.00	462.00	488.00	515.00	541.00	568.00
120	410.00	439.00	467.00	496.00	524.00	552.00	581.00	609.00

WOOD BUSHINGS.

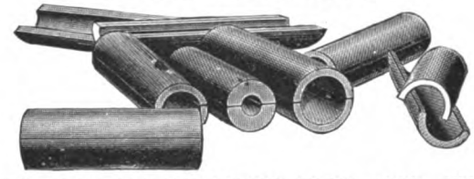


FIG. 4205. FOR PULLEYS, FIGS. 4203, 4204.

PRICE LIST OF EXTRA BUSHINGS.

Length of bush.	Outside diameter.		
6 to 8 inch.....	.....3 inch, each, 25c.	3½ inch	.....30c.
10 to 12 "	.....3 " " 30c.	3½ "	.....35c.
14 to 16 "	.....3 " " 35c.	3½ "	.....40c.

4-ARM WOOD PULLEYS.

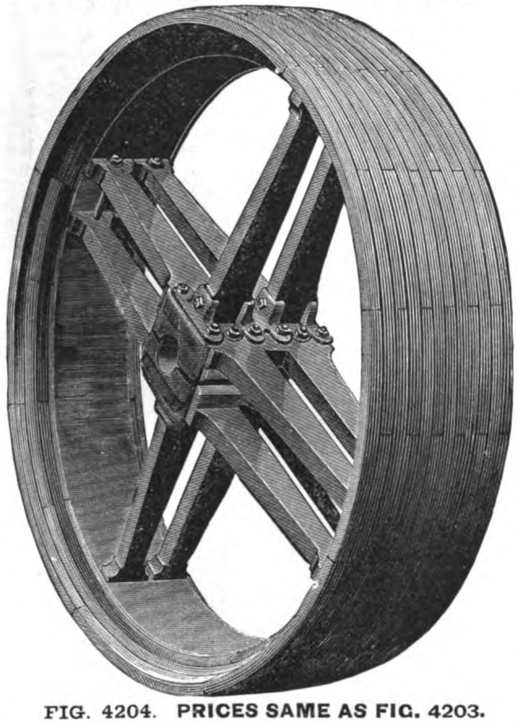


FIG. 4204. PRICES SAME AS FIG. 4203.

PRICE LIST OF IRON SLEEVES FOR LOOSE PULLEYS.

Face of pulley.	Bore.	Price.	Face of pulley.	Bore.	Price.
3 in.	$1\frac{3}{16}$ in.	$0.55	5 in.	$1\frac{15}{16}$ in.	$0.95
3 "	$1\frac{7}{16}$ "	.60	5 "	$2\frac{3}{16}$ "	1.05
3 "	$1\frac{11}{16}$ "	.65	6 "	$1\frac{7}{16}$ "	.90
3 "	$1\frac{15}{16}$ "	.70	6 "	$1\frac{11}{16}$ "	1.00
4 "	$1\frac{3}{16}$ "	.65	6 "	$1\frac{15}{16}$ "	1.10
4 "	$1\frac{7}{16}$ "	.70	6 "	$2\frac{3}{16}$ "	1.25
4 "	$1\frac{11}{16}$ "	.75	8 "	$1\frac{7}{16}$ "	1 15
4 "	$1\frac{15}{16}$ "	.80	8 "	$1\frac{11}{16}$ "	1.25
5 "	$1\frac{3}{16}$ "	.75	8 "	$1\frac{15}{16}$ "	1.40
5 "	$1\frac{7}{16}$ "	.80	8 "	$2\frac{3}{16}$ "	1.60
5 "	$1\frac{11}{16}$ "	.85			

SOLID WEB PULLEY, WITH IRON CENTER.

The advantages of the taper sleeve fastening are:

It requires no key-way or set screws, and hence no scarring or weakening of the shaft.

There are no projections to catch the clothing and endanger life and limb.

It may be loosened and slid along the shaft to any desired position.

Fig. 4027 represents a solid web pulley with an iron center, fitted with key-seat and set screws. This pulley is designed for very heavy work, such as main drivers. These pulleys are in use 168 inches in diameter, carrying 45-inch double leather belts.

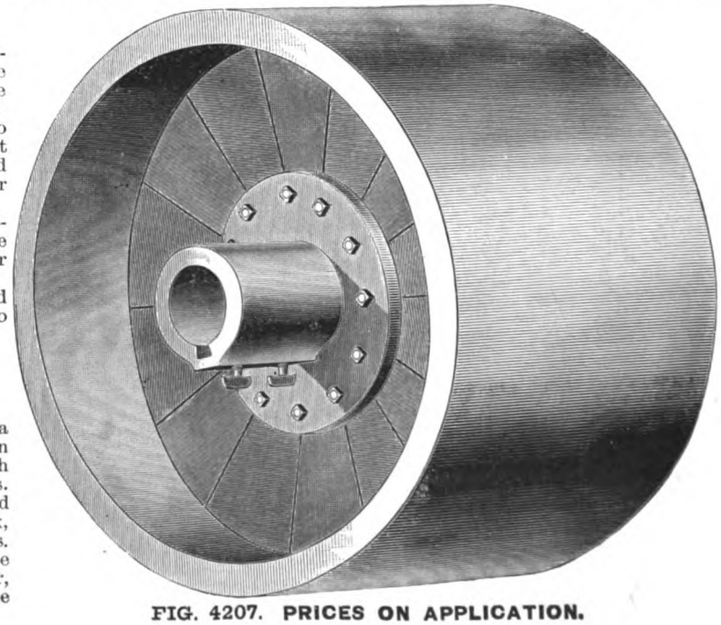


FIG. 4207. PRICES ON APPLICATION.

TAPER SLEEVE PULLEYS.

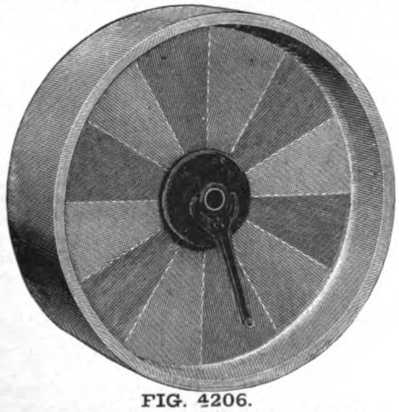


FIG. 4206.
PRICES SAME AS FIG. 4203.

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STEEL OR CAST IRON RIM CLUTCH PULLEYS.

FOUR ARMS.



FIG. 4208.

SIX ARMS.



FIG. 4209.

These clutch pulleys are furnished with single or double arm spiders to the pulley and with two, four, six or eight arms to the clutch, we reserving the right to determine these details but guarantceing to furnish the proper means to transmit the power called for in the tables that follow.

There is absolutely no contact of frictional surfaces when not "in clutch." The operation of clutching and releasing is so easy that it can be readily accomplished by moving the cone by the hand, unaided by the lever. All the clutch pulleys are furnished with split cast sleeves for bearings, which are babbitted with the best quality of metal, turned on the outside to fit the hub of the pulley and bored on the inside to fit the shaft. The sleeves are held in position by means of two cap screws, and when the babbitt is worn they can be readily taken out, rebabbitted and placed in position again without removing the pulley from the shaft.

SECTIONAL VIEW.

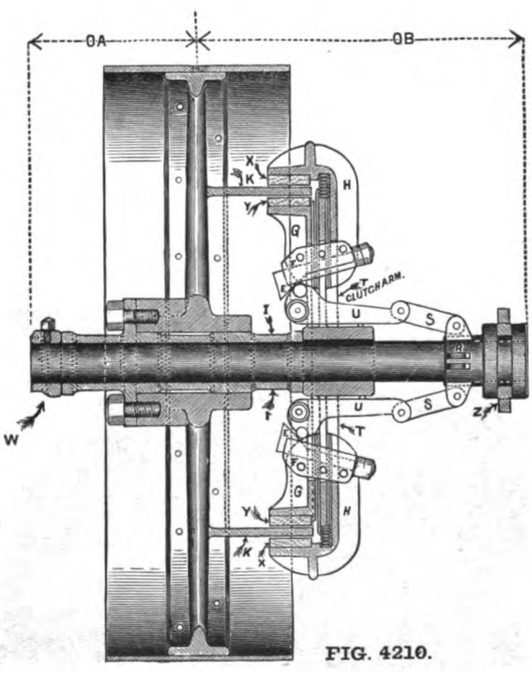


FIG. 4210.

HORIZONTAL SHIFTER RIG.

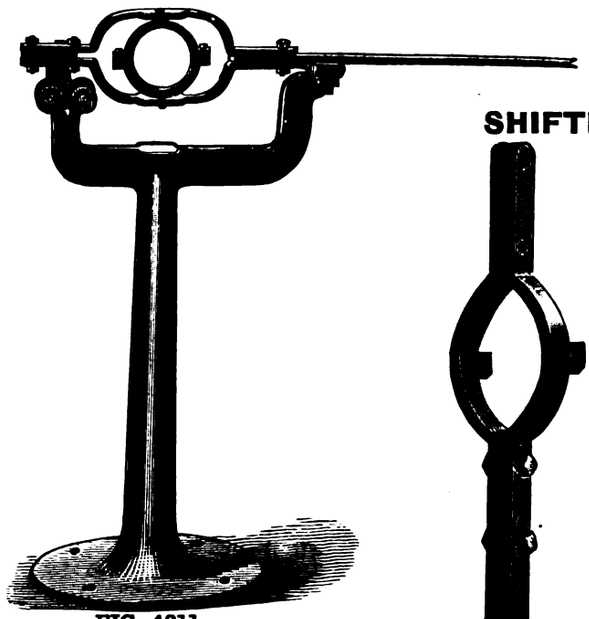


FIG. 4211.

For operating clutch when near floor.

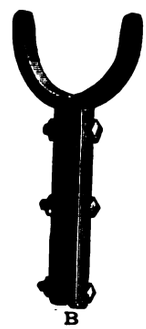
PRICE,

SHIFTER FORKS.



A

FIG. 4212.



B

FIG. 4213.

The working of this clutch will be readily understood from the above sketch. The clutch ring K is generally made about one-half of the diameter of the pulley on to the arms of which it is cast. The inner jaws G on each arm are forced outward, and the outer jaws H inward, by means of the toggle levers S U, which operate upon the jaw-driving lever F. Lever F has its fulcrum between its points of connection with G and H and is operated upon at E by U. The jaws, of which there are four sets on the four arm clutches and six sets on the six arm clutches, grasp the clutch ring with an irresistible vise-like grip. The pressure of the inside and outside jaws upon the friction ring K is always exactly equal.

When desired, the power may be applied by degrees and the pulley started gradually instead of instantly at full speed, as is the case when the cone R is slipped over its entire course by one quick movement of the shifting lever.

The clutch jaws are adjustable by means of the steel wedges E in the short lever F; are shod with thoroughly seasoned maple at X and Y, which will wear many years, is renewable, and requires no oil. All parts that are subject to wear are renewable at a very small expense, and without trouble or loss of time, it being unnecessary to remove pulley from shaft in order to replace worn-out parts.

☞ Bearings must be kept well lubricated.

We furnish either of the above styles. When orders do not designate which style is desired, the style "A," long fork, will be furnished. We furnish one fork with each clutch without extra charge, i. e., price of clutch includes fork.

"A" represents a long fork designed for use when the lever fulcrum is located on the opposite side of shaft from the operator.

"B" represents a short fork designed for use when the fulcrum is located between operator and shaft.

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PRICES, FIGS. 4208 AND 4209.

Diam. of pulley.	Face of pulley.	Space on shaft including collar.	H. P. 100 rev.	Prices of clutch and pulley.
16	4	17	3.25	29.00
	5	18	4.00	30.15
	6	19	4.50	31.25
	7	20	6.00	33.50
	8	21	7.50	35.00
17	4	17	4.15	30.00
	5	18	5.20	31.25
	6	19	6.50	33.20
	7	20	7.75	34.25
	8	21	9.80	35.75
18	4	17	5.67	31.70
	5	18	7.08	32.95
	6	19	8.50	34.30
	7	20	10.02	35.65
	8	21	11.34	37.10
19	4	18	6.13	33.00
	5	18	7.66	34.30
	6	19	9.20	35.70
	7	20	10.73	37.10
	8	21	12.26	38.60
	9	22	13.80	40.15
20	4	18	6.30	34.30
	5	19	7.88	35.70
	6	20	9.45	37.10
	7	21	11.03	38.60
	8	22	12.60	40.15
	9	23	14.18	41.75
	10	24	15.75	43.40
21	4	18	6.80	35.70
	5	19	8.51	37.10
	6	20	10.21	38.60
	7	21	11.91	40.15
	8	22	13.41	41.75
	9	23	15.31	43.40
	10	24	17.01	45.15
	11	25	18.71	46.95
	12	26	20.41	48.80
22	4	18	7.29	37.30
	5	19	9.14	38.85
	6	20	10.96	40.45
	7	21	12.79	42.15
	8	22	14.62	42.90
	9	23	16.44	45.75
	10	24	18.21	47.65
	11	25	20.10	49.65
	12	26	22.92	51.70
23	4	18	7.69	38.85
	5	19	9.61	40.45
	6	20	11.53	42.15
	7	21	13.45	43.90
	8	22	15.37	45.75
	9	23	17.30	47.65
	10	24	19.22	49.65
	11	25	21.19	51.70
	12	26	23.05	53.85
24	4	18	8.07	40.45
	5	19	10.08	42.15
	6	20	12.20	43.90
	7	21	14.11	45.75
	8	22	16.13	47.65
	9	23	18.14	49.65
	10	24	20.16	51.70
	11	25	22.15	53.85
	12	26	24.50	56.05
	13	27	25.90	58.40
	14	28	27.90	60.85
25	4	18	8.30	42.15
	5	19	10.45	43.90
	6	20	12.45	45.75
	7	21	14.50	47.65
	8	22	16.60	49.65
	9	23	18.70	51.70
	10	24	20.80	53.85
	11	25	22.80	56.05
	12	26	24.90	58.40
	13	27	27.00	60.85
	14	28	29.00	63.35
26	4	18	8.60	43.90
	5	19	10.82	46.10
	6	20	12.90	48.40
	7	21	15.00	50.80
	8	22	17.25	53.35
26	9	23	19.40	56.00
	10	24	21.50	58.80
	11	25	23.80	61.75
	12	28	25.75	64.80
	13	29	28.00	68.05
	14	30	30.10	71.45
	15	31	32.25	75.05
	16	32	34.50	78.80
27	5	18	11.10	47.65
	6	20	13.40	50.05
	7	21	15.70	52.55
	8	22	17.90	55.15
	9	23	20.00	57.90
	10	24	22.10	60.80
	11	25	24.70	63.80
	12	29	26.50	67.00
	13	29	29.10	70.35
	14	30	31.25	73.85
	15	31	33.50	77.55
	16	32	35.80	81.40
28	5	19	11.50	49.65
	6	19	13.90	52.15
	7	21	16.21	54.75
	8	22	18.50	57.45
	9	23	20.25	60.35
	10	24	23.20	63.35
	11	25	25.50	66.50
	12	28	27.92	69 80
	13	29	30.25	73.30
	14	30	32.50	76.95
	15	31	34.90	80.80
	16	32	37.30	84.85
	17	33	39.50	89.10
	18	34	41.50	93.55
29	5	19	12.00	51.70
	6	19	14.40	54.30
	7	21	16.60	57.00
	8	21	19.20	59.85
	9	23	21.70	62.80
	10	24	24.10	65.95
	11	25	26.50	69.25
	12	28	28.98	72.70
	13	29	31.15	76.30
	14	30	33.80	80.15
	15	31	36.23	84.15
	16	32	38.50	88.35
	17	33	41.05	92.75
	18	34	43.45	97.35
30	5	19	12.50	53.85
	6	20	16.00	56.55
	7	23	17.40	59.35
	8	24	20.00	62.30
	9	25	22.45	65.45
	10	26	24.90	68.70
	11	27	27.40	72.15
	12	28	29.50	75.75
	13	29	32.25	79.50
	14	32	34.90	83.45
	15	33	37.40	87.65
	16	34	39.25	92.00
	17	35	42.20	96.60
	18	36	44.50	101.45
31	5	19	12.86	56.10
	6	20	15.40	58.90
	7	21	18.00	61.85
	8	25	20.58	64.95
	9	26	23.00	68.15
	10	26	25.73	71.55
	11	27	28.30	75.15
	12	28	30.50	78.90
	13	29	33.20	82.90
	14	32	36.00	87.05
	15	33	38.59	91.35
	16	34	41 10	95.90
	17	35	43.50	100.70
	18	36	46.31	105.75
32	5	19	13.28	58.40
	6	20	15.94	61.30
	7	21	18.60	64.40
	8	25	21.20	67.60
	9	26	23.90	70.95
	10	27	26.56	74.50
	11	28	29.22	78.20
	12	29	32.88	82.15
	13	30	34.24	86.25
	14	31	37.19	90.55
32	15	32	39.60	95.05
	16	34	42.20	99.80
	17	35	45.10	104.80
	18	36	46.81	110.05
33	5	19	13.50	60.85
	6	20	16.10	63.90
	7	21	19.10	67.10
	8	22	21.50	70.45
	9	23	24.10	73.95
	10	26	27.15	77.65
	11	28	30.00	81.65
	12	29	32.05	85.70
	13	30	34.90	90.00
	14	32	38.00	94.50
	15	33	41.00	98.20
	16	34	43.85	103.15
	17	35	46.53	108.30
	18	36	49.00	113.70
34	5	19	14.00	63.35
	6	20	16.90	66.50
	7	21	19.50	69.85
	8	22	22.00	73.30
	9	23	25.15	76.95
	10	27	28.00	80.85
	11	28	31.00	84.45
	12	29	33.50	89.10
	13	30	36.50	93.55
	14	32	39.10	98.20
	15	34	42.30	103.15
	16	36	45.19	108.30
	17	36	48.00	113.70
	18	37	50.50	119.40
35	5	19	14.54	66.00
	6	20	17.40	69.30
	7	21	20.25	72.70
	8	22	23.20	76.35
	9	23	26.00	80.15
	10	26	29.00	84.15
	11	28	31.50	88.35
	12	29	35.00	92.75
	13	30	37.50	97.40
	14	33	40.50	102.25
	15	34	43 62	107.35
	16	35	46.20	112.70
	17	36	49.50	118.35
	18	37	51.35	124.25
36	5	19	14.96	68.80
	6	21	17.96	72.20
	7	22	20.90	75.80
	8	23	23.50	79.60
	9	24	26.25	83.60
	10	27	29.10	87.75
	11	28	32.15	92.15
	12	29	35.25	96.75
	13	30	38.50	101.60
	14	33	41.00	106.65
	15	34	44.50	112.00
	16	35	47.10	117.55
	17	38	50.20	123.45
	18	39	53.25	129.60
	19	40	56.25	136.10
	20	41	59.25	142.90
37	5	19	15.25	71.50
	6	20	18.25	75.05
	7	21	21.25	78.80
	8	25	24.50	82.75
	9	26	27.50	86.90
	10	27	30.76	91.25
	11	28	33.80	95.80
	12	31	36.50	100.55
	13	32	39.90	105.60
	14	33	43.00	110.85
	15	34	46.00	116.40
	16	35	49.00	122.20
	17	37	52.00	128.30
	18	38	55.25	134.70
	19	39	58.25	141.45
	20	40	61.25	148.50
38	5	19	15.80	74.35
	6	20	18.50	78.05
	7	23	22.12	81.95
	8	24	25.29	86.05
	9	26	28.20	90.35
	10	29	31.00	94.85
	11	30	34.76	99.60
	12	31	37.25	104.60
38	13	34	41.00	109.80
	14	34	44.00	115.30
	15	35	47.00	121.05
	16	36	50.50	127.10
	17	37	53.73	133.45
	18	39	56.25	140.10
	19	40	59.90	147.10
	20	41	63.00	154.45
39	5	19	16.20	77.35
	6	20	19.40	81.20
	7	23	22.25	85.25
	8	24	25.75	89.55
	9	25	29.00	94.00
	10	28	32.00	98.70
	11	29	35.25	103.65
	12	30	38.50	108.80
	13	31	42.00	114.25
	14	34	45.00	119.95
	15	35	48.25	125.95
	16	36	52.25	132.25
	17	37	55.00	138.85
	18	38	57.50	145.80
	19	39	61.25	153.05
	20	40	64.00	160.70
40	5	21	16.00	80.40
	6	22	19.25	84.40
	7	23	23.00	88.65
	8	27	26.25	93.05
	9	28	29.50	99.70
	10	29	33.00	102.60
	11	30	36.50	107.75
	12	31	39.50	113.10
	13	32	43.27	118.75
	14	33	45.00	124.70
	15	34	48.00	130.90
	16	35	51.25	137.45
	17	36	54.10	144.35
	18	39	57.75	151.55
	19	40	61.00	159.15
	20	41	64 00	167.10
	21	43	67.00	174.45
	22	44	69.25	184.20
	23	45	73.00	193.40
	24	46	76.25	203.05
41	5	22	16.50	83.65
	6	23	20.00	87.85
	7	26	23.00	92.20
	8	27	26.50	96.85
	9	28	30.00	101.65
	10	31	33.00	106.75
	11	32	36.00	112.10
	12	33	39.50	117.70
	13	34	43.00	123.55
	14	35	46.00	129.70
	15	36	49.00	136.20
	16	38	52.25	143.00
	17	39	56.00	150.15
	18	40	59.00	157.65
	19	41	62.00	165.55
	20	42	66.00	173.80
	21	43	69.00	182.50
	22	44	72.00	191.70
	23	46	75.00	201.30
	24	47	78.00	211.35
42	5	23	17.00	86.95
	6	24	20.00	91.30
	7	25	24.00	95.85
	8	26	27.00	100.55
	9	27	30.00	105.55
	10	31	33.50	110.85
	11	32	37.00	116.40
	12	33	40 25	122.20
	13	34	44.00	128.30
	14	35	47.00	134.70
	15	36	50.25	141.45
	16	38	53.75	148.50
	17	39	57.00	155.95
	18	40	60.00	163.75
	19	41	64 00	171.90
	20	43	67.00	180.50
	21	44	70.00	189.50
	22	45	74.00	199.00
	23	46	77.00	208.95
	24	47	80.00	219.35
43	5	24	18.00	90.45
	6	25	21.00	94.95
	7	26	24.00	99.70

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PRICES, FIGS. 4208 AND 4209.

Diam. of pulley.	Face of pulley.	Space on shaft including collar.	H. P. 100 rev.	Prices of clutch and pulley.
43	8	27	27.75	104.70
	9	28	31.00	109.90
	10	32	35.00	115.40
	11	33	38.00	121.20
	12	34	41.00	127.25
	13	35	45.00	133.60
	14	36	48.00	140.25
	15	37	52.00	147.25
	16	39	55.00	154.65
	17	40	58.25	162.35
	18	41	62.00	170.45
	19	42	65.00	178.95
	20	43	69.00	187.90
	21	44	72.00	197.30
	22	45	75.75	207.15
	23	46	79.00	217.50
	24	47	82.00	228.36
44	5	24	18.00	94.05
	6	25	21.00	98.75
	7	26	25.00	103.70
	8	27	28.00	108.85
	9	28	32.00	114 30
	10	32	35.00	120.00
	11	33	39.00	126.00
	12	34	42.00	132.30
	13	35	46.00	138.90
	14	36	49.25	145.85
	15	37	53.00	153.15
	16	39	56.00	160.80
	17	40	60.00	168.85
	18	41	63.00	177.30
	19	42	67.00	186.15
	20	43	70.00	195.45
	21	44	74.00	205.20
	22	45	77.00	215.45
	23	46	81.00	226.25
	24	47	84.00	237.55
45	5	24	18.00	97.80
	6	25	22.00	102 70
	7	26	25.00	107.80
	8	27	29.00	113.20
	9	28	33.00	118.85
	10	32	36.00	124.80
	11	33	40.00	131.05
	12	34	43.00	137.60
	13	35	47.00	144.50
	14	36	50.25	151.70
	15	37	54.25	159.30
	16	39	58.10	167.25
	17	40	61.50	175.60
	18	41	65.60	184.40
	19	42	68.25	193.60
	20	43	72.00	203.30
	21	44	75.50	213.45
	22	45	79.50	224.10
	23	46	83.00	235.30
	24	47	86.75	247.05
46	5	24	19.50	101.70
	6	25	22.25	106.80
	7	26	26.50	112.10
	8	27	30.25	117.70
	9	28	33.50	123.60
	10	32	37.50	129.70
	11	33	41.50	136.25
	12	34	44.25	143.05
	13	35	48.50	150.20
	14	36	52.25	157.70
	15	37	55.75	165.55
	16	39	59.25	173.85
	17	40	63.50	182.55
	18	41	66.75	191.65
	19	42	69.95	201.25
	20	43	74.25	211.30
	21	44	77.25	221.25
	22	45	81.25	232.95
	23	46	84.50	244.60
	24	47	88.50	256.80
	25	48	92.00	269.65
	26	49	95.00	283.10
47	5	24	18 90	105.80
	6	25	23.00	111.10
	7	26	27.00	116.65
	8	27	30.25	122.45
	9	28	34.25	128.60
	10	32	38.50	135.00
	11	33	42.00	141.75
	12	34	45.25	148.85
	13	35	49.00	156.35
47	14	36	53.50	164.15
	15	36	56.00	172.35
	16	38	59.90	180.95
	17	39	64.20	190.00
	18	41	68.10	199.50
	19	42	72.00	209.45
	20	43	76.00	217.90
	21	44	78.50	228.80
	22	45	83.00	240.25
	23	46	86 00	252.25
	24	47	90.00	264.85
	25	48	94.00	278.10
	26	49	97.25	292.00
48	5	24	19.50	110.00
	6	25	23.00	115.50
	7	26	27.25	121.25
	8	27	31.50	127.35
	9	28	35.50	133.70
	10	32	39.00	140.35
	11	33	42.50	147.40
	12	34	46.25	154.75
	13	35	50.25	162.45
	14	36	54.00	170.60
	15	38	58.00	179.15
	16	39	61.25	188.10
	17	41	65.00	197.50
	18	42	69.00	207.35
	19	43	73.00	217.70
	20	44	76.50	228.60
	21	45	79.25	240.00
	22	46	84.00	252.00
	23	47	88.00	264.60
	24	49	91.75	277.85
	25	50	95.50	291.70
	26	51	99.25	306.30
49	5	24	20.00	114.40
	6	25	24.00	120.10
	7	26	27.75	126.10
	8	27	31.50	132.40
	9	28	35.00	139.05
	10	32	39.25	146.00
	11	33	43.00	153.30
	12	34	47.00	160.95
	13	35	51.00	169.00
	14	36	54.75	177.40
	15	38	58.75	186.40
	16	39	62.50	195.70
	17	40	66.25	205.50
	18	42	70.25	215.75
	19	43	74.00	226.55
	20	44	78.00	237.85
	21	45	82 00	249.75
	22	46	86.00	262.20
	23	47	89.50	275.30
	24	48	93.75	289.05
	25	49	97.50	303.50
	26	50	101.25	318.70
50	6	24	24.00	123.75
	7	25	28.00	129.95
	8	26	32.00	136.40
	9	27	36.00	143.30
	10	32	40.00	150.45
	11	33	44.00	157.95
	12	34	48.00	165.85
	13	35	52.00	174.15
	14	36	56.00	182.85
	15	38	60.00	192.00
	16	39	64.25	201.60
	17	40	68.00	211.65
	18	42	71.75	222.25
	19	43	76.00	233.35
	20	44	81.00	245.00
	21	45	84.75	257.25
	22	46	87.75	270.10
	23	47	91.50	283.60
	24	48	95.75	297.80
	25	49	99.50	312.65
	26	50	103.00	328.30
	27	51	107.00	344.70
	28	52	111.25	361.95
51	6	24	25.00	126.20
	7	25	29.00	132.55
	8	26	30.00	139.15
	9	27	37.00	146.10
	10	32	41.00	153.40
	11	33	45.00	161.05
	12	34	49.00	169.10
	13	35	53 00	177.55
51	14	36	57.00	186.45
	15	38	61.00	195.75
	16	39	65.00	205.55
	17	40	69.00	215.80
	18	41	73.00	226.60
	19	42	77.00	237.95
	20	43	80.50	249.80
	21	44	85.00	262.30
	22	45	90.25	274.40
	23	46	93.25	288.15
	24	48	97 50	302.55
	25	49	102.00	317.65
	26	50	105.25	333.55
	27	51	109.25	350.20
	28	52	113.50	367.70
52	6	24	25.00	128.75
	7	25	29.00	135.15
	8	26	30.25	141.90
	9	27	37.50	149.00
	10	32	41.25	156.45
	11	33	46.00	164.25
	12	34	50.00	172.50
	13	35	54.00	181.10
	14	36	58.00	190.15
	15	39	62.25	199.65
	16	40	66.50	209.65
	17	41	70.75	220.10
	18	42	75.00	231.10
	19	43	79.00	242.50
	20	44	83.00	254.75
	21	45	87.00	267.45
	22	46	91.00	280.85
	23	47	95.00	294.85
	24	49	99.25	309.60
	25	50	103.25	325.10
	26	51	107.75	341.35
	27	52	112.00	358.40
	28	53	116.00	376.30
53	6	24	26.00	131.30
	7	25	30.00	137.85
	8	26	34.00	144.75
	9	27	38.25	152.00
	10	32	42.50	159.55
	11	33	47.00	167.55
	12	34	51.00	175.90
	13	35	55.00	184.70
	14	36	59.25	193.95
	15	37	63.75	203.60
	16	38	68.00	213.80
	17	39	72.00	224.45
	18	40	76.00	235.70
	19	41	80.00	247.45
	20	42	84.75	259.75
	21	43	88.50	272.75
	22	44	93.00	286.40
	23	45	97.00	300.70
	24	46	101.25	315.75
	25	50	105.50	331.50
	26	51	110.00	348.10
	27	52	114.00	365.50
	28	53	118.00	383.75
54	6	24	26.00	133.95
	7	25	30.25	140.65
	8	26	35.00	147.65
	9	27	39.00	155.05
	10	32	43.00	162.80
	11	33	47.50	170.95
	12	34	52.00	179.50
	13	35	56.00	188.45
	14	36	60.00	197.85
	15	37	65.00	207.75
	16	40	69.00	218.15
	17	41	73.00	229.05
	18	43	77.25	240.50
	19	44	81.25	252.50
	20	45	86.00	265.15
	21	46	89.25	278.40
	22	47	94.00	292.30
	23	48	99.00	306.90
	24	49	103.00	322.25
	25	50	107.00	338.35
	26	51	111.50	355.25
	27	52	116.00	373.00
	28	53	120.00	391.65
55	6	25	26.50	136.60
	7	26	31.00	143.45
	8	27	35.00	150.65
	9	28	39.50	158.15
55	10	32	44.00	166.05
	11	33	48.25	174.35
	12	34	53.00	183.05
	13	35	57.00	192.20
	14	38	61.25	201.80
	15	39	66.00	211.85
	16	40	70.00	222.45
	17	41	74.25	233.55
	18	44	79.00	245.25
	19	45	83.00	257.50
	20	46	87.50	270.35
	21	47	92.00	283.55
	22	48	96.25	298.05
	23	49	100.75	312.95
	24	51	105.00	328.60
	25	52	109.00	345.05
	26	53	114.00	362.30
	27	54	118.00	380.40
	28	55	122.00	399.40
56	6	25	27.00	139.35
	7	26	31.50	146.30
	8	27	36.00	153.60
	9	31	40.25	161.30
	10	32	45.00	169.35
	11	33	49.00	177.80
	12	34	54.00	186.70
	13	35	58.00	196.05
	14	38	62.75	205.85
	15	39	67.00	216.10
	16	40	71.00	226.90
	17	41	76.00	238.25
	18	44	80.00	250.75
	19	45	85.75	263.30
	20	46	89.00	276.45
	21	47	93.75	290.30
	22	48	99.00	304.80
	23	49	102.00	320.00
	24	51	107.00	336.00
	25	52	111.00	352.80
	26	53	115.75	370.45
	27	54	120.00	388.95
	28	55	124.75	408.40
	29	56	129.00	428.80
	30	57	133.25	450.25
57	6	25	27.50	142.10
	7	26	32.00	149.20
	8	27	36.50	156.65
	9	28	41.00	164.50
	10	33	45.75	172.70
	11	34	50.00	181.35
	12	35	55.00	190.40
	13	36	59.00	199.90
	14	38	64.00	209.90
	15	39	68.00	220.40
	16	40	73.00	231.40
	17	41	77.00	242.95
	18	44	82.00	254.10
	19	45	86.00	266.80
	20	46	90.25	280.10
	21	47	95.00	294.10
	22	48	100.25	308.80
	23	49	104.00	324.25
	24	50	109.00	340.45
	25	51	113.00	357.45
	26	52	118.00	375.35
	27	53	122.00	394.10
	28	54	127.00	413.80
	29	55	131.00	434.50
	30	56	136.00	451.85
58	6	25	28.00	144.95
	7	26	33.00	152.20
	8	29	37.00	159.80
	9	30	42.00	167.75
	10	31	46.00	176.15
	11	32	51.00	184.95
	12	33	55.75	194.20
	13	37	60.00	203.90
	14	38	65.00	214.10
	15	39	69.00	224.80
	16	40	74.00	236.05
	17	41	79.00	247.85
	18	42	83.00	260.24
	19	43	88.00	273.25
	20	46	92.00	286.90
	21	47	97.00	301.25
	22	48	101.00	316.30
	23	49	106.00	332.10
	24	50	111.00	348.70
	25	51	115.00	366.15

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PRICES, FIGS. 4208 AND 4209.

Diam. of pulley.	Face of pulley.	Space on shaft including collar.	H. P. 100 rev.	Prices of clutch and pulley.
58	26	52	120.00	384.45
	27	53	124.00	403.65
	28	54	129.00	423.85
	29	55	134.00	445.00
	30	56	138.00	467.25
59	6	25	29.00	147.85
	7	26	33.00	155.25
	8	28	38.00	163.00
	9	29	43.00	171.15
	10	30	47.00	179.50
	11	31	52.00	188.45
	12	32	57.00	197.85
	13	35	61.00	207.75
	14	36	66.00	218.15
	15	37	71.00	229.05
	16	42	75.00	240.50
	17	43	80.00	252.50
	18	44	85.00	265.15
	19	45	89.00	278.40
	20	46	94.00	292.30
	21	47	99.00	306.90
	22	48	103.00	322.25
	23	49	108.00	338.35
	24	50	113.00	355.25
	25	51	117.00	373.00
	26	52	122.00	391.65
	27	53	127.00	411.25
	28	54	131.00	430.10
	29	55	136.00	452.00
	30	56	141.00	470.05
60	8	29	39.00	199.20
	10	32	48.00	215.15
	12	35	58.00	232.35
	14	38	67.00	250.90
	16	40	77.00	271.00
	18	42	86.00	292.65
	20	44	96.00	316.05
	22	48	105.00	341.35
	24	50	115.00	368.65
	26	53	124.00	398.15
	28	56	134.00	434.00
	30	57	143.00	473.00
	32	58	153.00	515.55
	34	60	162.00	561.95
	36	61	172.00	612.55
62	8	29	40.00	207.15
	10	32	50.00	224.75
	12	35	59.00	242.70
	14	39	69.00	262.10
	16	42	79.00	283.10
	18	45	89.00	305.70
	20	46	99.00	330.15
	22	48	109.00	355.55
	24	50	118.00	384.00
	26	52	128.00	414.75
	28	54	138.00	447.90
	30	56	148.00	483.75
	32	58	158.00	522.40
	34	60	167.00	569.45
	36	62	177.00	620.55
64	8	30	41.00	215.45
	10	32	51.00	232.70
	12	37	61.00	251.30
	14	39	71.00	271.40
	16	42	82.00	293.10
	18	44	92.00	316.55
	20	46	102.00	341.85
	22	48	112.00	369.20
	24	50	122.00	398.75
	26	52	132.00	430.60
	28	54	142.00	465.05
	30	56	153.00	502.25
	32	59	163.00	542.45
	34	61	173.00	585.85
	36	63	183.00	632.70
66	8	30	42.00	224.05
	10	32	53.00	241.95
	12	38	63.00	261.30
	14	40	74.00	282.20
66	16	42	84.00	304.80
	18	44	95.00	329.15
	20	46	105.00	355.50
	22	48	116.00	383.95
	24	50	126.00	414.65
	26	52	136.00	447.80
	28	55	147.00	483.60
	30	57	157.00	522.30
	32	59	168.00	558.85
	34	61	178.00	598.00
	36	63	189.00	639.85
68	8	30	44.00	233.00
	10	36	54.00	251.65
	12	38	65.00	271.75
	14	40	76.00	293.50
	16	42	87.00	314.30
	18	44	98.00	339.45
	20	46	108.00	366.60
	22	48	119.00	395.90
	24	50	130.00	427.85
	26	52	141.00	462.05
	28	54	151.00	494.40
	30	56	162.00	529.00
	32	58	173.00	566.00
	34	60	184.00	605.65
	36	62	195.00	648.05
	38	64	205.00	693.40
70	8	31	45.00	242.35
	10	33	56.00	261.75
	12	35	67.00	282.65
	14	37	78.00	305.25
	16	43	89.00	329.70
	18	45	100.00	356.05
	20	47	112.00	384.55
	22	49	123.00	415.30
	24	51	134.00	444.35
	26	53	145.00	475.45
	28	55	156.00	508.75
	30	57	167.00	544.35
	32	59	178.00	582.45
	34	63	189.00	623.25
	36	66	200.00	666.85
	38	68	211.00	713.50
72	8	31	46.00	252.05
	10	33	58.00	272.20
	12	35	69.00	294.00
	14	37	80.00	317.50
	16	43	92.00	342.90
	18	45	103.00	370.30
	20	47	115.00	396.25
	22	49	126.00	423.95
	24	51	138.00	453.65
	26	53	149.00	485.40
	28	55	160.00	519.35
	30	56	172.00	555.70
	32	58	183.00	594.60
	34	65	195.00	636.25
	36	67	206.00	680.80
	38	69	217.00	728.45
74	8	32	47.00	262.10
	10	34	59.00	283.05
	12	36	71.00	305.70
	14	38	83.00	330.15
	16	43	94.00	353.25
	18	45	106.00	378.00
	20	47	118.00	404.45
	22	49	130.00	432.75
	24	51	141.00	463.05
	26	53	153.00	495.45
	28	55	165.00	530.10
	30	57	177.00	567.20
	32	63	188.00	606.90
	34	65	200.00	649.40
	36	67	212.00	694.85
	38	69	224.00	743.50
76	8	32	49.00	272.60
	10	34	61.00	294.40
	12	36	73.00	315.00
	14	38	85.00	337.05
76	16	43	97.00	360.65
	18	45	109.00	385.90
	20	47	121.00	412.90
	22	49	133.00	441.80
	24	51	145.00	472.70
	26	53	157.00	505.80
	28	55	169.00	541.20
	30	63	181.00	579.05
	32	65	193.00	619.60
	34	67	206.00	662.95
	36	69	218.00	709.35
	38	71	230.00	759.00
78	8	32	50.00	283.50
	10	34	62.00	303.35
	12	36	75.00	324.55
	14	38	87.00	347.30
	16	43	100.00	371.60
	18	45	112.00	397.60
	20	51	124.00	425.40
	22	53	137.00	455.20
	24	55	150.00	487.05
	26	57	161.00	521.15
	28	59	174.00	567.60
	30	61	186.00	596.65
	32	63	199.00	638.40
	34	65	211.00	683.10
	36	67	222.00	730.90
	38	69	236.00	782.10
80	10	34	64.00	315.00
	12	36	77.00	337.60
	14	41	89.00	361.25
	16	43	102.00	386.50
	18	49	115.00	413.55
	20	51	128.00	442.50
	22	53	140.00	473.45
	24	55	153.00	506.60
	26	57	166.00	542.10
	28	59	178.00	580.00
	30	61	191.00	620.60
	32	63	204.00	664.05
	34	65	216.00	710.55
	36	67	229.00	760.25
	38	69	242.00	810.45
	40	71	256.00	870.40
	42	73	267.00	931.35
82	10	34	66.00	328.10
	12	36	79.00	351.10
	14	41	92.00	375.65
	16	47	105.00	401.95
	18	49	118.00	430.10
	20	51	131.00	460.15
	22	53	144.00	492.40
	24	55	157.00	526.85
	26	57	170.00	563.70
	28	59	183.00	603.15
	30	61	196.00	645.40
	32	63	209.00	690.55
	34	65	222.00	738.90
	36	67	234.00	790.60
	38	69	248.00	845.90
	40	71	261.00	905.15
	42	73	274.00	968.50
84	10	37	67.00	341.20
	12	39	81.00	365.10
	14	41	94.00	390.65
	16	47	107.00	418.00
	18	49	121.00	447.25
	20	51	134.00	478.55
	22	53	147.00	512.05
	24	55	161.00	547.85
	26	57	174.00	586.20
	28	59	188.00	627.25
	30	61	201.00	671.15
	32	63	214.00	718.15
	34	65	228.00	768.40
	36	67	241.00	822.15
	38	73	254.00	879.70
	40	75	268.00	941.30
	42	77	280.00	1,007.20
90	12	39	86.00	410.60
	14	41	101.00	439.35
	16	43	115.00	470.10
	18	49	129.00	503.00
	20	51	143.50	538.20
	22	53	158.00	575.85
	24	55	172.00	616.15
	26	57	186.00	659.30
	28	59	201.00	705.45
	30	61	215.00	754.85
	32	63	229.00	807.65
	34	65	243.50	864.20
	36	70	258.00	924.70
	38	72	272.00	989.40
	40	74	287.00	1,058.65
	42	76	301.00	1,132.75
96	12	39	92.00	461.85
	14	41	107.00	494.20
	16	43	122.00	520.80
	18	49	138.00	565.80
	20	51	153.00	605.40
	22	53	168.00	647.75
	24	55	183.00	693.10
	26	57	199.00	741.60
	28	63	214.00	793.55
	30	65	229.00	849.05
	32	67	244.00	908.50
	34	69	260.00	972.05
	36	71	275.00	1,040.10
	38	73	290.00	1,112.90
	40	75	305.00	1,190.80
	42	77	321.00	1,274.15
102	14	44	114.00	555.90
	16	46	130.00	594.80
	18	48	146.00	636.45
	20	50	162.00	681.00
	22	52	178.00	728.65
	24	58	195.00	779.65
	26	60	211.00	834.20
	28	62	227.00	892.60
	30	64	243.00	955.10
	32	66	259.00	1,021.95
	34	68	276.00	1,093.50
	36	70	292.00	1,170.05
	38	77	308.00	1,251.95
	40	79	324.00	1,339.55
	42	81	340.00	1,433.30
108	14	44	120.00	625.30
	16	46	138.00	669.05
	18	48	155.00	715.90
	20	54	172.00	766.00
	22	56	189.00	819.65
	24	58	206.00	877.10
	26	60	223.00	938.40
	28	62	240.00	1,004.05
	30	64	258.00	1,074.35
	32	66	275.00	1,149.55
	34	68	292.00	1,230.00
	36	75	309.00	1,316.10
	38	77	326.00	1,408.20
	40	79	343.00	1,506.80
	42	81	360.00	1,612.25
114	14	48	127.00	703.35
	16	50	145.00	752.60
	18	52	163.00	805.25
	20	54	181.00	861.60
	22	56	199.00	921.90
	24	58	217.00	986.45
	26	60	236.00	1,055.50
	28	62	254.00	1,129.35
	30	64	272.00	1,208.40
	32	71	290.00	1,293.00
	34	73	308.00	1,383.50
	36	75	326.00	1,480.35
	38	77	344.00	1,583.95
	40	79	362.00	1,694.80
	42	81	380.00	1,813.45
	44	83	398.00	1,940.40

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CUT-OFF CLUTCH COUPLINGS AND CLUTCH PULLEYS.

FOUR ARM CUT-OFF.

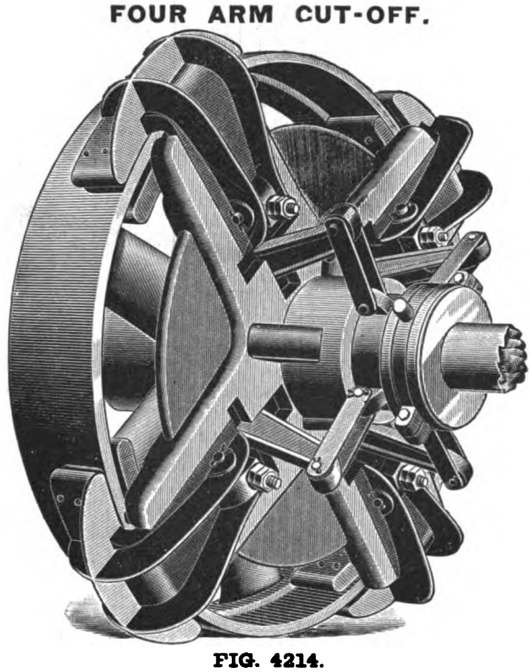


FIG. 4214.

These couplings operate upon the same principle as the friction clutch pulleys, Fig. 4208. The ring is keyed to the driving shaft and the clutch to the driven, or *vice versa*, permitting the instantaneous stopping or starting of that portion of the shafting which lies beyond the clutch.

They are perfectly balanced, fitted with straight keys and set screws, and may be run at any speed desired.

The horse power indicated is for four arms. A corresponding increase will be obtained if six arm clutch is used. We have patterns for six arm clutches in principal sizes, and prices will be quoted upon application.

The friction clutch coupling is furnished with an interchangeable brass sleeve bearing which, when it becomes worn, can be easily and cheaply replaced with a new one, thus giving an entirely new bearing.

PRICES, FIG. 4214.

Largest shaft to which clutch can be fitted.	Diameter of clutch.	Space on shaft.	Horse power, 100 revolutions.	Prices of coupling complete.
2 inch.	12 inch.	15¼ inch.	3	$45.00
3¼ "	14 "	15¼ "	4	50.00
3¼ "	16 "	17⅝ "	5	55.00
4 "	18 "	18⅛ "	7	60.00
4¼ "	20 "	18¼ "	10	73.00
4¼ "	22 "	21 1/16 "	14	85.00
4½ "	24 "	23¾ "	19	100.00
4½ "	26 "	23¾ "	23	110.00
4½ "	28 "	24¼ "	26	118.00
4¾ "	30 "	26⅞ "	30	125.00
5½ "	33 "	27 "	34	140.00
6 "	36 "	29 15/16 "	53	160.00
6¾ "	40 "	32 7/16 "	75	260.00
7 "	42 "	34 9/16 "	90	270.00
7¼ "	48 "	38 "	105	360.00
9 "	54 "	40 11/16 "	175	460.00
9½ "	60 "	43 "	280	700.00
11 "	72 "	48 "	410	850.00

HUB FRICTION CUT-OFF COUPLING.

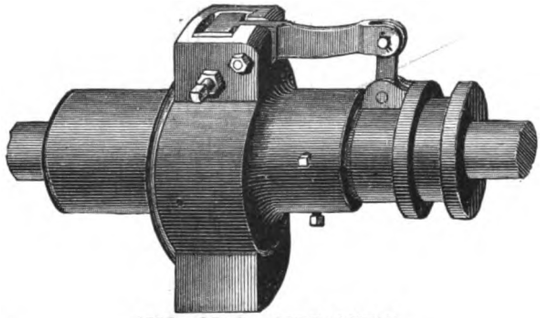


FIG. 4215. SIDE VIEW.

PRICES, FIG. 4215.

1 No. of clutch or diameter of hub.	2 Price of clutch or cut-off coupling.	3 Price of shifter fork.	4 Face of hub.	5 Largest diameter of shaft on which the clutch can be used.	6 Extreme outside diameter or sweep of clutch.	7 Space occupied on shaft, including movement of spool.	8 Size of shaft equal in power to clutch at 150 revolutions.	9 H. P. for clutch.
3	$16 00	$4.25	1½ in.	1 7/16 in.	8½ in.	10½ in.	15/16 in.	3
3½	18.00	4.50	2 "	1 11/16 "	9 "	12 "	1 1/16 "	3½
4	20.00	4.75	2½ "	1 15/16 "	9½ "	13¼ "	1 3/16 "	4
4½	25.00	5.00	2½ "	2 3/16 "	10½ "	14½ "	1 5/16 "	5
5	30 00	5 25	2¾ "	2 7/16 "	11¼ "	15½ "	1 7/16 "	6½
5½	38.00	5.50	2¾ "	2 11/16 "	12 "	16½ "	1 9/16 "	8
6	45.00	6.00	3 "	2 15/16 "	13 "	18½ "	1 11/16 "	10
6½	52.00	6.50	3¼ "	3 3/16 "	13¾ "	19½ "	1 13/16 "	12½
7	60.00	7.00	3½ "	3 7/16 "	14½ "	20½ "	1 15/16 "	16
7½	68.00	7.50	3½ "	3 15/16 "	15 "	21½ "	2 1/16 "	20
8	75.00	8.00	4 "	4 7/16 "	15¾ "	22½ "	2 3/16 "	25
9	90.00	9.00	4½ "	5 3/16 "	17½ "	24½ "	2 5/16 "	35
10	110.00	10.00	5 "	5 15/16 "	19 "	26 "	2 7/16 "	45
11	130.80	11.00	6 "	6 15/16 "	20½ "	28 "	2 11/16 "	60
12	150.00	12.00	6 "	7 15/16 "	22 "	30 "	2 15/16 "	75
13	175.00	13.00	6 "	8 15/16 "	23½ "	31½ "	3 3/16 "	90
14	200.00	14.00	6 "	8 15/16 "	25 "	33½ "	3 7/16 "	105
15	225.00	15.00	6 "	8 15/16 "	26¼ "	35½ "	3 7/16 "	125
16	250.00	16.00	6 "	8 15/16 "	27½ "	37½ "	3 11/16 "	150
18	275.00	18.00	6 "	8 15/16 "	30 "	41½ "	3 15/16 "	175
20	300.00	20.00	6 "	8 15/16 "	32½ "	44½ "	4 3/16 "	210
22	325 00	21.00	6 "	8 15/16 "	35 "	47 "	4 7/16 "	250
24	350.00	22.00	6 "	8 15/16 "	37½ "	49½ "	4 11/16 "	300
28	400.00	25.00	6 "	8 15/16 "	50 "	53 "	4 15/16 "	350

DIRECTIONS TO GIVE IN ORDERING CUT-OFF COUPLINGS.

In ordering cut-off couplings, if the speed is less than 150 turns per minute, give number of clutch and size of shaft.

If the speed is over 150 turns per minute, give number of clutch, size and speed of shaft and horse power required.

EXPLANATION OF TABLE OF PRICES.

Column 1.—In this column the number of clutch is merely an arbitrary number by which the different sizes of clutches can be conveniently designated. For this purpose we have taken the outside diameter of the wood-filled ring, or hub, in inches.

Column 2 and 3. Prices. Boxing for shipment will be charged extra to the price quoted in list.

Column 4. Face of hub, or width of the steel clasping ring.

Column 5.—Here we give the limit of size of shaft on which the clutch can be used, or in other words, the greatest bore which can be made in the clutch. If any given clutch is wanted on a larger shaft than indicated in these columns, the shaft must be turned down at least to the size here given.

Column 6.—These figures give the extreme diameter outside of all projections.

Column 7.—Here we give the length occupied on shaft from outside of hub on one side to outside of spool on other side, including movement of spool. The measures are accurate and invariable for cut-off couplings, but in clutch pulleys their length may vary somewhat, being less for narrow faced pulleys; but the length given would not probably be exceeded for even the widest pulley for which a clutch would be used.

Column 8.—In this column we give the largest size of shaft for which we recommend our clutches when the clutch is to transmit a power equal to the full strength of the shaft, and when the shaft has a speed not exceeding 150 turns per minute. That is, the corresponding clutch is fully equal in power and strength to the shaft of the size given, and will do as much work as the shaft will do. For higher speeds than 150 turns, we recommend a larger size clutch for a given shaft than is indicated in the table; and for high speeds we construct the clutch somewhat different than for slow speeds. The clutch can be used on shafts both smaller and larger under certain conditions; on smaller shafts when the speeds are over 150 turns per minute, and on larger shafts when the power to be transmitted does not exceed that indicated in the table.

Column 9.—In this column we give a table showing the horse powers for which we recommend our clutches when running 150 revolutions.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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HUB FRICTION CLUTCH PULLEYS.

PRICES, FIG. 4216.

The price of a hub friction clutch pulley is the combined price of a given clutch, as per the tables on page 400, with the price of a given whole pulley, as per the price-list for pulleys.

DIRECTIONS TO GIVE IN ORDERING CLUTCH PULLEYS.

In ordering clutch pulleys, give diameter and face of pulley, number of clutch and size of shaft, also, speed of pulley and horse-power required.

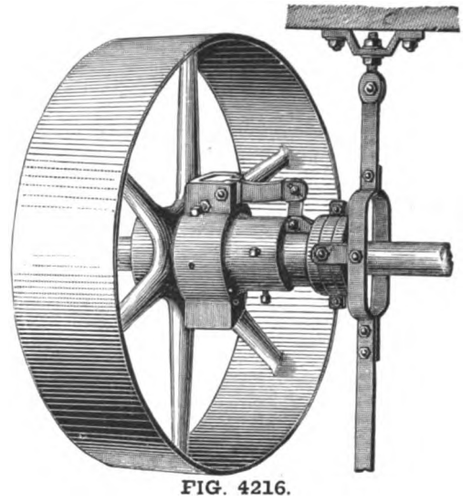


FIG. 4216.

OAK TANNED FLAT LEATHER BELTING.

PRICES, PER RUNNING FOOT.

1 inch	$0.10	3¼ inch	$0.40	8 inch	$1.02	17 inch	$2.31	28 inch	$4.30
1¼ "	.13	3½ "	.43	9 "	1.15	18 "	2.49	30 "	4.64
1½ "	.17	3¾ "	.46	10 "	1.29	19 "	2.66	32 "	5.00
1¾ "	.20	4 "	.50	11 "	1.42	20 "	2.84	34 "	5.35
2 "	.23	4½ "	.56	12 "	1.55	21 "	3.02	36 "	5.70
2¼ "	.26	5 "	.63	13 "	1.68	22 "	3.20	40 "	6.40
2½ "	.30	5½ "	.70	14 "	1.82	23 "	3.37	44 "	7.10
2¾ "	.33	6 "	.76	15 "	1.98	24 "	3.54	48 "	7.80
3 "	.36	7 "	.90	16 "	2 14	26 "	3.92		

Double belts are twice the price of single.

COTTON-LEATHER BELTING.

PRICES, SINGLE COTTON-LEATHER BELTING.

1 inch	$0.10	7 inch	$0.90	22 inch	$3.20
1¼ "	.13	8 "	1.02	24 "	3 54
1½ "	.17	9 "	1.15	26 "	3.92
1¾ "	.20	10 "	1.29	28 "	4.30
2 "	.23	11 "	1.42	30 "	4.64
2¼ "	.26	12 "	1.55	32 "	5.00
2½ "	.30	13 "	1.68	34 "	5.35
2¾ "	.33	14 "	1.82	36 "	5.70
3 "	.36	15 "	1.98	38 "	6.05
3½ "	.43	16 "	2 14	40 "	6.40
4 "	.50	17 "	2.31	42 "	6.75
4½ "	.56	18 "	2.49	44 "	7.10
5 "	.63	19 "	2.66	46 "	7.45
5½ "	.70	20 "	2.84	48 "	7.80
6 "	.76	21 "	3.02		

Equal in strength and durability to the best short lap leather belting made. The tensile strength of this single cotton-leather belting is 900 lbs. per inch of width.

PRICES, LIGHT DOUBLE COTTON-LEATHER BELTING.

2 inch	$0.40	6 inch	$1.35	16 inch	$3.50
2¼ "	.45	7 "	1.55	17 "	3.75
2½ "	.50	8 "	1.75	18 "	4.05
2¾ "	.55	9 "	1.95	19 "	4.30
3 "	.65	10 "	2.15	20 "	4.55
3½ "	.75	11 "	2.35	21 "	4.85
4 "	.85	12 "	2.55	22 "	5.40
4½ "	.95	13 "	2.75	24 "	5.95
5 "	1.05	14 "	3.00		
5½ "	1.15	15 "	3.25		

Equal in strength and durability to the ordinary double leather belting as made and sold. The tensile strength of this double cotton-leather belting is 1,500 lbs. per inch of width.

PRICES, DOUBLE COTTON, COTTON-LEATHER BELTING.

2½ inch	$0.60	11 inch	$2.84	28 inch	$8.60
2¾ "	.66	12 "	3.10	30 "	9.28
3 "	.72	13 "	3.36	32 "	10.00
3½ "	.86	14 "	3.64	34 "	10.70
4 "	1.00	15 "	3.96	36 "	11.40
4½ "	1.12	16 "	4.28	38 "	12.10
5 "	1.26	17 "	4 62	40 "	12.80
5½ "	1.40	18 "	4.98	42 "	13.50
6 "	1.52	19 "	5.32	44 "	14.20
7 "	1.80	20 "	5.68	46 "	14.90
8 "	2.04	22 "	6.40	48 "	15.60
9 "	2.30	24 "	7.08		
10 "	2.58	26 "	7.84		

Equal in strength and durability to the best double leather belt made. The tensile strength of this double cotton-leather belting is 2,020 lbs. per inch of width.

LEATHER BELT CEMENT.

PRICES.

Electric, 1 lb. cans	70c. per lb.
Crescent, 1 lb. lots	80c. " "
" 10 lb. lots	75c. " "
" 25 and 50 lb. lots	60c. " "
Traction belt grease	30c. " "

BELT STUFFING.

PRICES.

5 lb. can, $2.00; 10 lb. can, $3.25; 50 lb. can, $13.00.

SUCCESS DRESSING.

In sticks, per doz $3.00

GRAPHITE BELT GREASE.

In cans and kegs, per lb ..... 30c.

BELT OILS.

Neat's-foot, per gall ..... $.....

STITCHED CANVAS BELTING.



FIG. 4217.

Showing a small piece of stitched canvas belting and the way in which it is sewed.

COTTON BELTING.

PRICES, PER RUNNING FOOT.

TWO-PLY.

1 inch	$0.04	3½ inch	$0.09
1¼ "	.05	4 "	.10
2 "	.06	5 "	.14
2½ "	.07	6 "	.18
3 "	.08		

THREE-PLY.

1½ inch	$0.07	7 inch	$0.28
2 "	.09	8 "	.32
2½ "	.11	9 "	.36
3 "	.13	10 "	.40
3½ "	.15	12 "	.50
4 "	.16	14 "	.62
4½ "	.18	16 "	.75
5 "	.20	18 "	.86
6 "	.24	20 "	.96

FOUR-PLY.

4 inch	$0.21	10 inch	$0.50
4½ "	.24	12 "	.60
5 "	.26	14 "	.75
6 "	.30	16 "	.90
7 "	.34	18 "	1.00
8 "	.38	20 "	1.15
9 "	.44	22 "	1.35

FIVE-PLY.

4 inch	$0.34	10 inch	$0.63
4½ "	.36	12 "	.75
5 "	.38	14 "	.94
5½ "	.40	16 "	1.12
6 "	.42	18 "	1.28
7 "	.45	20 "	1.44
8 "	.50	22 "	1.62
9 "	.56	24 "	1.80

SIX-PLY.

6 inch	$0.46	14 inch	$1.12
7 "	.51	16 "	1.35
8 "	.57	18 "	1.50
9 "	.66	20 "	1.72
10 "	.75	22 "	1.94
12 "	.90	24 "	2.16

EIGHT-PLY.

6 inch	$0.75	14 inch	$1.65
7 "	.83	16 "	1.95
8 "	.91	18 "	2.13
9 "	1.03	20 "	2.43
10 "	1.15	22 "	2.82
12 "	1.35	24 "	3.20

STITCHED CANVAS BELTING.

PRICES, FIG. 4217. FOUR-PLY.

Equal to single leather or four-ply rubber belt.

	Per ft.		Per ft.		Per ft.		Per ft.
1½ inch	$0.14	3½ inch	$0.32	6 inch	$0.54	10 inch	$0.90
2 "	.18	4 "	.36	7 "	.63	11 "	.99
2½ "	.23	4½ "	.41	8 "	.72	12 "	1.08
3 "	.27	5 "	.45	9 "	.81		

PRICES, FIG. 4217. SIX-PLY.

Equal to double leather or six-ply rubber belt.

	Per ft.		Per ft.		Per ft.
3 inch	$0.36	8 inch	$0.96	15 inch	$1.80
3½ "	.42	9 "	1.08	16 "	1.92
4 "	.48	10 "	1.20	17 "	2.04
4½ "	.54	11 "	1.32	18 "	2.16
5 "	.60	12 "	1.44	20 "	2.40
6 "	.72	13 "	1.56	22 "	2.64
7 "	.84	14 "	1.68	24 "	2.88

PRICES, FIG. 4217. EIGHT-PLY.

Stronger than double leather or six-ply rubber belt.

	Per ft.		Per ft.		Per ft.
12 inch	$1.80	22 inch	$3.30	36 inch	$5.40
13 "	1.95	24 "	3.60	38 "	5.70
14 "	2.10	26 "	3.90	40 "	6.00
15 "	2.25	28 "	4.20	42 "	6.30
16 "	2.40	30 "	4.50	44 "	6.60
18 "	2.70	32 "	4.80	46 "	6.90
20 "	3.00	34 "	5.10	48 "	7.20

Endless belts, 3 feet extra for making the splice.

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BELTING.

CANDY STITCHED COTTON DUCK BELTS.

4-PLY.		6-PLY.	
1½ in.	per ft. $0.13½	3 in.	per ft. $0.36
1¾ "	" .15¾	3½ "	" .42
2 "	" .18	4 "	" .48
2¼ "	" .20¼	4½ "	" .54
2½ "	" .22½	5 "	" .60
2¾ "	" .24¾	6 "	" .72
3 "	" .27	7 "	" .84
3½ "	" .31½	8 "	" .96
4 "	" .36	9 "	" 1.08
5 "	" .45	10 "	" 1.20
6 "	" .54	12 "	" 1.44
7 "	" .63	13 "	" 1.56
8 "	" .72	14 "	" 1.68
9 "	" .81	15 "	" 1.80
10 "	" .90	16 "	" 1.92
11 "	" .99	17 "	" 2.04
12 "	" $1.08	18 "	" 2.16

8-PLY.		10-PLY.	
6 in.	per ft. .90	12 in.	per ft. $2.40
7 "	" $1.05	14 "	" 2.80
8 "	" 1.20	15 "	" 3.00
9 "	" 1.35	16 "	" 3.20
10 "	" 1.50	18 "	" 3.60
11 "	" 1.65	20 "	" 4.00
12 "	" 1.80	22 "	" 4.40
14 "	" 2.10	24 "	" 4.80
15 "	" 2.25	26 "	" 5.20
16 "	" 2.40	28 "	" 5.60
17 "	" 2.55	30 "	" 6.00
18 "	" 2.70	36 "	" 7.20
20 "	" 3.00	40 "	" 8.00
24 "	" 3.60	44 "	" 8.80
30 "	" 4.50	48 "	" 9.60
36 "	" 5.40	54 "	" 10.80
40 "	" 6.00	60 "	" 12.00

Endless belts, 3 feet extra charged for splice.

RAW HIDE BELTS.

SINGLE PLY.

1 in.	per ft. $0.10	17 in.	per ft. $2.31
1¼ "	" .13	18 "	" 2.49
1½ "	" .17	19 "	" 2.66
1¾ "	" .20	20 "	" 2.84
2 "	" .23	21 "	" 3.02
2¼ "	" .26	22 "	" 3.20
2½ "	" .30	23 "	" 3.37
2¾ "	" .33	24 "	" 3.54
3 "	" .36	26 "	" 3.92
3½ "	" .43	28 "	" 4.30
4 "	" .50	30 "	" 4.64
4½ "	" .56	32 "	" 5.00
5 "	" .63	34 "	" 5.35
5½ "	" .70	36 "	" 5.70
6 "	" .76	40 "	" 6.40
6½ "	" .83	44 "	" 7.10
7 "	" .90	48 "	" 7.80
8 "	" 1.02	50 "	" 8.15
9 "	" 1.15	52 "	" 8.50
10 "	" 1.29	54 "	" 8.85
11 "	" 1.42	56 "	" 9.20
12 "	" 1.55	60 "	" 9.90
13 "	" 1.68	64 "	" 10.60
14 "	" 1.82	68 "	" 11.30
15 "	" 1.98	72 "	" 12.00
16 "	" 2.14		

Double belts double above list.

CAMEL'S-HAIR BELTS.

PRICES.

3 in.	per ft. $0.72	15 in.	per ft. $3.96
3½ "	" .86	16 "	" 4.28
3¾ "	" .93	17 "	" 4.63
4 "	" 1.00	18 "	" 4.98
4¼ "	" 1.06	19 "	" 5.32
4½ "	" 1.12	20 "	" 5.68
5 "	" 1.26	21 "	" 6.04
5½ "	" 1.40	22 "	" 6.40
6 "	" 1.52	23 "	" 6.74
6½ "	" 1.66	24 "	" 7.18
7 "	" 1.80	25 "	" 7.46
7½ "	" 1.92	26 "	" 7.84
8 "	" 2.04	27 "	" 8.22
8½ "	" 2.17	28 "	" 8.60
9 "	" 2.30	29 "	" 8.94
9½ "	" 2.44	30 "	" 9.28
10 "	" 2.58	32 "	" 10.00
11 "	" 2.84	34 "	" 10.70
12 "	" 3.10	36 "	" 11.40
13 "	" 3.36	40 "	" 12.80
14 "	" 3.64	42 "	" 13.50

Endless belts made to order by cementing and stitching at a charge of 3 feet, extra, on price list.

HAIR BELTS.

Width.	Per ft.	Width.	Per ft.	Width.	Per ft.	Width.	Per ft.
3 inches	$0.72	7 inches	$1.80	15 inches	$3.96	26 inches	$7.84
3¼ "	.79	7½ "	1.92	16 "	4.28	27 "	8.22
3½ "	.86	8 "	2.04	17 "	4.63	28 "	8.60
3¾ "	.93	8½ "	2.17	18 "	4.98	29 "	8.94
4 "	1.00	9 "	2.30	19 "	5.32	30 "	9.28
4¼ "	1.06	9½ "	2.44	20 "	5.68	32 "	10.00
4½ "	1.12	10 "	2.58	21 "	6.04	34 "	10.70
5 "	1.26	11 "	2.84	22 "	6.40	36 "	11.40
5½ "	1.40	12 "	3.10	23 "	6.74	40 "	12.80
6 "	1.52	13 "	3.36	24 "	7.18	42 "	13.50
6½ "	1.66	14 "	3.64	25 "	7.46		

LEATHER LINK BELTS.

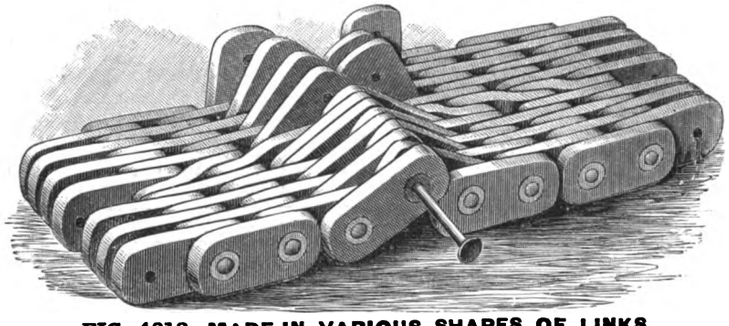


FIG. 4218. MADE IN VARIOUS SHAPES OF LINKS.

Width of belt.	Factory sizes.		Dynamo.	For extra heavy work.	
	7/16 in. thick.	Standard 8/16 in. thick	11/16 in. thick.	7/16 in. thick.	1 in. thick.
1 inch	$0.10	$0.15	$0.25	$0.30	$0.35
1½ "	.15	.23	.38	.45	.52
2 "	.20	.30	.50	.60	.70
2½ "	.25	.38	.63	.75	.87
3 "	.30	.45	.75	.90	1.05
3½ "	.35	.53	.88	1.05	1.22
4 "	.40	.60	1.00	1.20	1.40
4½ "		.68	1.13	1.35	1.57
5 "		.75	1.25	1.50	1.75
5½ "		.83	1.38	1.65	1.92
6 "		.90	1.50	1.80	2.10
7 "		1.05	1.75	2.10	2.45
8 "		1.20	2.00	2.40	2.80
9 "			2.25	2.70	3.15
10 "			2.50	3.00	3.50
11 "			2.75	3.30	3.85
12 "			3.00	3.60	4.20
13 "			3.25	3.90	4.55
14 "			3.50	4.20	4.90
15 "			3.75	4.50	5.25
16 "			4.00	4.80	5.60
18 "			4.50	5.40	6.30
20 "			5.00	6.00	7.00
22 "			5.50	6.60	7.70
24 "			6.00	7.20	8.40
26 "			6.50	7.80	9.10
30 "			7.50	9.00	10.50
36 "			9.00	10.80	12.60

PRICES PER FOOT.

Wider belts should be standard thickness.

Wider sizes should be made of thicker links.

No extra charge for water-proofed belts.
We recommend the dynamo size for all electrical work.

RUBBER BELTS.

TWO-PLY.

1 in.	$0.07	4 in.	$0.30	9 in.	$0.67	15 in.	$1.16
1¼ "	.09	4½ "	.33	10 "	.75	16 "	1.25
1½ "	.11	5 "	.36	11 "	.83	18 "	1.41
2 "	.15	6 "	.43	12 "	.91	20 "	1.58
2½ "	.18	7 "	.51	13 "	1.00	22 "	1.76
3 "	.22	8 "	.59	14 "	1.08	24 "	1.96
3½ "	.26						

THREE-PLY.

2 in.	$0.17	5 in.	$0.43	11 in.	$1.00	18 in.	$1.70
2½ "	.22	6 "	.52	12 "	1.08	20 "	1.90
3 "	.26	7 "	.60	13 "	1.18	22 "	2.12
3½ "	.30	8 "	.70	14 "	1.28	24 "	2.36
4 "	.34	9 "	.80	15 "	1.38	26 "	2.60
4½ "	.39	10 "	.90	16 "	1.50	28 "	2.84

FOUR-PLY.

2 in.	$0.21	8 in.	$0.84	18 in.	$2.02	36 in.	$4.48
2½ "	.26	9 "	.95	20 "	2.26	38 "	4.76
3 "	.31	10 "	1.07	22 "	2.52	40 "	5.04
3½ "	.37	11 "	1.18	24 "	2.80	42 "	5.32
4 "	.42	12 "	1.30	26 "	3.08	44 "	5.60
4½ "	.47	13 "	1.42	28 "	3.36	46 "	5.88
5 "	.52	14 "	1.54	30 "	3.64	48 "	6.16
6 "	.62	15 "	1.66	32 "	3.92		
7 "	.73	16 "	1.78	34 "	4.20		

FIVE-PLY.

8 in.	$1.05	15 in.	$2 07	26 in.	$3.85	38 in.	$5.95
9 "	1.18	16 "	2.22	28 "	4.20	40 "	6.30
10 "	1.33	18 "	2.52	30 "	4.55	42 "	6.65
11 "	1.47	20 "	2.82	32 "	4 90	44 "	7.00
12 "	1.62	22 "	3.15	34 "	5.25	46 "	7.35
13 "	1.77	24 "	3.50	36 "	5.60	48 "	7.70
14 "	1.92						

SIX-PLY.

8 in.	$1.26	15 in.	$2.49	26 in.	$4.62	38 in.	$7.14
9 "	1.42	16 "	2.67	28 "	5.04	40 "	7.56
10 "	1.60	18 "	3.03	30 "	5.46	42 "	7.98
11 "	1.77	20 "	3.39	32 "	5.88	44 "	8.40
12 "	1.95	22 "	3.74	34 "	6.30	46 "	8.82
13 "	2.13	24 "	4.20	36 "	6.72	48 "	9.24
14 "	2.31						

All other widths at proportionate prices.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ROUND BELT.

TWISTED.		SOLID.	
Inches.	Per foot.	Inches.	Per foot.
1/8	6 cts.	1/8	5 cts.
		3/16	7 "
3/16	10 "	1/4	10 "
		5/16	14 "
1/4	14 "	3/8	18 "
5/16	18 "	**RAW HIDE.**	
		Inches.	Per foot.
3/8	22 "	1/8	5 cts.
		3/16	7 "
1/2	30 "	1/4	10 "
5/8	36 "	5/16	18 "
3/4	46 "	3/8	22 "
		1/2	30 "
7/8	60 "	5/8	36 "
		3/4	46 "
1	72 "		

ROUND BELTING.

WIRE SCREWED SOLID ROUND.

This solid round leather belt is made from several pieces of leather cemented together, and then fastened with copper wire screws, which are forced into the leather, which make the belt firm and solid.

PRICES, FIG. 4219.

5/16 in. diam., per ft.,	$0.14	1 1/8 in. diam., per ft.,	$0.85
3/8 " " " "	.20	1 1/4 " " " "	1.00
7/16 " " " "	.23	1 1/2 " " " "	1.35
1/2 " " " "	.25	1 3/4 " " " "	1.75
5/8 " " " "	.36	2 " " " "	2.15
3/4 " " " "	.46	2 1/4 " " " "	2.55
7/8 " " " "	.60	2 1/2 " " " "	2.95
1 " " " "	.72		

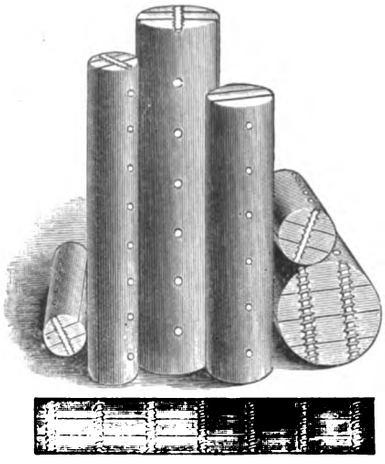


FIG. 4219.

RAW HIDE LACING.

1/4 inch, per 100 feet	$1.00
5/16 " " " "	1.25
3/8 " " " "	1.50
1/2 " " " "	2.00
5/8 " " " "	2.75
3/4 " " " "	3.50

LACE LEATHER.

Tanned lace leather, per square foot	$0.20
Raw hide lace leather, per square foot	.25

TIPPED LACINGS.

Length of laces.	Width of laces.	Prices, per gross.	Prices, per dozen.	Will lace width of belt.	No. holes in belt laced double.
12 in.	1/4 in.	$1.10	$0.10	1 in.	2
15 "	1/4 "	1.50	.14	1 1/4 and 1 1/2 "	2
18 "	1/4 "	1.75	.16	1 3/4 "	2
20 "	1/4 "	2.00	.18	2 and 2 1/4 "	2
24 "	5/16 "	2.50	.22	2 1/2 "	3
2 1/2 ft.	5/16 "	4.00	.35	2 3/4 "	3
3 "	5/16 "	5.50	.50	3 and 3 1/2 "	4
3 1/2 "	5/16 "	7.00	.60	4 and 4 1/2 "	5
4 "	3/8 "	9.00	.80	5 and 5 1/2 "	5
4 1/2 "	3/8 "	11.50	1.00	6 "	7
5 "	7/16 "	14.00	1.20	7 and 8 "	7
5 1/2 "	7/16 "	16.50	1.45	9 and 10 "	9
6 "	1/2 "	20.00	1.75	For main belts	
6 "	3/4 "	25.00	2.20	" " "	
6 1/2 "	5/8 "	25.00	2.20	" " "	
7 "	3/4 "	33.00	2.85	" " "	

1/4 inch strings are without tips, unless otherwise ordered; but they are pointed at both ends, and put into boxes in one-half gross lots.

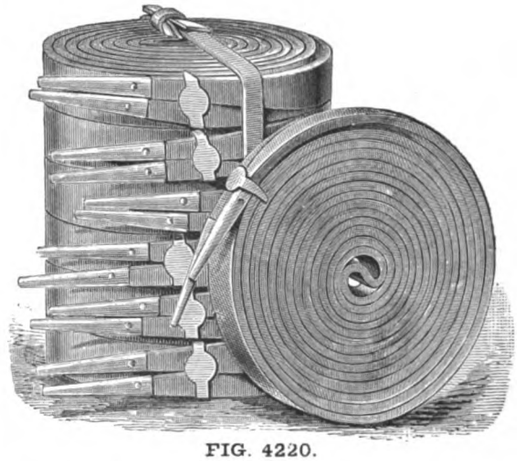


FIG. 4220.

CRESCENT BELT COUPLINGS.



FIG. 4222.

ONLY MADE IN THE FOLLOWING SIZES:

3/16	1/4	5/16	3/8	7/16	size.
$2.00	$2.00	$2.50	$3.00	$3.50	per doz.
1/2	5/8	3/4	7/8	1	size.
$4.00	$6.00	$9.00	$13.00	$18.00	per doz.

EMPIRE LACE CUTTER.

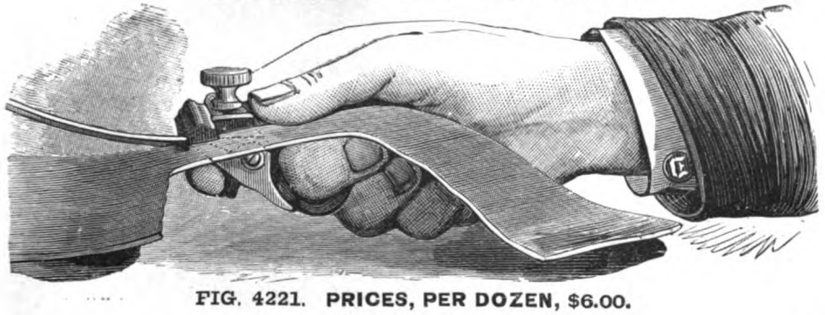


FIG. 4221. PRICES, PER DOZEN, $6.00.

MORAN'S STEEL BELT COUPLINGS.



FIG. 4223.

FOR ROUND BANDS OF EVERY DESCRIPTION.

1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	7/16	size.
$3.00	$3.00	$2.50	$2.50	$2 00	$2.50	$2.50	$3.00	$3.00	$3.50	per doz.
1/2	9/16	5/8	11/16	3/4	7/8	1	1 1/8	1 1/4		size.
$4.00	$5.00	$6.00	$7.50	$9.00	$13.00	$18.00	$22.00	$26.00		per doz.

ARCH HANDLE PUNCH.

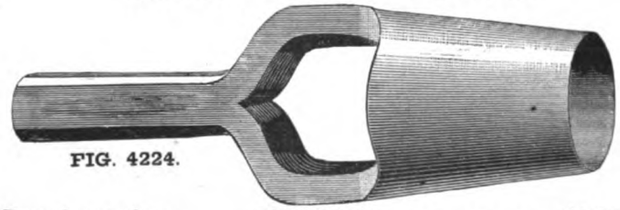


FIG. 4224.

Round punches,		5/8 inch hole		$2.00
"	"	3/4 and 7/8	" "	2.50
"	"	1 " 1 1/8	" "	2.75
"	"	1 1/4	" "	3.00
"	"	1 3/8	" "	3.25
"	"	1 1/2	" "	3.50
"	"	1 5/8	" "	4.00
"	"	1 3/4–1 7/8	" "	5.00
"	"	2	" "	5.50

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BELT PUNCHES.

ROUND SOCKET PUNCHES.

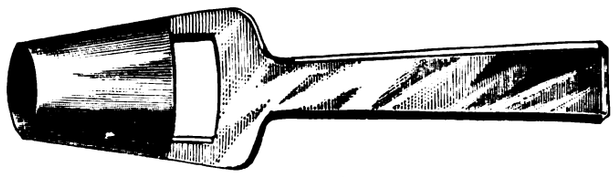


FIG. 4225.

PRICES.

7/16 @ 1/2	9/16 @ 5/8	11/16 @ 3/4	13/16 @ 7/8	15/16 @ 1	1 1/8 @ 1 1/4	1 3/8 @ 1 1/2			inch.
$10.00	$11.00	$12.00	$13.00	$14.00	$25.00	$32.00			per doz.
1 5/8	1 3/4	1 7/8	2	2 1/8	2 1/4	2 3/8	2 1/2	2 3/4	3 inch.
$2.75	$3.50	$3.75	$4.00	$4.25	$4.75	$5.25	$6.00	$7.50	$9.00 each.

ROUND DRIVE PUNCH.



FIG. 4227.

PRICES.

Nos. 00, 0	per doz.	$4.00
Nos. 1, 2, 3, 4, 5	"	2.00
Nos. 6, 7, 8, 9	"	2.25
Nos. 10, 11, 12	"	2.50
Nos. 13, 14, 15, 16	"	6.00

One dozen in a box.

OVAL DRIVE PUNCH.



FIG. 4228.

PRICES.

Nos. 1, 2, 3, 4, 5	per doz.	$4.00
Nos. 6, 7, 8, 9	"	4.50
Nos. 10, 11, 12	"	5.00
Nos. 13, 14, 15, 16	"	12.00

One dozen in a box.

SPRING PUNCHES.

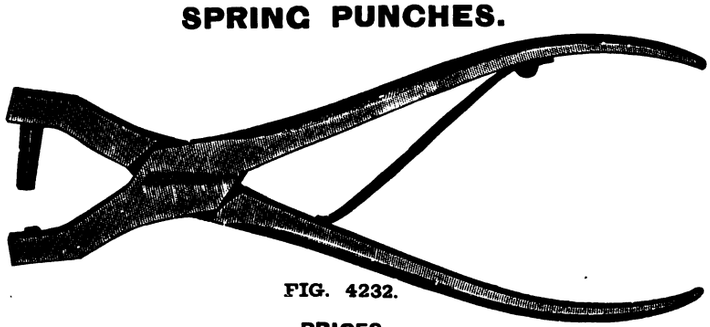


FIG. 4232.

PRICES.

Plain tubes	per doz.	$6.00
Screw "	"	8.00
Extra plain tubes	"	2.50
" screw "	"	4.00

REVOLVING PUNCHES.

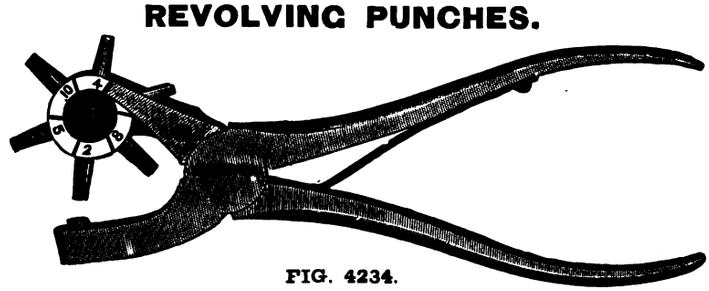


FIG. 4234.

PRICES.

4 tube	per doz.	$15.00
6 tube	"	17.50
Extra tubes for same	"	1.80

LARGE DRIVE PUNCH.

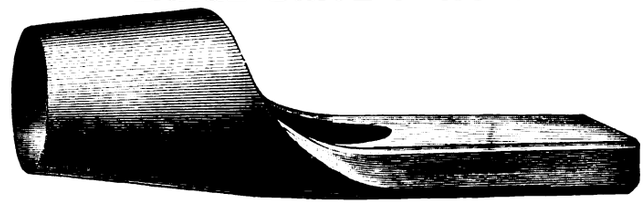


FIG. 4226.

PRICES.

5/8 inch hole	each,	$1.25
3/4 "	"	1.50
7/8 "	"	1.50
1 "	"	1.75
1 1/8 "	"	2.00
1 1/4 "	"	2.25
1 3/8 "	"	2.50
1 1/2 "	"	2.75

BELT AWLS.



FIG. 4229.

With eye in the end to carry lacing through the hole.....per doz. $2.00

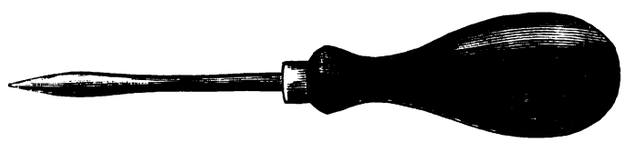


FIG. 4230.

Cast steel.....per doz. $2.00

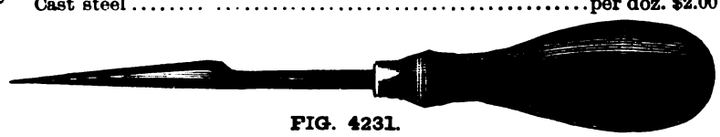


FIG. 4231.

Cast steel.....per doz. $2.50

PATENT BELT AWL.

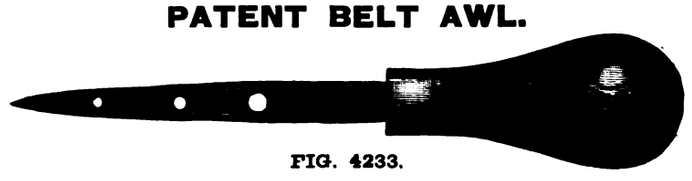


FIG. 4233.

DIRECTIONS FOR USING.

For single leather belts, use no belt punch; the awl will make the holes required. It will do the same in double leather and rubber with a little force behind it, but to use a small belt punch, in all but single leather belts, is not objectionable.

Push the awl through the belt from either side, as required, until first or second hole (whichever the size of lace used may require) of awl is visible on the opposite side of the belt. Put end of lace through the hole in the awl, pull awl back, and lacing will come with it every time. Turning or twisting awl to the right, it will cut hole, but turned to the left, it only swells it, without cutting.

PRICES.

Per doz.....$9.00

HOLLOW HANDLE BELT PUNCH.



FIG. 4235.

PRICES.

Patent 5-tube belt punch	per doz.	$16.00
Extra tubes for same, any size	"	2.25

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BELT PUNCHES, RIVETS AND HOOKS.

REVOLVING PUNCH.

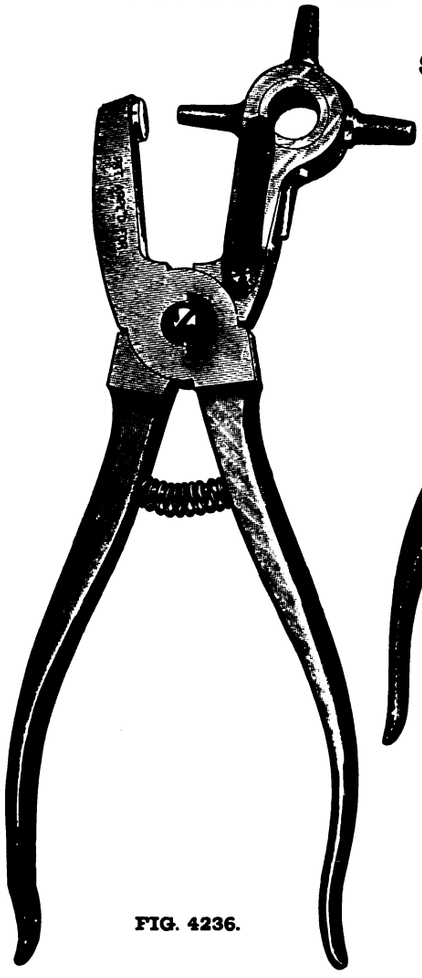


FIG. 4236.

SINGLE PUNCH.



FIG. 4237.

RIVET SET AND HEADER.



FIG. 4240.

PRICES.

Number.	Size of holes.	For iron rivets.	For copper rivets.	Per dozen.
00	$\frac{5}{16}$	14		$9.00
0	$\frac{9}{32}$	10 & 12	5	9.00
1	$\frac{17}{64}$ in.	8	6	7.50
2	$\frac{3}{4}$	6	7	7.50
3	9	4 & 5	8	6.00
4	15	2½ & 3	9	6.00
5	21	2	10 & 11	4.50
6	27	1½	12	4.50
7	33	1¼	13	3.75
8	39 ga.	12 oz.	14	3.75

POINTED BELT HOOKS.

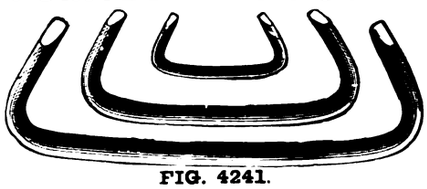


FIG. 4241.

PRICES.

No. 16, per M	$2.00	No. 9, per M	$4.00	No. 2, per M	$20.00
No. 15, "	2.00	No. 8, "	5.00	No. 1, "	30.00
No. 14, "	2.40	No. 7, "	6.00	2½ inch, "	50.00
No. 13, "	2.60	No. 6, "	8.50	3 " "	60.00
No. 12, "	2.80	No. 5, "	11.00	3½ " "	70.00
No. 11, "	3.00	No. 4, "	14.00	4 " "	80.00
No. 10, "	3.50	No. 3, "	16.00		

SIZES PUNCHES USED WITH FIGS. 4236 AND 4237.

Stubs steel wire gauge.	1	5	10	15	20	25	30	35	40	45	60
A	B	C	D	E	F	G	H	I	K	L	M	P

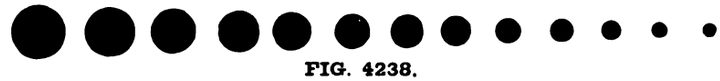


FIG. 4238.

PRICES, FIG. 4236. Per doz.

Leather punch.....$18.00

The punch is 18 inches long and takes tubes E to K.

PRICES, FIG. 4237.	Per doz.	By gross per doz.
Leather punches, 10 inch, take A to D size	$7.00	$6.50
Extra tubes for same	1.60	1.40
Leather punches, 8 inch, take E to K sizes	5.00	4.50
" " 6 " " F " L "	4.50	4.00
" " 4 " " I " M "	4.00	3.40
Extra tubes for 8, 6, and 4 inches punches	1.35	1.15

COPPER RIVETS AND BURRS.

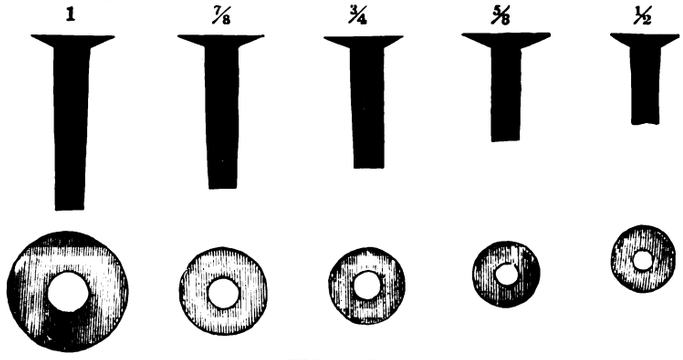


FIG. 4239.

PRICES.

Nos.	7	8	9	10	11	12	13	14	15
Per lb.	$0.49	0.50	0.52	0.54	0.56	0.58	0.60	0.65	0.70

Belt and hose rivets are packed as follows:

Rivets only in 4 lb. or 1 lb. paper boxes, and in solid cases of 100 lbs.

Rivets and burs mixed (equal quantities of each), in 1 lb. or ½ lb. paper boxes, and in solid cases of 100 lbs.

Also rivets, assorted lengths, ⅜ to ¾ inch, with burs to match, in 1 lb. or ½ lb. paper boxes, and in solid cases of 100 lbs.

For rivets and burs in ½ lb. boxes, add one cent per lb. net.

PATENT BELT FASTENERS.

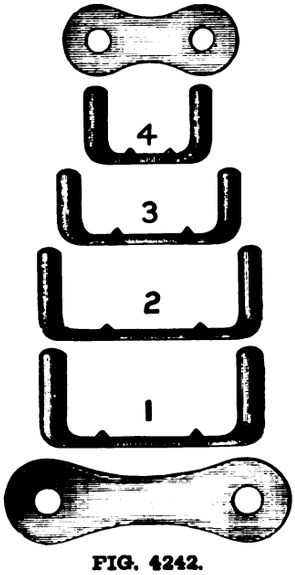


FIG. 4242.

PRICES.

Fig. 4242.—No. 4.
Per 100, $1.25.

Fig. 4242.—No. 3.
Per 100, $1.50.

Fig. 4242.—No. 2.
Per 100, $1.75.

Fig. 4242.—No. 1.
Per 100, $2.00.

Packed in boxes of 100 each.

PRICES, FIG. 4243.

Combination punch, each, $1.25.



FIG. 4243.

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BELL HOOKS AND FASTENERS.

POTTER'S PATENT BELT HOOKS.

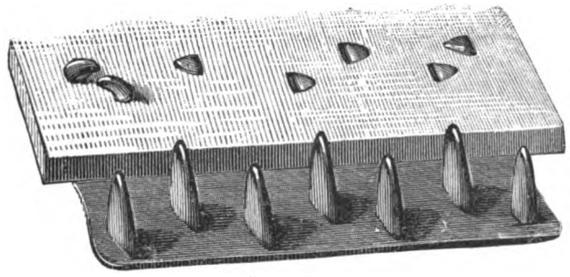


FIG. 4244.

PRICES.

SINGLE LEATHER.

		Per 100.
No. 1.	For 1 inch belts	$1.50
No. 2.	" 1½ "	2.00
No. 3.	" 2 "	2.50
No. 4.	" 2½ "	3.00
No. 5.	" 3 "	3.50
No. 6.	" 3½ "	4.50
No. 7.	" 4 "	5.50

DOUBLE LEATHER.

No. 8.	For 2 inch belts	$5.00
No. 9.	" 2½ "	6.50
No. 10.	" 3 "	7.50
No. 11.	" 3½ "	8.50
No. 12.	" 4 "	9.50

OLD SINGLE LEATHER.

No. 28.	For 3 inch ex. wide	$6.00
No. 29.	" 4 "	8.00

3-PLY RUBBER.

No. 26.	For 2 inch belts	$4.00
No. 17.	" 2½ "	5.00

3-PLY RUBBER—Con.

		Per 100.
No. 20.	For 3 inch belts	$7.00
No. 21.	" 4 "	8.00

4-PLY RUBBER.

No. 13.	For 2 inch belts	$5.00
No. 14.	" 2½ "	6.50
No. 15.	" 3 "	7.50
No. 16.	" 4 "	9.50

4-PLY OLD BELTS.

No. 27.	For 2 inch ex. wide	$8.00
No. 18.	" 3 " "	10.00
No. 19.	" 4 " "	12.00

5 AND 6-PLY RUBBER.

No. 22.	For 3 inch belts	$10.00
No. 23.	" 4 "	12.00

6, 7 AND 8-PLY OLD BELTS.

No. 24.	For 3 inch belts	$12.00
No. 25.	" 4 "	15.00

RUBBER AND LEATHER CUTTERS.



FIG. 4246.

For use with studs, Fig. 4247.

PRICES.

Large cutters for rubber belts ..... each, $1.25
Small " " leather " ..... " .90

THE BUFFALO BELT FASTENER.



FIG. 4245.

PRICES.

No. 15.	1,000 in a box		$1.50 per thousand.
No. 13.	1,000 " "		2.00 " "
No. 10.	1,000 " "		2.50 " "
No. 8.	500 " "		3.50 " "
No. 7.	250 " "		4.00 " "
No. 6.	250 " "		5.00 " "

BLAKE'S IMPROVED BELT STUDS.

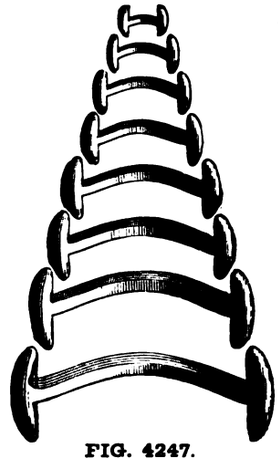


FIG. 4247.

No. 6.	Prices, per box of 100	$0.60
No. 5.	" " "	.70
No. 4.	" " "	.80
No. 3.	" " "	.90
No. 2.	" " "	1.25
No. 1.	" " "	1.65
No. 0.	" " "	2.00
No. 00.	" " "	2.50

INSTRUCTIONS FOR ORDERING FIG. 4247.

They are put up in boxes of 100 each; directions on the box. No. 00 for the heaviest double leather or 5 and 6-ply rubber belt. No. 6 for the thinnest sewing machine belt, which needs to run very smoothly. Intermediate sizes in proportion.

STEEL BELT LACING.



FIG. 4248.

PRICES FOR STRIPS 100 INCHES IN LENGTH.

FOR LEATHER BELTS.

No. 0. For split leather and extra light belts from 1/8 in. to 3/16 in. thick, assorted lengths. Packed 100 inches in a box $1.00
No. 1. For ordinary single leather belts from 3/16 in. to 1/4 in. thick. Packed 100 inches in a box, assorted or regular lengths from one inch to three inches 1.50
No. 2. For extra heavy and wide single leather belts from 1/4 in. to 5/16 in. thick. Packed 100 inches in a box, assorted lengths only 2.00
No. 3. For double leather belts from 5/16 in. to 3/8 in. thick. Packed 100 inches in a box, assorted lengths only 2.50

FOR RUBBER, COTTON AND WOVEN BELTS.

No. 10. For 2-ply rubber and cotton belts from 1/8 in. to 3/16 in. thick, assorted lengths. Packed 100 inches in a box $1.10
No. 11. For 3-ply rubber and cotton belts from 3/16 in. to 1/4 in. thick. Packed 100 inches in a box, assorted or regular lengths from one inch to three inches 1.65
No. 12. For 4-ply rubber and cotton belts from 1/4 in. to 5/16 in. thick. Packed 100 inches in a box, assorted lengths only 2.20
No. 13. For 5 and 6-ply rubber and cotton belts from 5/16 in. to 3/8 in. thick. Packed 100 inches in a box, assorted lengths only 2.75

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WILSON BELT HOOKS.

FOR BELTS WIDER THAN FOUR INCHES USE TWO OR MORE HOOKS.

DIRECTIONS.

Lay the hook down on something solid (A) with the teeth up. Put one end of the belt on the teeth, and drive it down tight on the plate. Then put the other end of the belt on in the same way.

Let the opposite edge of the hook (B) be tipped up, so that the edge you are driving on (C) shall have a good bearing behind the teeth. The object is to put the belt on without taking the curve out of the plate.

To take up a loose belt, take hold of the belt with pliers each side of the hook and twist off one end, cut off as much as you want, and drive it back on the same hook.

In ordering, please state width and thickness of belts.

BE SURE AND POUND ON THE BELT, AND NOT ON THE HOOK.



FIG. 4249.

PRICES, FIG. 4249.

SINGLE LEATHER.

100 in a package.

		Per 100.
No. 1.	For 1 inch belts	$1.00
No. 2.	" 1¼ "	1.25
No. 3.	" 1½ "	1.50
No. 4.	" 1¾ "	1.75
No. 5.	" 2 "	2.25
No. 6.	" 2¼ "	2.50
No. 7.	" 2½ "	3.00

50 in a package.

		Per 100.
No. 8.	For 2¾ inch belts	$3.25
No. 9.	" 3 "	3.50
No. 10.	" 3¼ "	4.00
No. 11.	" 3½ "	4.50
No. 12.	" 4 "	5.00

DOUBLE LEATHER.

100 in a package.

		Per 100.
No. 13.	For 1½ inch belts	$2.50
No. 13½.	" 1¾ "	3.00
No. 14.	" 2 "	3.50
No. 15.	" 2¼ "	3.75
No. 16.	" 2½ "	4.00

DOUBLE LEATHER.

50 in a package.

		Per 100.
No. 17.	For 3 inch belts	$5.25
No. 17½.	" 3¼ "	5.75
No. 18.	" 3½ "	6.25
No. A.	" 4 "	7.25

4-PLY RUBBER AND SINGLE LEATHER MAIN BELTS.

50 in a package.

		Per 100.
No. 19.	For 2 inch belts	$8.00
No. 20.	" 2½ "	9.00
No. 21.	" 3 "	10.00
No. B.	" 4 "	12.00

5-PLY RUBBER AND DOUBLE LEATHER MAIN BELTS.

50 in a package.

		Per 100.
No. 22.	For 2 inch belts	$8.00
No. 23.	" 2½ "	9.00
No. 24.	" 3 "	10.00
No. C.	" 4 "	12.00

6-PLY RUBBER.

50 in a package.

		Per 100.
No. 25.	For 2½ inch belts	$10.00
No. 26.	" 3 "	12.00

EXTRA HEAVY HOOKS.

3 rows of teeth for 6-ply rubber main belts; teeth, ⅜ inch long.

50 in a package.

		Per 100.
No. 27.	For 2 inch belts	$10.00
No. 28.	" 3 "	15.00

3 rows of teeth for double leather main belts; teeth, 7/16 inch long.

		Per 100.
No. 29.	For 2 inch belts	$10.00
No. 30.	" 3 "	15.00

3 rows of teeth for belts ½ inch thick; teeth, ½ inch long.

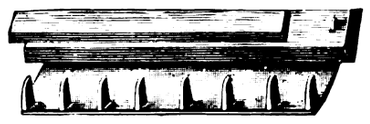
		Per 100.
No. E.	For 3 inch belts	$18.00

CLINCHING BELT HOOKS.

DIRECTIONS.

Place the hook on something solid, with the teeth up. Put one end of the belt on one set of teeth, square with the plate, and drive it partly down. Lay a piece of belt on top and pound it down tight to the plate, then tip the points over in any desired direction. Put the other end on in the same way. Do not pound on the back of the hook.

PLEASE ORDER BY NUMBERS.


FIG. 4250.

PRICES, FIG. 4250.

SINGLE LEATHER.

For belts 7/16 inch thick and under.

100 in a package.

		Per 100.
No. 31.	For ½ inch belts	$0.50
No. 31½.	" ¾ "	.65
No. 32.	" 1 "	.75
No. 33.	" 1¼ "	.90
No. 34.	" 1½ "	1.15
No. 35.	" 1¾ "	1.35
No. 36.	" 2 "	1.50
No. 37.	" 2¼ "	1.75
No. 38.	" 2½ "	2.00
No. 39.	" 2¾ "	2.25
No. 40.	" 3 "	2.50
No. 41.	" 3¼ "	2.75
No. 42.	" 3½ "	3.00
No. 43.	" 4 "	4.00

HEAVY SINGLE LEATHER, LIGHT DOUBLE LEATHER, 3-PLY RUBBER, AND 4-PLY COTTON.

100 in a package.

		Per 100.
No. 44.	For 1 inch belts	$1.50
No. 45.	" 1½ "	2.00
No. 45½.	" 1¾ "	2.25
No. 46.	" 2 "	2.50
No. 47.	" 2¼ "	3.00
No. 48.	" 2½ "	3.25
No. 49.	" 3 "	4.25
No. 49½.	" 3¼ "	4.75
No. 50.	" 3½ "	5.25
No. 51.	" 4 "	6.00

MEDIUM DOUBLE LEATHER.

100 in a package.

		Per 100.
No. 52.	For 1 inch belts	$2.00
No. 53.	" 1½ "	2.50
No. 53½.	" 1¾ "	2.75
No. 54.	" 2 "	2.75
No. 55.	" 2¼ "	3.25
No. 56.	" 2½ "	3.50

50 in a package.

		Per 100.
No. 57.	For 3 inch belts	$4.50
No. 58.	" 3½ "	5 50
No. 59.	" 4 "	6.50

4 AND 5-PLY RUBBER AND 6-PLY COTTON.

50 in a package.

		Per 100.
No. 60.	For 2 inch belts	$3.50
No. 61.	" 2½ "	5.00
No. 62.	" 3 "	6.00
No. 63.	" 4 "	7.00

6-PLY RUBBER.

50 in a package.

		Per 100.
No. 68.	For 2 inch belts	$5.00
No. 69.	" 2½ "	6.00
No. 70.	" 3 "	8.00
No. 71.	" 4 "	10.00

6-PLY RUBBER, EXTRA HEAVY BACKS.

50 in a package.

		Per 100.
No. 72.	For 2 inch belts	$6.00
No. 74.	" 3 "	10.00
No. 75.	" 4 "	12.00

4 AND 5-PLY RUBBER, EXTRA WIDE.

50 in a package.

		Per 100.
No. 76.	For 2 inch belts	$8.00
No. 77.	" 3 "	10.00
No. 78.	" 4 "	12.00

6-PLY RUBBER, EXTRA WIDE.

50 in a package.

		Per 100.
No. 79.	For 3 inch belts	$10.00
No. 80.	" 4 "	12.00

8-PLY RUBBER, AND 8 AND 10-PLY COTTON.

50 in a package.

		Per 100.
No. 88.	For 3 inch belts	$10.00
No. 90.	" 4 "	12.00

ALL MAIN BELTS 1-2 INCH THICK.

50 in a package.

		Per 100.
No. 92.	For 3 inch belts	$12.00
No. 93.	" 4 "	15.00

ALL MAIN BELTS 3-4 INCH THICK, AND 10 AND 12-PLY COTTON, EXTRA HEAVY BACKS.

50 in a package.

		Per 100.
No. 97.	For 3 inch belts	$15.00
No. 98.	" 4 "	18.00

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COMBINATION CLINCH AND DRIVE BELT HOOKS.

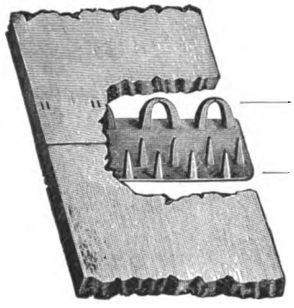


FIG. 4251.

SINGLE LEATHER.

	100 in a package.	Per 100.
No. 99.	For ½ in. belts	$0.60
No. 100.	" ¾ " "	.80
No. 101.	" 1 " "	1.00
No. 102.	" 1¼ " "	1.25
No. 103.	" 1½ " "	1.50
No. 104.	" 1¾ " "	1.75
No. 105.	" 2 " "	2.00
No. 106.	" 2¼ " "	2.25
No. 107.	" 2½ " "	2.75
No. 108.	" 2¾ " "	3.00
No. 109.	" 3 " "	3.25
No. 110.	" 3¼ " "	3.50
No. 111.	" 3½ " "	4.00
No. 112.	" 4 " "	4.50

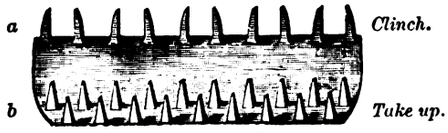


FIG. 4252.

For belts wider than 4 inches, use 2 or more hooks.

PRICES, FIG. 4252.

DOUBLE LEATHER.

	100 in a package.	Per 100.
No. 113.	For 1 inch belts	$2.00
No. 114.	" 1½ " "	2.50
No. 115.	" 2 " "	3.50
No. 116.	" 2¼ " "	3.75
No. 117.	" 2½ " "	4.00

	50 in a package.	Per 100.
No. 118.	For 3 inch belts	$5.25
No. 119.	" 3½ " "	6.25
No. 120.	" 4 " "	7.25

4-PLY RUBBER AND SINGLE LEATHER MAIN BELTS.

	50 in a package.	Per 100.
No. 128.	For 2 inch belts	$8.00
No. 129.	" 2½ " "	9.00
No. 130.	" 3 " "	10.00
No. 131.	" 4 " "	12.00

DIRECTIONS.

Lay the hook down on something solid with the teeth up; put one end of the belt on one set of teeth and drive it down tight to the plate. Then put the other end on in the same way. The teeth on the side (*a*) are beveled or sharpened unequally, causing them to clinch automatically as they pass into the belt. The teeth in the double row (*b*) are wedge-shaped, and the belt can be removed, shortened and replaced at will.

The clinching teeth should be put on the leading end of the belt.

To take up a loose belt, take hold of the belt with a pair of pliers, next to the side (*b*), and twist the belt off from the hook, shorten your belt and drive it back snug to the plate again.

Be sure to pound on the belt, and not on the hook.

5-PLY RUBBER AND DOUBLE LEATHER MAIN BELTS.

	50 in a package.	Per 100.
No. 132.	For 2 inch belts	$8.00
No. 133.	" 2½ " "	9.00
No. 134.	" 3 " "	10.00
No. 135.	" 4 " "	12.00

6-PLY RUBBER—EXTRA WIDE.

	50 in a package.	Per 100.
No. 136.	For 2 inch belts	$10.00
No. 138.	" 3 " "	12.00
No. 139.	" 4 " "	15.00

THATCHER BELT FASTENERS.

FOR SINGLE LEATHER.

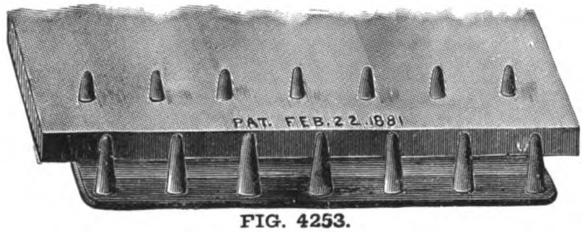


FIG. 4253.

The above cut shows a single leather fastener, 1 inch wide, driven through the material before being clinched, showing that the material is not only unimpaired, but more compact and stronger than at any other place in the belt.

Fig. 4254 shows a double leather or 3 or 4-ply rubber fastener, 1¾ in. wide, driven through the material and clinched, showing a smooth running surface to the pulley. For double leather and 3 or 4-ply rubber the sizes are from 2 to 4 inches. Two or more on wider belts.

FOR DOUBLE LEATHER AND 3 OR 4-PLY RUBBER.

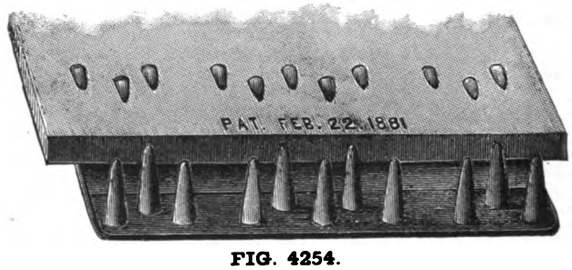


FIG. 4254.

PRICES, FIG. 4253.

SINGLE LEATHER OR 4-PLY COTTON.

	100.
No. 1.	For 1 inch belts $1.50
No. 2.	" 1½ " " 2.00
No. 3.	" 2 " " 2.50
No. 4.	" 2½ " " 3.00
No. 5.	" 3 " " 3.50
No. 6.	" 3½ " " 4.00
No. 7.	" 4 " " 5.00

PRICES, FIG. 4254.

DOUBLE LEATHER, 3 AND 4-PLY RUBBER OR 6-PLY COTTON.

No. 8.	For 2 inch belts $3.50
No. 9.	" 2½ " " 4.50
No. 10.	" 3 " " 5.50
No. 11.	" 3½ " " 6.50
No. 12.	" 4 " " 7.50

FOR 5 OR 6-PLY RUBBER AND 8-PLY COTTON AND FOR OLD BELTS.

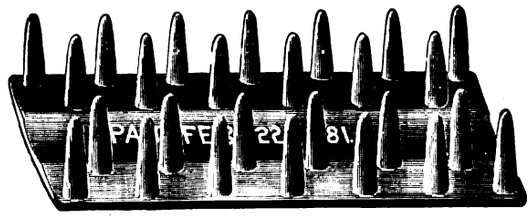


FIG. 4255.

The above cut shows an extra wide and heavy fastener. These fasteners are intended for extra heavy belts, and are especially adapted to old and tender belts. The plate is made 1¾ or 2 inches wide, allowing the teeth to reach further on the material, and in many instances where the belt is so far gone that all other appliances are useless, these fasteners will hold it with perfect safety, giving you the use of your belt a much longer time than by any other method. For wider belts use two or more. No punch required.

PRICES, FIG. 4255.

FOR HEAVY BELTS, OR 5 AND 6-PLY RUBBER, OR 8-PLY COTTON.

No. 13.	For 2 inch belts $6.00
No. 14.	" 3 " " 8.00
No. 15.	" 4 " " 10.00

7 AND 8-PLY OR EXTRA HEAVY OR OLD BELTING.

No. 16.	For 3 inch belts $12.00
No. 17.	" 4 " " 15.00

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BELT CLAMPS.

BELT CLAMP.

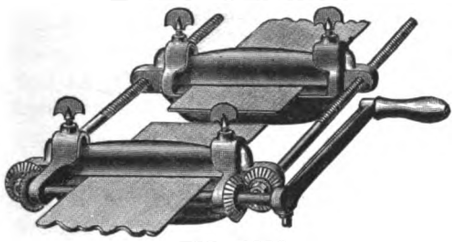


FIG. 4256.

PRICES.

8 inch	$14.00	24 inch	$30.00
12 "	18.00	28 "	34.00
16 "	22.00	32 "	38.00
20 "	26.00	36 "	44.00

HERCULES BELT CLAMP.

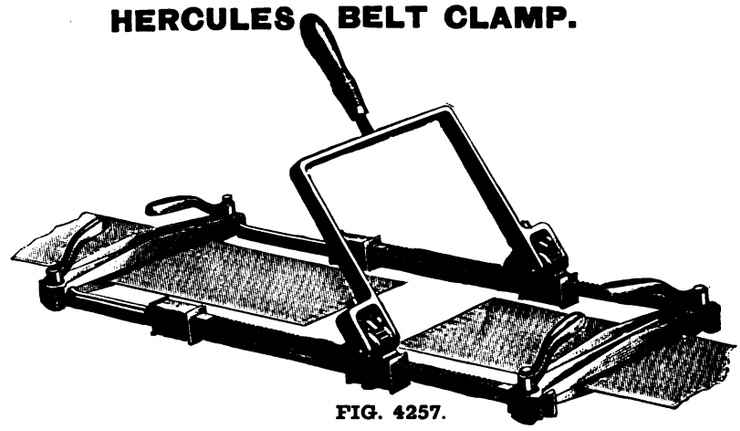


FIG. 4257.

PRICE.

For 12 inch belt $15.00

CORRUGATED CLAMP.

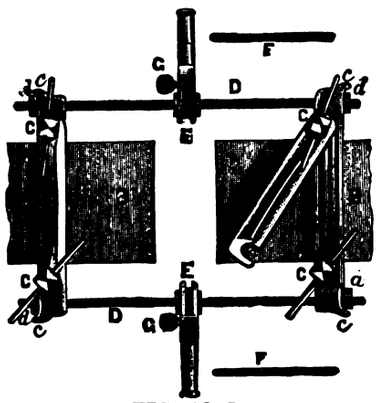


FIG. 4258.

PRICES.

Size.	Length of rods.	Prices.
8 inch clamps	30 inches.	$10.00
12 " "	30 "	12.00
16 " "	30 "	15.00
20 " "	34 "	18.00
24 " "	36 "	20.00
26 " "	36 "	22.00
30 " "	40 "	24.00
34 " "	44 "	26.00
36 " "	44 "	28.00
40 " "	48 "	30.00
44 " "	48 "	32.00
48 " "	5 feet.	34.00

WOOD BELT CLAMP.

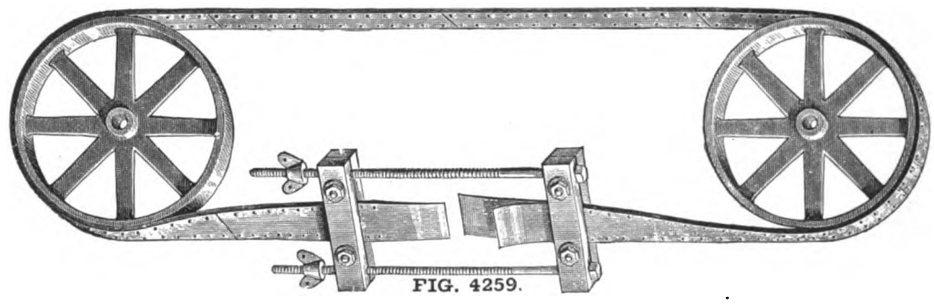


FIG. 4259.

PRICES.

8 inch	belt	clamps	and	rods		per pair,	$9.00
10 "	"	"	"	"		" "	10.00
12 "	"	"	"	"		" "	11.50
14 "	"	"	"	"		" "	12.50
16 "	"	"	"	"		" "	13.25
18 "	"	"	"	"		" "	14.00
20 "	"	"	"	"		" "	14.75
24 "	"	"	"	"		" "	16 00
26 "	"	"	"	"		" "	17.25
30 "	"	"	"	"		" "	19.00
36 "	"	"	"	"		" "	22.00
44 "	"	"	"	"		" "	25.25

WOOD SCREW BELT CLAMP.

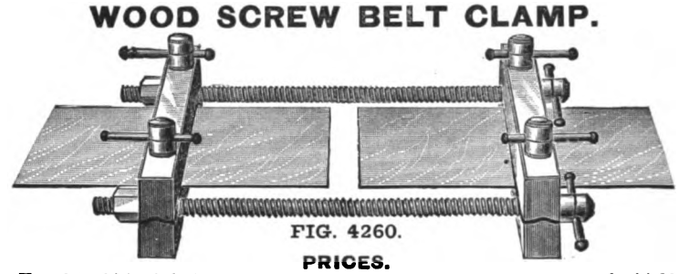


FIG. 4260.

PRICES.

For 6 to 14 inch belts.		each,	$4.00
" 12 to 18 "	"	"	4.50
" 18 to 24 "	"	"	5.50
" 24 to 36 "	"	"	7.00

PORTER BELT TIGHTENER.

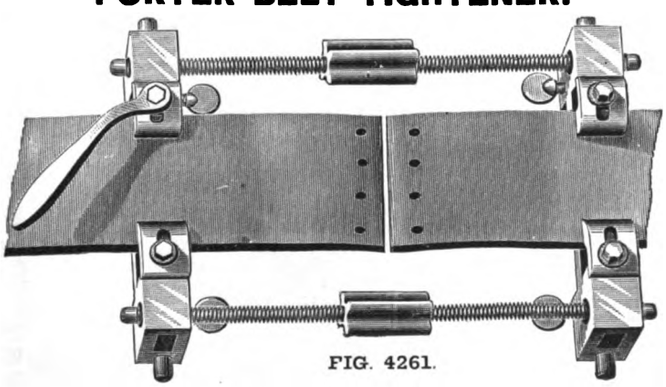


FIG. 4261.

VIEW OF TOP SIDE.

Takes a belt from 2 to 20 inches wide.

PRICES, $12.00 PER SET.

PORTER BELT TIGHTENER.

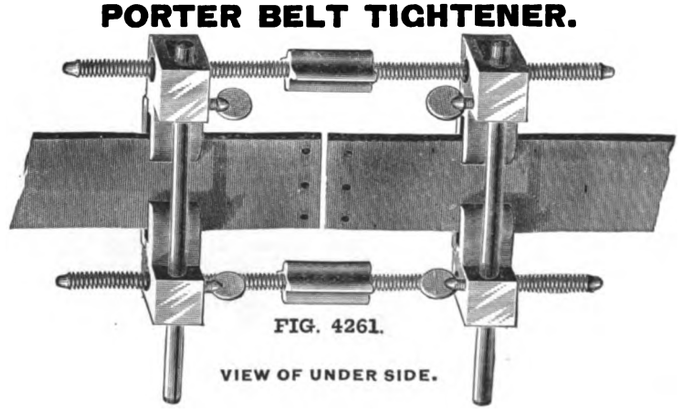


FIG. 4261.

VIEW OF UNDER SIDE.

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WASHER CUTTERS.

ADJUSTABLE ARM.

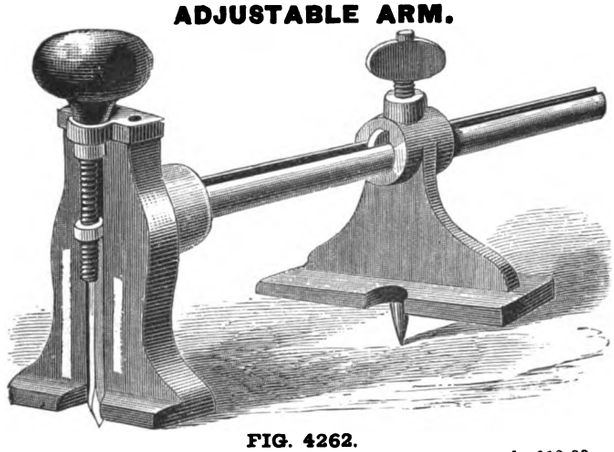


FIG. 4262.

Price..... ....each, $12.00

DOUBLE.

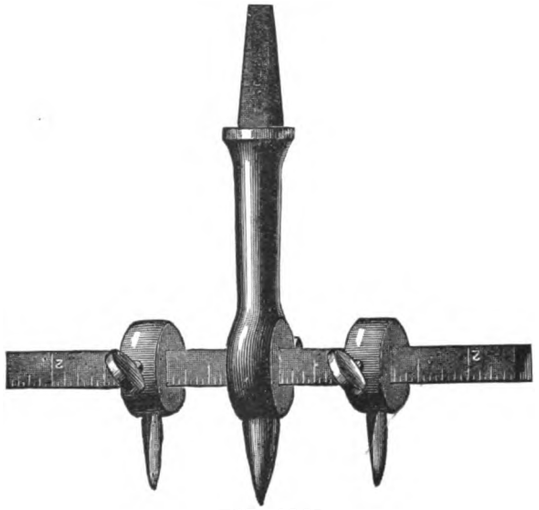


FIG. 4265.

Price.....per dozen, $24.00

DOUBLE CUTTER.

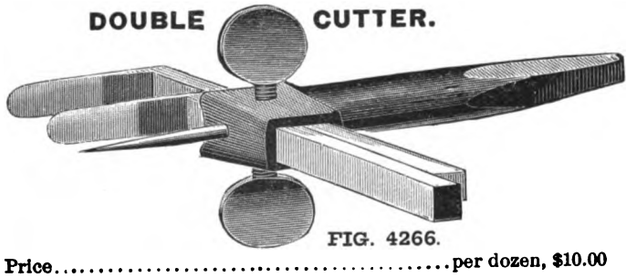


FIG. 4266.

Price.....per dozen, $10.00

DOUBLE CUTTER.

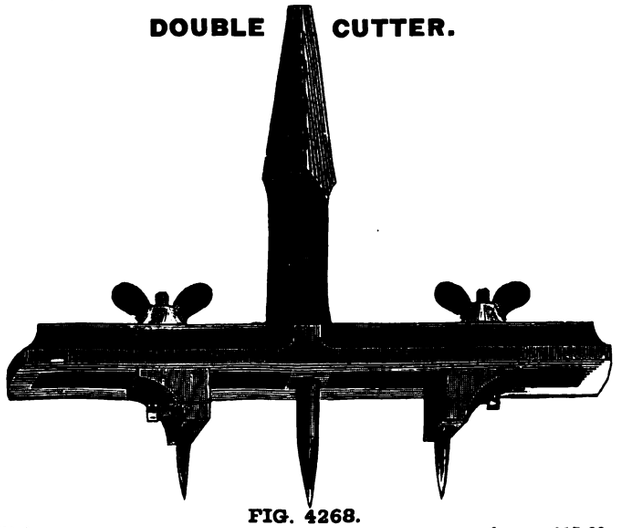


FIG. 4268.

Price.....per dozen, $15.00

POCKET.

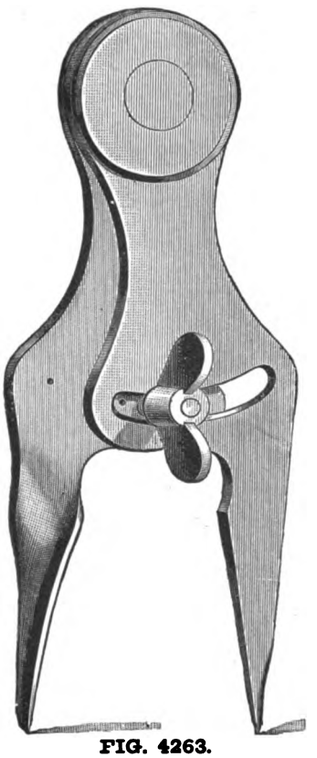


FIG. 4263.

Price.....per dozen, $6.00

UNIVERSAL CUTTER.

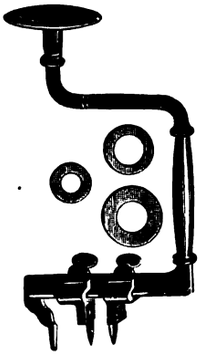


FIG. 4269.

It consists of a brace provided with a center point and two sliding cutter heads. It cuts out circles of wood, leather, rubber, etc., up to 8½ inches diameter. The blades are removable, and a single blade can be used to cut out circular holes. The blades are of fine tool steel, and the brace of malleable iron.

DOUBLE.

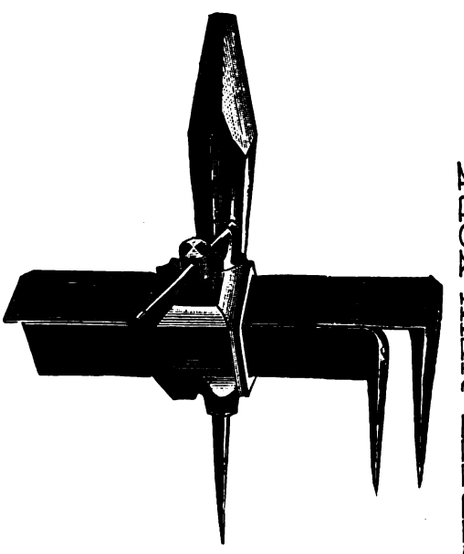


FIG. 4264.

Price..... .per dozen, $18.00

DOUBLE CUTTER.

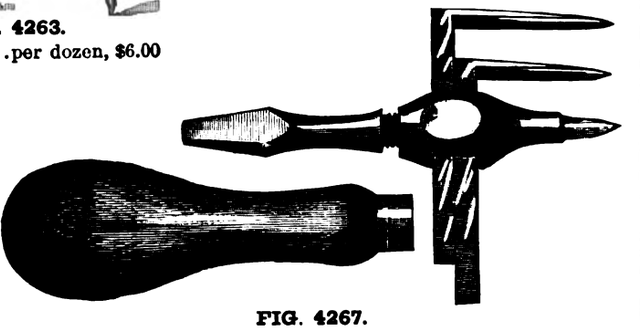


FIG. 4267.

Price.....per dozen, $24.00

ECLIPSE CUTTER.

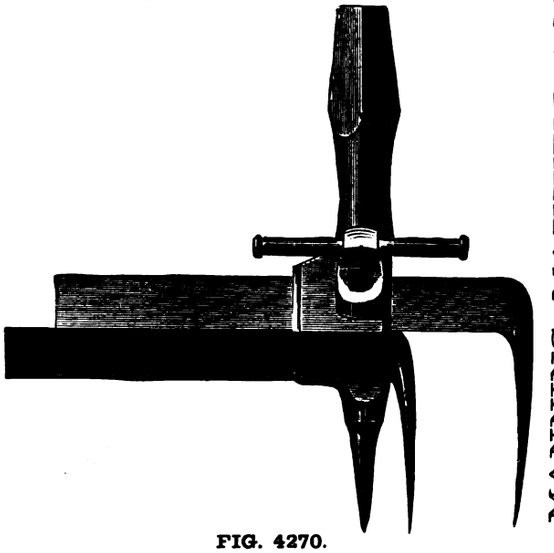


FIG. 4270.

Hand forged cutters and a vise screw grip.

Price..... .....per dozen, $15.00

PRICES, FIG. 4269.

Size..... 10¼ in. x 4⅞ in.
Weight.....1¼ lbs.
Price.....each, $1.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SELF FEED LATH MILL.

There are always about every saw mill thousands of feet of refuse lumber thrown away or burnt up, because it is unmerchantable. The greater part of this could be made into laths, if the miller only had a good machine. This machine has fluted feed-rollers that draw in and discharge the boards. It has three 12 inch saws separated by movable collars, cutting three laths at a time. A boy fifteen years old can attend it and make 1,200 laths per hour with ease. Two saws can be removed and the machine converted into a regular saw table, and cut palings, furring strips, etc. In fact, it is what every saw mill needs, and will pay for itself in a few weeks wherever laths can be sold. Pulley, 6½ inch diameter, 8 inch face. Revolutions, 3,000.

PRICES.

Hand-feed lath machine, weight, 300 lbs.....$50.00
Self-feed lath machine (as shown), weight, 400 lbs.....110.00

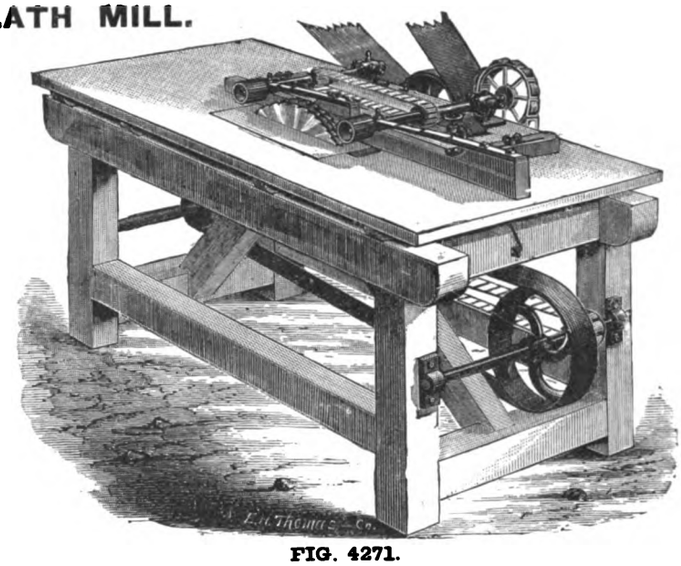


FIG. 4271.

NEW AND IMPROVED EDGING AND SLITTING TABLE.

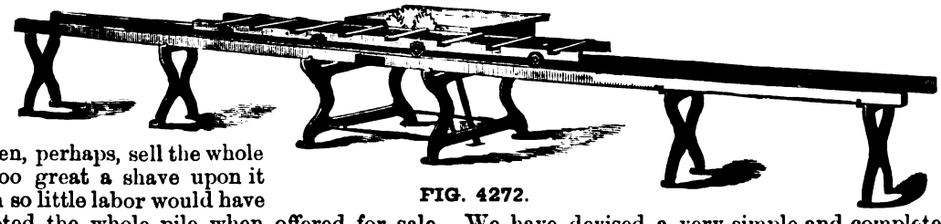


FIG. 4272.

The advantage of properly preparing lumber for market seems to be well understood by saw mill men generally; but yet, how many there are who continue to ship their lumber with heart and sap in it, paying for the transportation of offal, instead of leaving it at home for fuel; and then, perhaps, sell the whole as second-class lumber, or else submit to too great a shave upon it because there are some bad places in it which so little labor would have taken out, and which seems to have corrupted the whole pile when offered for sale. We have devised a very simple and complete machine for the above-named purpose, of which the accompanying engraving is a good representation, which is sold at a moderately low price, and is not only well adapted to edging and hearting lumber, but is also a convenient slitting table, for the manufacture of pickets, lath, etc. The frame is a combination of wood and iron, sufficiently long to edge sixteen-feet lumber; is put together entirely with bolts, and may readily be taken apart into sections for shipment. The arbor or mandrel is of steel, and the table supplied with a slitting gauge. The carriage wheels are of large diameter, and run upon iron track, making it easy to operate. Single machine, sixteen-inch saw.

PRICE, $80.00.

LUMBER ROLLERS,
WITH WROUGHT IRON FRAMES.

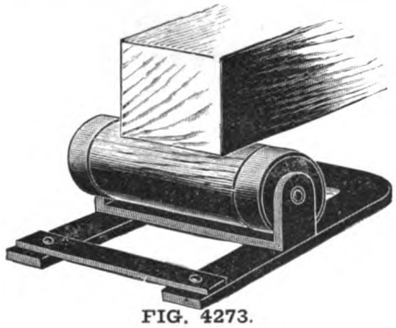


FIG. 4273.

These rollers will be found very useful for moving heavy timbers, etc. Rollers, 13½ inch long by 3⅞ inch diameter. Frame, 14 inch by 8½ inch. Price, each, $5.00.

TIMBER TRUCKS,
WITH WOOD FRAMES.

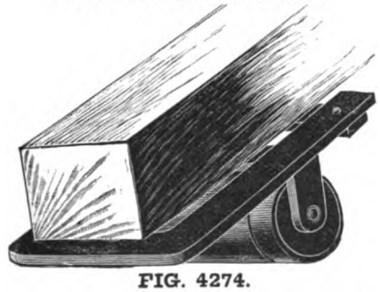


FIG. 4274.

Rollers, 12 inch long by 5¾ inch diameter. Frame, 14 inch by 16½ inch. Price, each, $6.00.

CANT HOOK.



FIG. 4275.

PRICES, WITH HANDLES.

4, 4½, 5 and 5½ foot handles, $20.00 per doz.

CANT HOOK.

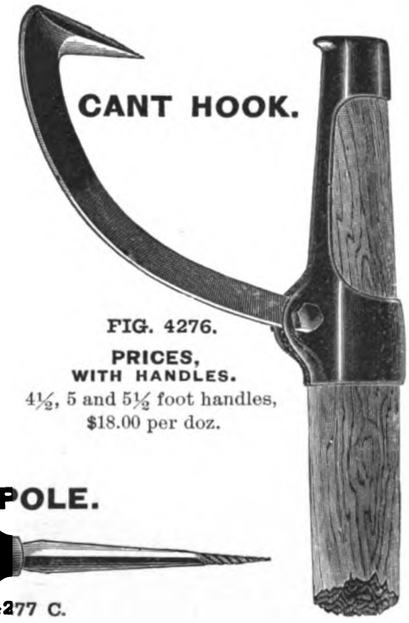


FIG. 4276.

PRICES, WITH HANDLES.

4½, 5 and 5½ foot handles, $18.00 per doz.

PIKE POLE.



FIG. 4277 C.

PRICES, PER DOZ.

Length.	Fig. 4277.	Fig. 4277 C.
12 ft.	$13.50	$12.00
14 "	14.50	13.00
16 "	16.50	15.00
18 "	19.50	18.00
20 "	23.50	22.00

PIKE POLE WITH HOOK.



FIG. 4277.

CANT HOOK.

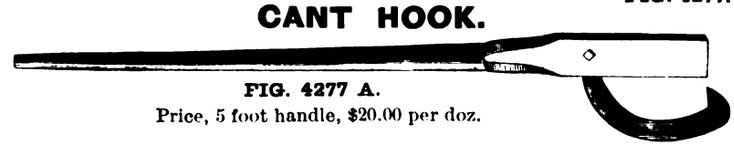


FIG. 4277 A.

Price, 5 foot handle, $20.00 per doz.

ADJUSTABLE CANT HOOK.

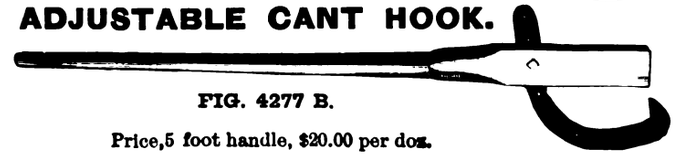


FIG. 4277 B.

Price, 5 foot handle, $20.00 per doz.

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LEVER-SET CIRCULAR SAW MILL.

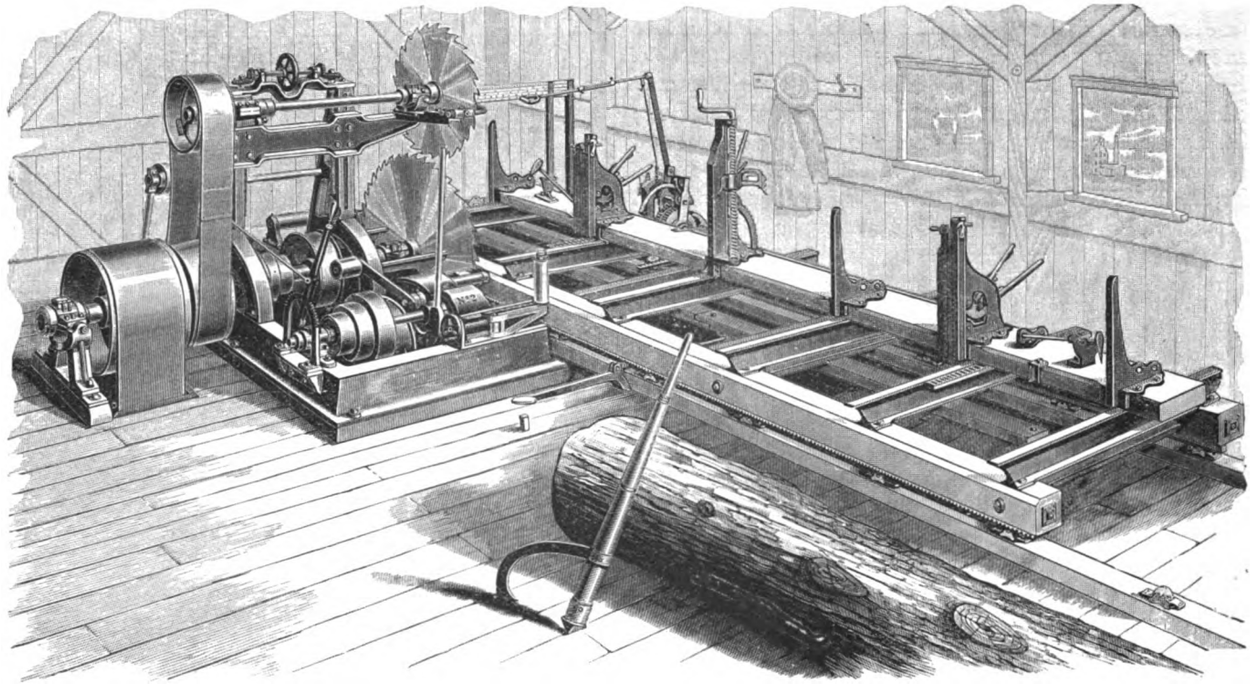


FIG. 4278. REPRESENTS NO. 2 DOUBLE IRON FRAME, 25-FOOT CARRIAGE AND UPPER SAW.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

PRICES.

Length of carriage.	Length of feed-rack.	Length of set-beam.	Number of head-blocks.	Number of compound uprights.	Number of plain uprights.	Number of patent screw Frost dogs.	Number of post dogs.	Price of No. 1 mill, complete. No saw.		Weight.	Price of No. 2 mill, complete. No saw.		Weight.
								Kind of frame.	Price.	lbs.	Kind of frame.	Price.	lbs.
25 feet.	30 ft.	18 ft.	6	2	3	1	1	Wood,	$540.00	5,000	Wood,	$675.00	6,000
								Iron,	570.00	5,500	Iron,	725.00	7,000
30 "	35 "	24 "	7	3	3	1	1	Wood,	600.00	5,400	Wood,	750.00	6,600
								Iron,	630.00	5,900	Iron,	800.00	7,600
35 "	40 "	28 "	8	3	4	1	2	Wood,	635.00	6,000	Wood,	800.00	7,500
								Iron,	665.00	6,500	Iron,	850.00	8,500
40 "	45 "	33 "	9	3	5	1	2	Wood,	670.00	6,750	Wood,	850.00	8,100
								Iron,	700.00	7,250	Iron,	900.00	9,100
45 "	50 "	38 "	11	4	6	1	2	Wood,	720.00	7,500	Wood,	925.00	9,000
								Iron,	750.00	8,000	Iron,	975.00	10,000
50 "	55 "	43 "	12	4	7	1	2	Wood,	770.00	8,300	Wood,	975.00	10,000
								Iron,	800.00	8,800	Iron,	1,025.00	11,000
55 "	60 "	47 "	14	5	8	1	2	Wood,	810.00	9,100	Wood,	1,050.00	11,300
								Iron,	840.00	9,600	Iron,	1,100.00	12,300
60 "	65 "	53 "	15	5	9	1	3	Wood,	870.00	9,900	Wood,	1,100.00	12,200
								Iron,	890.00	10,400	Iron,	1,150.00	13,200

PRICES, SMALL MILLS.

No. 0 mill, wood frame, 20 ft. carriage, no saw, $375.00
No. 00 mill, 12 ft. carriage, 18 ft. feed-rack, no saw..... 300.00

The following are furnished with every No. 1, 2, 2½, 3 and 4 mill:

Fairbanks' patent gauge-roll..... $30.00
Lane's patent screw Frost dog..... 25.00
Lane-Pattee foot-rig..... 25.00
Guernsey's patent saw guide..... 18.00
Frost dog..... 6.00
Elevated scale..... 6.00

PRICES OF UPPER PARTS FOR DOUBLE MILLS.

No. 1, including 30 inch upper saw $215.00
No. 2, " 34 " " " 240.00
No. 2½, " 36 " " " 300.00
No. 3 and 4, " 40 " " " 360.00
Green mountain dog 50.00
Box-board attachment 50.00
Brown patent dogging device..... 40.00
Brown's patent dogging device..... 35.00

Prices of mill frames and attachments, and prices of carriages with set-works, quoted on application.

PRICES.

Length of carriage.	Length of feed-rack.	Length of set-beam.	Number of head-blocks.	Number of compound uprights.	Number of plain uprights.	Number of green mountain dogs.	Number of post dogs.	Price of No. 2½ mill, complete. No saw.		Weight.	Price of No. 3 mill, complete. No saw.		Weight.	Price of No. 4 mill, complete. No saw.		Weight.
								Kind of frame.	Price.	lbs.	Kind of frame.	Price.	lbs.	Kind of frame.	Price.	lbs.
25 feet.	35 ft.	18 ft.	6	—	4	2	1	Iron,	$1,075.00	12,500	Iron,	$1,400.00	17,500	Iron,	$1,600.00	17,500
30 "	40 "	24 "	7	1	4	2	1	Iron,	1,175.00	14,000	Iron,	1,550.00	19,000	Iron,	1,775.00	19,000
35 "	45 "	28 "	8	1	5	2	2	Iron,	1,250.00	15,400	Iron,	1,650.00	20,400	Iron,	1,900.00	20,400
40 "	50 "	33 "	9	1	6	2	2	Iron,	1,325.00	16,800	Iron,	1,750.00	21,800	Iron,	2,025.00	21,800
45 "	55 "	38 "	11	1	7	3	2	Iron,	1,425.00	17,200	Iron,	1,900.00	23,700	Iron,	2,200.00	23,700
50 "	60 "	43 "	12	1	8	3	2	Iron,	1,500.00	19,600	Iron,	2,000.00	25,100	Iron,	2,325.00	25,100
55 "	65 "	47 "	14	2	9	3	2	Iron,	1,600.00	21,000	Iron,	2,150.00	26,200	Iron,	2,500.00	26,200
60 "	70 "	53 "	15	2	10	3	3	Iron,	1,675.00	22,400	Iron,	2,250.00	28,400	Iron,	2,625.00	28,400

Fig. 4278 represents a right-hand saw mill, but the mills can be made left-hand if desired. In writing state as to the length and diameter of the logs to be sawn, the capacity per day desired, the amount of power to be used and the kind of timber to be cut. Fuller descriptions furnished on application.

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LEVER SET CIRCULAR SAW MILL.—Continued.

The mill, Fig. 4278, is built in five sizes—from the very light to the very heavy—and above the number 0 size can be made with an upper part or top saw attachment.

The No. 00 has a carriage 15 feet long, 20 feet feed, and as large as a 44 inch saw can be used.

The No. 0 has carriages varying from 20 feet to 40 feet and as large as a 54 inch saw can be used.

The No. 1 has carriage varying from 25 feet to 60 feet, and is capable of cutting 15,000 feet per 10 hours.

The No. 2, with the same variations of carriage, will take as large as a 60 inch saw. [The cut on the opposite page illustrates this mill, showing the upper part with 34 inch saw, the single mill being the same except the top saw attachment.]

The No. 2½ has carriages varying from 25 to 70 feet, is capable of cutting 50,000 feet per 10 hours, and will take as large as a 66 inch lower saw, and if a double mill, a 36 inch upper saw.

The No. 3 is of same design as the No. 2½—except, if preferred, can have the center guide (without additional cost) instead of the steel rail—but is still heavier and will take a 72 inch saw, and if built a double mill, a 40 inch upper saw additional.

Any make of steam feed can be furnished in place of friction feed, if desired, or any variations for special sawing can be made.

These prices are for set works, to be operated by the sawyer from front side of carriage.

If made so as to be operated from back side of carriage by a setter, $50.00 extra will be charged on Nos. 1, 2 and 2½.

PRICE LIST OF SET WORKS FOR FIG. 4278.

	No. 1.	No. 2.	No. 2½.	No. 3.	No. 4.
18 foot set beam	$175.00	$250.00	$325.00	$425.00	$525.00
24 " "	210.00	290.00	400.00	525.00	650.00
27 " "	225.00	315.00	450.00	585.00	750.00
30 " "	240.00	340.00	500.00	645.00	850.00
38 " "	275.00	380.00	575.00	745.00	975.00
43 " "	300.00	415.00	625.00	805.00	1,075.00
47 " "	335.00	455.00	700.00	905.00	1,200.00
52 " "	375.00	500.00	750.00	965.00	1,300.00

FRICTION LOG TURNER.

The engraving represents our friction log turner as it is set up in the mill. It is designed to be placed above the carriage of a band or circular saw mill, the windlass being set parallel with the carriage so that the hook will hang down about a foot from the saw line. A light pull on the line at the end of the lever throws the friction wheels into contact, and when the line is released, the counter-weight throws them out at once. The driving pulley is 30 inches diameter, 7 inches face, and should make about 400 revolutions per minute.

When so ordered, this machine is made to lower by power.

WEIGHT, 1,250 LBS. PRICE, $125.00.

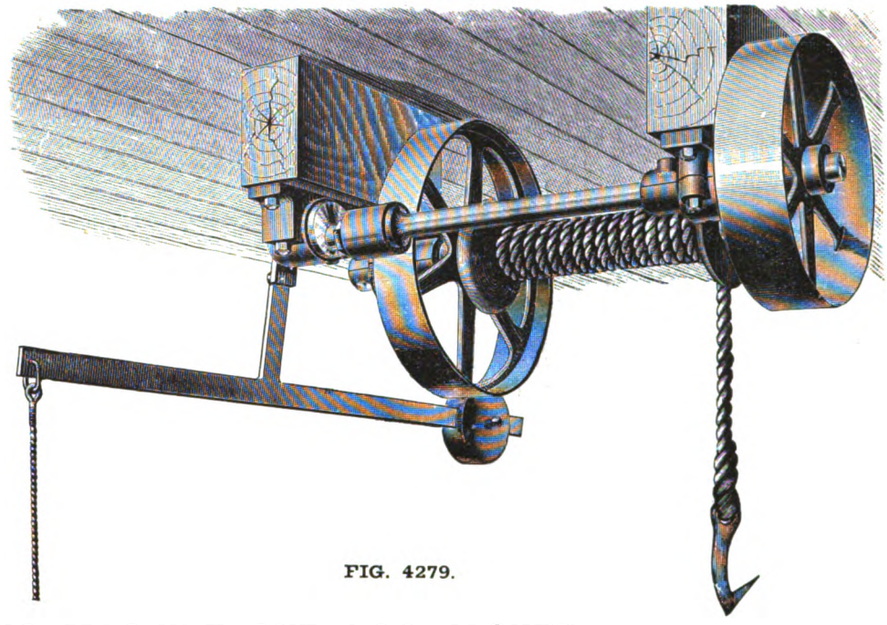


FIG. 4279.

LOG CANTING MACHINE AND LOG JACKER.

For rolling heavy logs on to the saw mill carriage, and for turning them when slabbing, a canting machine is well-nigh indispensable. The engraving represents a strong and simple arrangement for this purpose, and one that may also be used for drawing logs into the mill.

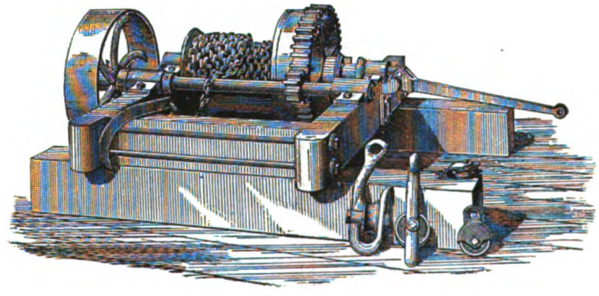


FIG. 4280.

As a log turner it is secured to the timbers overhead, and the chain carried along over open sheaves to the middle of the carriage, as it stands when run back to take on the longest sticks. In turning, the sawyer, or his assistant, takes down the hook from overhead and attaches it to the log, when a slight pull on a cord—attached to the lever shown at the right and carried over the small grooved pulleys to the desired position—causes the chain to wind up on the spool, and thus turn the log as much or as little as may be desired. If the logs are on the log deck they may be rolled on to the carriage by passing the chain entirely around them once or twice, and then operating the friction as described above. For turning short logs the chain is thrown out of the sheave furthest from the saw, so as to bring the hook nearer the head end of the carriage and nearer the middle of the log to be turned. When used simply for turning logs—especially logs 20 feet, or less, in length—the machine may be set over the carriage, and the spool and shaft run at a right angle with the saw arbor and parallel with the carriage ways. The pinion shaft and gear are run constantly—the large gear turning freely on the shaft of spool. Raising the lever forces a steel pin against a steel key next to a wide face collar bearing against the hub of the gear. The inside of gear is a female friction, corresponding with the male friction on spool shaft, which forms one flange of spool. Bringing the two friction surfaces in contact of course causes the spool to revolve and wind the chain. The amount of draught on the cord regulates the speed of spool in winding, and determines the power used, which may either be sufficient to turn the very heaviest logs in a twinkling, or merely hold an ordinary log against the uprights until dogged.

As a log jacker for hauling in logs, a longer spool, heavier gears and longer chain are used, and the machine is placed under the mill floor, or overhead, as may be most convenient. The gearing and frictions are heavy enough for hauling several logs at a time into the second story of a mill building.

PRICES.

No. 1 (for canting only), with 40 feet of cable chain.....$100.00
No. 2 (for canting or jacking), with 125 feet of cable chain..... 125.00

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STANDARD SAW MILL.

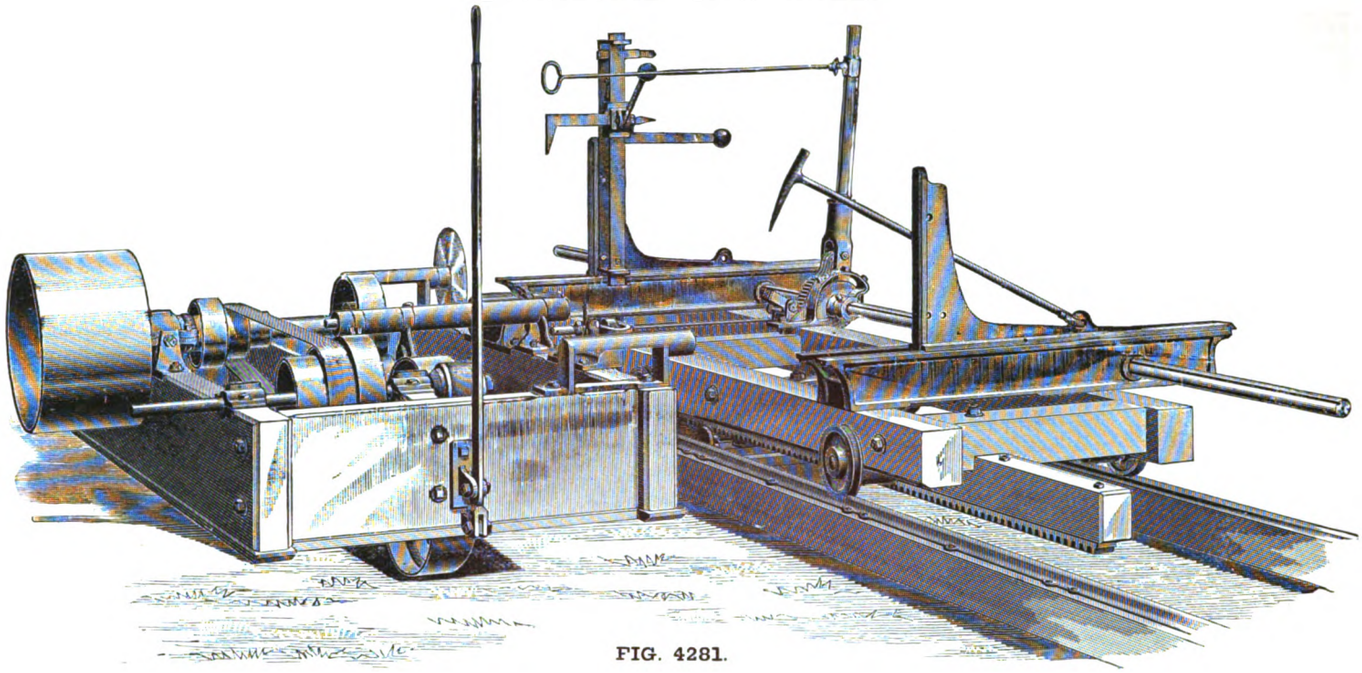


FIG. 4281.

CARRIES SAW UP TO 60 INCHES DIAMETER; WILL CUT ABOUT 8,000 FEET PER DAY.

Husk, of best pine, 7 feet 6 inches long, 4 feet wide, 12½ inches deep, 4 inches thick; 2⅝ inch steel arbor with solid collar, 5 inches diameter. Lug pins, 3 inches center to center. Gig and feed shaft pulley, 24 inches diameter, 5 inch face. Gig and feed paper frictions, 14 inches and 5 inches by 4 inch face. Rag shaft, 1½ inches diameter. Rag pinion, 4½ inches diameter. Turned spreader, 13 inches diameter. Upper feed shaft, 1⅜ inches. Three changes of feed for 3 inch belt, feeding from 1 to 2½ inches, but will be changed to suit purchaser.

Carriage, 20 feet long, running on six pairs of wheels and axles, or wheels and chairs, as may be preferred, timbers of best pine, 4½ inches by 5½ inches. Rack stick, with rack, 24 feet long, 3½ x 4½ inches; 48 feet of Λ and 48 feet of flat track, with necessary screws and bolts complete.

Blocks. Two furnished unless otherwise ordered, opening 36 inches from the saw, provided with the new standard ratchet. Blocks made in one piece, with solid knee, one provided with the well-known Knight dog, combining both log and last board dogs, the other with the common log dog, 16 feet of 1⅞ inch set rod, key-seated entire length, and with steel knee pinions. These blocks will fit carriages from the narrowest to 44 inches wide outside.

WEIGHT, 3,000 LBS. **PRICE, $.....**

NO. 3 SAW MILL, WITH TOP SAW ATTACHED TO HUSK.

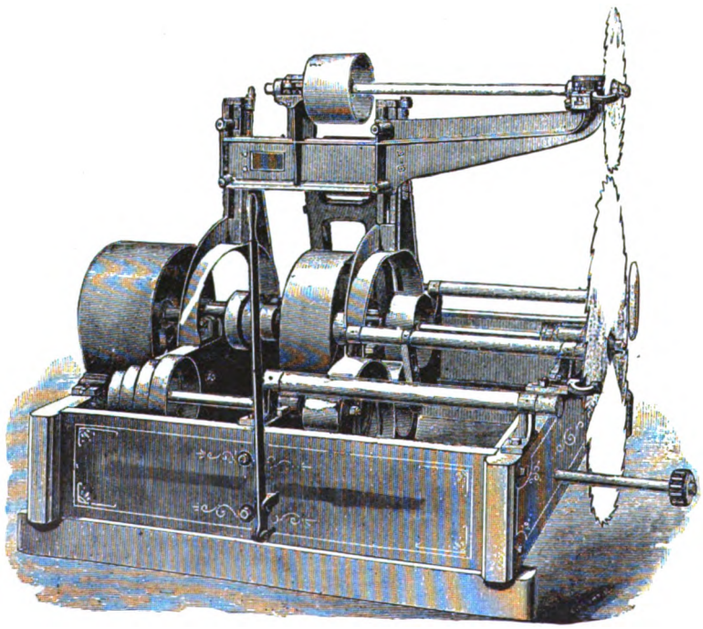


FIG. 4282.

Husk, 6½ feet wide, 9 feet long, 5 inches thick, 16 inches deep; 3½ inch forged steel arbor with solid collar; 3 long self-adjusting arbor boxes; driving pulley, 28 inches diameter for 14 inch belt; large bearing rollers, before and behind the saw, wheel spreader; friction feed and gig-back, with four changes of feed with 3 inch belt, or three changes with 4 inch belt. Heavy carriage, 20 feet long, corners ironed; 24 feet rack, 48 feet Λ and 48 feet flat track; 6 pairs of wheels and chairs, with self-oiling journals; 2 No. 1 Eureka head-blocks with indicator, and patent dogs for holding last board; 2 cant hooks, 1 mill bar, saw gauge, saw set, saw swage and feed belt. This mill carries a 52 to 66 inch saw.

WEIGHT, ABOUT 8,600 LBS.

A carriage with heavy wheels and axles, running in self-oiling bearings, will be substituted for carriage with wheels and chairs, when so ordered, at the same price.

The Eureka head-blocks, Fig. 4283, are furnished with this mill. The Eureka Junior or Frazer's patent friction head-blocks will be subsituted for the Eureka when so ordered, and the difference in price deducted. For specifications of head-blocks, see page 415.

Portable track sills, framed in 12 foot sections with track bolted on, will be furnished, when so ordered, at an additional price.

When ordering, state whether a right or left hand mill is wanted. The cut represents a right hand mill. When neither hand is specified, a right hand mill will be furnished.

CAPACITY, 10,000 TO 25,000 FEET PER DAY.

Saws and driving belts are not included in the price of the mill, but will be furnished when so ordered. For prices see page 415.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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EUREKA JUNIOR HEAD-BLOCK, WITH INDICATOR.

These head-blocks are connected by a shaft, move simultaneously and always remain parallel The independent knees of the Eureka blocks slide through the main knees, their movement being independent of them and of each other. They are used when sawing tapering butt logs or whenever one end of the log is to be set in advance of the other; and when three or more head-blocks are used, are very useful in straightening a log or cant that has sprung in sawing. Their use does not impair the parallelism of the knees, and when not in use they are drawn back out of the way. These head-blocks are provided with our patent indicator and dogs for holding the last board.

The ratchet set works are provided with a setting lever, forked at the lower end to secure the ratchet wheel, the lever is provided with five setting pawls, bearing on the upper side of the wheel, and a reversing pawl on the lower side. Five check pawls, opposite the setting pawls, take up and hold the slightest movement imparted to the ratchet wheel by the setting lever and prevent all lost motion. A single throw of the upright reversing lever trips the setting and check pawls and engages the reversing dog with the ratchet wheel. The operator advances and recedes the knee by the same lever.

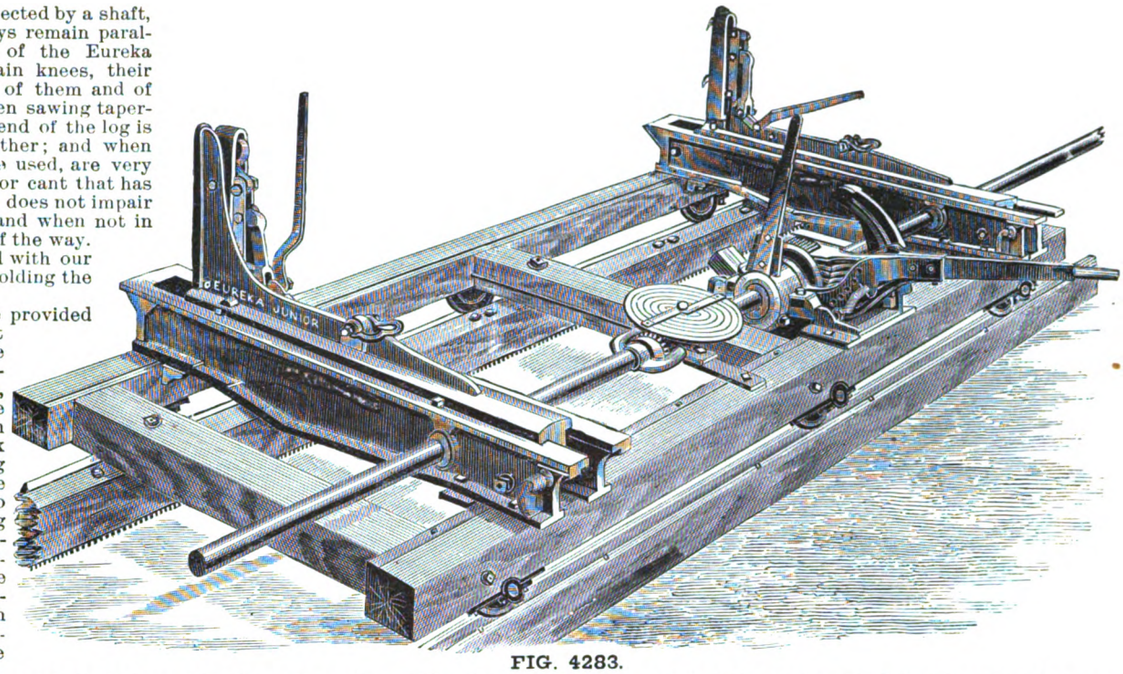


FIG. 4283.

A circle and block are also furnished which enables the setter, when cutting the same thickness of stock for any length of time, to set up the same distance each time, with one throw of the lever, and without watching scale or indicator.

When so ordered, we furnish an attachment which enables the sawyer to operate the setting lever. This is not included with the regular head-blocks, but is furnished for a small additional price.

The "Eureka Junior" head-blocks have no independent knees, but are fitted with single standards; otherwise specifications are the same in all respects as the "Eureka." Weight, 1,500 lbs. Extra head-blocks, shafts and couplings furnished when so ordered.

PRICES.

	No. 0 mill.	Med. mill, Fig. 4281.
No. 0 mill. Cut represents medium	$256.00	$297.00
Husk alone	113.00	142.00
Carriage alone	78.00	78.00
Blocks "	65.00	77.00
Extra block, including 12 feet of set rod and coupling	32.00	32.00
" set rod alone, key-seated entire length ... per foot	.65	.65
If Knight's pony dogs are wanted in place of log dogs ... per pair	26.00	13.00
Extra carriage, including one foot of rack and two of track ... per foot	4.00	4.00
Portable track sills framed in sections for 48 feet of track	26.00	26.00
Extra wheels and axles or wheels and chairs ... per pair	4.50	4.50
Λ track castings with screws ... per foot	.20	.20
Flat " " " " "	.12	.12
Rack castings with T head bolts "	.35	.35
If mill is wanted with hand screw blocks ... deduct	40.00	

If No. 0 mill is wanted with 36-inch blocks as used on medium mill, substitute price of medium mill's carriage and blocks for above carriage and blocks.

If medium mill is wanted with 42-inch Eureka Junior blocks, Fig. 4283, in place of above, substitute price of carriage and blocks of No. 1 mill for above.

PRICES.

	No. 1 mill.	No. 2 mill.
No. 1 mill	$445.00	$641.00
Husk alone	190.00	296.00
Carriage "	95.00	140.00
Head-blocks, Fig. 4283	160.00	
Extra block, including 12 feet of set rod and coupling	55.00	76.00
" set rod alone, key-seated entire length ... per foot	.90	.90
If Knight's excelsior dogs are wanted on both knees in place of our last board dogs, add	18.00	18.00
If Knight's duplex dogs are wanted on both knees in place of our last board dogs, add	42.00	
Extra carriage, including one of rack and two of track ... per foot	4.80	7.25
Portable track sills, framed in sections, for 48 feet of track	26.00	35.00
Extra wheels and chairs or wheels and axles ... per pair	6.00	7.00
Λ track castings with screws ... per foot	.30	.60
Flat " " " " "	.12	.15
Rack castings with T head bolts "	.45	.65

If No. 1 mill is wanted with 36-inch blocks, ratchet and carriage as used with medium mill, or with 40-inch star blocks, substitute their prices for those above given.

If No. 1 mill is wanted with Eureka blocks, substitute price of blocks as given for No. 2 mill.

If indicator is not wanted, deduct ... $12.50

If our last board dogs are not wanted, deduct 17.00

PRICES OF NO. 1 1-2 MILL.

Price of No. 1½ mill, which is the No. 1 mill with top saw attachment, Fig. 4282 .. $585.00

Price of all parts and extras for No. 1½ mill same as for No. 1.

PRICES OF NO. 3 MILL.

Price of No. 3 mill, which is the same as No. 2, except with top saw attachment, Fig. 4282 ... $798.00

Price of all parts and extras for No. 3 same as for No. 2.

Log turner operated by friction pulley attached to mill	$60.00
Wheels and axles, including boxes for log trucks, 4 wheels 12 in. diam., axles 2 in. diam.	20.00
" " " " " " lumber " 4 " 16 " " " 17⅞ " "	22.00
Log haul-up, consisting of a 36 in. x 5 in. gear, an 8 in. x 4 in. pinion, tight and loose pulleys 24 in. x 7 in., a 2¼ in. and a 3 in. shaft with necessary boxes and collars, but no chain	70.00
Tightener pulley with boxes and iron frame for 12 in. belt, pulley 16 in. diam.	18.00
" " " " " " " " 14 " " " 16 " "	20.00
" " " " " " " " 16 " " " 20 " "	32.00
One saw side edger, including iron saw frame, with arbor, collars and one 14 in. saw, six pairs of 4 in. turned Λ wheels on ¾ in. axles, with necessary boxes and 40 feet of planed track, but no woodwork	45.00

If No. 2 mill is wanted with Junior blocks, Fig. 4283, substitute price of blocks as given for No. 1 mill.

If indicator is not wanted, deduct ... $12.50

If our last board dogs are not wanted, deduct ... 17.00

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VARIABLE FEED SAW MILLS.

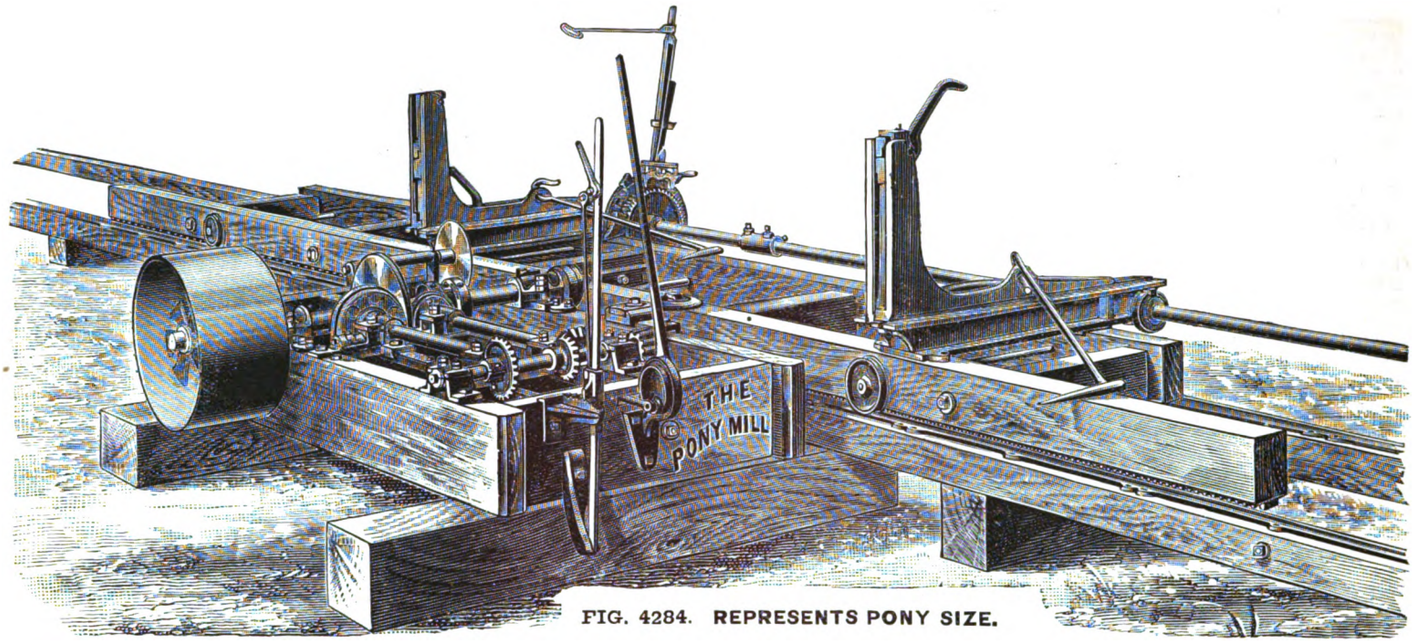


FIG. 4284. REPRESENTS PONY SIZE.

The variable feed saw mills give to the lumberman the advantages of an instant change from the fastest to the slowest rate of speed, or to any intermediate feed that may be required, by a single stroke of a lever. The great advantage of this will at once appear. It enables the sawyer to use his power to its fullest capacity at all times. When the logs are large and power light there need be no stopping of the carriage to allow the exhausted power to be recovered, as is so often done when small engines are used. The log can be fed to the saw so as to give the engine all it can do and no more, and thus also avoid the sudden jerks to which these engines are subjected. On the other hand, if the timber is light the small engine can be made to cut as fast as a large one on the old style mill. A gain of from twenty to thirty-five per cent. of cutting power is made. This is the verdict of sawyers and those who operate these mills. The variation in the feed is made by moving a friction wheel from the center to the periphery of a disc or plate, which is kept revolving when the mill is running.

PONY MILL.

Husk 7 ft. long, 3 ft. wide, 10 in. deep and 3 in. thick; mandrel 2 $\frac{3}{8}$ in. diam., forged collar, adjustable arbor boxes, wheel spreader, saw guide; width of carriage 2 ft. 3 in.; driving pulley 20 in. diam., 10. in. face; 20 ft. carriage, 40 ft. of track on portable stringers, two patent simultaneous ratchet head-blocks with bull dogs, 13 feet of connecting shaft, swage, gauge, monkey-wrench, cant hook and oil-can. Will carry up to a 48-inch saw.

WEIGHT, 2,000 LBS.

STANDARD MILL.

Husk 9 ft. long, 4 ft. 4 in. wide, 12 in. deep and 4 $\frac{1}{2}$ in. thick; mandrel 2 $\frac{1}{8}$ in. in diam., forged collar, pivoted adjustable arbor boxes, board roller, wheel spreader, and patent adjustable saw guide, two patent simultaneous and independent ratchet head-blocks, with bull dogs and 17 ft. of connecting shaft, swage, gauge, monkey-wrench and oil-can; driving pulley 20 in. diam., 13 in. face, 24 ft. carriage and 48 ft. of track on portable stringers, carriage 35 $\frac{1}{2}$ in. wide, 4 in. thick, and 6 $\frac{1}{2}$ in. deep; track 3 $\frac{3}{4}$ in. thick and 4 $\frac{3}{4}$ in. deep. Will carry up to a 54-inch saw.

WEIGHT, 4,000 LBS.

NO. 4 MILL.

Husk 9 ft. 6 in. long, 5 ft. 7 in. wide, 12 in. deep and 4 $\frac{1}{2}$ in. thick; mandrel 3 $\frac{3}{16}$ in. diam., forged collar, patent adjustable saw guide, pivoted adjustable arbor boxes, board roller, wheel spreader, 24 ft. carriage, and 48 ft. of track on portable stringers, carriage 37 $\frac{1}{2}$ in. wide, 5 in. thick, and 7 in. deep; track 5 in. thick and 5 in. deep; two heavy patent simultaneous and independent ratchet head-blocks, with bull dogs and 17 ft. of connecting shaft, driving pulley 20 in. diam., 14 in. face; swage, gauge, monkey-wrench, cant hook and oil-can. Will carry up to a 66-inch saw. On this No. 4 we can place, if desired, at an extra cost, our top saw attachment.

WEIGHT, 6,500 LBS.

PRICES DO NOT INCLUDE SAW OR DRIVING BELT.

PONY MILL, complete, as per specifications	**$215.00**
Husk frame, complete	$95.00
Carriage and track, complete, without head-blocks	65.00
Head-blocks, complete, per pair, with 13 feet of shaft	80.00
Extra ratchet block	30.00
Extra ratchet block, with 8 ft. of shaft and coupling	35.00
If wood-work of track is not wanted, deduct	10.00
Extra carriage, per section of 10 ft., including 20 ft. of track	35.00
Extra carriage, per section of 10 ft., including irons for 20 ft. of track	30.00
Extra carriage, per ft., including 2 ft. of track	3.75
Extra carriage, per ft., including irons for 2 ft. of track	3.50
Rollers and axle, with journal boxes, each	3.00
Tightening pulley and frame (iron) for driving belt	10.00
Wood tightening pulley, without frame or boxes	2.00
Axles and wheels (10 inches) for lumber carriage, per set	10.00
Axles and wheels for lumber carriage, with journal boxes, per set	13.00

STANDARD MILL, complete, as per specifications	**$325.00**
Husk frame, complete	$160.00
Carriage and track, complete, without head-blocks	95.00
Head-blocks, complete, with bull dogs and 17 ft. of shaft, per pair	115.00
Same, with indicator	125.00
Extra ratchet head-block	40.00
Extra ratchet head-block, with 10 ft. of shaft and coupling	50.00
Independent screw head-blocks, per pair,	50.00
If wood-work of track is not wanted, deduct	15.00
Extra carriage, per section of 12 ft., including 24 ft. of track	50.00
Extra carriage, per section of 12 ft., including irons for 24 ft. of track	42.50
Extra carriage, per ft., including 2 ft. of track	5.00
Extra carriage, per ft., including irons for 2 ft. of track	4.50
Rollers and axle, with journal boxes, each	4.00
Tightening pulley and frame (iron) for driving belt	12.00
Wood tightening pulley, no frame or boxes	2.00
Axles and wheels (10 inches) for lumber carriage, per set	10.00
Same, with journal boxes	13.00
Axles and wheels (12 inches) for lumber carriage, per set	12.00
Same, with journal boxes	15.00

NO. 4 MILL, complete, as per specifications	**$500.00**
Same, with top saw attachment	**600.00**
Husk frame, complete	$250.00
Carriage and track, complete, without head-blocks	150.00
Head-blocks, complete, with 17 ft. of shaft, per pair	160.00
Same, with extra knee on each block	190.00
Indicator for head-blocks	10.00
Extra ratchet block, with 10 ft. of shaft and coupling	70.00
Extra ratchet block, with extra knee and 10 ft. of shaft and coupling	85.00
Independent screw head-blocks, per pair,	60.00
If wood-work of track is not wanted, deduct	18.00
Extra carriage, per section of 12 ft., including 24 ft. of track	75.00
Extra carriage, per section of 12 ft., including irons for 24 ft. of track	66.00
Extra carriage, per ft., including 2 ft. of track	7.00
Extra carriage, per ft., including irons for 2 ft. of track	6.60
Rollers and axle, with journal boxes, each,	6.50
Tightening pulley and frame (iron) for driving belt	15.00
Wood tightening pulley, without frame or journal boxes	2.00
Axles and wheels (12 inches) for lumber carriage, per set	12.00
Same, with journal boxes	15.00
Axles and wheels (16 inches) for lumber carriage, per set	17.00
Same, with journal boxes	20.00

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FRICTION FEED SAW MILLS.

On these mills there are four friction wheels, two of iron and two of composition.

Nos. 2 and 3 have all our latest improvements in the carriage, saw guide, head-blocks and bull dogs, and No. 1 has the latest carriage and head-blocks, but is not sent out with the bull dogs unless specially ordered, and at a slight advance on the list prices quoted.

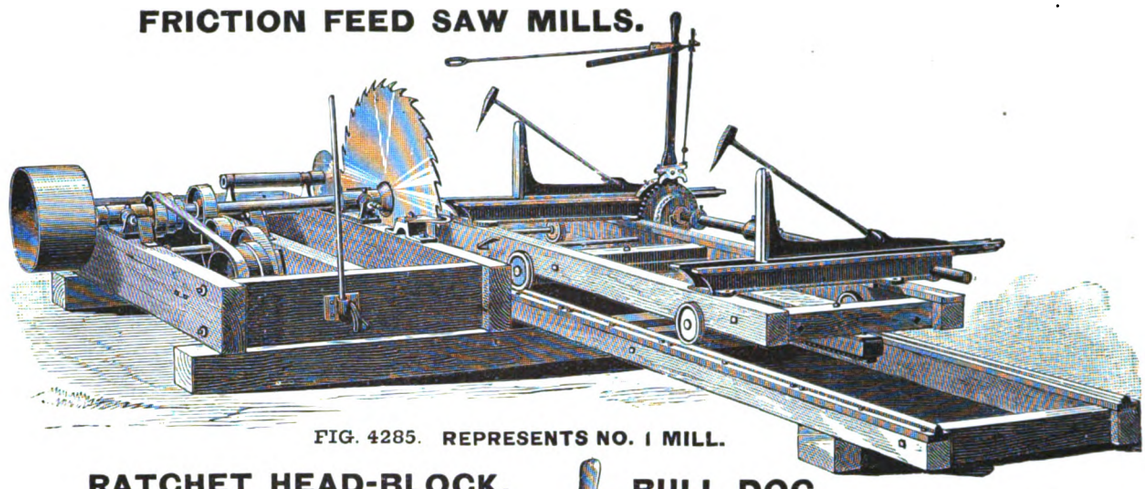


FIG. 4285. REPRESENTS NO. 1 MILL.

BULL DOG.

For holding fast board or timber after it is squared; it has an upper and lower dog operated by one lever; it is simple, durable and easily handled.

RATCHET HEAD-BLOCK.

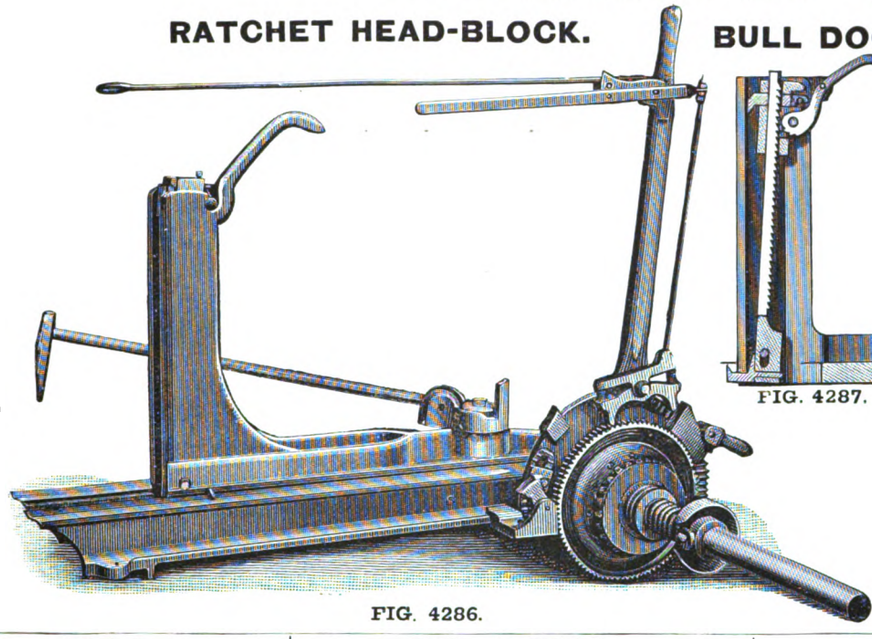


FIG. 4286.

BULL DOG.



FIG. 4287.

BULL DOG.

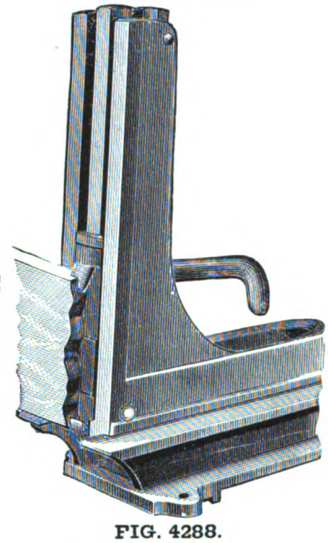


FIG. 4288.

NO. 1 MILL.

Husk 8 ft. long, 4 ft. 4 in. wide, 12 in. deep, and 4½ in. thick; mandrel 2 7/16 in. diam., forged collar, pivoted adjustable arbor boxes, board roller, wheel spreader, and patent adjustable saw guide; two patent simultaneous and independent ratchet head-blocks, and 17 ft. of connecting shaft, swage, gauge, monkey-wrench, oil-can and feed belt; driving pulley, 20 in. diam., 13 in. face, 24 ft. carriage, and 48 ft. of track on portable stringers; carriage 35½ in. wide, 4 in. thick, and 6½ in. deep; track 3¾ in. thick and 4¾ in. deep.

WEIGHT, 3,300 LBS.

NO. 2 MILL.

Husk 9 ft. long, 4 ft. 4 in. wide, 12 in. deep, and 4½ in. thick; mandrel 2 11/16 in. diam., forged collar, pivoted adjustable arbor boxes, board roller, wheel spreader, patent adjustable saw guide; driving pulley, 20 in. diam. and 13 in. face; 24 ft. carriage and 48 ft. of track on portable stringers; carriage, 35½ in. wide, 4 in. thick and 6½ in. deep; track, 3¾ in. thick and 4¾ in. deep; 2 patent simultaneous and independent ratchet head-blocks, with patent bull dogs and 17 ft. of connecting shaft, swage, gauge, monkey-wrench, cant hook, oil-can and feed belt.

WEIGHT, 3,800 LBS.

NO. 3 MILL.

Husk 9 ft. 6 in. long, 5 ft. 7 in. wide, 12 in. deep and 4½ in. thick; mandrel 3 3/16 in. diam., forged collar, patent adjustable saw guide, pivoted adjustable arbor boxes, board roller, wheel spreader; 24 ft. carriage and 48 ft. of track on portable stringers; carriage, 37½ in. wide, 5 in. thick and 7 in. deep; track, 5 in. thick and 5 in. deep; 2 heavy patent simultaneous and independent ratchet head-blocks, with bull dogs and 17 ft. of connecting shaft; swage, gauge, monkey-wrench, cant hook, oil-can and feed belt; driving pulley, 20 in. diam., 14 in. face.

WEIGHT, 6,000 LBS.

PRICES DO NOT INCLUDE SAW OR DRIVING BELT.

NO. 1 MILL, complete, as per specifications	$275.00
Husk, complete	$130.00
Carriage and track, complete, without head-blocks	85.00
Head-blocks, complete, with 17 ft. of shaft	100.00
Same, with bull dogs	115.00
Extra ratchet block, with 10 ft. of shaft and coupling	42.50
Same, with bull dog	50.00
Independent screw head-blocks, per pair,	40.00
If wood-work of track is not wanted, deduct	15.00
Extra carriage, per section of 12 ft., including 24 ft. of track	45.00
Extra carriage, per section of 12 ft., including iron for 24 ft. of track	37.50
Extra carriage, per ft., including 2 ft. of track	4.00
Extra carriage, per ft., including irons for 2 ft. of track	3.60

NO. 2 MILL, complete, as per specifications	$325.00
Husk, complete	$175.00
Carriage and track, complete, without head-blocks	95.00
Head-blocks, complete, with bull-dogs and 17 ft. of shaft	115.00
Same, with indicator	125.00
Extra ratchet block	40.00
Extra ratchet block, with 10 ft. of shaft and coupling	50.00
Independent screw head-blocks, per pair,	50.00
If wood-work of track is not wanted, deduct	15.00
Extra carriage, per section of 12 ft., including 24 ft. of track	50.00
Extra carriage, per section of 12 ft., including irons for 24 ft. of track	42.50
Extra carriage, per ft., including 2 ft. of track	5.00
Extra carriage, per ft., including irons for 2 ft. of track	4.50

NO. 3 MILL, complete, as per specifications	$450.00
Same, with top-saw attachment	550.00
Husk frame, complete	$200.00
Carriage and track, complete, without head-blocks	150.00
Head-blocks, complete, with 17 ft. of shaft, per pair	160.00
Same, with extra knee on each block	190.00
Indicator for head-blocks	10.00
Extra ratchet block, with 10 ft. of shaft and coupling	70.00
Extra ratchet block, with extra knee and 10 ft. of shaft and coupling	85.00
Independent screw head-blocks, per pair,	60.00
If wood-work of track is not wanted, deduct	18.00
Extra carriage, per section of 12 ft., including 24 ft. of track	75.00
Extra carriage, per section of 12 ft., including irons for 24 ft. of track	66.00
Extra carriage, per ft., including 2 ft. of track	7.00
Extra carriage, per ft., including irons for 2 ft. of track	6.60

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SIDE CUTTING MULAY SAW MILL.

It has a large compass of usefulness, as it will cut all kinds of lumber, hard or soft, large or small, into any shape or dimensions, with less power than any other kind of mill. The main frame is made entirely of iron, and faced true to form bearings for the slides and other working parts. The crank-shaft runs in self-lubricating boxes at a speed of about 500 revolutions per minute. The driving pulley is 20 inches in diameter and 7 inch face, but will be made larger or smaller to suit the speed of the motive power. The crank-pin is of steel, and to this is fitted the pitman which gives motion to the saw. The lower end of the saw is attached to the pitman by means of a buckle and parallel rods, in such a manner as to produce a vertical movement of the saw on its downward stroke, and give clearance to the teeth on the upward stroke. It will cut boards 34 inches wide with a 5-foot saw, having only 16 inches stroke, without choking the saw with sawdust. The feed is driven by friction, and varied by tapering cones to cut from ⅛ to ⅜ inch at each stroke of the saw. The track furnished with the mill is fastened to the main frame in a manner that insures it to be at a right angle with the crank-shaft and of the proper height to suit the carriage and head-blocks. The carriage is in two sections, bolted together, and is long enough for 20-foot logs of any diameter up to 4 feet. The corners of the carriage are protected with iron, and it is mounted on 8-inch track wheels whose axles extend from side to side of carriage. The head-blocks may be set any distance apart to suit different lengths of logs, and the knees moved simultaneously by a lever and pawls working into a ratchet wheel. Any thickness of board up to 1½ inch may be set by one movement of this lever, and the graduated stop varies the thickness by sixteenths. In addition to the ordinary dog for driving into the top of the log, each knee has a screw dog which can be forced into the face of the log, or side of the plank, and prevent it from being drawn from the knees or thrown upward by the saw.

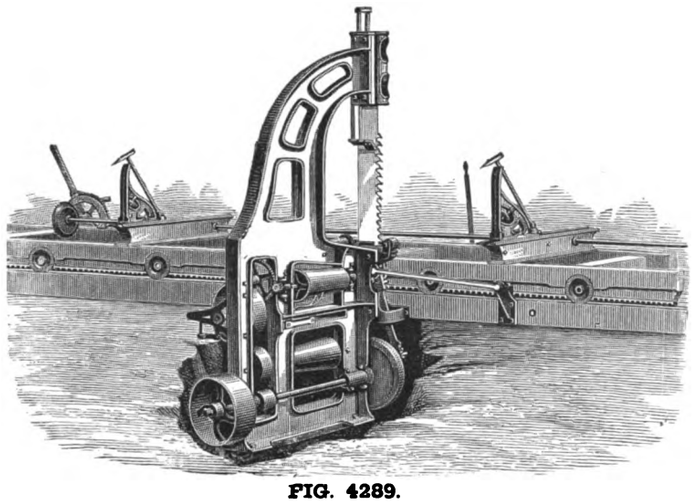


FIG. 4289.

The capacity of the mill is varied by the manner it is handled, and by the size and character of the logs to be cut. With the usual size threshing engine of 10-horse power and medium-sized oak logs, eighteen hundred to three thousand feet per day would be an average; while in poplar logs of good size, double that quantity could be reached.

Each mill is supplied with a saw, feed belt, oil-can, saw-set, upset, file, crowbar, monkey-wrench, two small wrenches, two cant hooks, two lumber clamps, and two off-bearing rollers. **PRICE, $400.00.**

BAND SAW LOG MILL.

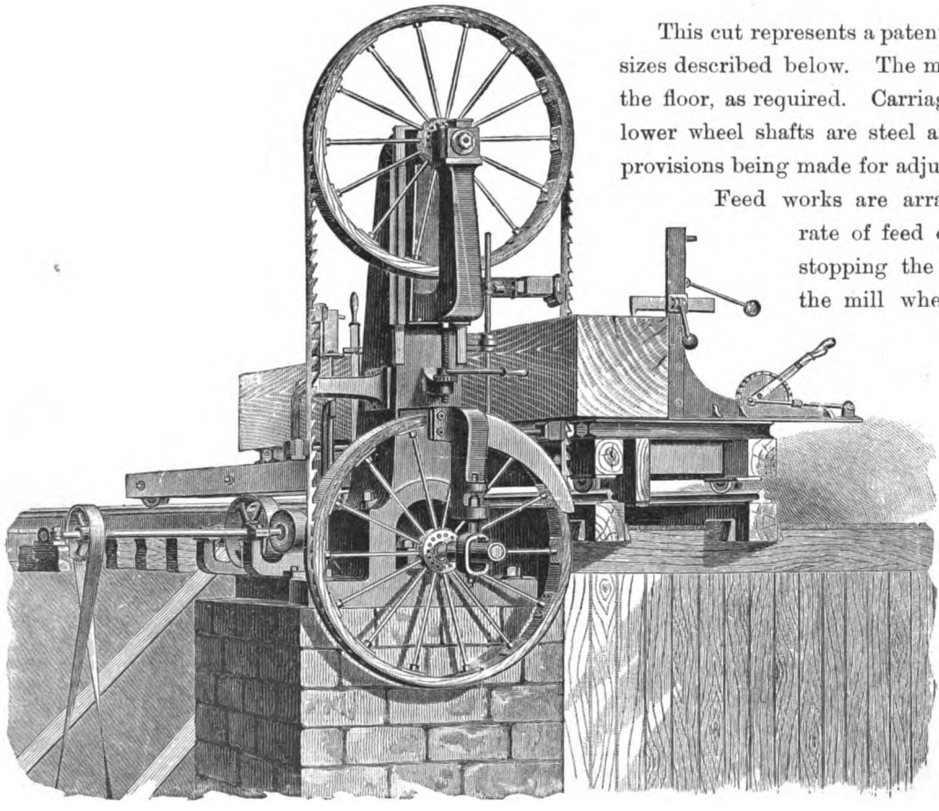


FIG. 4290.

This cut represents a patent band saw mill, and shows the design of both sizes described below. The mills may be belted from either above or below the floor, as required. Carriages are made of any length. The upper and lower wheel shafts are steel and have bearings on each side of the wheels, provisions being made for adjustment in either direction.

Feed works are arranged with a friction device by which the rate of feed can be varied from zero to full speed without stopping the mill. Engines will be furnished to drive the mill when required.

We supply with each mill, scarfing frame and a full set of wrenches.

	Size of saw.	Size of wheels.	Driving pulley	Speed.	Weight	Price.
No. 8 mill	6 in. wide, 38 ft. long.	72 in. diam. 6 in. face.	30 in. x 10 in.	400 revs.	8,000 lbs.	$1,350.00
No. 9 mill	8 in. wide, 47 ft. long.	96 in. diam. 8 in. face.	42 in. x 16 in.	300 revs.	19,000 lbs.	$1,980.00

Carriage, 20 ft. long; two 40 in. screw head-blocks; weight, 680 lbs. Price, $652.00. For each additional 40 in. head-block add $150.00. Weight of head-block, 500 lbs.

For each additional foot of carriage and track add $16.00.

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BAND RE-SAW.

Fig. 4291 represents No. 6 band re-sawing machine; it has a capacity for re-sawing about 50,000 feet in ten hours. It takes in lumber 30 inches wide, 13 inches thick, or will saw off from the side of a piece 10 inches thick. The wheels are 72 inches diameter, of wrought iron covered with wood and faced with gum cloth. They are warranted to stand the tension of blades 6 inches wide. The top wheel has a bearing on both sides. Rolls can be angled for bevel sawing.

The No. 5 machine has a capacity of about 30,000 feet in ten hours. The wheels are 60 inches diameter. The machine will saw lumber up to 30 inches in width and 13 inches thick.

The No. 3 machine has a capacity of about 3,000 to 4,000 feet in ten hours, and may also be used for a hand machine, the feed rolls being easily removed from the table.

Each machine is furnished with one saw, scarfing frame, pair of brazing irons, and a full set of forged steel wrenches.

No. of machine.	Size of saw.	Diameter of wheel.	Size of tight and loose pulley.	Speed.	Weight.	Prices.
3	3 in. wide 23 ft. 6 in. long.	44 in.	20 in. x 4½ in.	520 rev.	3,950 lbs.	$600.00
5	4 in. wide 32 ft. long.	60 "	30 " x 7 "	100 "	6,750 "	1,100.00
6	6 in. wide 37 ft. 10 in. long.	72 "	30 " x 10 "	100 "	10,600 "	1,350.00

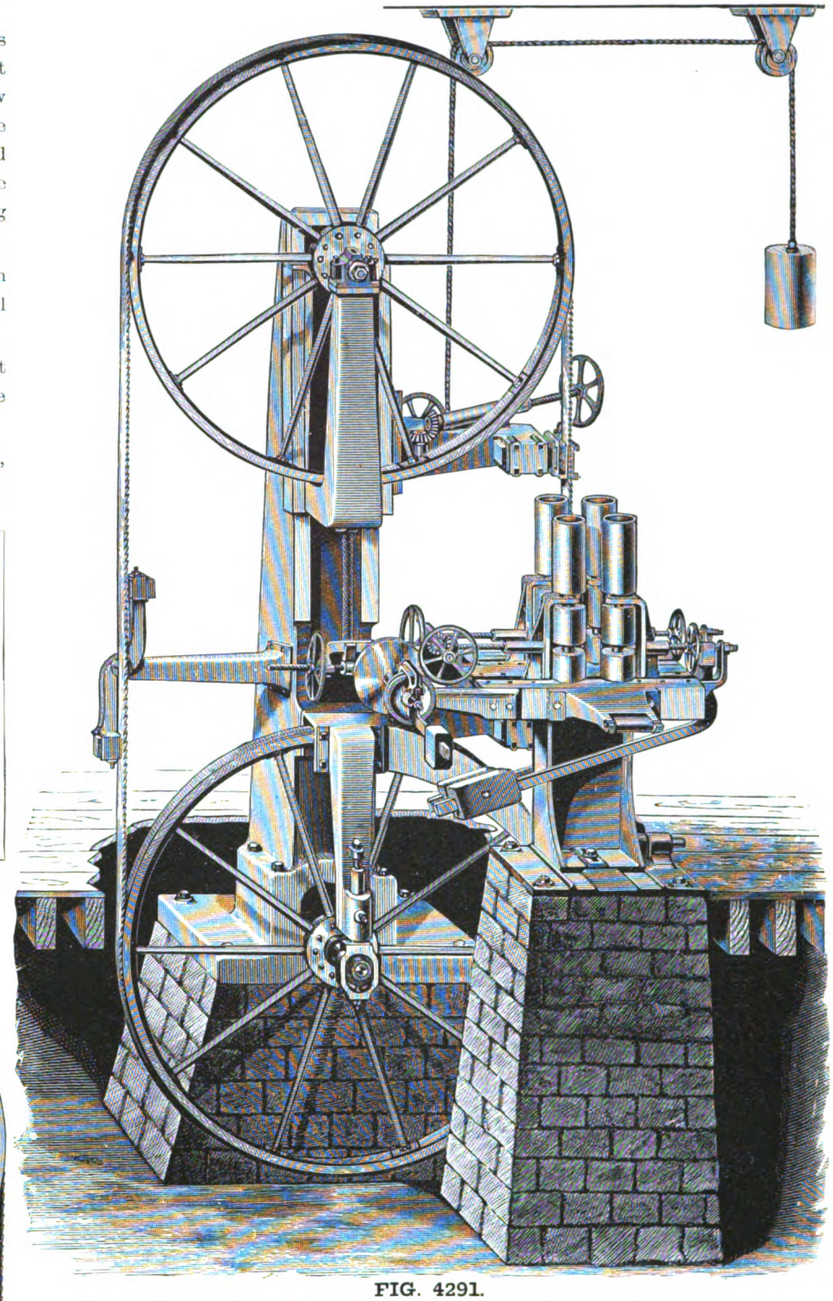


FIG. 4291.

BAND RE-SAW.

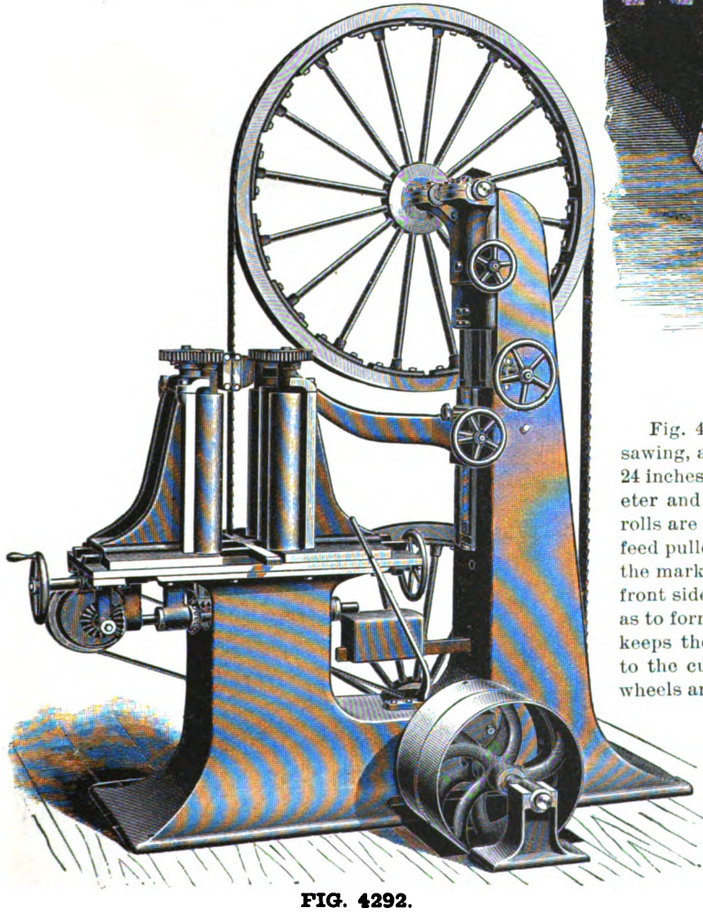


FIG. 4292.

DESCRIPTION, FIG. 4292.

HEAVY BAND RE-SAW.

Fig. 4292 represents a heavy band re-sawing machine, designed for general re-sawing, and will work equally well upon soft or hard wood. It will cut stock up to 24 inches in width and to the center of ten inches. The wheels are 54 inches in diameter and are made to carry a saw of any width from one to four inches. The feed rolls are adjusted so as to be perfectly self-centering, and are driven by our patented feed pulley with gear connections, which makes the strongest feed on any machine in the market. It can be instantly started or stopped by means of a lever placed on the front side of the machine and convenient to the operator. The frame is so arranged as to form a solid support for the table, which prevents any springing of the rolls and keeps them in perfect alignment with the saw. This machine is especially adapted to the cutting of stock for panels and boxes, where thin material is required. The wheels are adjustable in their bearings, the upper wheel by means of the hand wheel on the front of the machine, and is also furnished with a novel device providing for the expansion and contraction of the saw. The machine is fitted with a new pattern of guide, which prevents the breaking of the saws, and is held in position by an arm attached to the front of the machine, and is adjusted as required by means of a rack and pinion convenient to the operator. One three-inch saw goes with each machine. Floor space, 3 x 7 feet. Height, 9 feet from floor. Driving pulleys, 24 x 6. Speed, 300 revolutions.

WEIGHT, 3,000 LBS. **PRICE, $.....**

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BAND RE-SAW.

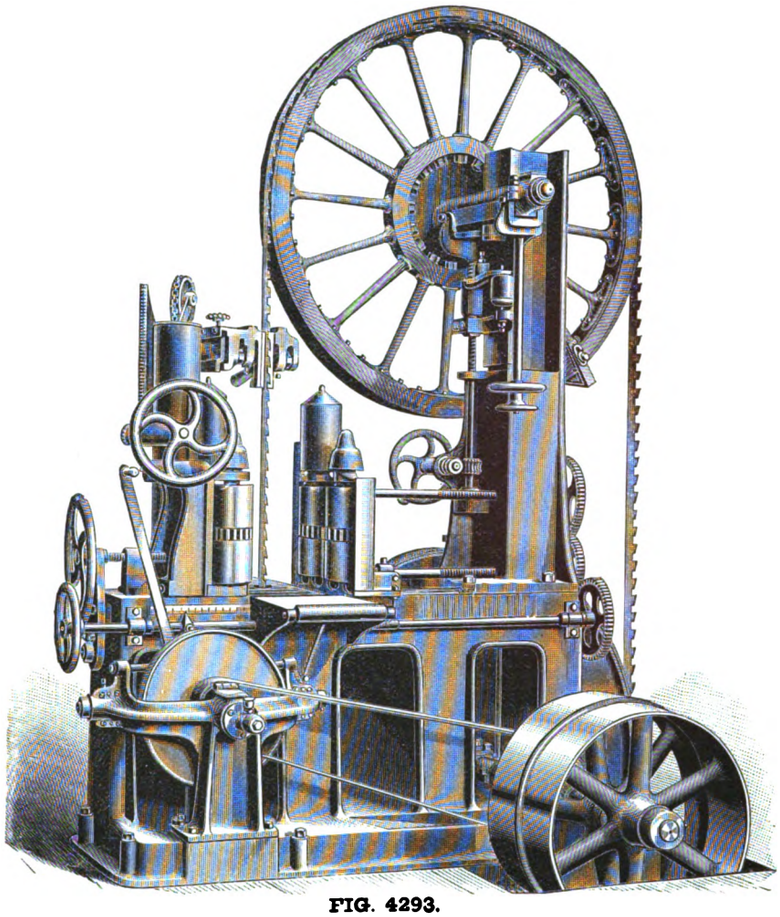


FIG. 4293.

This machine will use saws as thin as 24 gauge and up to 6 inches wide. It will saw 16,000 to 20,000 feet per day, making a kerf of only $\frac{1}{20}$ of an inch, or less, where most re-saws make $\frac{3}{32}$ to $\frac{1}{8}$, or more.

The feeding is effected by four strongly geared live rolls, while two smaller idle rolls guide the last end of the stock up to the finish of the cut.

Strong springs hold the rolls upon one side up to their work, and enable them to yield to all inequalities of thickness or shape, while the rolls upon the other side form a guide in perfect line with the saw, thus insuring a cut parallel with one side of the stock.

A friction device, controlled by a single lever, enables the feed to be instantly stopped and started, or to be run at any speed desired, without changing belts.

The upper wheel has a rim of bent ash with steel spokes, and the lower one is a heavy iron casting. The lower wheel being thus much the heavier acts as a fly-wheel to prevent sudden and violent fluctuations of speed, as in starting and stopping, and thus prevents the overrunning of the upper wheel, which, being lighter, is capable of following the motion of the lower one without causing the saw to slip or to become slack on the working side.

Weight of machine complete, about 6,000 lbs.

Diameter of wheels, 60 inches.

Driving pulley, 22 to 30 inches diameter, as ordered, for an 8-inch belt.

Speed, 450 to 525 turns per minute.

Thickness taken between feed-rolls, 21 inches—12 inches on one side of the saw and 9 inches on the other.

Height of stock that can be sawed, 30 inches.

PRICE, $.....

CIRCULAR RE-SAW.

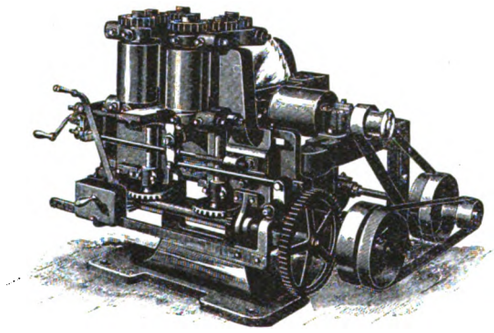


FIG. 4294.

The feed works consist of four large rolls, strongly and powerfully geared, held to their work by a heavy weight; the rolls can be adjusted in pairs, or all four simultaneously, for different thicknesses of lumber from ¼ inch to 8 inches. The swivel piece is attached to bearings on a strong upright post, inside of which the vertical driving shaft revolves; the back pressure and thrust of the feed rolls is all taken by this post. Four changes of feed can be obtained by cone pulleys. Pulley for 24-inch saw, 8 inches by 8 inches, to run 1,500 revolutions per minute; for 30-inch saw, 10 inches by 8 inches face, to run 1,200 revolutions; hole in saw should be 1½ inches.

PRICES.

With 24-inch saw, weight 1,700 lbs. **$350.00**
" 30 " " " 1,800 " **400.00**

SMALL DANIELS PLANER.

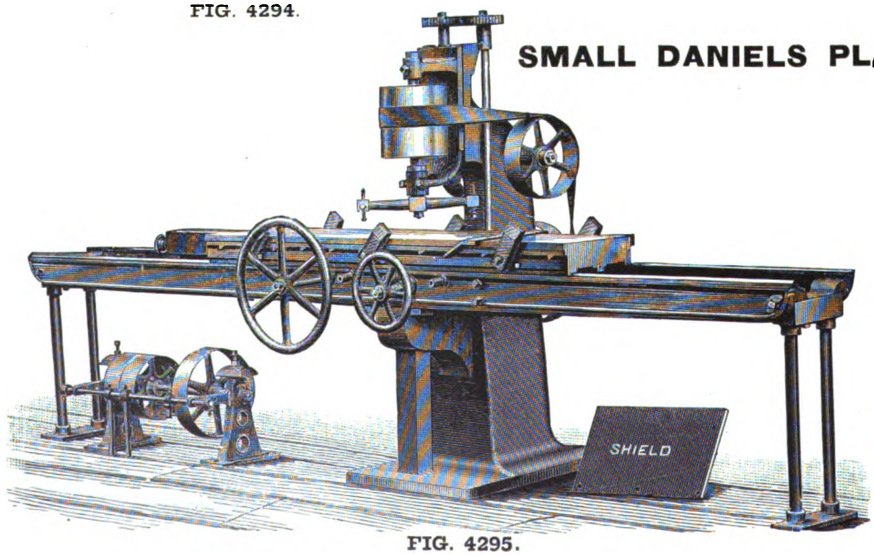


FIG. 4295.

This machine is intended for use in pattern shops, and in any case where the work is small and continually changing. The surfaces produced are perfectly true, and ready for gluing as they come from the machine.

It planes 6 feet long, 15 inches wide, and 6 inches thick. The lumber is held by convenient screw clamps, which can be instantly changed for pieces of any size.

The feeding movement is performed by hand.

Tight and loose pulleys, 8 x 3½ inches. 1,500 revolutions per minute.

The cutter-bar is of wrought iron, and the spindle of steel.

WEIGHT, 1,900 LBS. PRICE, $.....

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TRAVERSE OR DANIELS PLANER, IRON FRAME.

Fig. 4296 represents a traverse, or Daniels planing machine. The entire frame which carries the working parts is made of iron, the table and shear being made of wood. It is made to plane 27 inches wide and any length required.

Planes width.	Planes length.	Weight.	Tight and loose pulleys.	Speed.	Price.
27 in.	12 ft.	3,700 lbs.	14 in. x 4½ in.	400 rev.	$.....
27 "	16 "	4,200 "	14 " x 4½ "	400 "	.....
27 "	20 "	5,000 "	14 " x 4½ "	400 "	.....
27 "	25 "	5,800 "	14 " x 4½ "	400 "	.....
27 "	30 "	6,600 "	14 " x 4½ "	400 "	.....
27 "	35 "	7,400 "	14 " x 4½ "	400 "	.....
27 "	40 "	8,200 "	14 " x 4½ "	400 "	.....
27 "	50 "	9,800 "	14 " x 4½ "	400 "	.....
27 "	60 "	11,400 "	14 " x 4½ "	400 "	.....

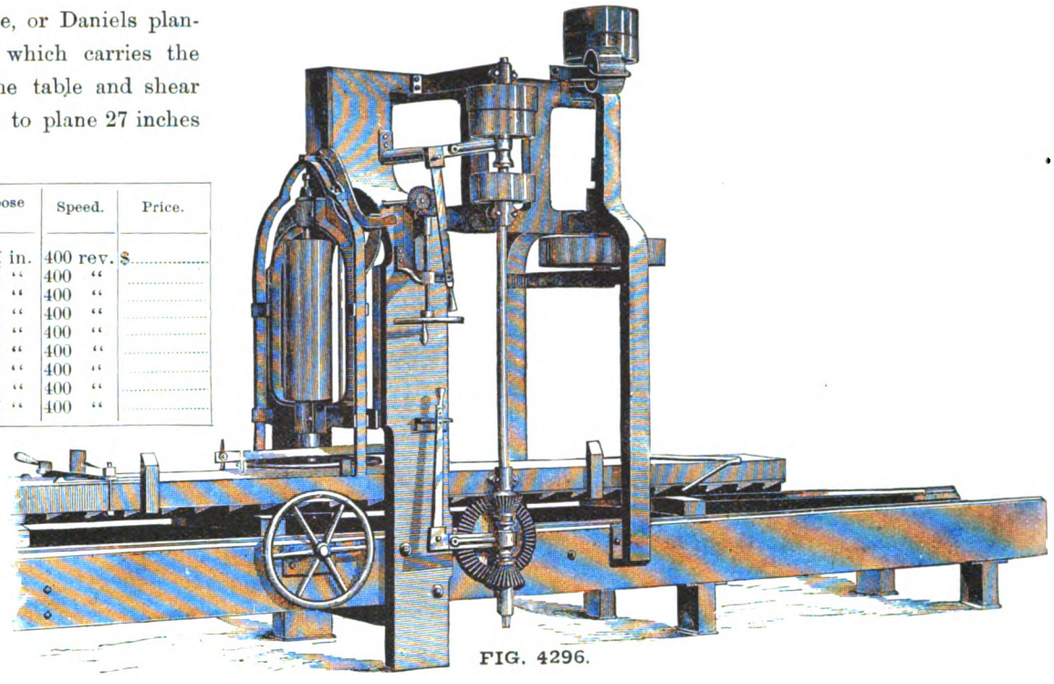


FIG. 4296.

DANIELS PLANER, IRON AND WOOD FRAME.

DESCRIPTION, FIG. 4297.

This machine is built from new designs, having an iron frame or top, steel spindle, improved arm, feed works, etc., and it is especially recommended to those needing this class of planers. For cabinet shops, carriage builders, wheelwrights, pattern making, etc., it is indispensable. For squaring timber and making true surfaces they have no equal. The recent important improvements in various parts of this machine add greatly to its value without any advance in the price. The dead-weight and rolls for planing panels and thin lumber have become so important that they are considered a part of the machine, and are always sent with it unless otherwise ordered. Each machine will plane the full-rated width with the dead-weight, and three inches wider when the dead-weight is removed.

It is a superior machine for planing out of wind.

In ordering, care should be had to mention both the length and the width desired to be planed, also the class of work for which the machine is designed.

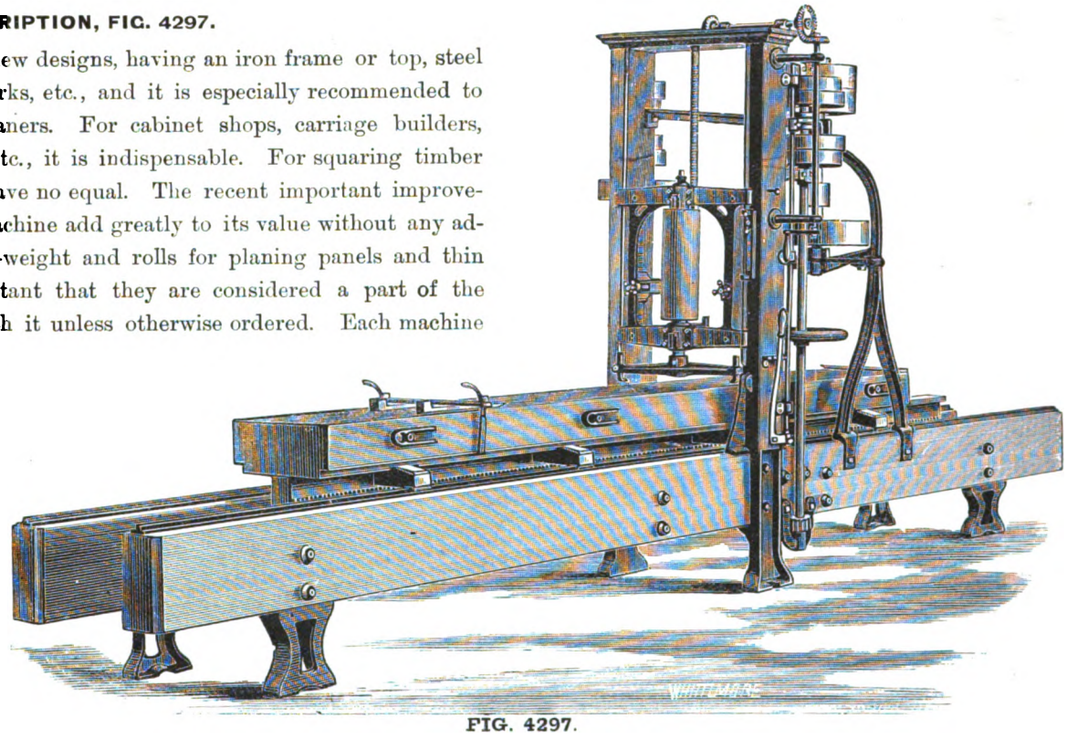


FIG. 4297.

PRICES.

To plane.	16 in. wide.	20 in. wide.	24 in. wide.	27 in. wide.	31 in. wide.	36 in. wide.	42 in. wide.	48 in. wide.
7 feet long.....	$245.00	$295.00	$330.00	$372.00	$406.00	$470.00	$520.00	$575.00
8 " "	252.00	302.00	338.00	381.00	415.00	479.00	529.00	585.00
9 " "	259.00	309.00	346.00	390.00	424.00	488.00	538.00	595.00
10 " "	266.00	316.00	354.00	399.00	433.00	497.00	547.00	605.00
11 " "	273.00	323.00	362.00	408.00	442.00	506.00	556.00	615.00
12 " "	280.00	330.00	370.00	417.00	451.00	515.00	565.00	625.00
13 " "	287.00	338.00	378.00	426.00	460.00	524.00	574.00	635.00
14 " "	294.00	346.00	386.00	435.00	469.00	533.00	583.00	645.00
15 " "	301.00	353.00	394.00	444.00	478.00	542.00	592.00	655.00
16 " "	308.00	361.00	402.00	453.00	487.00	551.00	601.00	665.00

Extra cutters per dozen, $\frac{5}{8}$ inch square, $5.50; $\frac{9}{16}$ inch square, $5.00; $\frac{1}{2}$ inch square, $4.50.

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LARGE DIMENSION PLANER.

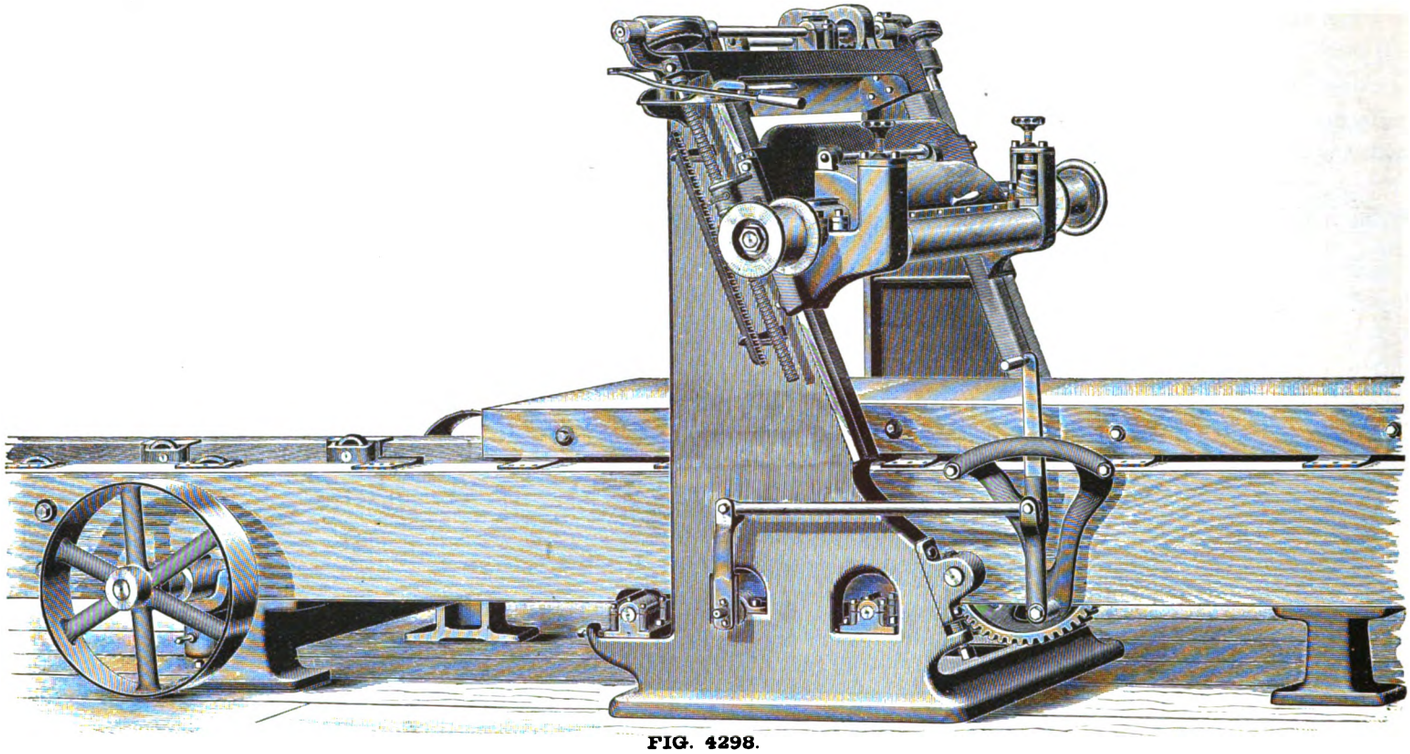


FIG. 4298.

Works 30 inches wide, and 24 inches thick, can be built to any length required; with friction feed, quick return motion, and power hoisting attachment for cylinder.

It is for squaring and truing up timber of large dimensions. All the working parts are attached to the heavy iron framework forming the central portion of the machine; the woodwork being connected to the central frame independent of all running gears. A feed, with quick return motion, is provided.

The cutter head is square, slotted on four sides; cutters can be attached for chamfering, beading, etc. Suitable pressure rolls are placed before and after the cut. The entire cutter head attachment is raised and lowered by power, with hand adjustment for fine variations. All the bearings are provided with self-oiling boxes; and all parts are readily accessible for oiling. The idler trucks on which the platen travels reduce the friction to a minimum.

The cutter head pulleys are 6 inch diameter, for 5 inch belt. Tight and patent self-oiling loose pulleys are 16 inch diameter, for 10 inch belt.

WEIGHT.....LBS. PRICE, $.....

HEAVY TIMBER PLANER.

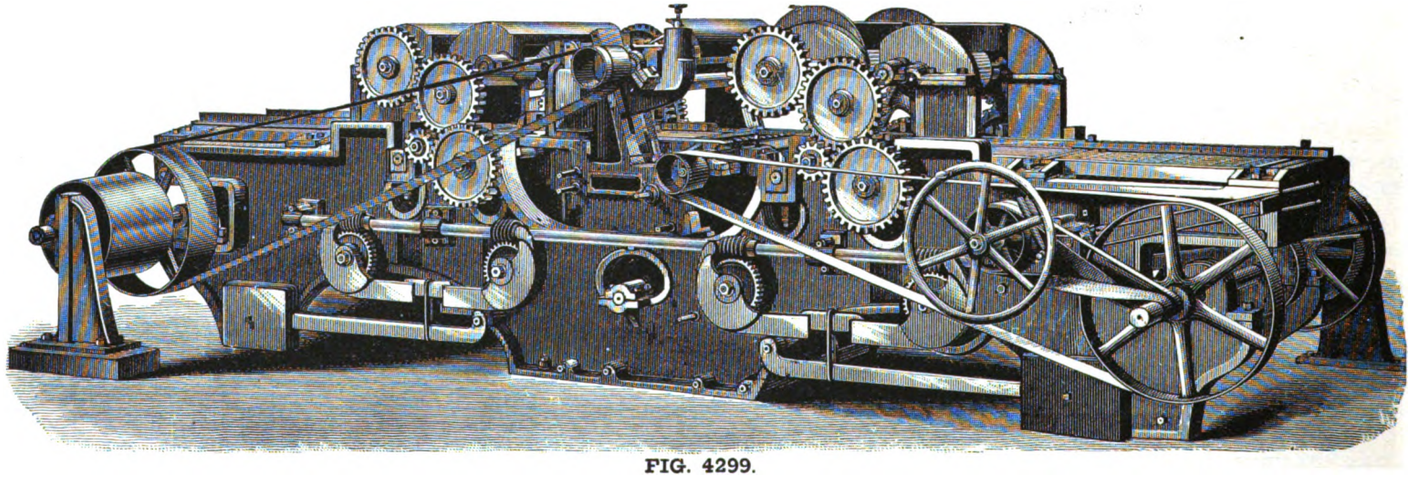


FIG. 4299.

The above cut represents the design of various sizes of timber planing machines. The description given will follow good in all cases. The cutter heads are made of forged steel, slotted on all four sides, fitted with steel bolts and case-hardened nuts. The gears on rolls are one and one-half times the diameter of the rolls. The under cylinder is set so as to plane first, giving the timber a solid bearing on the bed while being finished. All top rolls are raised by power or hand, as desired. With each size machine we furnish one set of knives for each cutter head and full set of wrenches.

Planes. 2 sides or 4 sides.	No. of feed rolls.	Weight.	Tight and loose pulleys.	Speed.	Prices.
28 in. x 16 in. 14 in. x 16 in.	8	17,000 lbs.	20 in. x 6 in.	850 revs.	$2,500.00
24 " x 8 " 14 " x 8 "	8	12,000 "	16 " x 8 "	850 "	1,800.00
24 " x 8 " 14 " x 8 "	6	11,400 "	16 " x 8 "	850 "	1,600.00
24 " x 8 " 14 " x 8 "	4	10,000 "	16 " x 8 "	850 "	1,400.00

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EIGHT ROLL TIMBER PLANER.

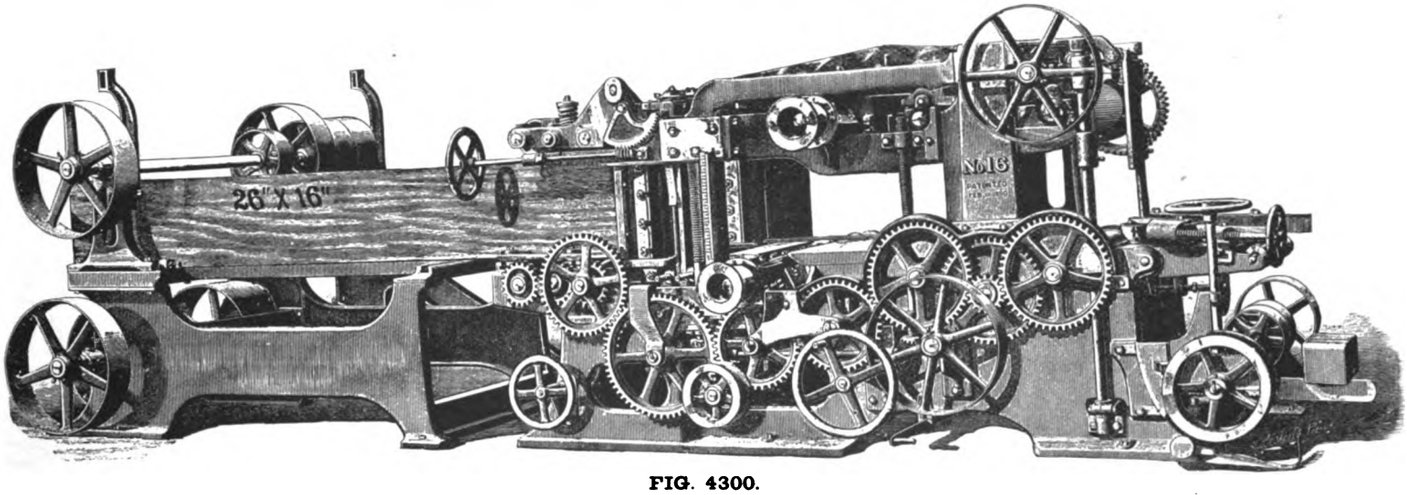


FIG. 4300.

This machine will surface 26 inches and 30 inches wide, as ordered, up to 16 inches thick, and square a timber to the full dimension of 26 x 16 inches or as small as 3 x 5/8 inches. With center guide it will surface two pieces, top and bottom and the outside edge, each up to 11 inches wide, at one operation.

At a slight additional cost it can be constructed to work 20 or 24 inches thick, if required.

The novel method of driving the feed rolls by a patented expanding belt motion secures the great amount of variation in thickness, and is a most powerful and reliable feed. The feed belt is driven at the velocity of about 800 feet per minute when feeding at the rate of 25 feet per minute. The rolls are 7 inches in diameter and raise perfectly parallel, avoiding all strain on the gearing.

The first bottom roll is yielding, and weighted so as to raise and follow the irregularities of the lumber. The pressure on the top entry rolls is centered in one weighted lever. The top section may be run for single surfacing without operating the entire machine or removing the belts.

The bed is stationary, and all variations in thickness are made by raising, by hand or power, the top section carrying the rolls and cutter head. The side heads are readily adjusted, and an indicator shows the exact size of timber. The bottom cutter head is adjusted in combination with the bottom delivery rolls all in the one operation.

The tight and loose pulleys on countershaft are 16 inches diameter, 8 inches face, and should run 850 revolutions per minute.

WEIGHT, 14,000 LBS.

PRICES, 26 x 16 inches, **$3,000.00;** 30 x 16 inches, **$3,200.00.**

4 AND 6 ROLL PLANER AND MATCHER.

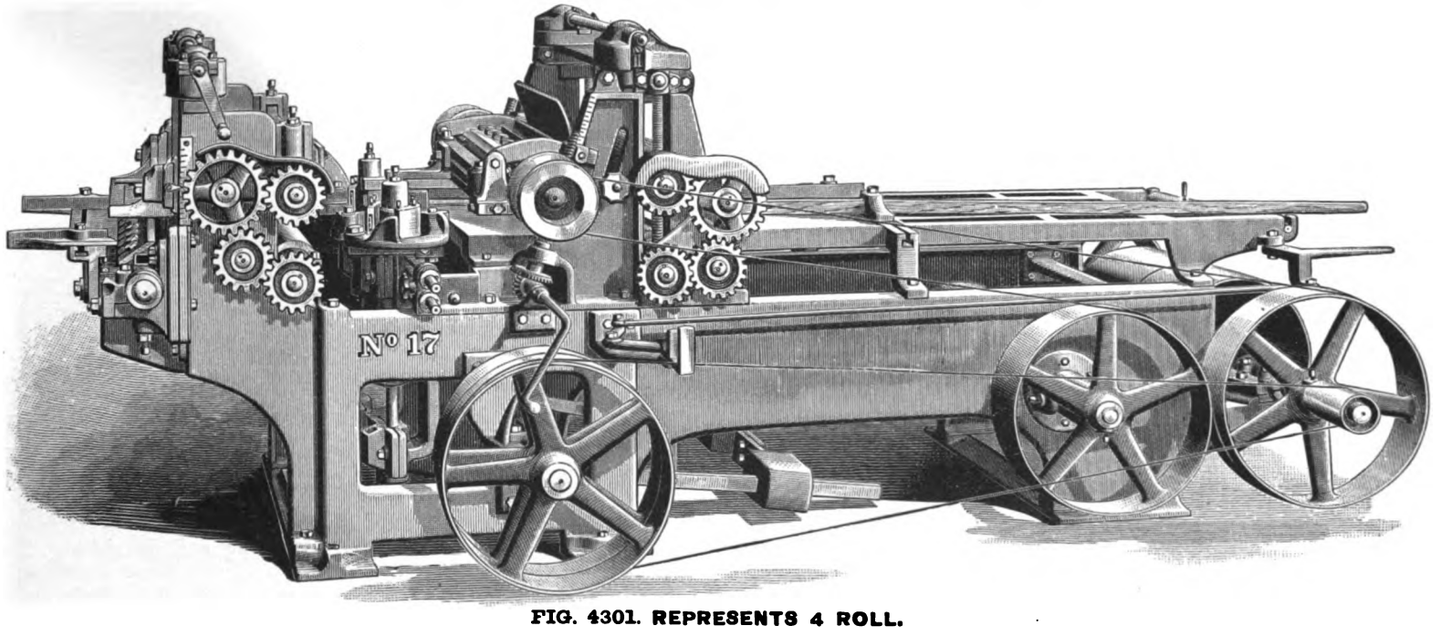


FIG. 4301. REPRESENTS 4 ROLL.

TO DOUBLE OR SINGLE SURFACE 24 IN. WIDE UP TO 8 IN. THICK AND MATCH 20 IN. WIDE.

There is clearance for projecting cutters, and the pressure bars are likewise adapted to the same. The rolls will lift sufficiently to take in a nine inch timber.

The outfeeding top roll and pressure plate over the bottom cutter head are raised in the one operation and set by indicator.

The top and bottom heads are four sided, slotted on two sides.

WEIGHT, 6,000 LBS.

PRICE, 4 roll, **$900.00.** **PRICE,** 6 roll, **$1,000.00.**

Countershaft has tight and loose pulleys, 12 in. diameter, 7 in. face, and should run 850 revolutions.

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DOUBLE DECK 2-BOARD RAPID FLOORING MACHINE.

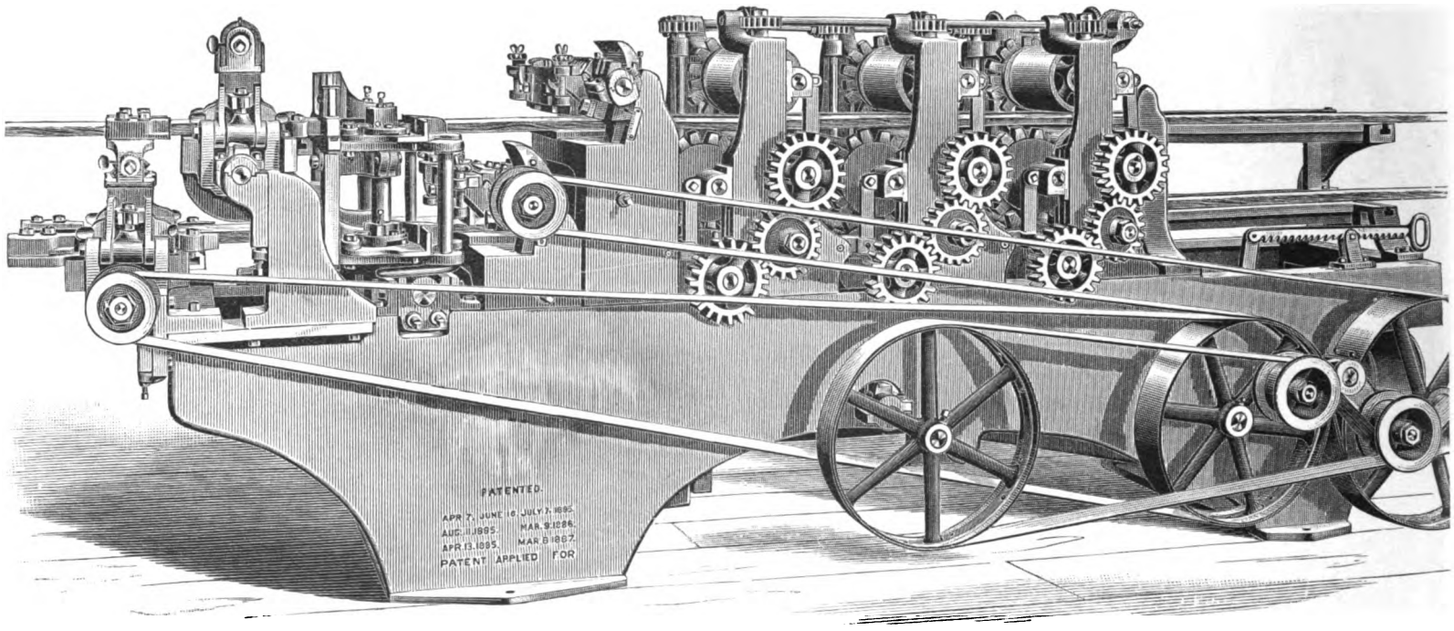


FIG. 4302.

SECTIONAL VIEW, SIDE ELEVATION, SHOWING TWO BOARDS IN POSITION, ONE ON EACH DECK.

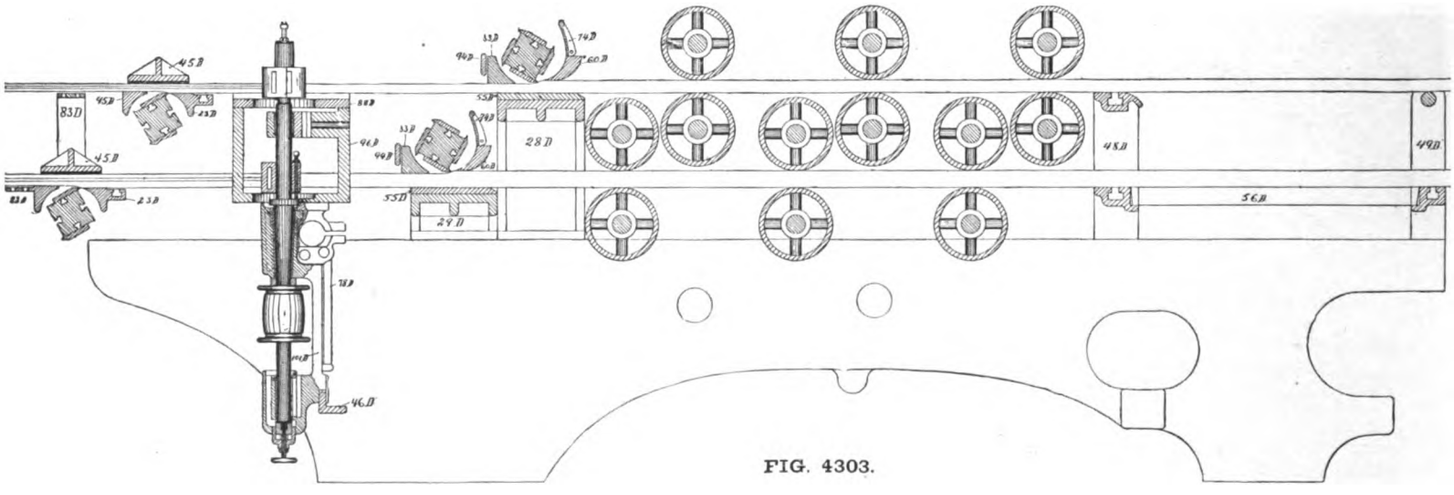


FIG. 4303.

The machine represented herewith is one of entirely original and novel construction. It has been carefully designed to meet a growing requirement of the lumber dressing industry. Its object is to do a large quantity of work in the most superior manner.

As will be seen, the machine is a double one, or, as we call it, a double decker. There are two feed ways—one directly over the other—two sets of feed rolls (one set of six rolls for each feed way), two upper and two lower cylinders, and two side spindles, each of them carrying two matcher heads, one above the other. Everything is compact and simple, strong and durable. The cylinders are short and stiff with long bearings that run cool and steady.

Either deck may be run independently of the other; that is to say, either the upper or the lower one may be in use while the other is standing still, or both may be run together, giving, with a moderate feed on each, a large aggregate output of perfectly dressed lumber. Each division of the machine is complete in itself and capable of running at as high a speed as any single machine, and do as good or better work.

PRICES.

Number of machine.	Width it planes and matches.	Height.	Number of sides it works.	Number of rolls.	Length.	Weight.	Prices.
46	10 in.	2 in.	8 sides.	12	14 ft. 7 in.	10,000 lbs.	$ .....
47	10 "	2 "	6 "	12	14 " 7 "	9,600 "	.....

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SCREW FEED PLANER AND MATCHER.

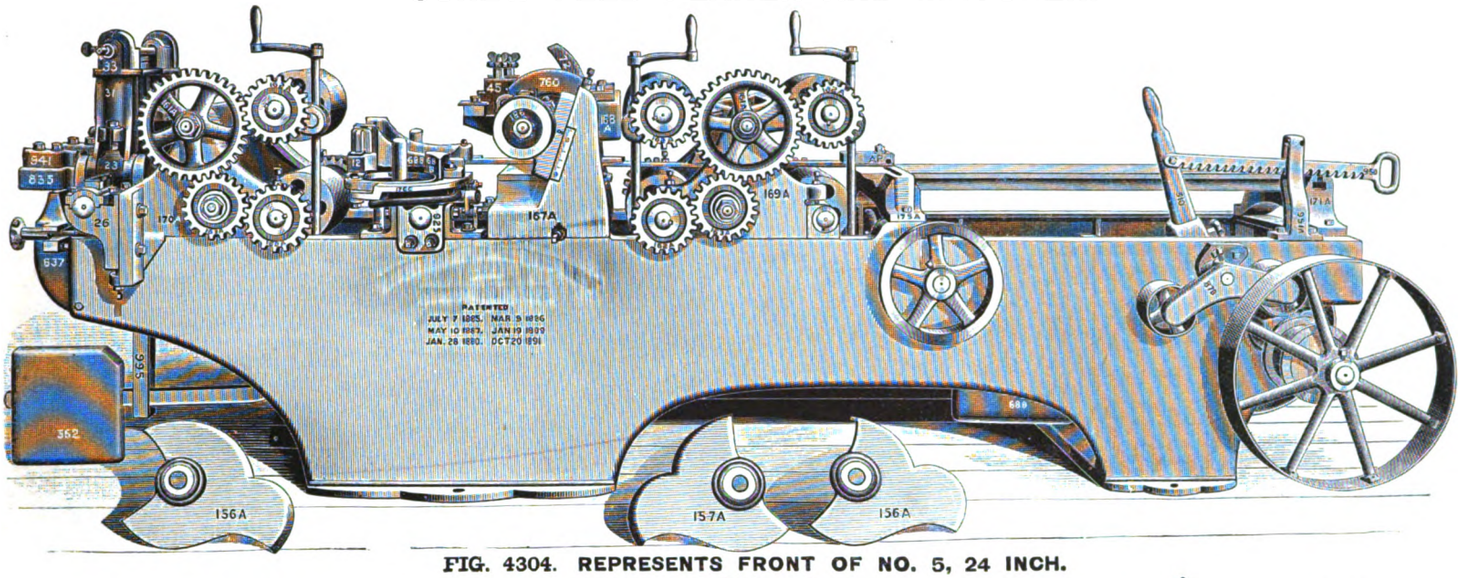


FIG. 4304. REPRESENTS FRONT OF NO. 5, 24 INCH.

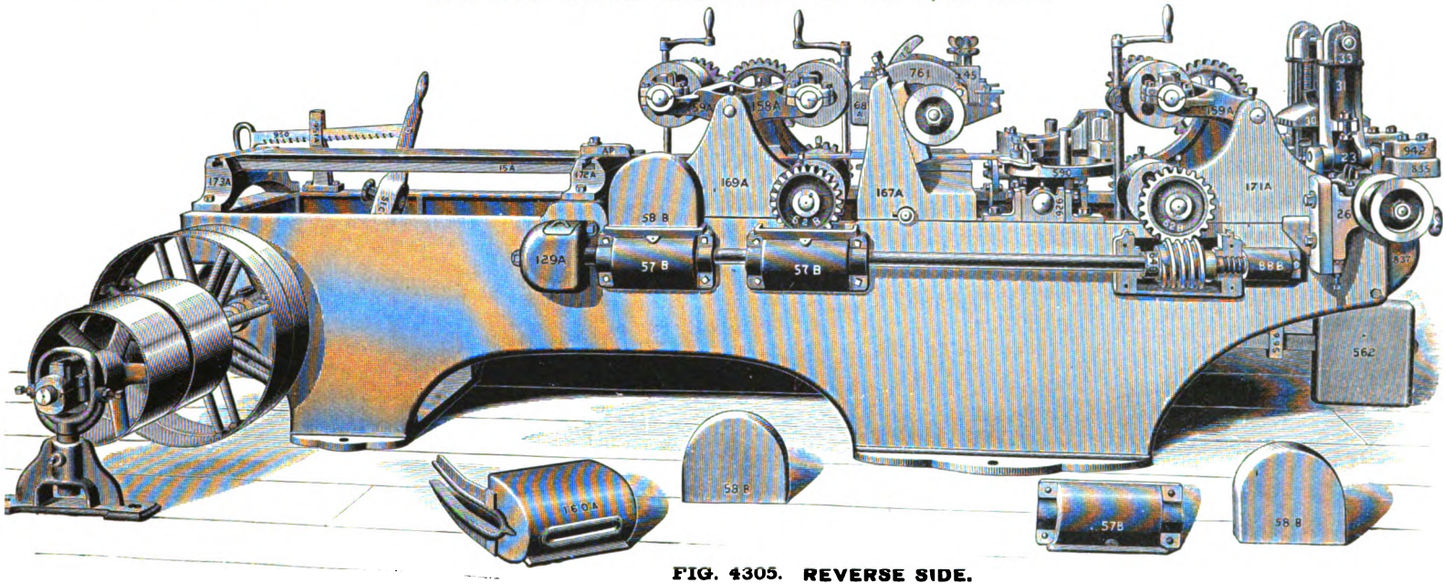


FIG. 4305. REVERSE SIDE.

SOME OF THE COVERS ARE REMOVED, SHOWING THE MANNER OF APPLYING THE SCREWS TO THE LOWER FEED ROLLS.

PRICES, 24 INCH, 4 SIDED, FIG. 4305.

Number of machine.	Width it planes and matches.	Height.	Number of sides it works.	Number of rolls.	Length.	Weight, lbs.	Price.
1	24 in.	8 in.	4 sides.	8	14 ft. 5 in.	11,500	$ .....
2	24 "	6 "	4 "	8	14 " 5 "	11,000	.....
3	24 "	8 "	4 "	6	13 " 8 "	10,200	.....
4	24 "	6 "	4 "	6	13 " 8 "	9,900	.....
5	24 "	6 "	4 "	6	13 "	8,900	.....
6	24 "	6 "	4 "	6	12 "	7,000	.....
7	24 "	6 "	4 "	4	12 "	6,600	.....
8	18 "	6 "	4 "	6	13 "	8,200	.....

PRICES, 14 INCH, 4 SIDED, FIG. 4305.

Number of machine.	Width it planes and matches.	Height.	Number of sides it works.	Number of rolls.	Length.	Weight, lbs.	Price.
20	14 in.	8 in.	4 sides.	8	14 ft. 5 in.	10,100	$ .....
21	14 "	6 "	4 "	8	14 " 5 "	9,700	.....
22	14 "	8 "	4 "	6	13 " 8 "	9,000	.....
23	14 "	6 "	4 "	6	13 " 8 "	8,800	.....
24	14 "	6 "	4 "	6	13 "	7,600	.....
25	14 "	6 "	4 "	6	12 "	6,300	.....
26	14 "	6 "	4 "	4	12 "	6,000	.....

PRICES.

SPECIAL MATCHING, SIZING, AND SURFACING MACHINE.

Number of machine.	Width it planes and matches.	Height.	Number of sides it works.	Number of rolls.	Weight, lbs.	Price.
60	25 in.	8 in.	4 sides.	8	12,000	$ .....
62	25 "	8 "	4 "	6	10,900	.....
64	24 "	6 "	4 "	6	9,300	.....

SPECIAL FAST FEED PLANER AND MATCHER.

Number of machine.	Width it planes and matches.	Height.	Number of sides it works.	Number of rolls.	Weight, lbs.	Price.
52	10 in.	6 in.	4 sides.	6	7,200	$ .....
52½	10 "	6 "	3 "	6	7,000	.....
55	14 "	6 "	4 "	6	7,800	.....
55½	14 "	6 "	3 "	6	7,500	.....

If any of the above machines should be wanted three sided, deduct from "list" as follows:

Nos. 1, 2, 3, 4, 20, 21, 22 and 23..... $300.00
Nos. 5 and 24..... 250.00
Nos. 6, 7, 25 and 26..... 200.00

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RAPID FEED FLOORING MACHINE.

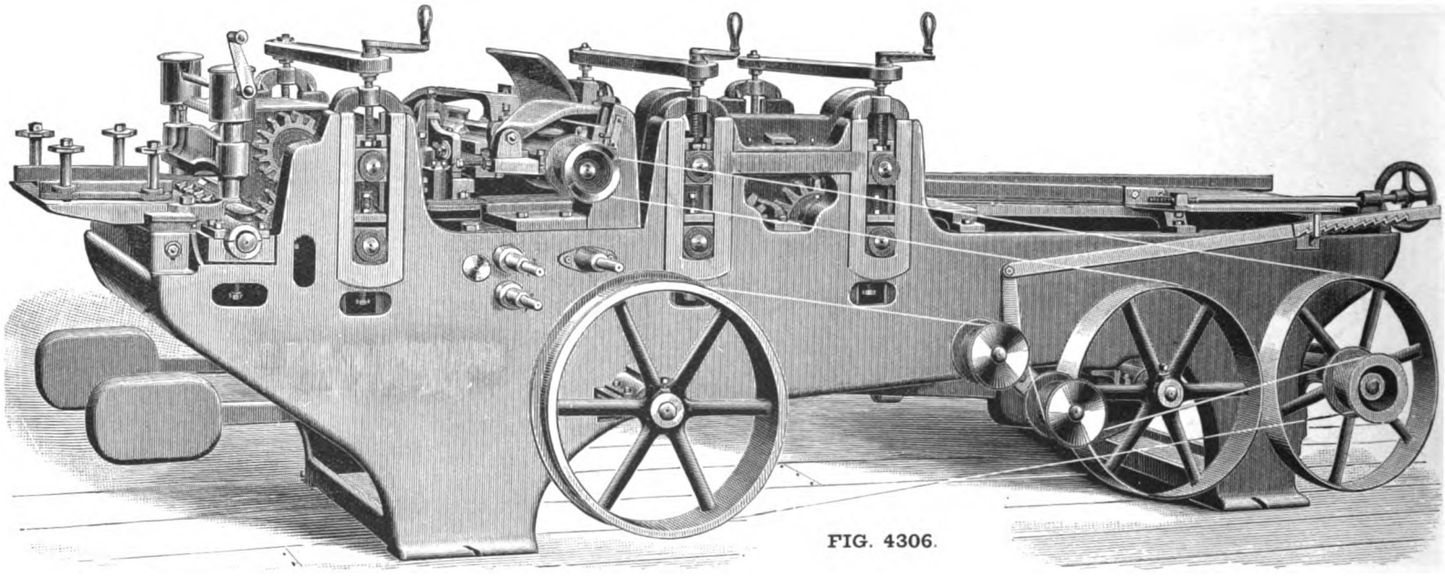


FIG. 4306.

The gearing is very powerful, insuring a steady and positive feed. The improved hinged pressure bar can be set close to the cutters and has an unlimited raise without danger of coming in contact with them. This machine is built in two sizes, to work 7 in. and 14 in. wide, 3 in. thick.

BELTS.

Main driving belt ..... 8 in. wide.
Two top head belts .... $20\frac{9}{12}$ ft. long, 4 " "
One bottom head belt ..... $20\frac{11}{12}$ " " 4 " "
Two side head belts ..... $20\frac{4}{12}$ ft. long, $3\frac{1}{2}$ in. wide.
Three feed pulleys go with each machine, 4, 6 and 8 in. diam.
The 8 in. pulley requires belt $19\frac{4}{12}$ ft. long, $3\frac{1}{2}$ in. wide.

Countershaft has tight and loose pulleys, 12 in. diam., 8 in. face, and should run 850 revs. Weight, 6,000 lbs.

PRICES.

To single surface and match, 7 in. wide, 3 in. thick $800.00
To single surface and match, 14 in. wide, 3 in. thick 900.00
To double surface and match, 7 in. wide, 3 in. thick. $900.00
To double surface and match, 14 in. wide, 3 in. thick 1,000.00

COMBINED PLANER AND MATCHER.

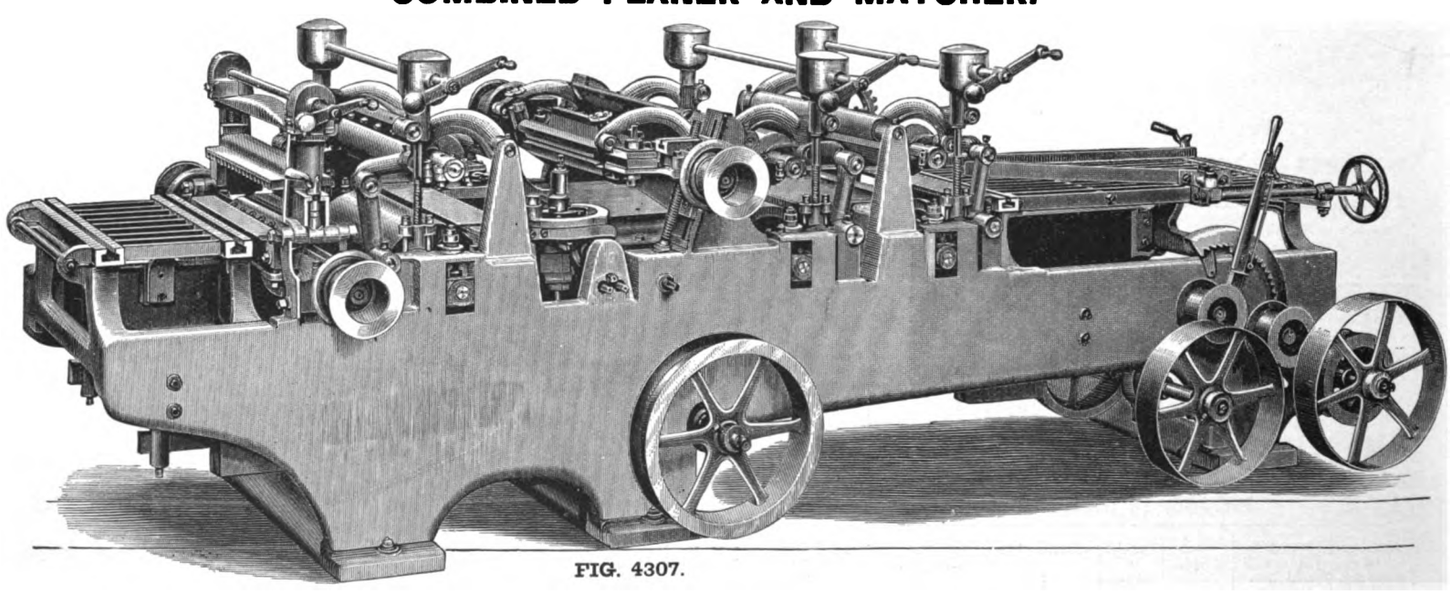


FIG. 4307.

The above cut represents a planing and matching machine, made in two sizes, to work 26 in. wide, 6 in. thick, or 14 in. wide, 6 in. thick. The lower feed rolls on this machine are 12 in. diameter, and driven by gears one and one-half times the diameter of the roll. The upper feed rolls are hung by links so as to have a vertical movement over the lower roll, which makes the entering of the material to be planed between the rolls very easy. Will match the full width of the machine. Each machine is furnished with a set of cutters for each head, one set of Shimer heads with two sets of cutters, and full set of forged steel wrenches.

2 sides.	No. of feed rolls.	Weight.	Size of tight and loose pulleys.	Speed.	Price.
26 in. x 6 in.	6	8,700 lbs.	16 in. x 8 in.	850 revs.	$1,800.00
14 " x 6 "	6	8,200 "	16 " x 8 "	850 "	1,600.00

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RAPID FEED FLOORING MACHINE.

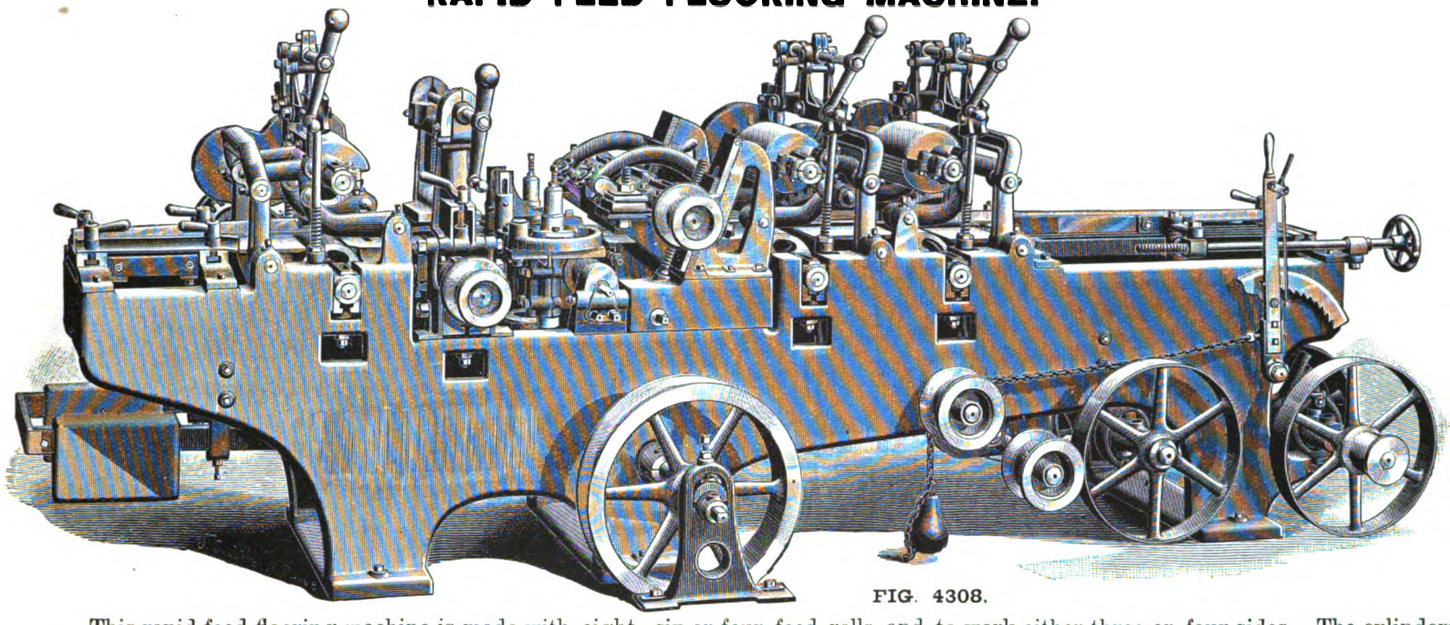


FIG. 4308.

This rapid feed flooring machine is made with eight, six or four feed rolls, and to work either three or four sides. The cylinders are made of forged steel, mounted in the best babbitt metal bearings, and planed on all four sides, to receive steel bolts with case-hardened nuts. The gears on the rolls are one and one-half times the diameter of the rolls. The rolls are held parallel and in a swinging frame, so as to raise perpendicularly over the lower rolls. Each machine is furnished with a full set of cutters for each head, one set of Shimer matcher heads, with one set of cutters. The matcher heads can be fastened from the outside of the machine when once set to the required width. All sizes match the full width of the machine.

Size.	No. of feed rolls.	Plane.	Tight and loose pulleys.	Speed.	Weight, lbs.	Price.	Size.	No. of feed rolls.	Plane.	Tight and loose pulleys.	Speed.	Weight, lbs.	Price.
24 in. x 6 in.	6	4 sides.	16 x 8	850	7,500	$1,050.00	16 in. x 6 in.	4	4 sides.	16 x 8	850	6,800	$850.00
24 " x 6 "	6	3 "	16 " 8	850	7,200	950.00	16 " x 6 "	4	3 "	16 " 8	850	6,600	750.00
24 " x 6 "	4	4 "	16 " 8	850	7,300	950.00	16 " x 7 "	6	4 "	14 " 7	850	6,200	850.00
24 " x 6 "	4	3 "	16 " 8	850	7,100	850.00	16 " x 7 "	6	3 "	14 " 7	850	6,000	750.00
16 " x 6 "	6	4 "	16 " 8	850	7,000	950.00	16 " x 7 "	4	4 "	14 " 7	850	6,000	750.00
16 " x 6 "	6	3 "	16 " 8	850	6,800	850.00	16 " x 7 "	4	3 "	14 " 7	850	5,800	650.00

ENDLESS BED SURFACER AND MATCHER.

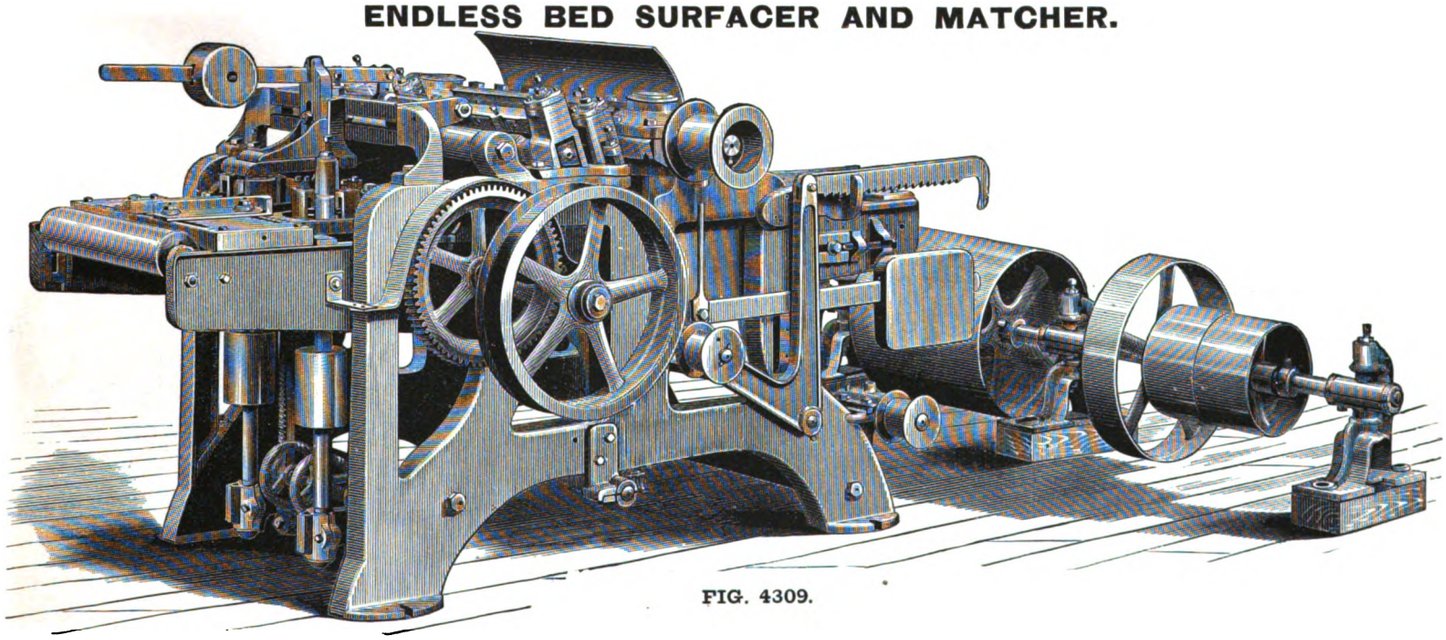


FIG. 4309.

The above cut represents an endless bed surfacer and matcher to work on three sides. It is made in three sizes, 26 in., 28 in. and 30 in. wide, working from 3/8 in. to 10 in. in thickness, and jointing or matching 13 in., 15 in., or 17 in. wide. The cutter-heads are forged cast steel, belted on both ends. The bed is raised or lowered either by hand or power. We furnish with each machine one pair of three wing matcher heads, with bits to work flooring, and a full set of knives for the upper head. Tight and loose pulleys are 14 in. diameter, 7 in. face, and should make 800 revs. per minute.

To plane 26 in. wide, 10 in. thick, match, 12 in. wide. Weight, 4,500 lbs. Price, $750.00.
To plane 28 in. wide, 10 in. thick, match, 15 in. wide. Weight, 4,800 lbs. Price, $825.00.
To plane 30 in. wide, 10 in. thick, match, 17 in. wide. Weight, 5,000 lbs. Price, $900.00.

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ENDLESS BED DOUBLE SURFACE PLANER.

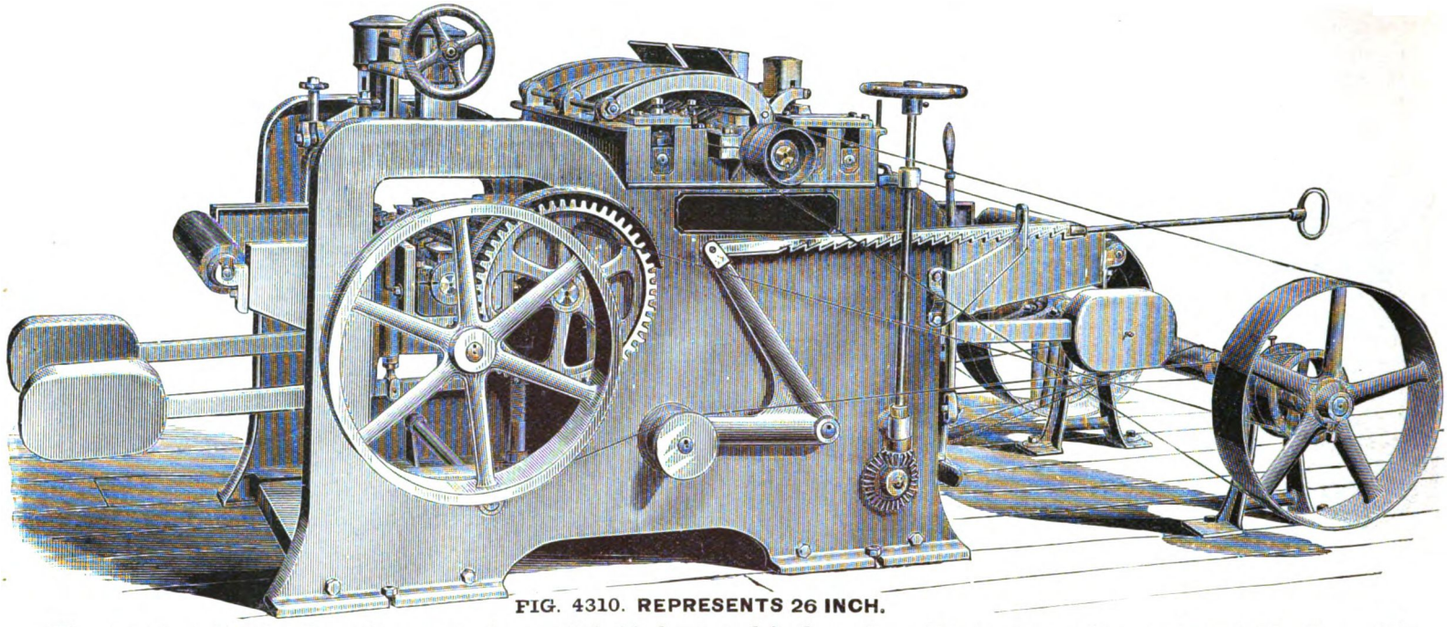


FIG. 4310. REPRESENTS 26 INCH.

The patent sectional rolls and pressure bars will hold down and feed equally well two courses of unevenly sawed lumber. The improved sectional hinged pressure bars can be set close to the knives, working nearly on a radius with them, and can be swung clear over and away from them while filing or setting. By loosening two hand nuts, the pressure bar over the under cutter-head can be turned away, permitting easy access to the knives.

The handles working the devices for raising and lowering the bed, both by hand and power, are at the top of the machine and near the scale for indicating the thickness. The ways on which the lag-bed travels have automatic oilers and scrapers. Built in two sizes, to surface 26 and 30 inches wide, both working 12 inches thick.

Countershaft has tight and loose pulleys, 12 in. diam., 8 in. face, and should run 900. Weight, 26 in., 5,500 lbs.

PRICES.

To double surface, 20 in. wide, 12 in. thick									$900.00	
"	"	"	30	"	"	12	"	"	1,000.00	
"	"	"	26	"	"	12	"	"	with jointer attachment,	1,100.00

To double surface, 30 in. wide, 12 in. thick, with jointer attachment	$1,200.00
Matching attachment, extra	50.00

ENDLESS BED SURFACE PLANER.

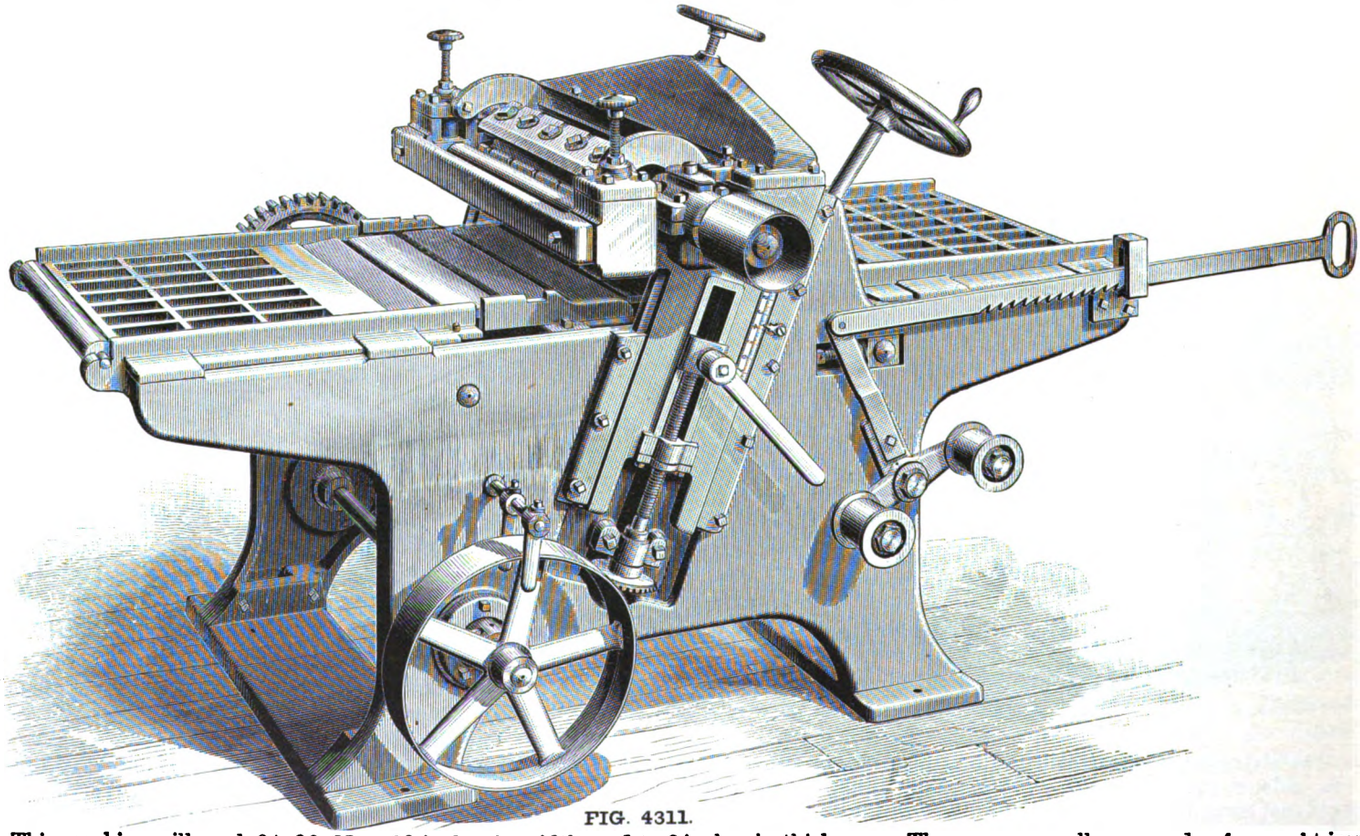


FIG. 4311.

This machine will work 24, 26, 28 or 30 inches in width, and to 8 inches in thickness. The pressure-rolls are made of wrought iron The feed is started and stopped by means of our improved binding lever. A countershaft placed upon the floor in the rear supplies power to the cutter-head. When the countershaft is placed so that its center is just 7 feet from the center of the cylinder the following belting is required: Two belts, each 17 feet by 9 in. long, 5 in. wide for cylinder; one belt, 19 feet by 3 in. long, 3 in. wide, for feed.

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30 AND 26 INCH ENDLESS BED SINGLE SURFACER.

The 26 inch single surfacer is intended for timber dressing and the heaviest grades of surfacing. It will do as good work as roll feed planers of like weight and capacity. Special attention is called to the patent sectional feed rolls.

Changes in thickness can be made by raising or lowering the bed, either by hand or power, while the machine is running. The ways on which the lag bed travels are carefully prepared and have automatic oiling device and scrapers. Arranged for any rate of feed desired.

It will work 26 in. and 30 in. wide and 10 in. thick. The countershaft can be placed on the floor or ceiling, and has tight and loose pulleys, 12 in. diameter, 8 in. face, and should run 900.

WEIGHT, 4,000 LBS.

PRICES.

26 in. x 10 in..... $550.00
30 in. x 10 in..... 600.00

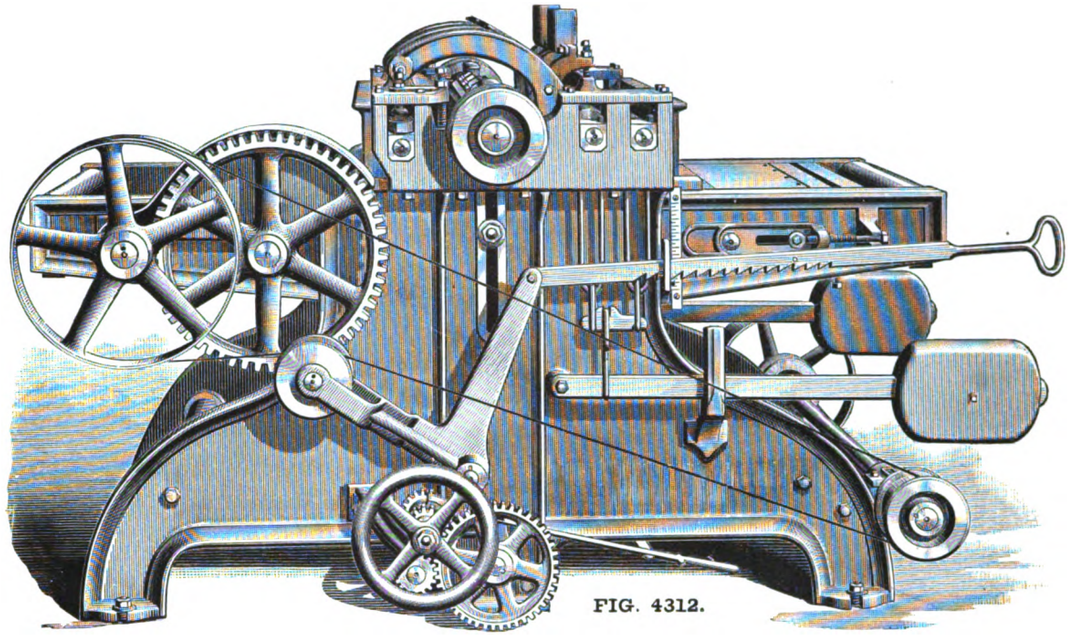


FIG. 4312.

26 INCH DOUBLE SURFACER.

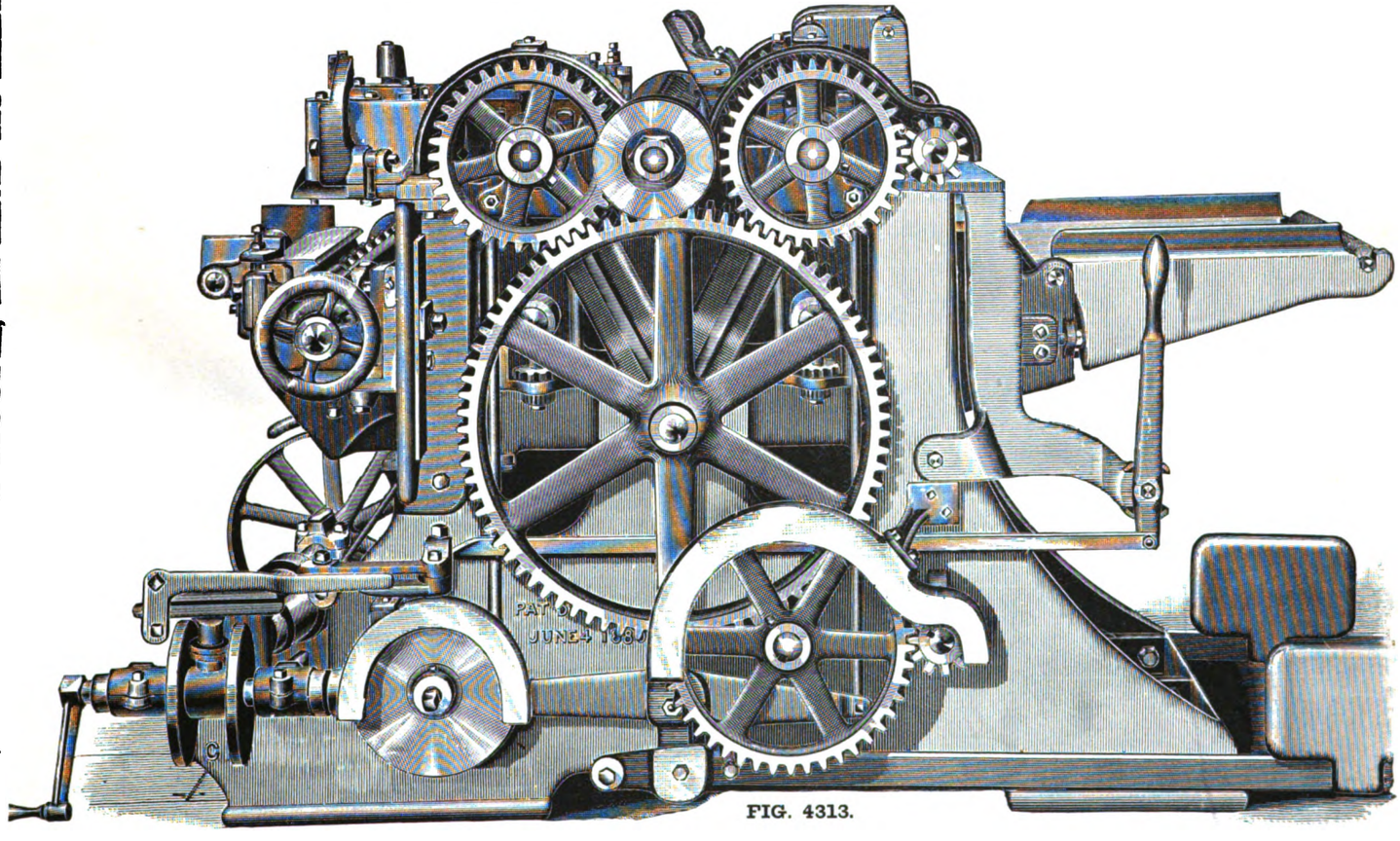


FIG. 4313.

It is built as either a double or single surfacer and works 26 inches wide and up to 10 inches thick. Can be furnished with four solid feed rolls or with divided feeding-in roll for feeding two pieces of stock of varying thickness at one time as desired.

Cylinders are large, slotted for three or four knives as desired, and run in heavy yoked boxes to insure perfect alignment. Bonnet chip breaker and pressure bars are all quickly and easily adjusted. Lower cylinder is readily set for any desired cut, and end of the bed swings down to admit of easy access to head for sharpening or setting knives. The bed is raised and lowered on four screws by hand or power; when power is used an adjustment of eight inches is accomplished in one minute.

We would call particular attention to the fact that when set to proper thickness the lower cylinder, while firmly attached to bed, is also clamped to the sides of the frame, insuring perfectly solid support. The feed on this machine is very powerful, rolls being large and the gears on the rolls about twice as large in diameter, giving proper leverage. Each pair of feed roll boxes are connected in yoke form to avoid possibility of cramping, and all links are hung on boxes instead of on roll shafts. Feed is driven direct from top cylinder through two feed shafts provided with cones giving four changes of speed.

Weight of double surfacer complete, 6,250 lbs. Weight of single surfacer complete, 5,500 lbs. Prices, solid roll, $825.00; divided roll, $925.00.

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27 AND 24 INCH DOUBLE SURFACER.

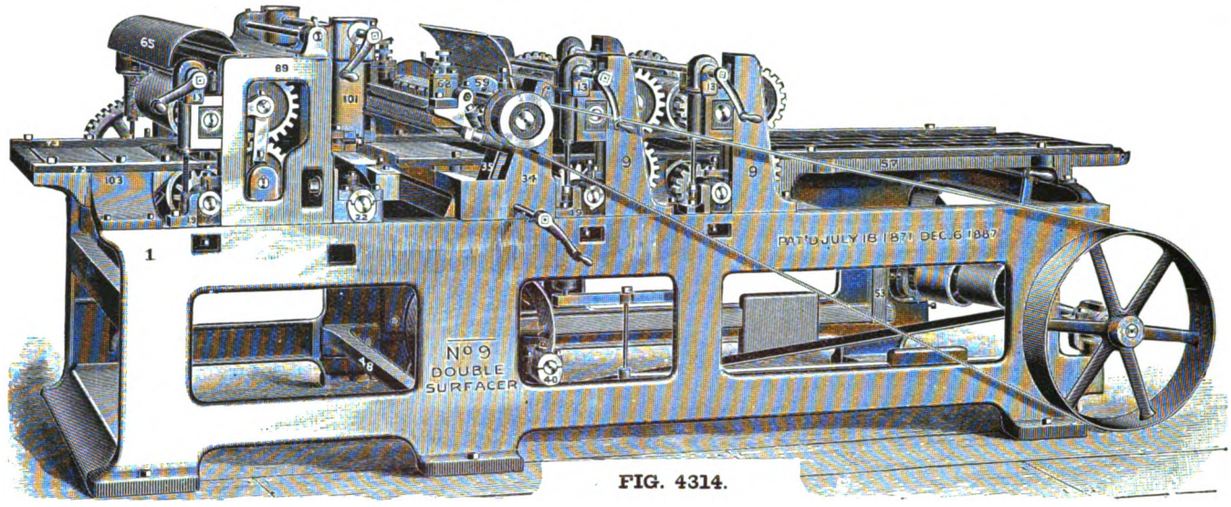


FIG. 4314.

12 feet long, with 6 feed rolls, 6 inches diameter, or with 4 feed rolls, at reduced price, to work 27 or 24 inches wide and up to 6 inches thick.

The pair of delivery rolls are located near the end of the frame, beyond the under cutter-head, and carry the lumber out, clear of the machine, after it is planed. This is very essential when planing lumber where broken, or scarfed, or pointed heads frequently occur.

Both cutter-heads are thoroughly convenient of access. The yoke connecting the top cutter-head boxes extends across under the bed, leaving the cutters unobstructed, and by loosening one swing bolt on the operator's side, the bed over the under head can be swung up, so that the cutters and pressure bars are within easy reach. The design of the frame, and the construction of the machine throughout, is such that it is unusually convenient for the operator to manipulate.

Both the top and bottom cutter-heads are square, lipped, and slotted, for square head bolts on all four sides. If three winged heads are preferred by purchaser, we can supply them, if specified when ordered.

The feed consists of six feeding rolls, 6 inches in diameter, all driven at both ends by our system of expansion gearing, producing a powerful and ever-reliable feed—simple, serviceable and very durable. All expansion and loose gears can be oiled by our improved method while the machine is in operation.

We can build the machine, if so ordered, with the bottom cutter-head at end of the frame, in which case the end table is hinged, and can be swung down, carrying with it the pressure bar, and giving unobstructed access to the cutters. The frame is left undisturbed, and the strength of the machine is in no way impaired.

On the 27 inch wide machine, we can apply our sectional feed-in rolls and pressure bars, so that two boards that vary in thickness can be planed side by side at the same time perfectly, being fed in and held down independent of each other, with requisite pressure.

Tight and self-oiling loose pulleys, on the machine, are 14 inches diameter, 6 inch face, and should be speeded about 750 revolutions per minute.

Belting required to drive top cutter-heads, $36\frac{5}{16}$ feet of 4 inch; to drive under cutter-head, $20\frac{5}{16}$ feet of 4 inch; for feed works, 16 feet of 4 inch; if under cutter-head at end, $23\frac{5}{16}$ feet of 4 inch.

WEIGHT, 5,700 LBS. **PRICES, 27 INCH, $1,250.00; 24 INCH, $1,200.00.**

24 DOUBLE SURFACER.

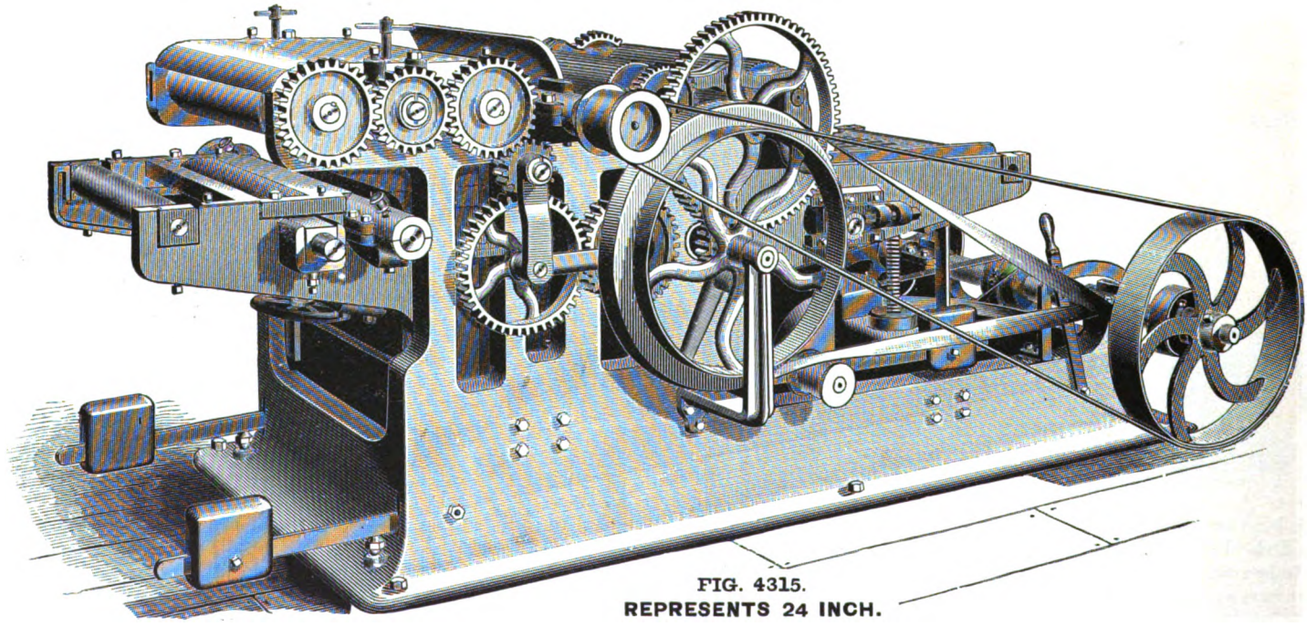


FIG. 4315.
REPRESENTS 24 INCH.

This machine will plane stock both sides at once, from one-fourth of one inch to 12 inches in thickness, and 24 inches wide, at a maximum speed of 100 feet per minute or a minimum speed of 50 feet per minute. It has a rotary bed especially arranged, which extends to within four inches of the cutter-head, the bed under which the cylinder revolves being solid, thereby enabling the finest of work being done with a feed unsurpassed. It has a pressure bar and chip breaker which holds the stock rigidly in place. There are six 6-inch feed rolls, with the upper cylinder double belted. The bed feeds up and down by power that will allow of the change of thickness to any fractional part of an inch. Tight and loose pulleys are 14 inches in diameter by 6 inch face. Driving pulley 24 inches in diameter by 6 inch face. Countershaft speed, 1,000 turns per minute. Floor space, 6 x 12 feet.

WEIGHT, 6,000 LBS. **PRICES, 24 IN. X 12 IN., $960.00; 16 IN. X 4 IN., $320.00.**

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26 INCH DOUBLE SURFACER.

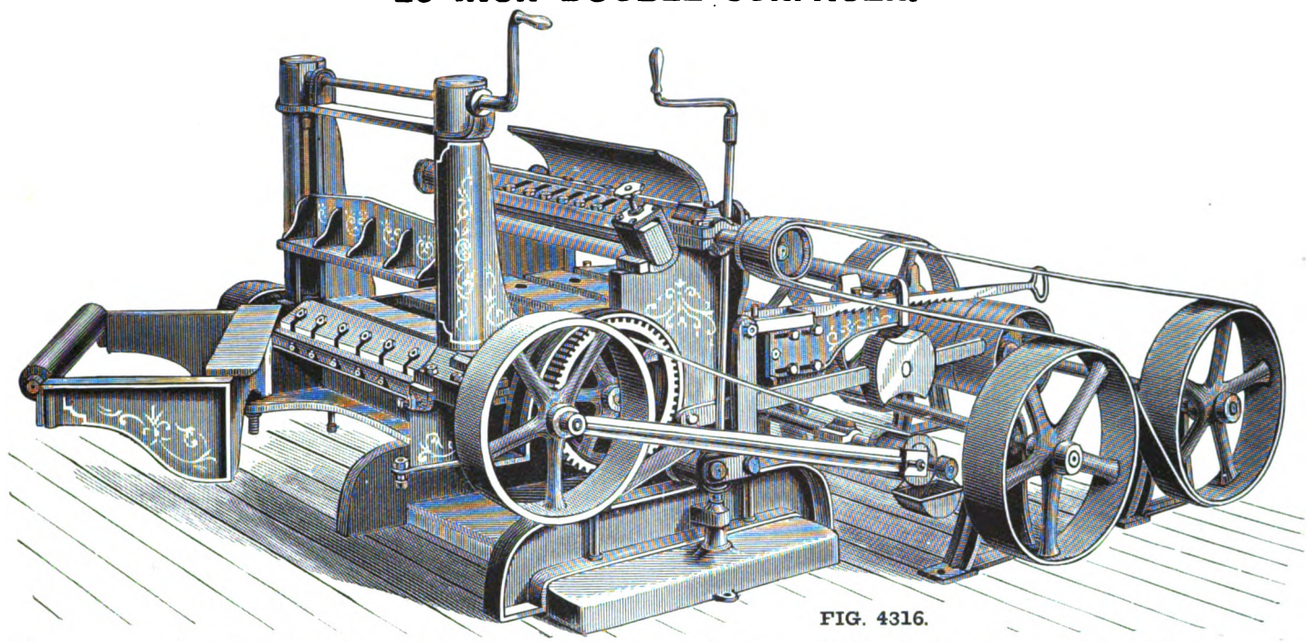


FIG. 4316.

This cut represents a 26 inch double surfacer, with patent endless bed or lags. Endless bed planers are preferred for many purposes, but as heretofore constructed they have been objectionable, for the reason that the edges or corners of the lags comprising the endless bed, as they pass over the rolls or wheels, project slightly above the surface of the bed, thereby creasing or marring the under surface of the lumber. Our object has been to overcome this difficulty, and at the same time construct a very compact and substantial machine. Our patent enables us to make our lags 6 inches wide and 1¼ inches thick, consequently we use but ten of them in the bed, and at no time will the edges of the lags project above the surface of the bed. Four heavy screws are used to raise and lower the bed, thus giving it a solid bearing on all four corners. The bed will lower from 9 to 10 inches : also has three changes of feed. Tight and loose pulleys, 12 x 8, and should make 900 revolutions per minute. Weight, 4,500 lbs.

PRICES, DOUBLE CYLINDER, $600.00; SINGLE CYLINDER, $450.00.

30 AND 26 INCH SINGLE SURFACER.

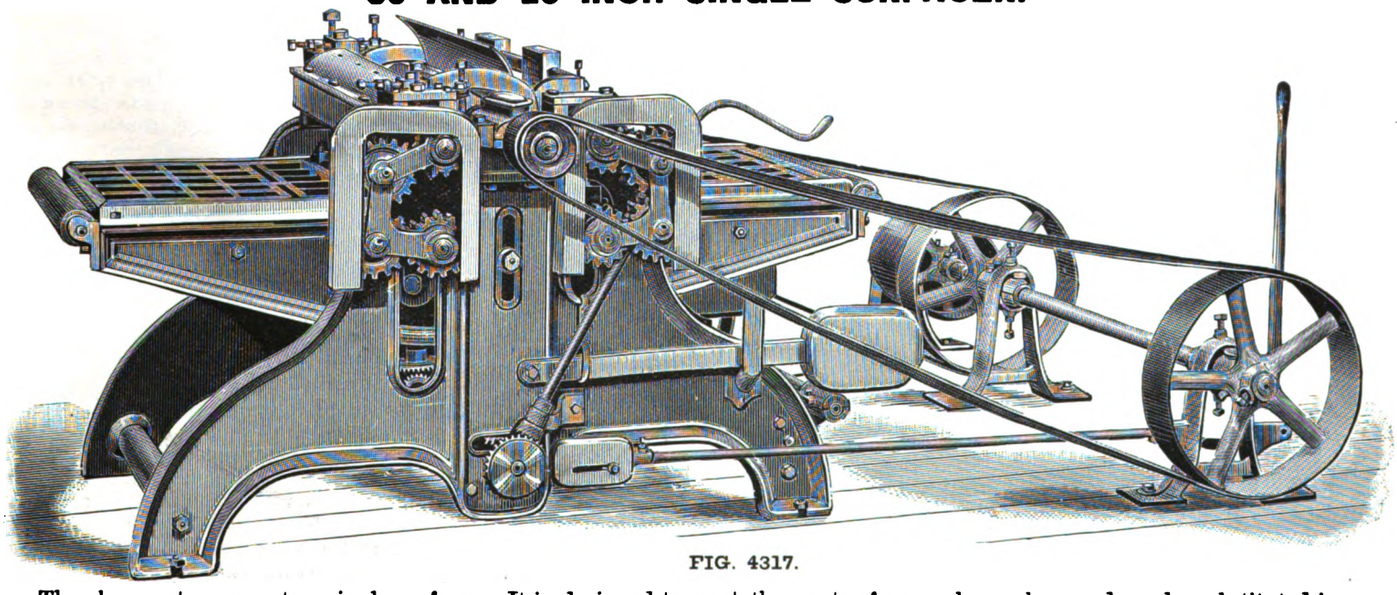


FIG. 4317.

The above cut represents a single surfacer. It is designed to meet the wants of a very large class, and can be substituted in many cases for a much more expensive machine, doing its work better, having larger capacity, takes less room, runs with less power, and of moderate price. The pressure bars, cylinder and feed rolls are as near together as possible, reducing the friction on the lumber and giving it a very strong feed. It will do very fine work, having improved hinged pressure bar, which can be swung clear of the cutters while filing them. The bed is raised and lowered by means of a crank at the side of the machine. Changes in thickness can be made while it is running. Built in two sizes to surface 26 in. and 30 in. wide, 6 in. thick. The countershaft can be placed on the floor or ceiling as may be most convenient. When on the floor the countershaft should be 6 feet from center of cylinder. Weight, 3,500 lbs.

Countershaft has tight and loose pulleys, 12 inches diameter, 8 inch face, and should run 950.

BELTS.

Main driving belt.....8 in. wide.
Two cylinder belts.....4 " "

PRICE.

No. 2, 26 inch 4 roll single surfacer.....$450.00

BELTS.

One feed belt.....11 ft. long, 3 in. wide.
One feed belt.....10 " " 1¾ " "

PRICE.

No. 2, 30 inch 4 roll single surfacer.....$500.00

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30, 27 AND 24 INCH 4 ROLL SURFACER.

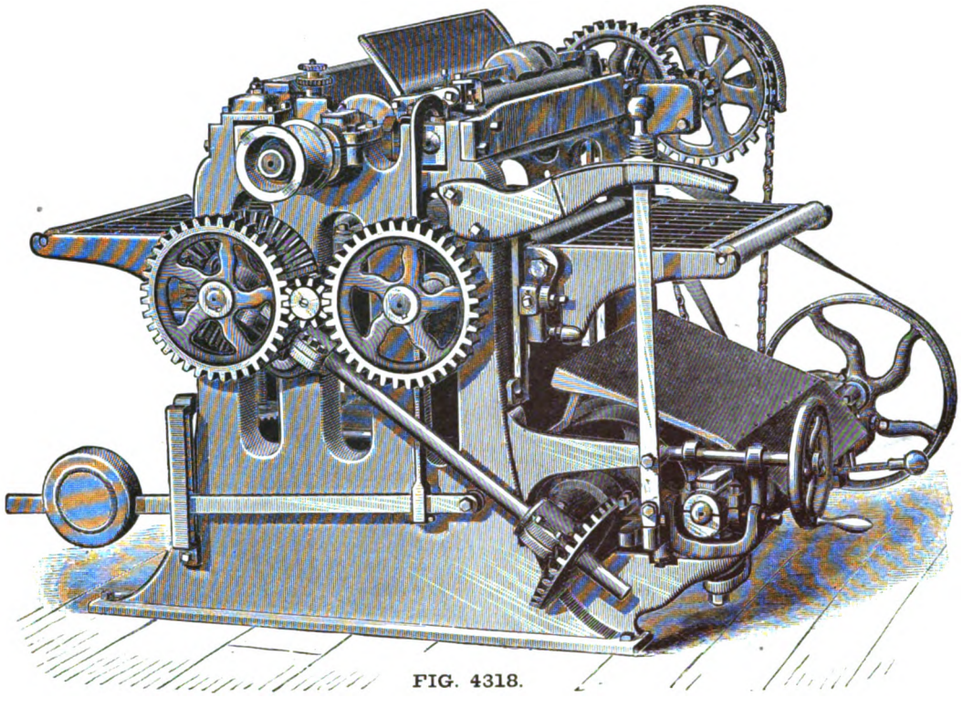


FIG. 4318.

This machine planes 30, 27 or 24 inches wide and from $\frac{1}{32}$ to 12 inches thick. For a single surfacer it covers a greater range of work than any other machine, doing either the lightest or the heaviest work with equal facility. The frame is of unusual strength and solidity, being cored, and the feed power is of the strongest, consisting of four 6-inch rolls, the upper ones being driven by a chain and sprocket wheels direct from the feed shaft, while the lower rolls are driven by an oblique shaft which is always in adjustment for any thickness. By this method of driving each train of gears direct from the feed shaft, we not only do away with expansion gears, but we get a direct and even feed with one-half the strain on the gears that exists where one set of rolls is driven by the other. The carrying-in roll being heavily weighted allows a heavy cut to be taken when desired, while the hinged pressure-bar keeps close to the knives, preventing tearing or splitting the stock.

The same friction feed is applied to this machine that is used on the double surfacer, and which has proved so successful on endless bed planers, and is, without doubt, the strongest and best feed in use, doing away with all belts and pulleys excepting the one belt from cutter-head to feed shaft, while a change of feed is obtained by merely moving a lever.

The frame carrying the lower rolls rests firmly upon four elevating screws, thus keeping it in perfect line, and is raised or lowered by a hand-wheel conveniently placed, while if the machine is to be used for a large range of work embracing both thick and thin stock, we apply an attachment for adjusting the bed by power at slight additional cost. The cylinder is heavy, made of wrought iron, with journals of best English steel, has large bearings, carries three knives, and is belted at both ends.

WEIGHT, 3,300 LBS. PRICES, WITH COUNTERSHAFT, 30 IN., $600.00; 27 IN., $575.00; 24 IN., $550.00.

24 INCH 4 ROLL GEARED BELT-FEED SURFACER.

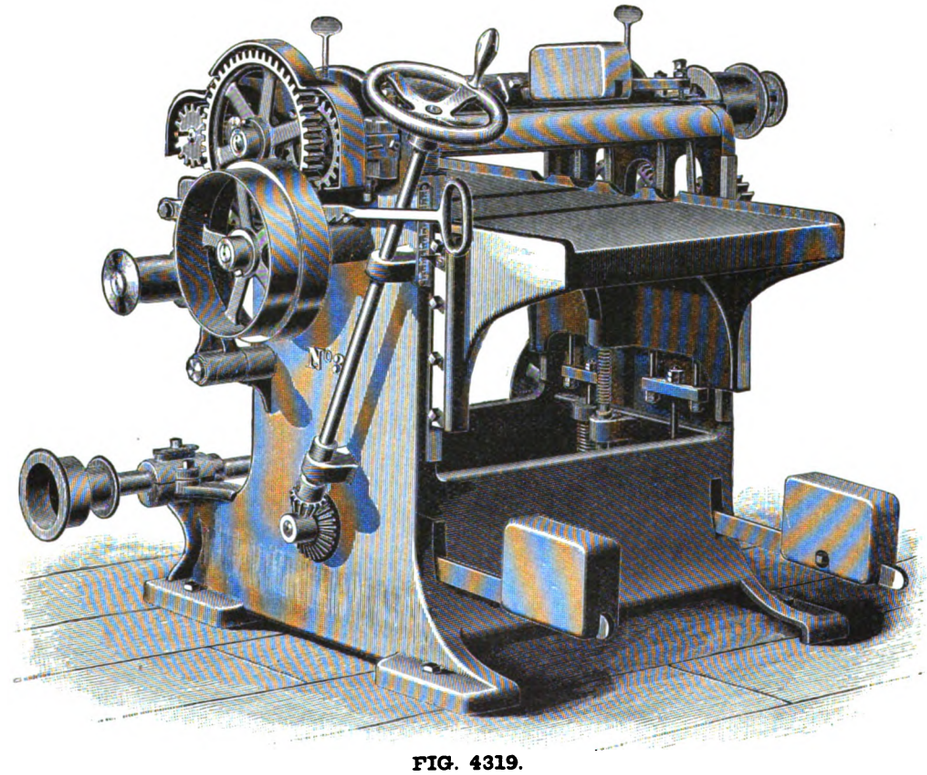


FIG. 4319.

Works 24 inch wide and 6 inch thick. The frame is cast in one piece, the base well spread, securing a broad and firm support on the floor. The sides of the frame are tied together by two strong cross girts which do not conflict with the movable parts, the heads, rolls, bars, etc., and add greatly to the stability of the machine. The bed on which the stuff is planed moves up and down on gibbed ways, located so as to obtain great steadiness; provision is made for taking up wear which might occur after years of use. The two elevating screws are of large size and situated to help keep the bed firm and steady. The hand wheel is located most convenient to the operator.

The feed is strong, consisting of four cast steel rolls, all driven by a very simple and durable system of expansion gearing. The top feeding-in roll is fluted and held down by weights which can be moved on the levers readily by the operator when desired, the roll having at all times a uniform pressure on different thicknesses of lumber. The carrying-out rolls are plain and protected by a shaving cap and steel scraper to prevent the board becoming indented by the chips and shavings. The feed is driven by a belt running on cone pulleys of ample capacity, affording two changes of feed. The belt tightener handle, whereby the feed is started or stopped, is conveniently arranged for control by the operator.

The pressure bars are applied on both sides of the cutting cylinder and close to the knives when cutting, enabling short pieces to be planed perfectly without chopping the ends. The bar on the feeding-in side is hinged and has a movable weight, controlled by the operator, to produce any desired pressure.

The head is forged from the best tool cast steel, carries two knives, and is shaped and constructed to do specially fine smooth work. The pulley on the cutter-head is 4½ inches diameter for 4½ inch belt, and should be run from 3,800 to 4,300 revolutions per minute.

WEIGHT, 1,600 LBS. PRICE, WITH COUNTER, $325.00.

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HEAVY SMOOTHING AND FINISHING PLANER.

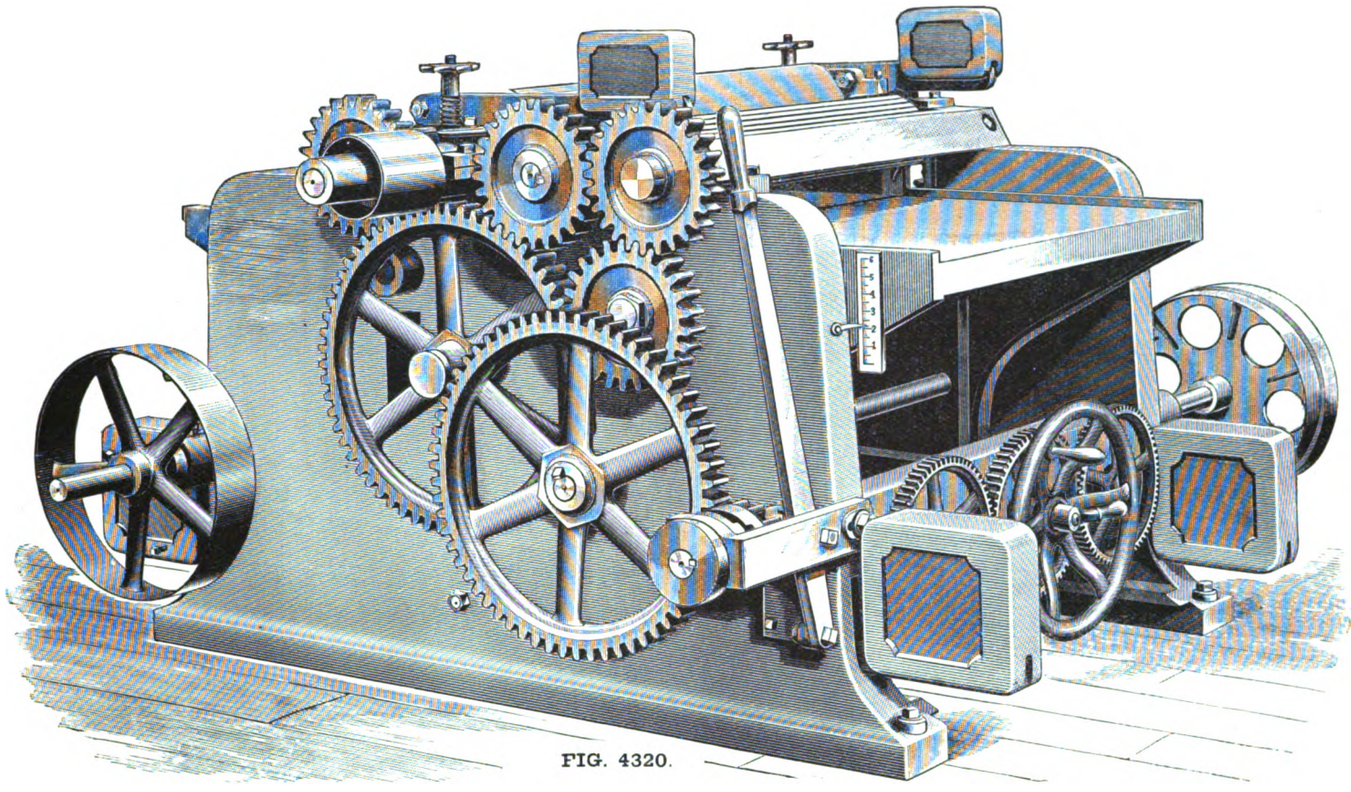


FIG. 4320.

REPRESENTS 30 INCH MACHINE.

The frame of the machine is of double thickness and cored throughout. The bed rests in long inclines with planed surfaces, adjustable by two heavy screws operated together by the large hand-wheels shown in front.

The heavy center-piece of the table is supported by bracing ribs and is fastened to the table brackets independently so it can be removed and planed straight, should it, through the ordinary wear of years, ever become necessary.

The table raises and lowers to plane from nothing up to 6 inches in thickness. The upper and lower feed rolls are driven and provided with heavy gearing and adjustable weight and with extra idler gearing, so that the rollers in raising do not disengage from the regular pitch line.

The cutter-head may be as ordered, either a triangular shear-knife head with three knives set at an angle on the head so as to produce a drawing or shear cut, or a 2-knife head made of the best tool steel crucible forging.

The mandrel is $2\frac{1}{16}$ inches in diameter and driven from both ends.

The chip-breaker bonnet is provided with adjustable weights, and rests close to the cutting line of the head from which it swings in concentric line.

The pressure-bar on the opposite side of the cutter-head is adjustable for either light or heavy pressure.

Two speeds are provided for the feed, which is started and stopped by means of a powerful clutch device.

The mandrel pulleys are 5 inches in diameter by $4\frac{3}{4}$ inches face, and should make 4,000 revolutions per minute.

PRICES.

Twenty-six inch wide.....	$570.00
Thirty " "	620.00
Thirty-six " " weight, 4,500 lbs.....	700.00
Countershaft, extra	

24-INCH FINISHING PLANER.

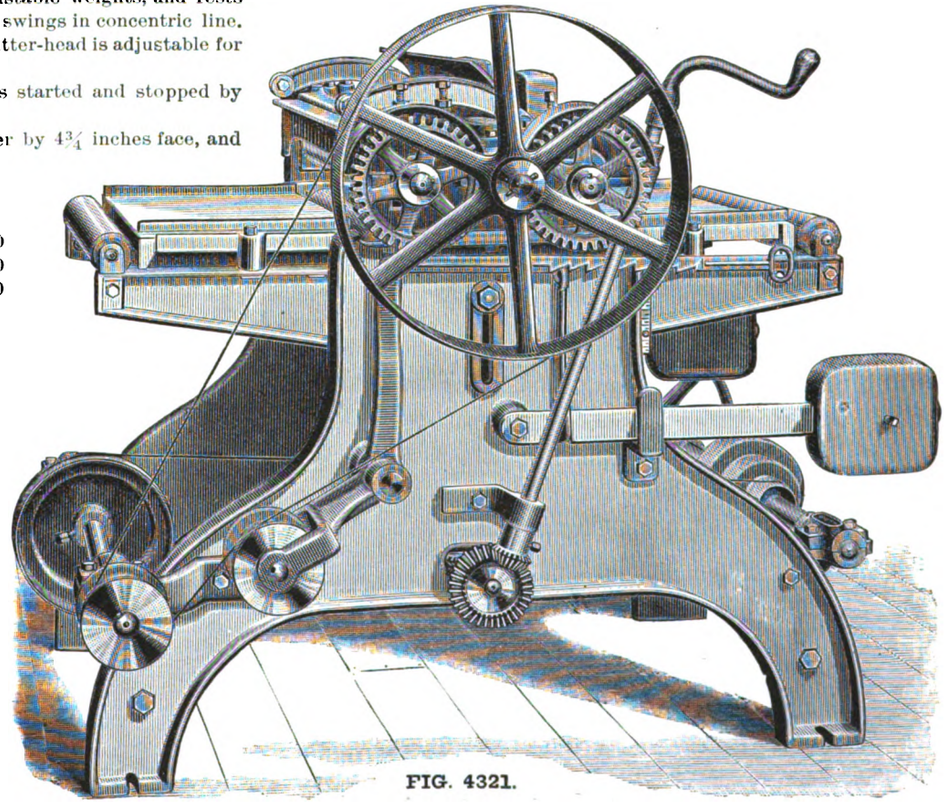


FIG. 4321.

DESCRIPTION, FIG. 4321.

It is built especially for cabinet makers, carriage makers, car builders and all places where very fine work is desirable. The cylinder is of forged steel, has extra number of bolts for the purpose of setting the knives close to the lip. The knives are set at an angle which has been found to be the best for smooth work. It has improved hinged pressure bar, which sets very close to the knives, and the dead pressure also. It will plane stock $3\frac{1}{2}$ inches long without clipping the ends. It will plane from the thinnest veneer to 6 inches thick and 24 inches wide.

Countershaft has tight and loose pulleys, 10 in. diameter, 6 in. face, and should run 1,012.

WEIGHT, 1,400 LBS. PRICE, $250.00.

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30 AND 27 INCHES WIDE CONCORD PLANERS.

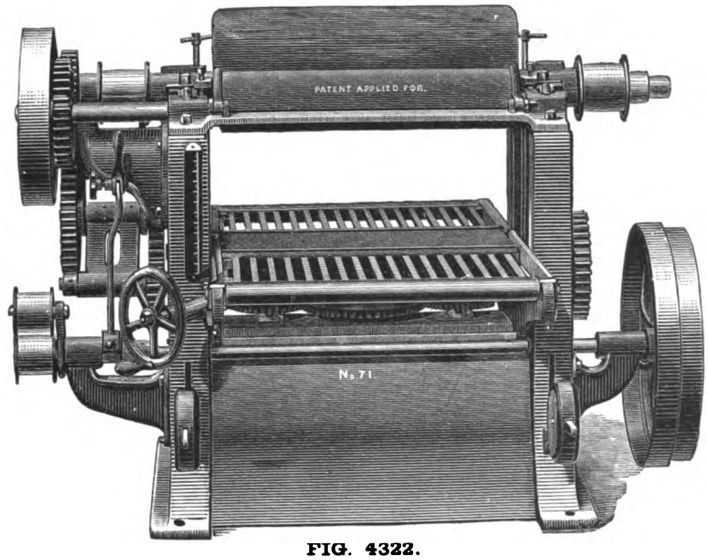


FIG. 4322.

The base, being cast in one piece, will not cramp or twist the boxes out of line. The new feature about this planer is the arrangement of the feed works ; each and every roll above and below the bed being driven by gears, by a patent combination of a link attached to a shaft passing through the machine, connected to a pinion gear, making a strong, durable and positive feed, thus overcoming an obstacle which many planers are subject to. By this device the large number of gears usually employed on planers to accomplish this is done away with. Only four are required. The result is a large decrease of power used in running this over almost all other machines. Can be belted from underneath or overhead, as may be desired.

The cylinder, driven by a double belt, with pulleys on each side, is made of the best forged steel.

The 27 and 30 inch machine will plane stock 12 inches thick. Countershaft tight and loose pulleys are 10 x 6 inches. Speed of countershaft, 900. Floor space, 5 x 6 feet. **WEIGHT, 2,500 LBS.**

PRICES.

30 inches wide $475.00
27 inches wide 450.00

Countershaft, $25.00 extra.

24 AND 20 INCH WIDE CONCORD PLANERS.

The base, being cast in one piece, will not cramp or twist the boxes out of line.

The new feature about this planer is the arrangement of the feed works ; each and every roll above and below the bed being driven by gears, by a patent combination of a link attached to a shaft passing through the machine, connected to a pinion gear, making a strong, durable and positive feed. By this device the large number of gears usually employed on planers to accomplish this is done away with. Only four are required. The result is a large decrease of power in running. Can be belted from underneath or overhead, as may be desired.

The cylinder, driven by a double belt, with pulleys on each side, is made from one piece of the best forged steel.

Countershaft tight and loose pulleys are 10 x 6 inches.
Driving pulleys are 24 x 4 inches.
Speed of countershaft, 900.
Floor space, 5 x 6 feet.
The 24 and 25 inch, weight 2,300 lbs.
Weight, 20 inch machine, 2,000 lbs.

PRICES.

24 inches wide, 10 inches thick..... $400.00
20 " " " " " 375.00

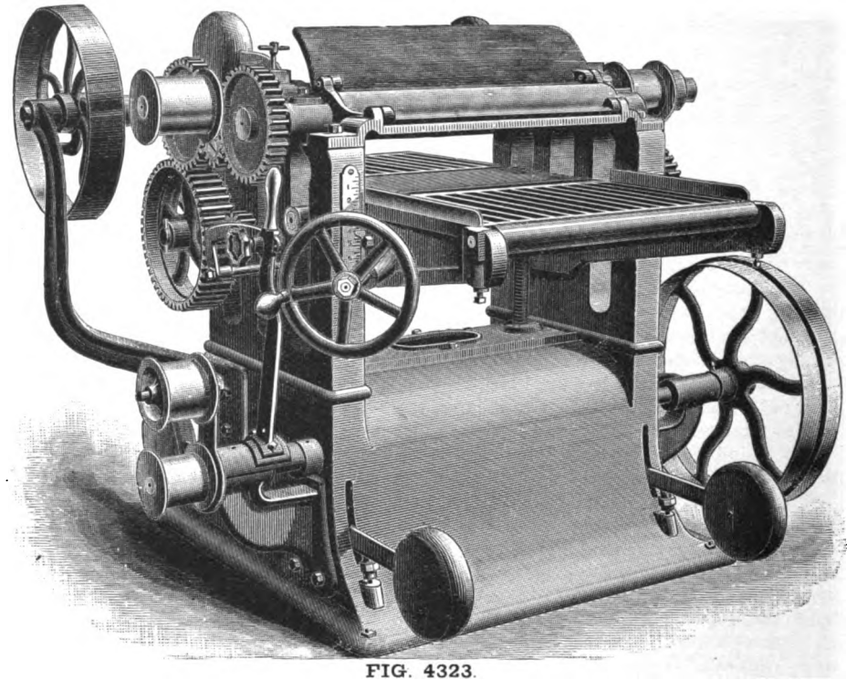


FIG. 4323.

24 INCH PLANER.

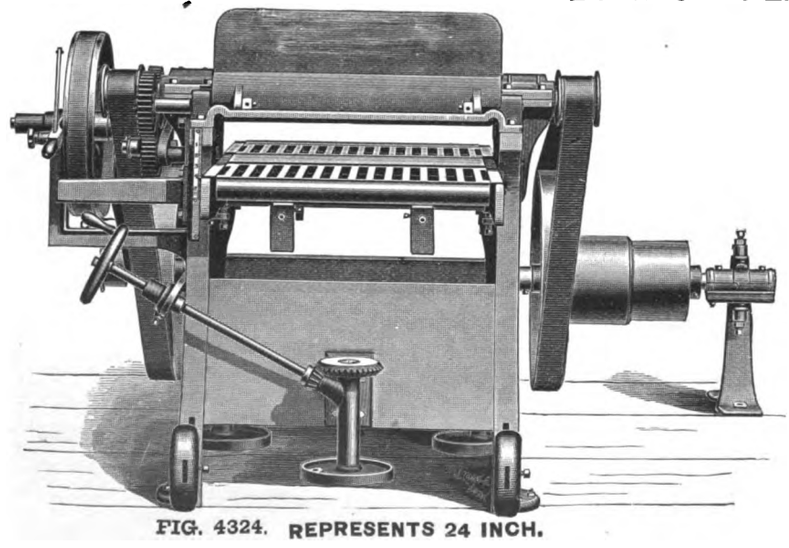


FIG. 4324. REPRESENTS 24 INCH.

The new feature in this machine is, that the lower rolls are made to yield to the pressure from the top rolls. Trouble often arises from getting the bed rolls too high or too low. By this arrangement this trouble is avoided. There are no pressure bars to be kept gauged nicely to a certain height. It is self-contained, having countershaft and planer complete in one frame, and will plane up to six and one-half inches in thickness.

Speed of cylinder, 4,500 turns per minute.
Speed of tight and loose pulleys, 900.
Floor space, 4 x 5½ feet.
WEIGHT, 1,800 LBS.

PRICE.

24 inches wide, 6 inches thick..... $200.00

Countershaft included.

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CORDON PLANERS.

24 INCH WIDE.

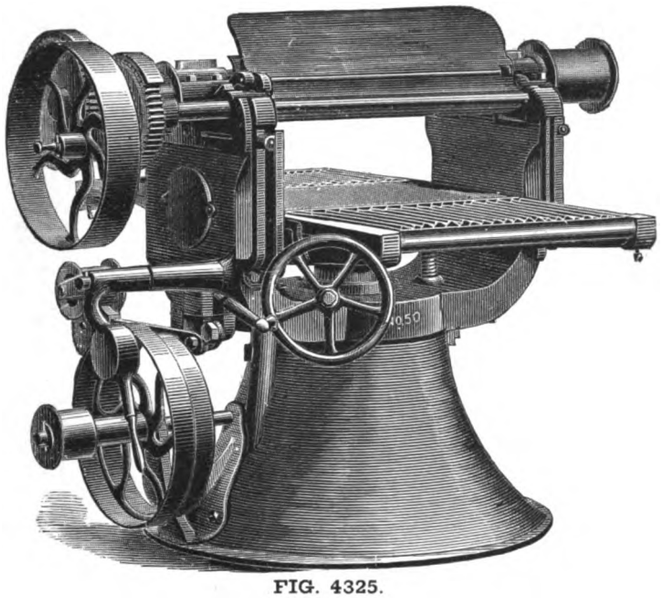


FIG. 4325.

These planers will plane stock from 1-16 of an inch to 7 inches in thickness. Speed of cylinder should be 5,000 turns per minute. It has four feed rolls, pressure bar, and chip breaker, which have our improved weighted attachment. It has no rubber springs to become inoperative by oil and other causes. The cone pulley for regulating the speed can be changed for slow or fast planing.

For very fine work, a rubber take-away roll is substituted for the iron roll. These are built to order only.

Floor space, 5 feet by 4 feet 6 inches for both machines. Weight of machine, 1,500 lbs.

PRICES.

24 inches wide by 7 inches thick	$260.00
Countershaft, extra	20.00

16 INCH WIDE.

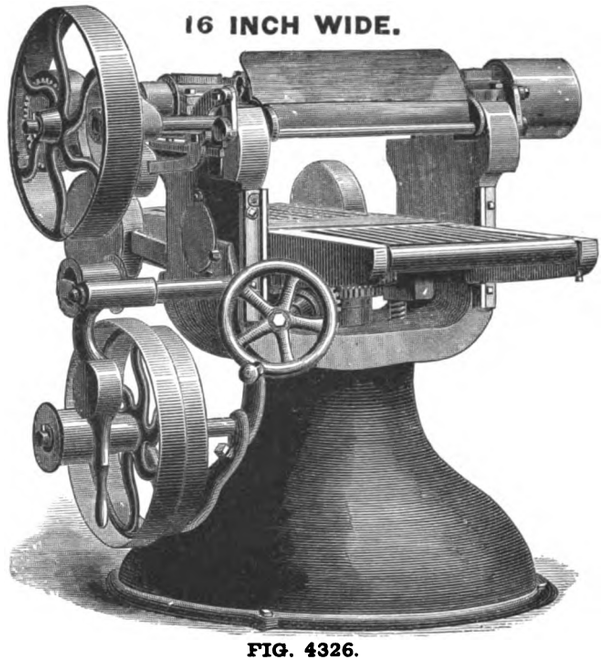


FIG. 4326.

PRICES.

16 inches wide by 7 inches thick	$210.00
Countershaft, extra	20.00

12 INCH WIDE.

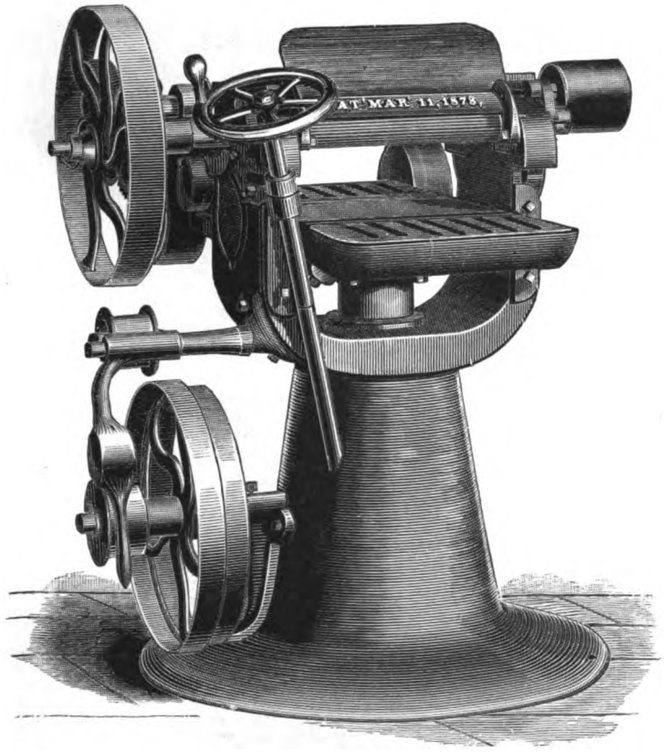


FIG. 4327. DESCRIPTION SAME AS FIG. 4325.

PRICES.

12 inches wide by 6 inches thick	$170.00
Countershaft, extra	20.00

PRICES, FIG. 4328.

16 inch machine	$165.00
20 inch machine	185.00
24 inch machine	210.00
Extra for reverse feed pulleys	10.00
Extra for countershaft	20.00

LITTLE GIANT PLANER.

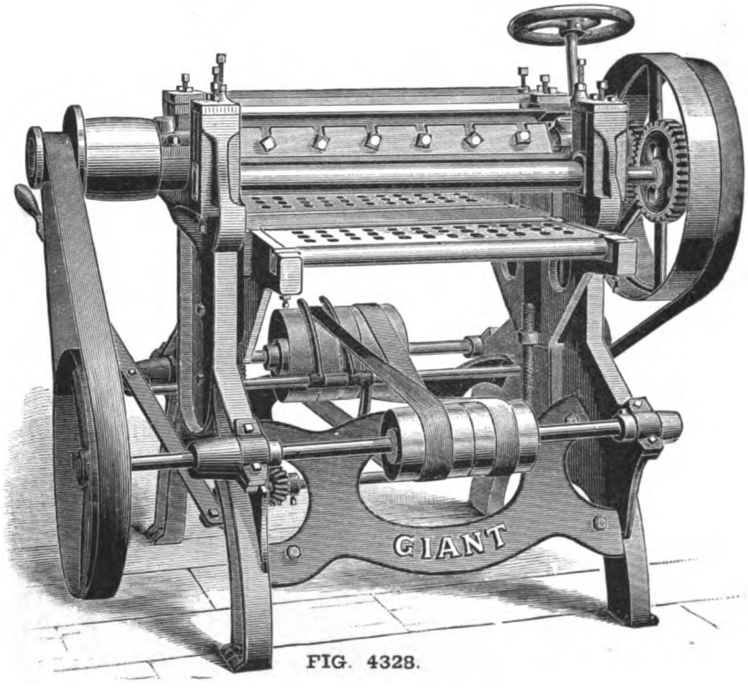


FIG. 4328.

The bed rises and lowers in dovetail slides, and all wear can instantly be taken up. It will plane 8 inches thick, or down to 1-16 of an inch. It has a self-adjusting pressure bar that rides upon the board, and adjusts itself to the thick edge as well as the thin edge; the other, on opposite side of cylinder, being arranged so as to press the lumber at the nearest possible line to the cut of the cylinder, and retain the same relative position to it.

The shifting lever operates the feed stop and reverse motion to feed works.

These machines, when ordered, have pulleys to accommodate the straight belt only. By ordering with reverse feed you get the machine in full, as shown. The 16 and 20 inch machines have 5 x 5 inch pulleys on cylinder, and 24 inch machines 6 x 6 inch, and should make 3,800 revolutions per minute.

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ROTARY BED SINGLE SURFACER, 27x7.

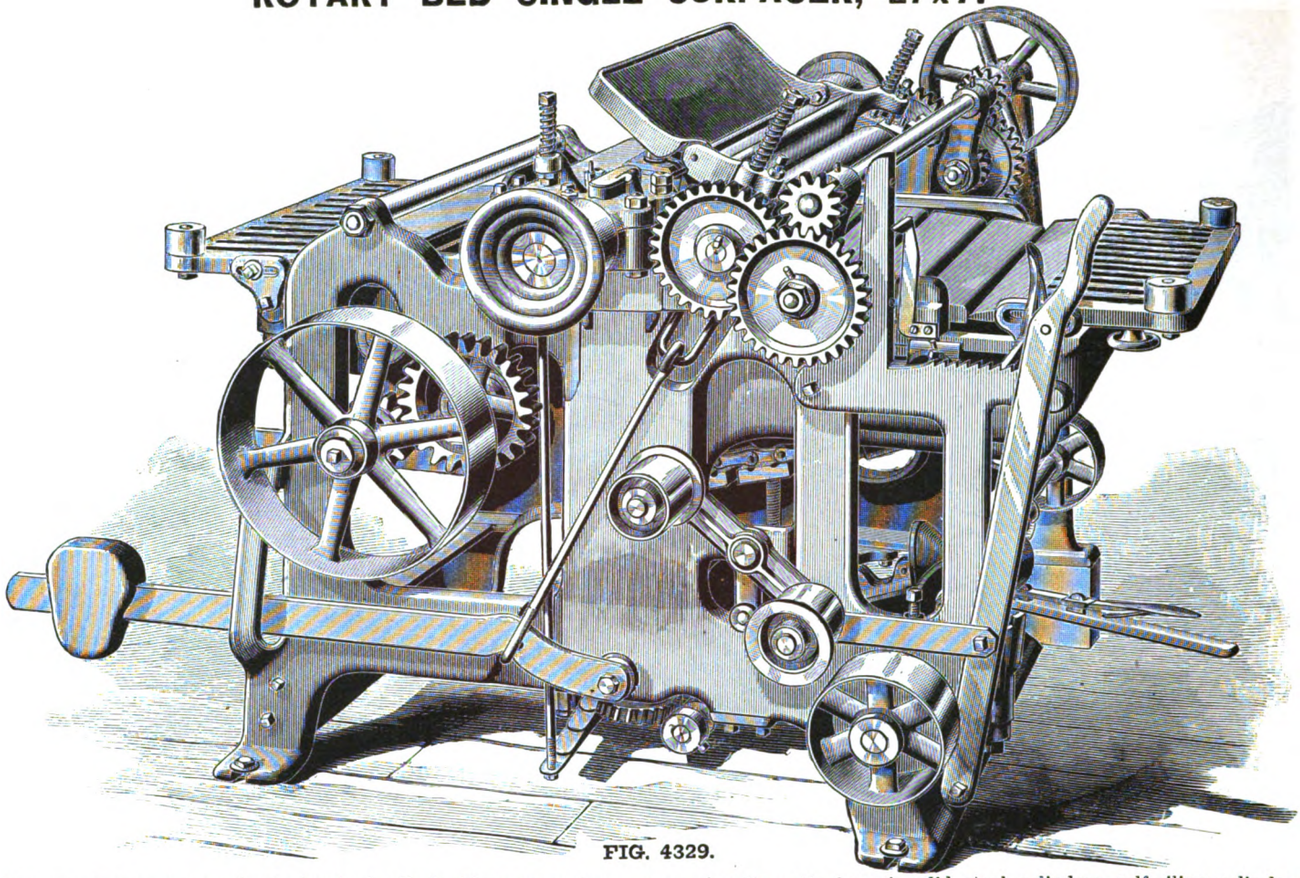


FIG. 4329.

It has an extra heavy geared entering feed roll, double pressure bars, power elevating attachment, solid steel cylinders, self-oiling cylinder boxes. All journals are extra large and long. The lag bed is thick and heavy and strongly linked together.

PRICE of machine with countershaft.....**$500.00.** Without countershaft, $40.00 less.

24 INCH DOUBLE-BELTED AND DOUBLE-GEARED PLANER.

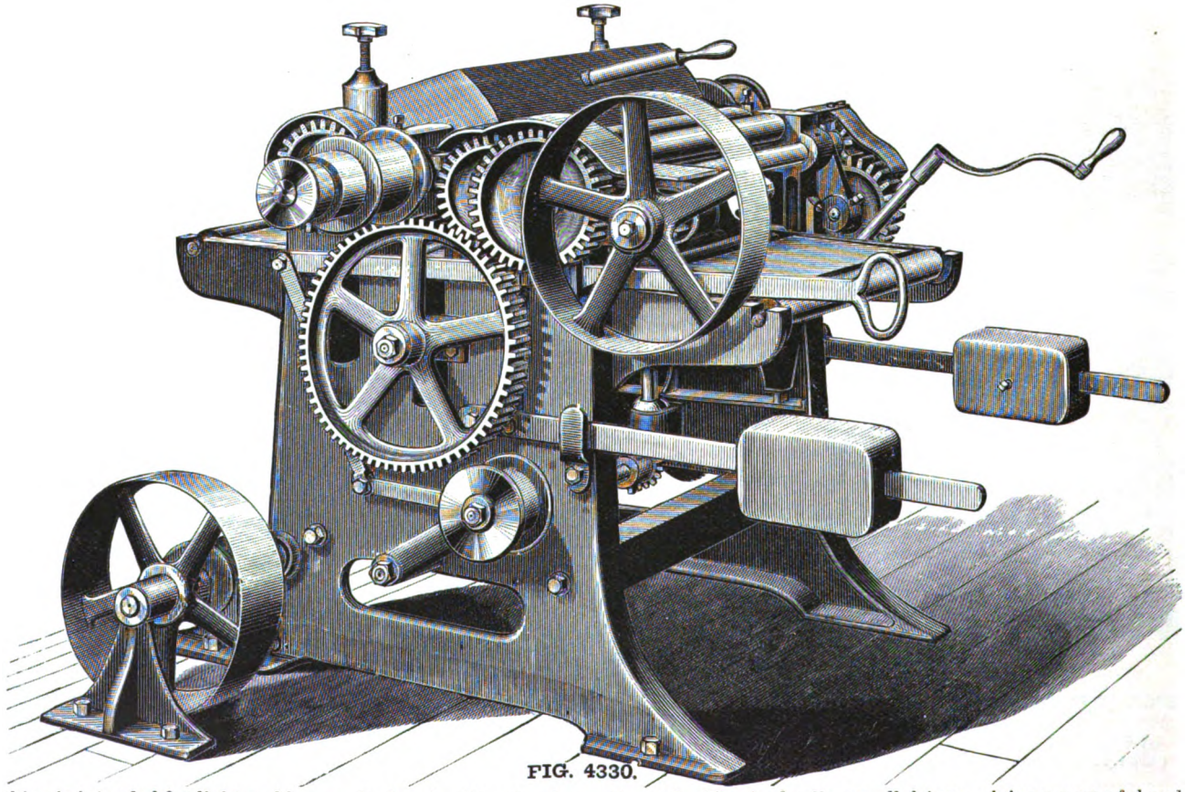


FIG. 4330.

This machine is intended for light and heavy planing, in either hard or soft wood. The feed-rolls are all driven, giving a powerful and reliable feed, and have two changes of feed. Will plane 24 inches wide and from 1-16th of an inch to 7 inches in thickness. The cutter-head is of forged steel; journals 8 inches long, driven by two belts. Has two pressure bars, the receiving one weighted and swings clear of knives. The machine does a fine grade of work and will not tear out or clip ends of lumber.

Tight and loose pulleys, 10 inches in diameter and 5 inches face, and should make 900 revolutions per minute. **WEIGHT, 2,200 LBS.**

PRICE, 24 inch planer and countershaft.....**$330.00**

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24 INCH PANEL PLANER.

It will plane from 1-16th of an inch to 8 inches in thickness, and as short as 4 inches, without clipping the ends of work. The cutter-head is made of solid forged steel; has pressure bars on either side of cutter-head; the receiving pressure bar is weighted and swings in a circle around the knives, keeping the same relative distance at all points; the feed has three changes; the receiving feed roll is weighted.

This machine will do the finest work on either hard or soft wood, and has no superior.

Tight and loose pulleys are 10 inches in diameter and 5 inches face, and should make 900 revolutions per minute. Weight, 1,750 lbs. and 1,850 lbs.

PRICES.

20 inch planer and countershaft...$225.00
24 " " " .. 250.00

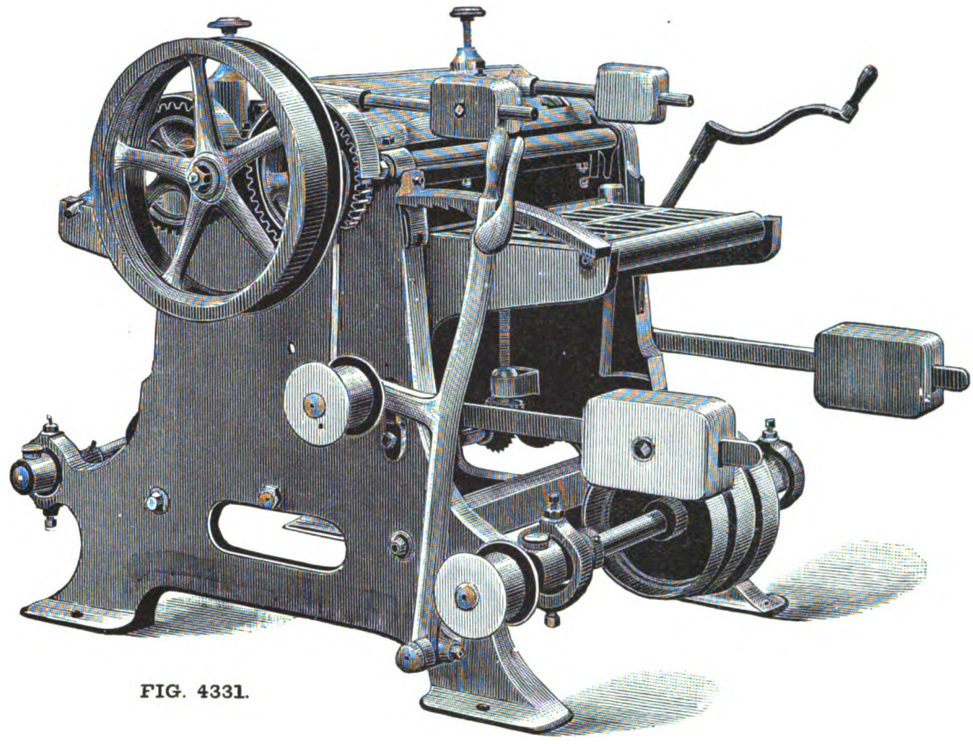


FIG. 4331.

HAND FEED PLANER OR JOINTER.

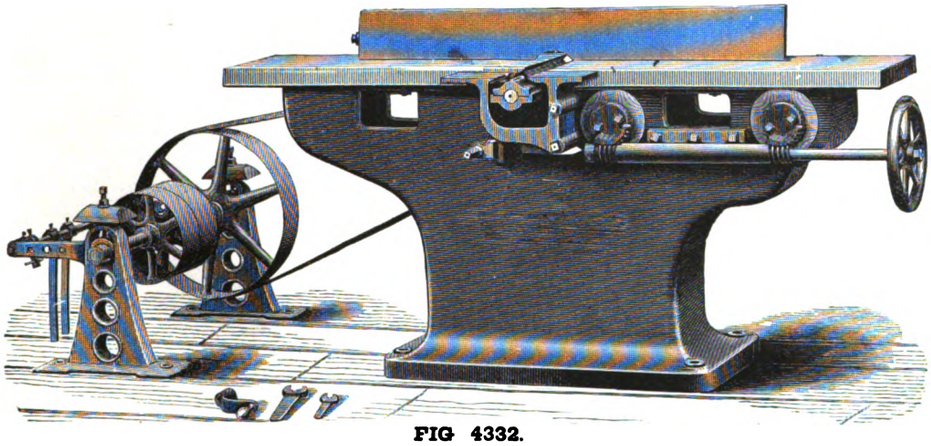


FIG 4332.

PRICES, FIG. 4332.

Width to plane.	Weight, lbs.	Tight and loose pulleys.	Speed, rev.	Price.
12 in. wide.	1,400	10 x 4 in.	800	$150.00
16 "	1,500	10 x 4 "	800	175.00
20 "	1,600	10 x 4 "	800	200.00

DESCRIPTION, FIG. 4332.

This machine planes out of wind. The cylinder is made in three widths, 12 inch, 16 inch and 20 inch. It is made of forged steel and slotted on all four sides. The ends of the table near the cylinder are faced with steel. The first end of the first table near the hand wheel can be raised or lowered so as to joint stuff either convex or concave, as desired. Each machine is furnished with one set of cutters, countershaft and full set of wrenches.

BUZZ PLANERS.

PRICES, WITH COUNTERSHAFT.

8 inch cylinder complete, with counter, tables 6 feet long, tight and loose pulleys, 8 x 4 inches, should make 5,000 revolutions per minute.....$100.00
12 inch cylinder complete, with counter, tables 6 feet long, tight and loose pulleys, 8 x 4 inches, should make 5,000 revolutions per minute..... 125.00
16 inch cylinder complete, with counter, tables 6 feet long, tight and loose pulleys, 8 x 4 inches, should make 4,500 revolutions per minute..... 150.00
20 inch cylinder complete, with counter, tables 6 feet long, tight and loose pulleys, 9 x 4 inches, should make 4,000 revolutions per minute..... 175.00
24 inch cylinder complete, with counter, tables 6 feet long, tight and loose pulleys, 9 x 4 inches, should make 4,000 revolutions per minute..... 200.00
8 inch cylinder complete, with counter, tables 7 feet long, tight and loose pulleys, 8 x 4 inches, should make 5,000 revolutions per minute..... 110.00
12 inch cylinder complete, with counter, tables 7 feet long, tight and loose pulleys, 8 x 4 inches, should make 5,000 revolutions per minute..... 140.00
16 inch cylinder complete, with counter, tables 7 feet long, tight and loose pulleys, 8 x 4 inches, should make 4,500 revolutions per minute..... 160.00
Price of steel cylinder heads made to use moulding, tonguing and grooving cutters, without changing planer knives..... 10.00

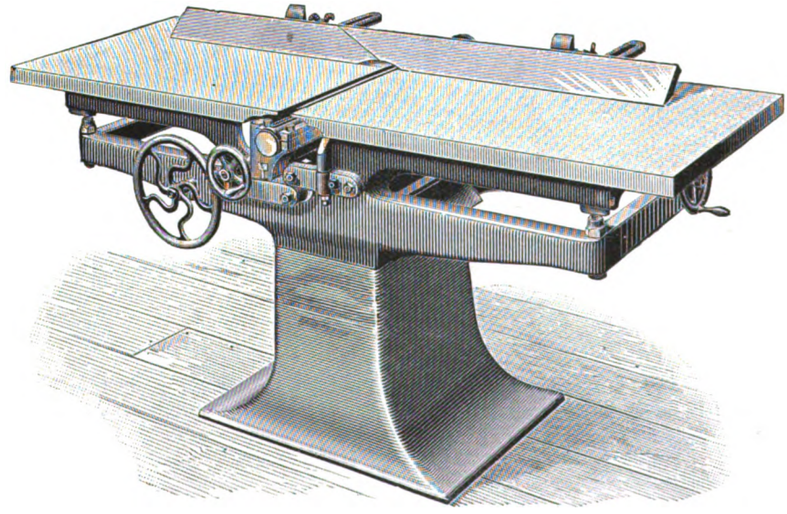


FIG. 4333.

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10 FOOT TABLE BUZZ PLANER OR JOINTER.

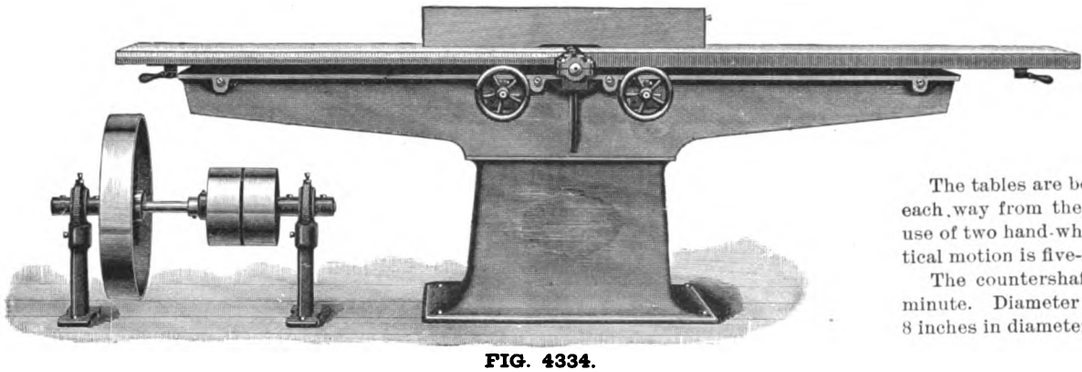


FIG. 4334.

PRICES, FIG. 4334.

Tables, 10 feet long.

30 inch knives.....	...$360.00
24 " "	300.00
20 " "	250.00

The tables are both instantly movable four inches each way from the cylinder horizontally and by the use of two hand-wheels, one to each table. The vertical motion is five-eighths to one inch.

The countershaft should run 800 revolutions per minute. Diameter of countershaft, tight and loose, 8 inches in diameter, 4 inches face.

7, 6 AND 5 1-2 FOOT BUZZ PLANER.

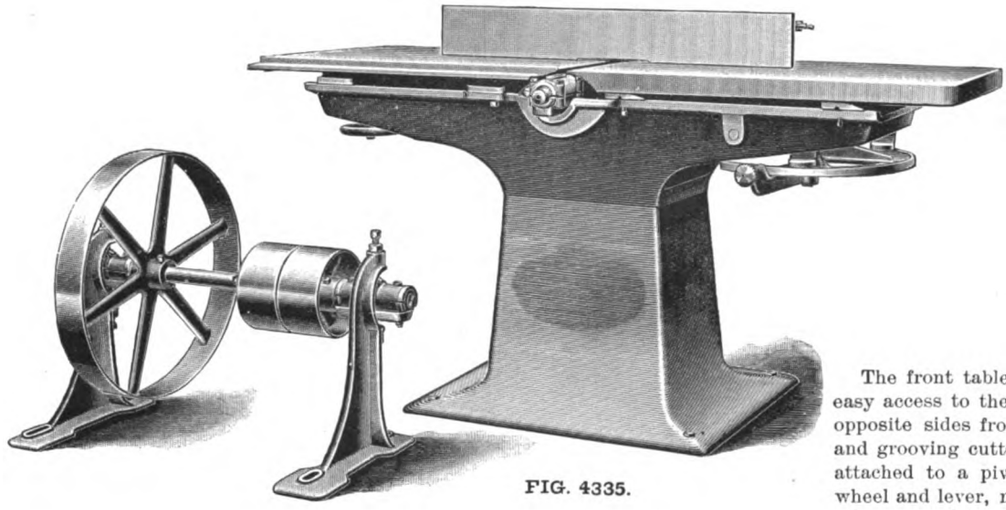


FIG. 4335.

PRICES, FIG. 4335.

Length of table.	Length of knife.	Prices.
7 foot.	30 inches.	$340.00
5½ "	30 "	325.00
7 "	24 "	285.00
5½ "	24 "	275 00
7 "	20 "	235.00
5½ "	20 "	225 00
7 "	16 "	170.00
5½ "	16 "	160.00
7 "	12 "	150.00
6 "	12 "	140.00

The front table has a longitudinal movement, to permit easy access to the knives. The cylinder has T grooves on opposite sides from the knives, to allow the use of moulding and grooving cutters, and is journaled in self-oiling boxes attached to a pivoted frame, which, by means of a hand-wheel and lever, may be raised and lowered to the proper height in relation to the rear table, which is stationary. The front table moves on inclined ways and is operated by a lever and hand-wheel held in any desired position by means of a thumb screw attached to the end of the lever, convenient to the operator. Countershaft, 8 x 4 inches, and should make 800 revolutions per minute.

7 FOOT TABLE BUZZ PLANER.

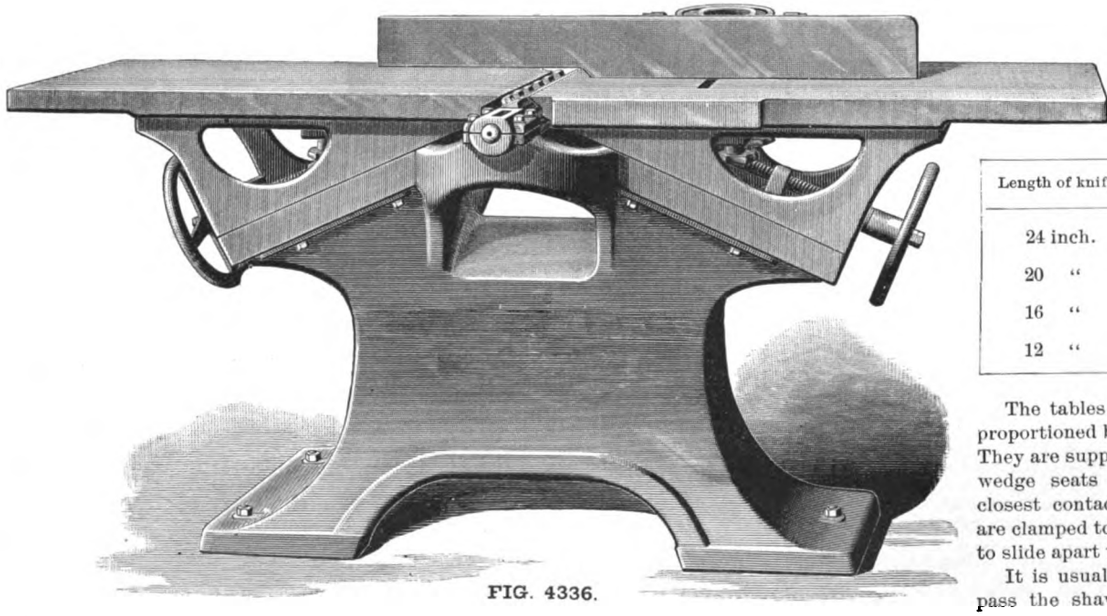


FIG. 4336.

PRICES, FIG. 4336.

Tables all 7 feet long.

Length of knife.	Prices.	Weights.
24 inch.	$220.00	1,900 lbs.
20 "	200.00	1,700 "
16 "	180.00	1,550 "
12 "	160.00	1,350 "

The tables are seven feet long, with a well-proportioned base to support their extra length. They are supported and adjusted by two large wedge seats of proper angle to secure the closest contact with the knives. The tables are clamped to the wedge seats, and arranged to slide apart to get access to the cutter-head.

It is usual, in this class of machines, to pass the shavings through the body of the column or base, which frequently causes them to choke, especially when the material is wet.

This is avoided by forming a yoke which supports the cutter-head, and affords a direct discharge for the shavings through an opening on both sides, twelve inches wide.

Cutter-head is four-sided, slotted on two sides for extra cutters.

The guide or fence is an important improvement. It is attached to the infeeding table, and fitted in and clamped to a T slot. It can be instantly moved across the full width of the machine, and adjusted to any angle.

Countershaft has tight and loose pulleys, 8 in. diameter, 4 in. face, and should make 1,000 revolutions per minute.

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BUZZ HAND PLANER OR JOINTER.

Both sections of the top may be drawn back on the planed ways, allowing easy access to the knives for the purpose of sharpening, etc. When once the two sections of the top are set level, they can, by means of the hand wheels at either end of the machine, be adjusted independent of each other, so as to regulate the depth of cut. Both tops are provided with steel lip next to cutters.

Countershaft has tight and loose pulleys 10 inches in diameter, 4 inch face, and should make 750 to 800 revolutions per minute.

Weight of 16 inch machine, 1,200 lbs.

PRICES.

7 ft. table,	20 in.	knife		$200.00
6 "	20 "			190.00
7 "	16 "			190.00
6 "	16 "			175.00
7 "	12 "			170.00
5 "	12 "			145.00

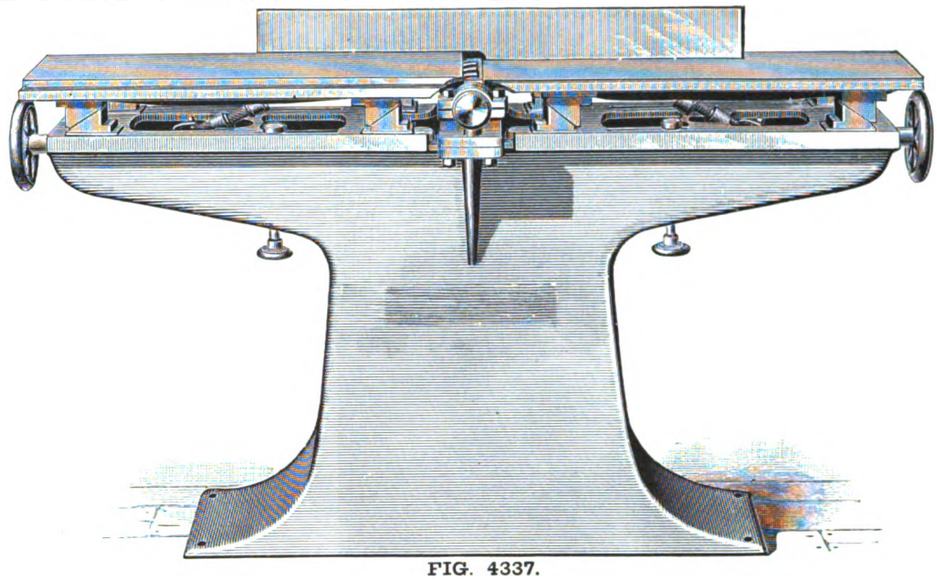


FIG. 4337.

9 INCH CLIMAX MOULDER.

The side heads are hung on the sticker bed and rise and lower with it, and are also independently adjustable for height and distance between the cutter-heads and for various angles. Both housings can be set and adjusted for angular and for under and over cutting, retaining the angle given when moved in or out.

The sticker bed lowers to take in material up to a thickness of 12 inches.

The illustration shows pressure plates and spring holders, supported with improved hold-fasts, all adjustable for quick changes and for taking up any possible wear.

We supply one head with knives for each mandrel, either slotted heads or triangular shear knife, as may be desired; countershaft has tight and loose pulleys, is 10 inches diameter by 6¼ in. face and should make 650 revolutions per minute. Weight, 2,200 lbs.

PRICE.

With improved sticker bed to plane 4 sides, with lower head to plane first, outside bearing for upper head, lower feed roll geared and two nine-inch and two four-inch slotted heads and knives $540.00

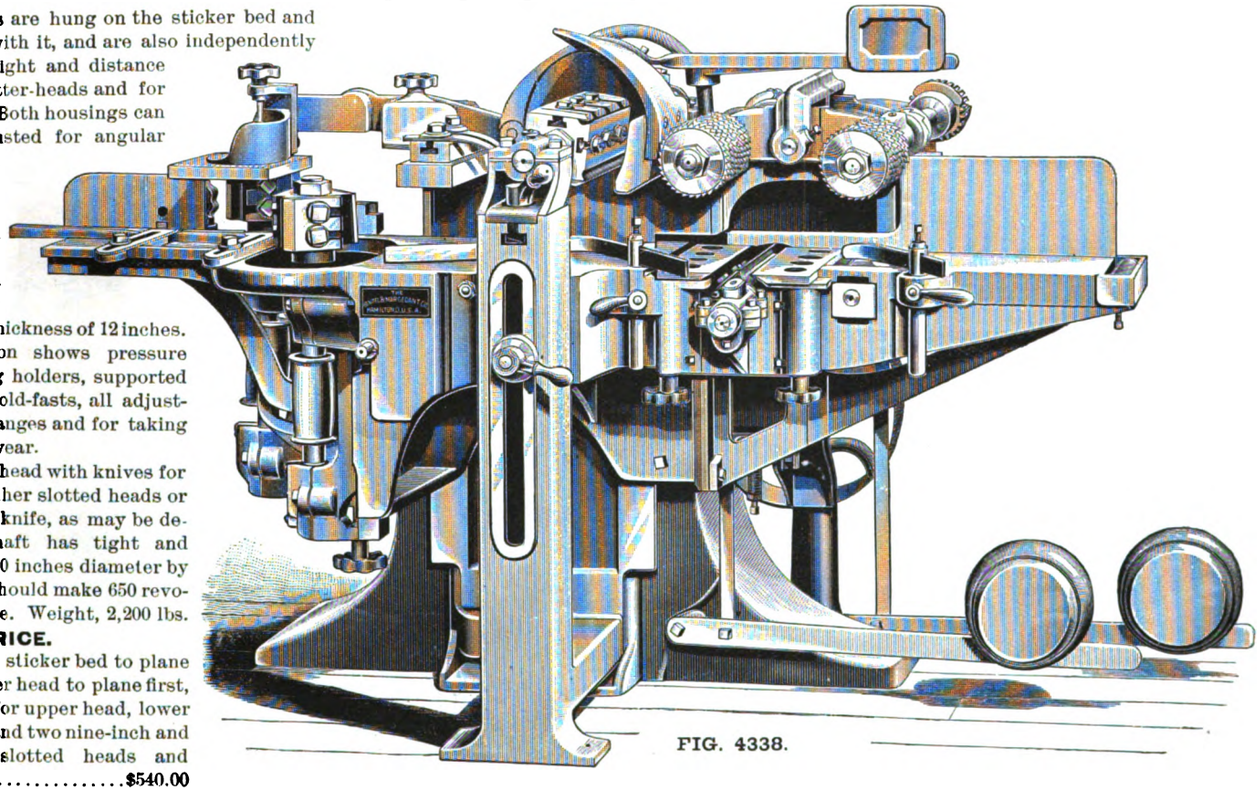


FIG. 4338.

PLANER KNIVES.

OPEN SLOT.

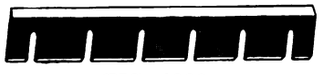


FIG. 4339.

LOOP SLOT.



FIG. 4340.

PRICES, FIGS. 4339 AND 4340.

Knives over 6 in. to 31 in. long, 4 in. wide or less, ⅜ in. thick or less, 12 cts. per inch.

PROPORTIONAL KNIFE BALANCING MACHINE.

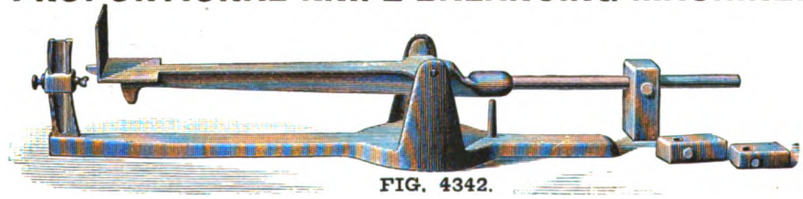


FIG. 4342.

PRICE, $15.00.

In ordering planing knives, etc., place the knife face down on a piece of blank paper, mark around to show the length of knife and size and position of slots, and be sure to state the width and thickness as shown in diagram, and number of knives in a set; also place on end and mark for section, as shown in Fig. 4341.

EXAMPLE FOR ORDERING.

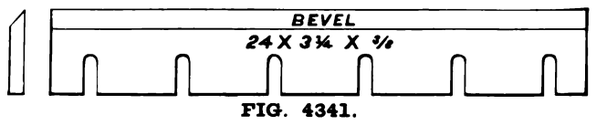


FIG. 4341.

24 inches long, 3¾ inches wide, ⅜ thick.

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14 INCH SCREW FEED MOULDER.

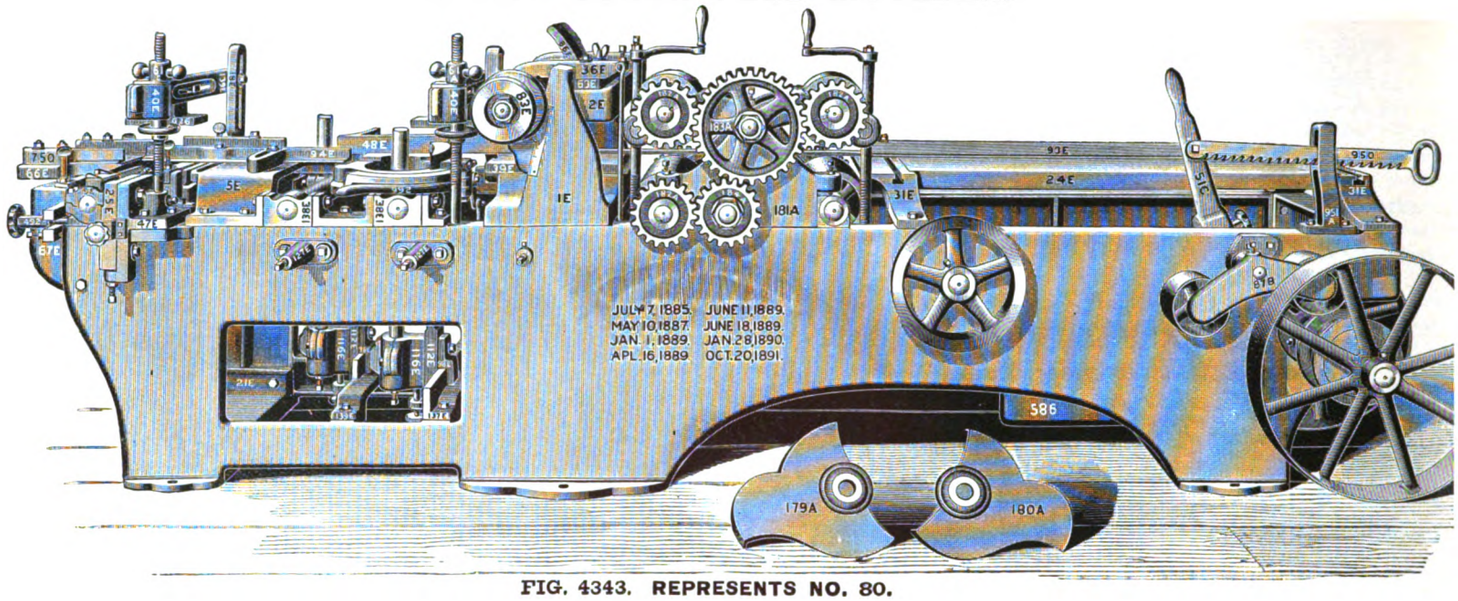


FIG. 4343. REPRESENTS NO. 80.

REAR VIEW, 10 INCH SCREW FEED MOULDER, AND INTERNAL PARTS EXPOSED.

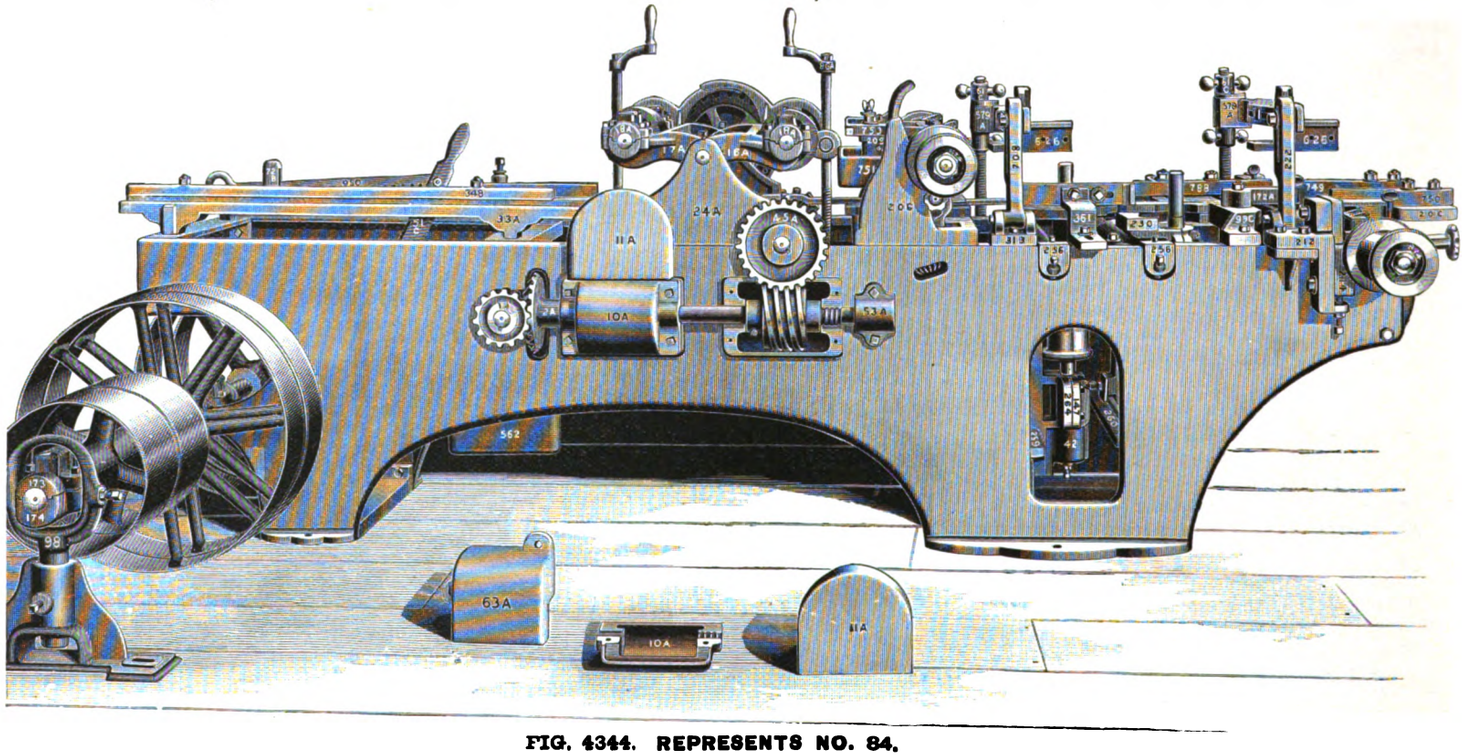


FIG. 4344. REPRESENTS NO. 84.

The rear view shows manner of applying the screws to the lower feed rolls, some of the covers being removed. The screw secures a fast and steady feed.

PRICES.

Number of machine.	Width.	Height.	Number of sides it works.	Number of rolls.	Length.	Weight.	Price.		
80	14 in.	6 in.	4 sides.	4	12 ft. 4 in.	7,000 lbs.	$.....	$.....	$.....
81	14 "	6 "	3 "	4	12 " 4 "	6,800 "			
82	12 "	6 "	4 "	4	12 " 4 "	6,700 "			
83	12 "	6 "	3 "	4	12 " 4 "	6,500 "			
84	10 "	4 "	4 "	4	11 "	4,500 "			
85	10 "	4 "	3 "	4	11 "	4,300 "			
86	8 "	4 "	4 "	4	11 "	4,200 "			
87	8 "	4 "	3 "	4	11 "	4,100 "			

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4 ROLL INSIDE MOULDER, PLANER AND MATCHER.

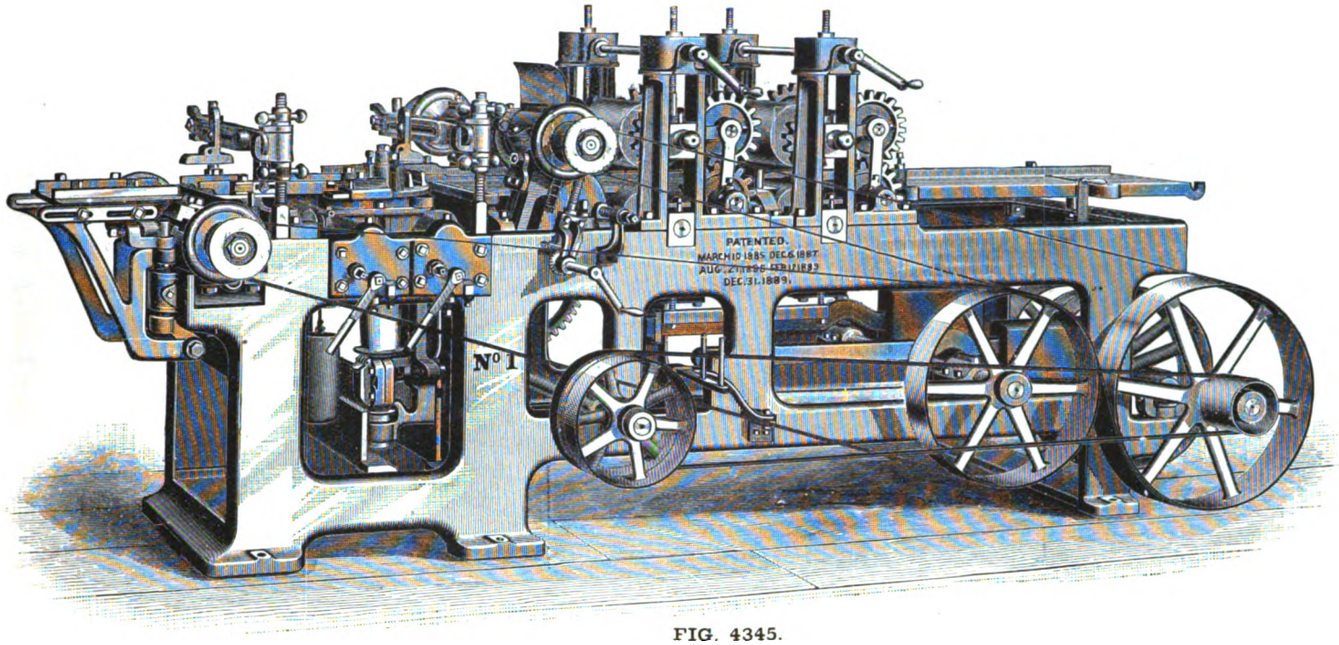


FIG. 4345.

The frame is strong and heavy, and allows the use of long belts. All cutter-head shafts are enlarged; square matcher bars with patented locking device, and weighted side chip-breaker, are applied in the same manner as on planers and matchers. The change of plates and side heads for working either mouldings or matching can be very readily made, consuming only a few minutes' time.

Tight and loose pulleys are 14 inches in diameter for 6 inch belt, and should make 600 revolutions per minute.

Works 4 sides 10 feet 8 inches long by 5 inches thick. Weight, 4,500 to 5,000 lbs.

PRICES.

15 INCHES WIDE, $1,300.00. 12 INCHES WIDE, $1,200.00. 10 INCHES WIDE, $1,100.00.

4 ROLL INSIDE MOULDER, PLANER AND MATCHER.

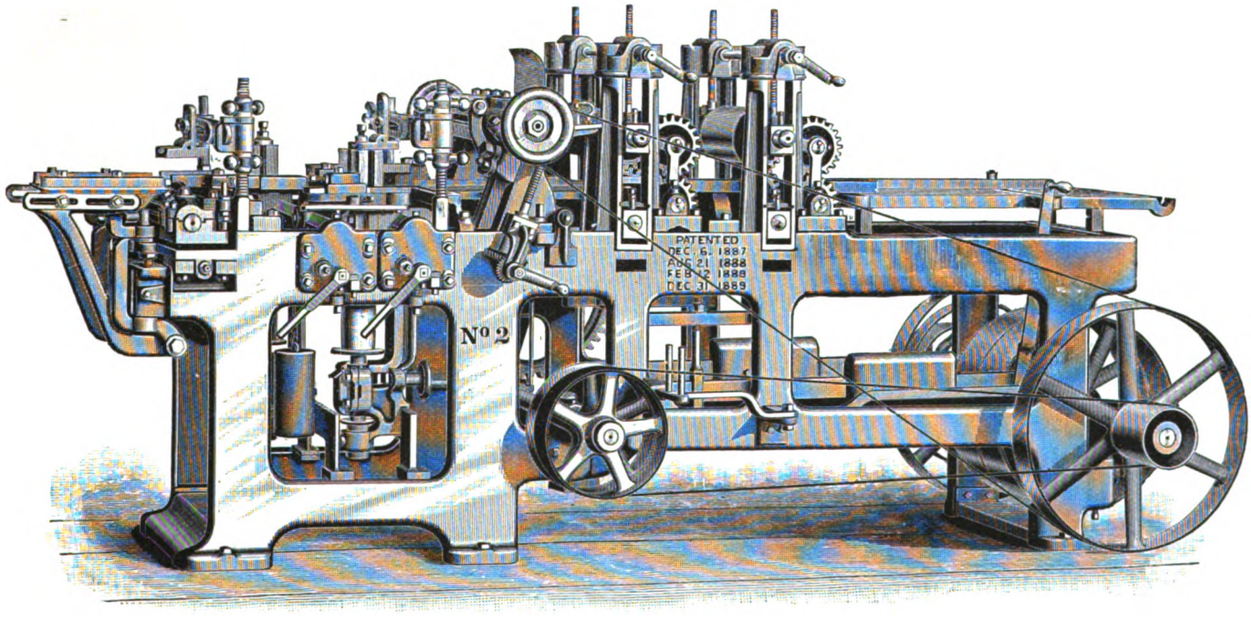


FIG. 4346.

The cut shows two pair of feed-rolls, but we build this size with one pair only, when so ordered.

The feed is driven by tight and loose pulleys, as shown in the cut. We also construct the machine with clutch and cone feed, when preferred.

Both side spindles may be set on an angle, or tipped for doing special work. Facility of adjustment and ease of operation have been carefully considered in designing this machine.

Belting required :—Two top cylinder belts, each 15 feet 3 inches, of 3½ inch ; one bottom cylinder belt, 19 feet 1 inch, of 3 inch ; one matcher belt, 17 feet 4 inches, of 3 inch ; one 16 feet 1 inch, of 3 inch ; one feed belt, 12 feet 4 inches, of 3 inch. 12 x 6 tight and loose pulleys, and should run 600 revolutions per minute.

Works 4 sides 10 feet 6 inches long by 4 inches thick. Weight, 3,500 to 4,000 lbs.

PRICES.

10 INCHES WIDE, $1,000.00. 8 INCHES WIDE, $900.00.

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12 AND 10 INCH OUTSIDE MOULDERS.

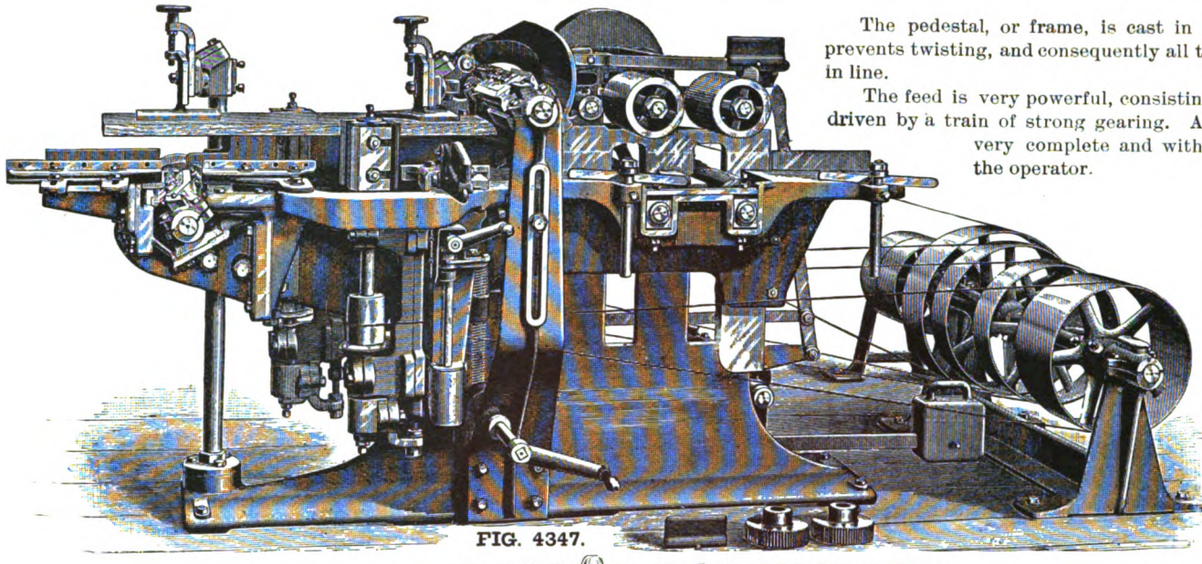


FIG. 4347.

The pedestal, or frame, is cast in one solid piece, which prevents twisting, and consequently all the bearings must keep in line.

The feed is very powerful, consisting of four six inch rolls driven by a train of strong gearing. All the adjustments are very complete and within convenient reach of the operator.

Planes four sides 6 inches thick; bed drops to plane two sides 12 inches thick.

WEIGHT, 4,500 LBS.

PRICES.

12 inch..... $900.00
10 inch..... 800.00

7 AND 6 INCH MOULDERS.

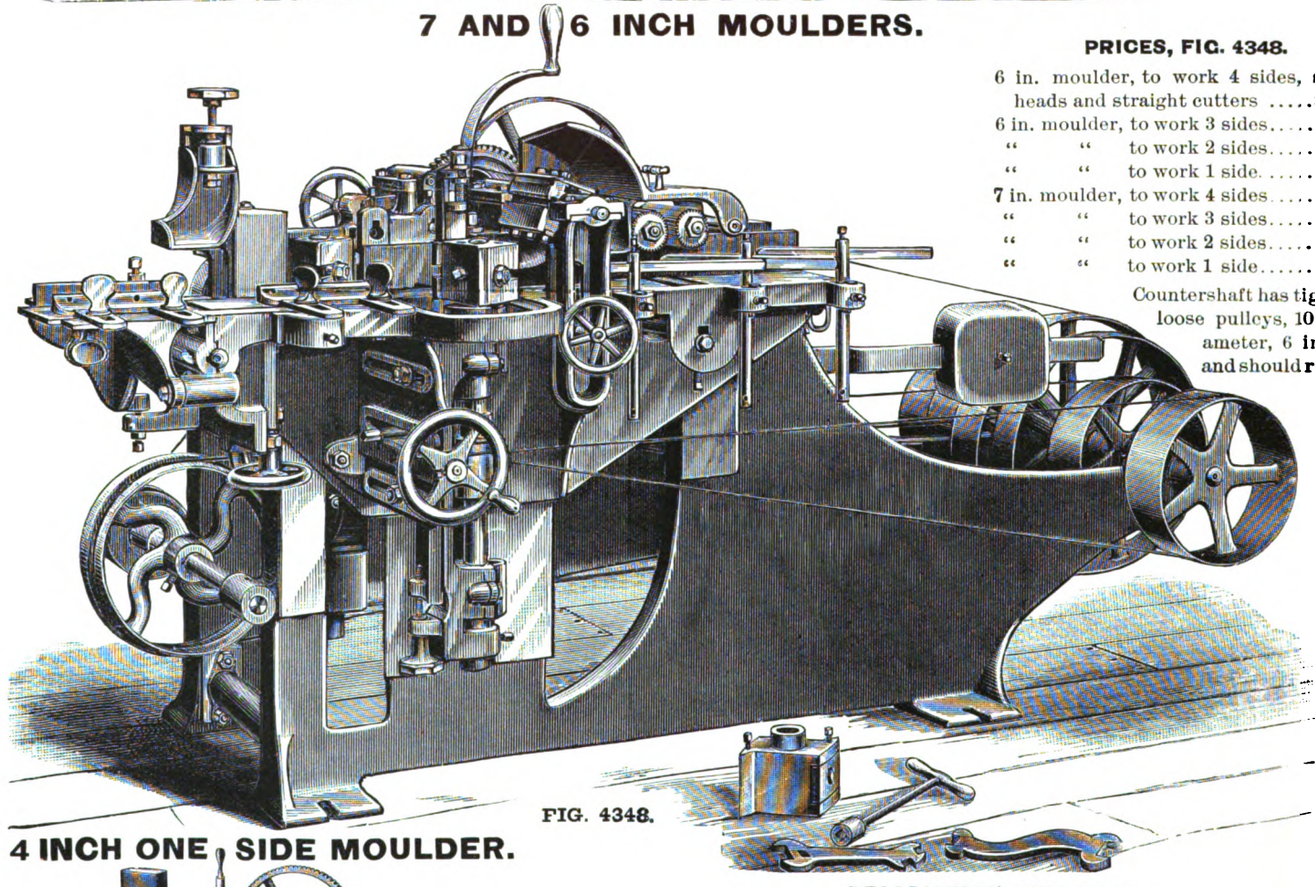


FIG. 4348.

PRICES, FIG. 4348.

6 in. moulder, to work 4 sides, slotted heads and straight cutters $300.00
6 in. moulder, to work 3 sides..... 275.00
" " to work 2 sides..... 250.00
" " to work 1 side..... 225.00
7 in. moulder, to work 4 sides..... 350.00
" " to work 3 sides..... 325.00
" " to work 2 sides..... 300.00
" " to work 1 side..... 275.00

Countershaft has tight and loose pulleys, 10 in. diameter, 6 in. face, and should run 825.

DESCRIPTION, FIG. 4348.

The upper cutter-head frame is adjustable across the machine. The cutter-head is slotted on four sides and has an outside removable bearing. The side heads are adjustable and can be set at an angle. The inside head can be moved up or down, out or in, without changing the angle. The machine has hinged pressure bar and chip breaker which is adjustable to and from the cutters. The feed rolls also can be set to and from the cutters, and to feed the stuff to the guides. The under head will work full width of bed. The bed is moved by a single screw and will drop 14 inches.

4 INCH ONE SIDE MOULDER.

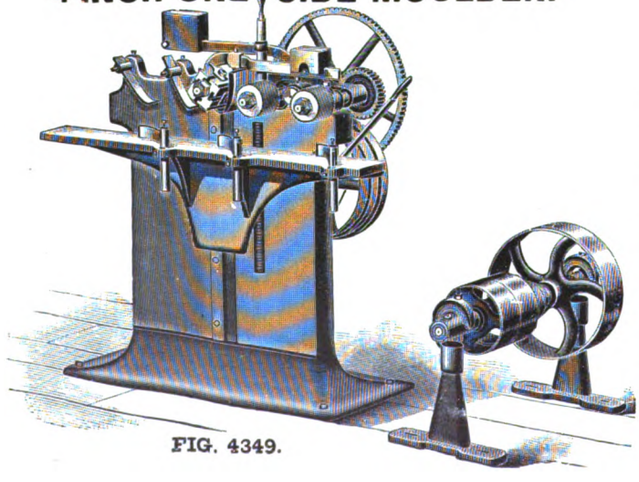


FIG. 4349.

DESCRIPTION, FIG. 4349.

It will plane up to four inches wide, and the table lowers sixteen inches; is adapted for grooving and planing door rails, stiles, etc. The table is attached to the frame the entire width and is securely gibbed in. It can be used as a sash sticker and for narrow mouldings, etc.

Tight and loose pulleys, 10 x 4 inches.
Countershaft should run 1,000 revolutions.
Floor space, 5 x 3 feet.

PRICE .....$190.00.

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9, 8 AND 7 INCH 4-SIDE MOULDERS.

DESCRIPTION, FIGS. 4350 AND 4351.

The new power feed device used on this machine enables its being made on a short frame. The feed works consist of two rolls above and two below the table, which are driven by a train of expansion gears. The upper rolls are mounted on swinging yokes and rise parallel with the stock being worked, and can be raised instantly to draw it from the knives, if desired.

The top arbor has a detachable outside bearing; both side heads are mounted on the platen and rise and fall with it. The side heads have an angular and vertical adjustment, which allows the working of the same laterally out or in from the working side of the machine. Both of the horizontal heads have an end adjustment by means of a hand wheel. The table has a movable mouth flush with the face, which can be adjusted to close the gap of the lower and inside head.

The bed is raised and lowered by a hand wheel on top of the machine.

Tight and loose pulleys are 12 x 6 inches on 9 inch, 8 inch and 7 inch machines; the countershaft should make 1,000 revolutions. Floor space, 12 x 6 feet.

WEIGHT, 3,500 LBS.

On the 5, 4 and 3 inch machines the tight and loose pulleys are 10 x 4. Countershaft should make 1,000 revolutions. Floor space, 7 x 3.

WEIGHT, 1,600 LBS.

PRICES, FIG. 4350.

9 inch outside heads	$500.00
8 " " "	450.00
7 " " "	425.00

PRICES, FIG. 4351.

5 inch outside heads	$320.00
4 " " "	290.00
3 " " "	265.00

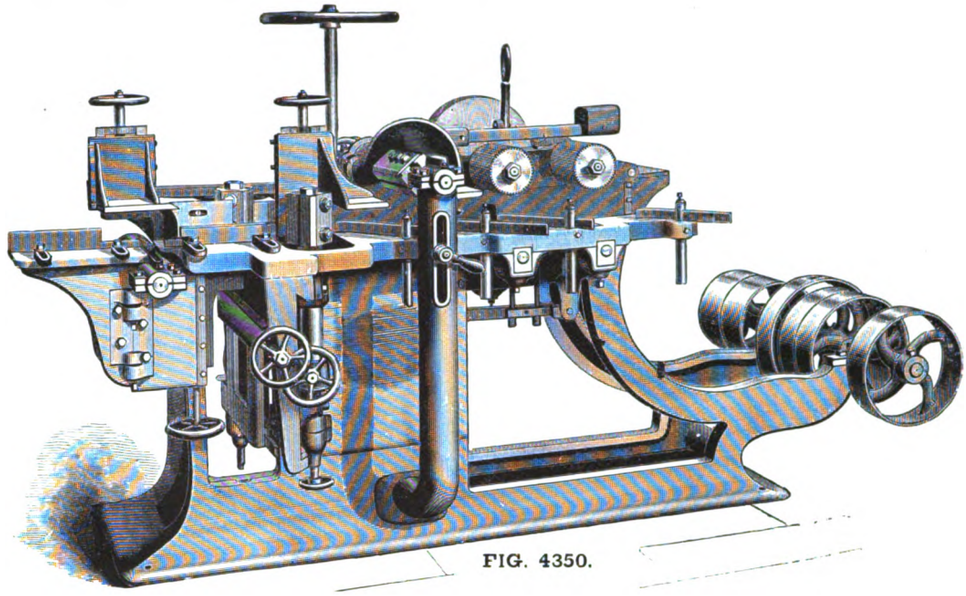


FIG. 4350.

5, 4 AND 3 INCH 4-SIDE MOULDERS.

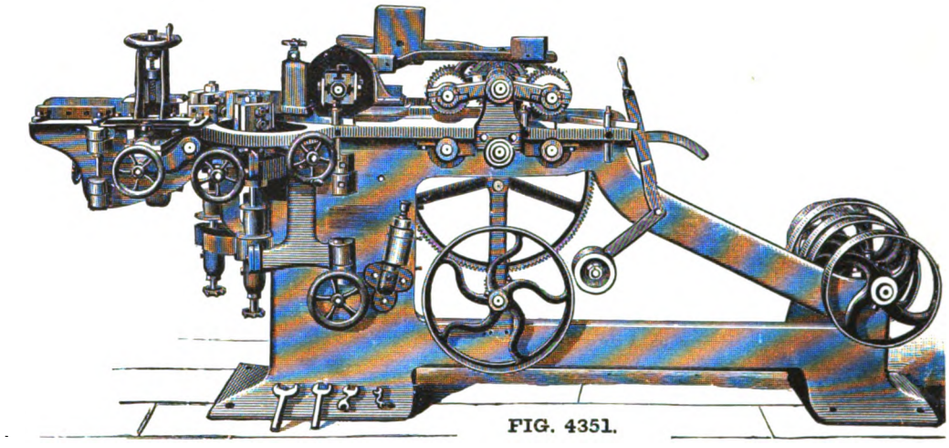


FIG. 4351.

10, 9, 7 AND 6 INCH MOULDERS.

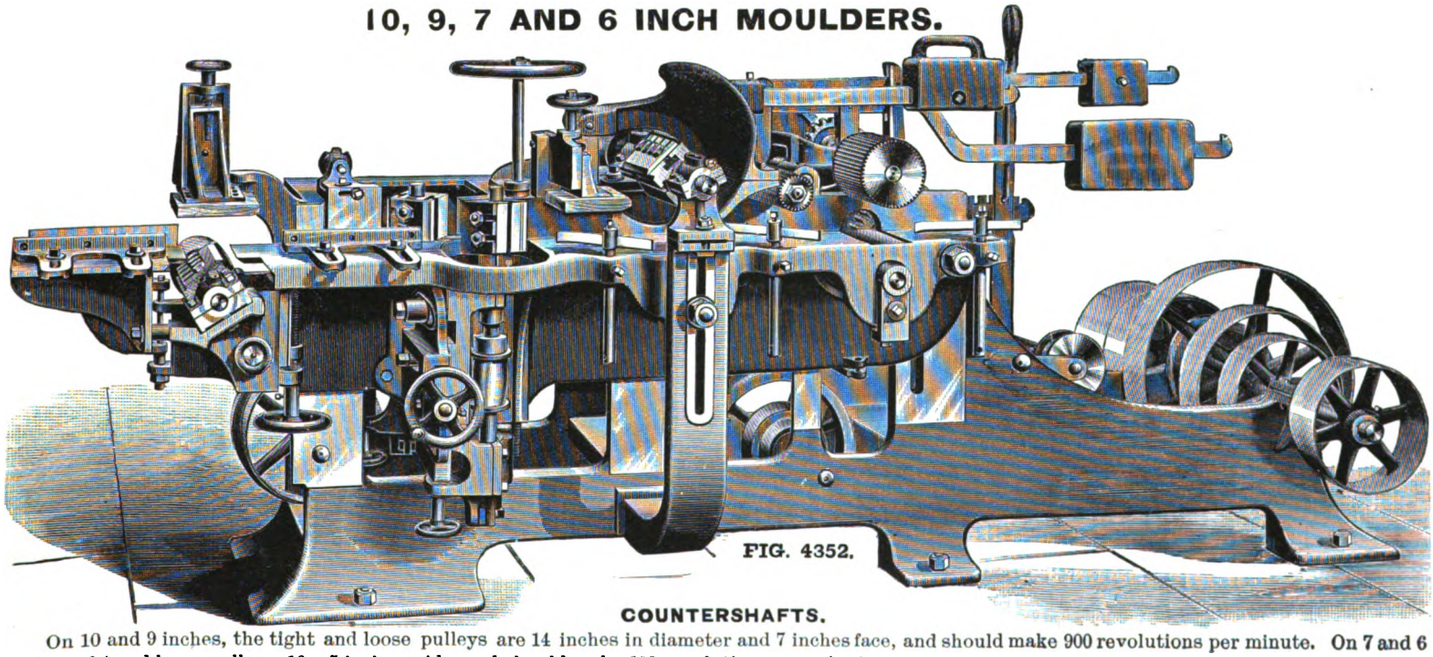


FIG. 4352.

COUNTERSHAFTS.

On 10 and 9 inches, the tight and loose pulleys are 14 inches in diameter and 7 inches face, and should make 900 revolutions per minute. On 7 and 6 inch, tight and loose pulleys, 10 x 5 inches wide, and should make 900 revolutions per minute.

PRICES.

10 inch, to work 4 sides; weight, 4,200 lbs.	$600.00
9 " " " " " 3,850 "	500.00
6 " " " " " 1,720 "	260.00
7 inch, to work 4 sides, friction roll	$300.00
7 " " " " geared roll	325.00

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10 INCH 4-HEADED MOULDER.

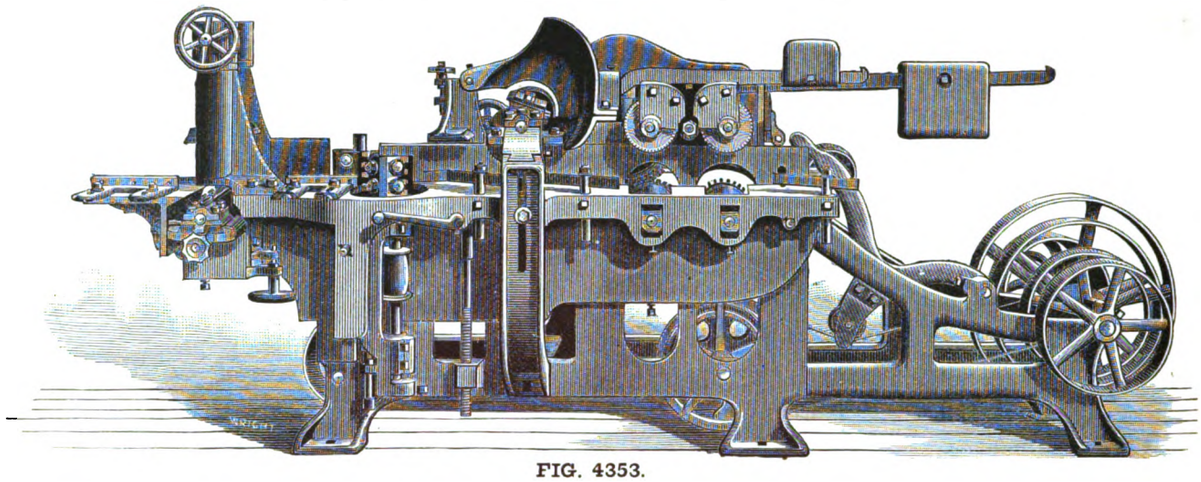


FIG. 4353.

It is capable of working any moulding not exceeding ten inches in width and five inches deep, and will also dress, on four sides, flooring and sheathing, planing and matching up to ten inches wide. The table is securely gibbed to middle of frame and at the rear end near the under cutter; also solidly clamped to frame at the front end. The under cutter has a horizontal and vertical adjustment, and is provided with a heavy pressure bar independent of the frame. The inside and outside headstocks are also adjustable. The top headstock has a lateral adjustment, and is provided with outside bearing. The feeding mechanism has four six-inch rolls. The two upper rolls are fluted and heavily weighted, and hung in such a manner that they rise parallel with the bed, thus giving them an equal bearing the full width of lumber. All four rolls are driven with a continuous train of gears. All heads are made of cast steel, four-sided, four-slotted. One set of straight cutters is furnished with each head; also one extra head and one complete set of wrenches.

It has four rates of feed:—Twenty-two, thirty, thirty-six and fifty-two feet per minute. Tight and loose pulleys are 13 x 7, and should make 900 revolutions per minute.

WEIGHT, 3,700 LBS. PRICE, $600.00.

9 INCH 4-SIDED MOULDER.

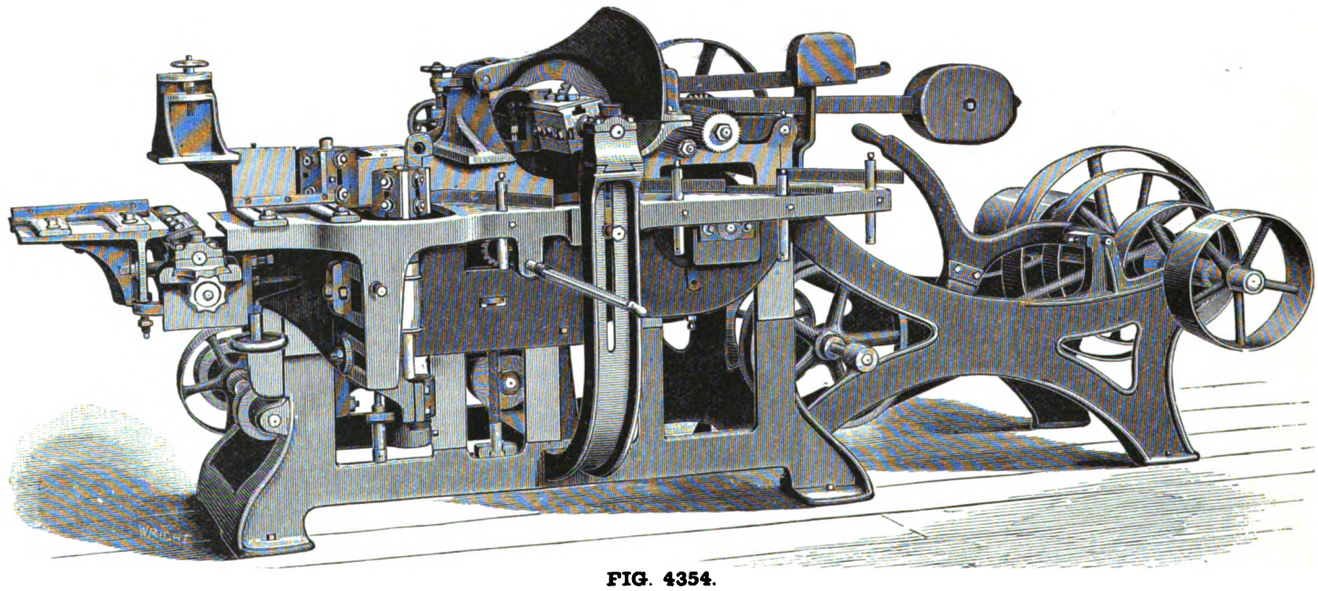


FIG. 4354.

The above cut represents the 9 inch four-sided moulder, is adapted to all the finer grades of work usually done on expensive inside machines, and while it comprises all the advantages of an inside machine, it also has all the advantages of an outside or overhung machine. It is a well-known fact that an outside machine is much more convenient to change to different kinds of work, and that an overhanging head will not do as good and perfect work as a head that has a solid bearing on each side of it.

One of the main features on this machine is the solid outside bearing for the top cutter-head shaft, bolted to both frame and table; there are other valuable improvements on this machine which make it the best in the market for planing and working mouldings up to its full capacity, as well as to work perfectly the smallest mouldings. The inside and outside headstocks are both adjustable, and can be moved to any angle or position desired while the machine is in motion, with greater accuracy and speed than on any other machine. These side headstocks have long bearings on frame and table, and the device for clamping them prevents all vibration and makes them like solid iron.

The gibs that hold the table to the frame extend the whole width of the table, and the face of the frame is planed, so as to allow them to slide entirely to the top of it, thus holding the table very firmly.

The bolt that fastens the outside bearing to the table extends entirely through the table into the gib, and clamps the table to the frame immediately beneath the top cutter-head, where it is most in need of a substantial support.

The feed is very strong and powerful, consisting of two upper rolls and one lower roll, all placed very near the top cutter-head, to hold the lumber firmly while being operated on. The large roll is placed directly over the under one, and the under roll is operated independently of the top ones.

The table in front of the under feed roll is planed one-eighth of an inch lower than the other parts of it; this is done to avoid friction, and to allow the lumber to be fed in on a line with the highest part of the table. When a table is planed straight, it is necessary to set the under roll one-eighth of an inch above the surface. When this is done, it raises the lumber that distance from the table, and it must be bent back to a solid bearing before it reaches the top cutter-head. To do this a great deal of pressure is necessary on heavy work; and the heavier the pressure is, the more power is required to feed in the lumber.

The under head on this machine can be moved endwise, with a hand-screw, as well as up and down. The advantage of moving it endwise is very great, when doing any uneven work, as it is much easier to move the head with a screw than to reset the cutters.

This machine has two sliding blocks or pieces dovetailed into the table in front and back of the lower cutter-head, for the purpose of chip-breaking, and for allowing mouldings to be sprung with that head. It has also an adjustable chip-breaker for the inside head.

It has a binder for feed works, instead of a clutch, which will be found an advantage on heavy work.

The heads are all four-side, cast steel, slotted. We furnish five heads and five sets of cutters with each four-sided machine.

The tight and loose pulleys are 12 inch diameter, 7 inch face, and should make 850 revolutions per minute. The machine will dress four inches thick on four sides, and the table will lower fifteen inches.

WEIGHT, 3,200 LBS.

PRICES, FOUR SIDES, $500.00; THREE SIDES, $450.00; TWO SIDES, $400.00; ONE SIDE, $350.00.

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7 INCH 4-SIDED MOULDER.

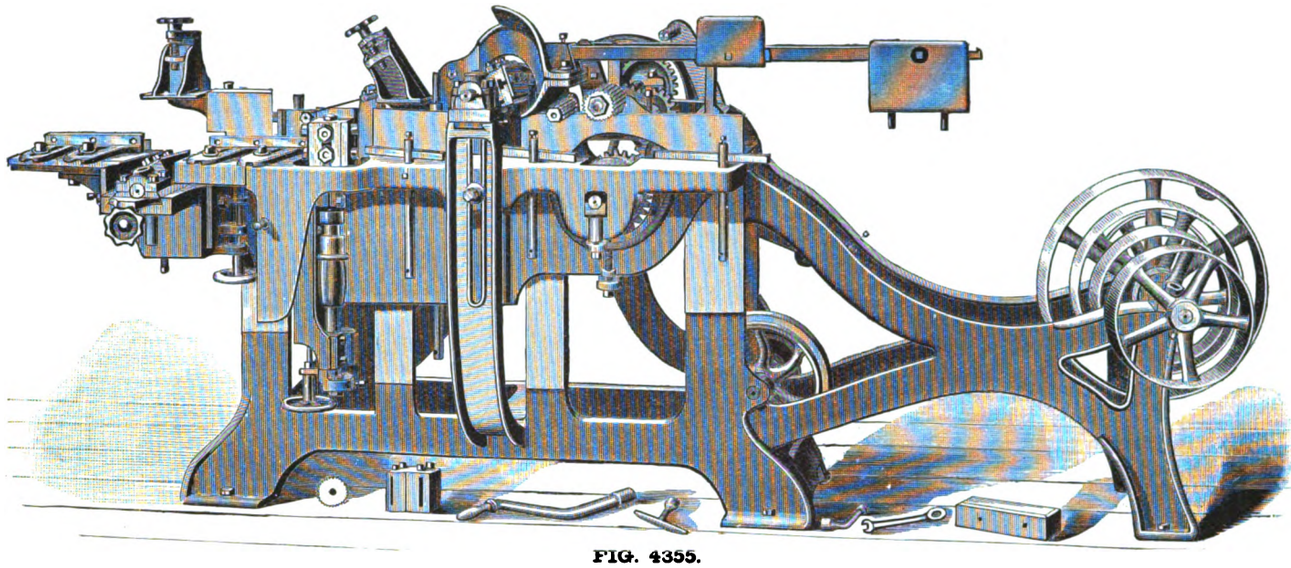


FIG. 4355.

There is a solid outside bearing for the top cutter-head shaft, and which acts as a support to the table. It is bolted to the frame below the table, the bolt extending through it into the gib that holds the table to the frame, thus clamping the frame, table and outside bearing securely together, making them like solid iron. The upper part of the outside bearing is dovetailed into the main standard, and can be readily removed for changing heads on top mandrel. To avoid friction, the table is planed lower in front of under roll than any other part of it, and to allow the work to be fed in on a line with the table under the top cutter-head.

The adjustable chip breaker for the inside head will be found very useful, as one side of the lumber must be worked against the grain.

The inside and outside headstocks can be set to any angle and fastened, and then be moved in and out or up and down accurately without changing the angle. The top head has lateral adjustment of one inch across the frame. The under cutter is adjustable vertically and horizontally. There is a slide fitted in the table on each side of the under cutter-head so as to open to allow cutters to be stuck through the face of the table, and these slides also act as chip breakers for the under cutter.

The feed on this machine is very strong and powerful, consisting of one lower and two upper rolls, all driven. This one upper roll is weighted, and the other held firmly by springs. There is a connection from the feed countershaft to the stud of the feed pulley, which acts as an outside bearing for the stud and takes the strain of the belt.

This machine has a binder for feed works instead of a clutch, which will be found much better.

We furnish five steel heads and four sets cutters with each four-sided machine. Four heads are four-sided, four-slotted, and the extra head is a solid cap head.

Tight and loose pulleys 10½ x 5, and should run 900 revolutions.

WEIGHT, 1,800 LBS.

PRICES.

Four-sided	$300.00	Two-sided	$250.00
Three-sided	275.00	One-sided	225.00

4 INCH 4-SIDED MOULDER.

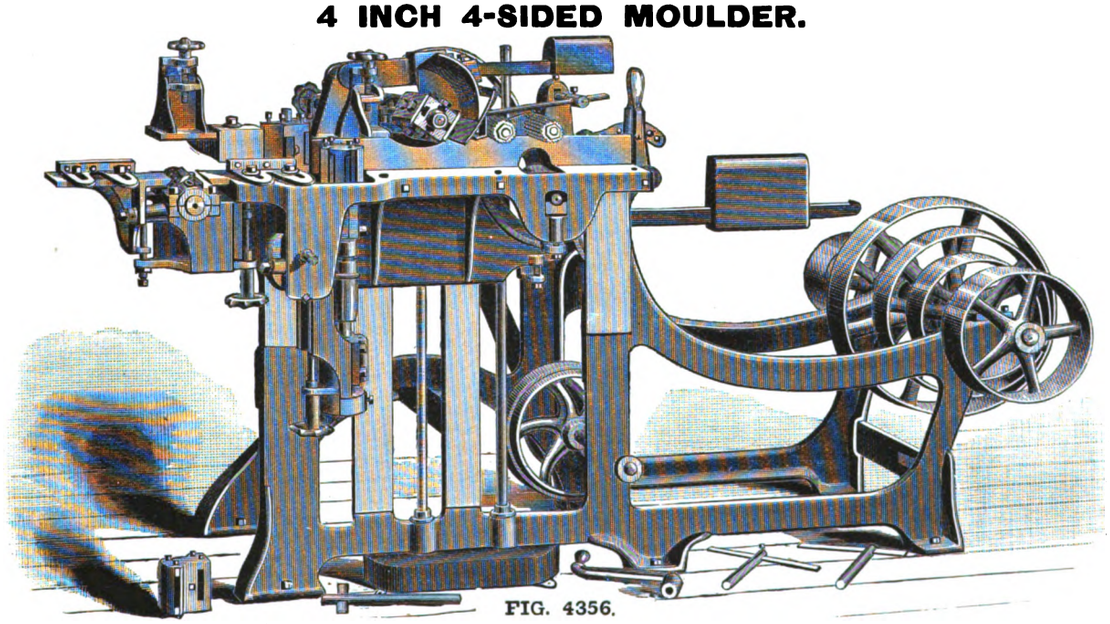


FIG. 4356.

The frame is cast in one solid piece, perfectly rigid and well braced at every point subject to any strain. The feed works are strong and reliable, consisting of two upper steel fluted rolls and one large friction roll in the bed; and the feed works are controlled by a well-arranged binder in easy access to the operator. The table will lower twenty inches, and the mandrels are all made of the very best steel and run in boxes lined with genuine babbitt metal. There is an adjustable pressure-foot directly over the under cutter and another close in the rear of top cutter-head, and the bonnet or shaving hood over top head is adjustable to and from the head and is fitted with an adjustable steel chip breaker that may be moved up to the very cutting edge of the knives. All these points tend to insure perfect and smooth work.

We furnish five heads and four sets cutters with each four-sided machine, and a full set of wrenches, springs, etc.

Tight and loose pulleys 10 x 4, and should make 900 revolutions per minute.

WEIGHT, 1,000 LBS.

PRICES.

Four-sided	$200.00	Two-sided	$150.00
Three-sided	175.00	One-sided	125.00

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DOUBLE UNIVERSAL WOOD WORKER.

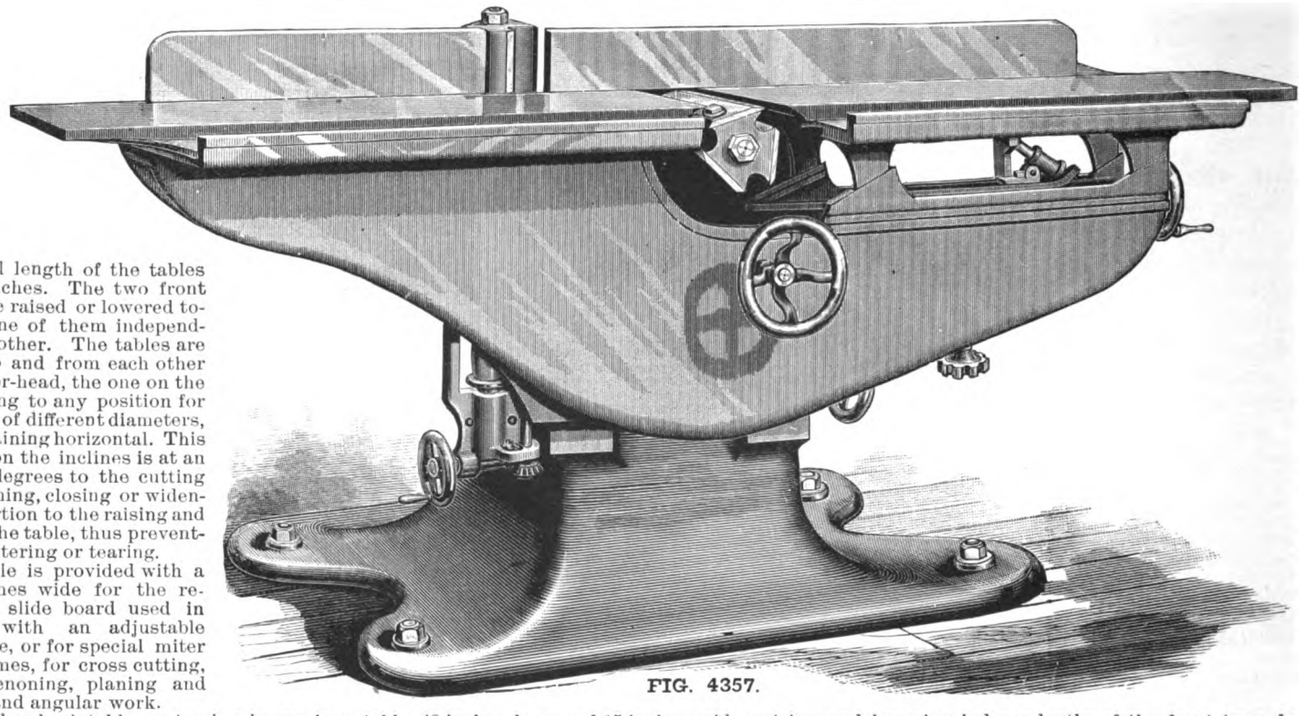


FIG. 4357.

The total length of the tables is 6 feet 10 inches. The two front tables can be raised or lowered together, or one of them independently of the other. The tables are adjustable to and from each other and the cutter-head, the one on the right adjusting to any position for cutter-heads of different diameters, but still remaining horizontal. This adjustment on the inclines is at an angle of 50 degrees to the cutting line, the opening, closing or widening in proportion to the raising and lowering of the table, thus preventing any splintering or tearing.

Each table is provided with a recess 4 inches wide for the reception of a slide board used in connection with an adjustable gaining frame, or for special miter or bevel frames, for cross cutting, mitering, tenoning, planing and other cross and angular work.

The third or back table or top is a heavy iron table, 48 inches long and 15 inches wide, raising and lowering independently of the front tops, by means of the hand wheel, partly shown at the right of the cut. It principally serves as a rest for the adjustable fence, and also as a rest for the various forms in making special cuts, such as oval and circular moulding, and for material used in gaining and cross cutting.

Weight, 1,750 pounds. The tight and loose pulleys on the countershaft are 10 inches in diameter by 5¼ inches wide, and should make 650 revolutions per minute.

PRICES.

Double universal wood worker, with special adjustable vertical side head, with improved vertical planing fence, combined adjustable fence and bevel rest, patent gaining frame and saw frame, one 8-inch and one 4-inch triangular shear knive cutter-heads and straight knives	**$375.00**
Boring and routing table	**25.00**
Countershaft	**25.00**

2-SPINDLE EDGE SHAPER OR MOULDER.

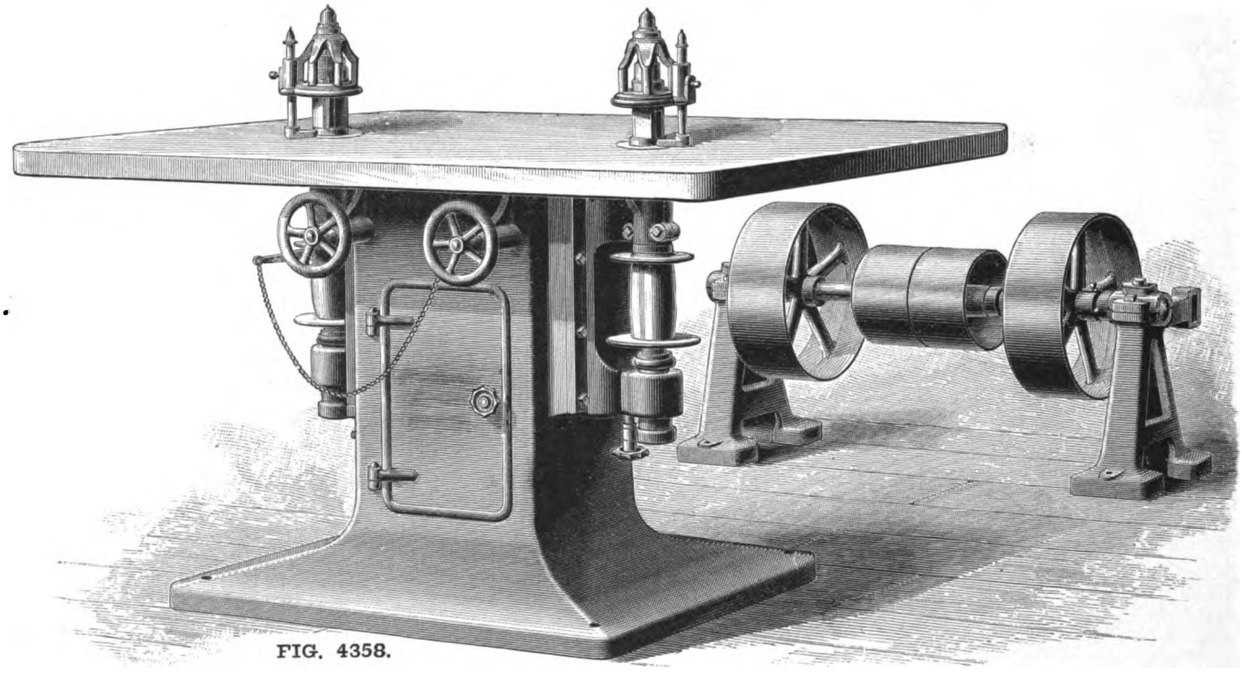


FIG. 4358.

It is provided with iron top table, and the spindle frames are elevating.

The lower step bearings are self-oiling and made adjustable to accommodate the wear on the ends of the arbors (they are raised and lowered by the hand wheels in front), and carry large heads, the cutters of which are held by end pressure between heavy wrought iron collars. A set of small collars is furnished to fill out the end of the spindle when narrow cutters are used. The heads being made detachable, any size or number can be used without disturbing the arbors. For very small work the upper ends of the arbors can also be made detachable, at a small extra cost. With this machine the very largest heads and cutters can be used with safety and without vibration. It is provided with a large iron table, made in two sections and planed perfectly true; also, floor countershaft and everything ready for operation the moment it is belted up.

As a security against accidents, safety guards can be supplied to the cutter spindles when desired. These guards are self-adjusting; they cover the cutters, being raised only sufficiently above the table to allow the material to be passed under them. They are secured to turned upright studs, on which they can be set at any height to suit the thickness of the material being worked. The studs are secured in turned rings let in flush with the table, and as the template acts in contact with them they move out of the way to allow it to pass. The countershaft has tight and loose pulleys, 10 x 6 inches, and should make 900 revolutions. Prices on application.

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2-SPINDLE VARIETY MOULDER.

Pulley on spindle, 3½ in. diam. Tight and self-oiling loose pulley on counter, 9 x 6 in. Speed it should run, 5,000.

PRICES.

With wood table, countershaft with self-oiling loose pulley, self-oiling hanger boxes, belts from counter to spindles, sixteen cast steel collars, 2, 2½, 3 and 4 in. diam., and eight filling collars..... $240.00
With iron table..... 270.00

Intermediate and extra collars, from $2.00 to $3.00 each, according to size.

Self-acting feed table for straight work, $45.00.

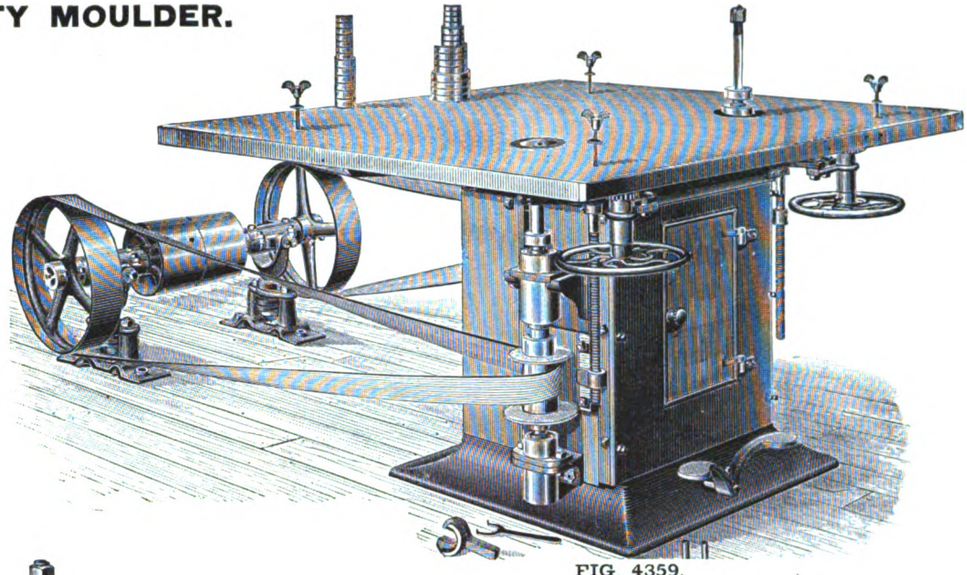


FIG. 4359.

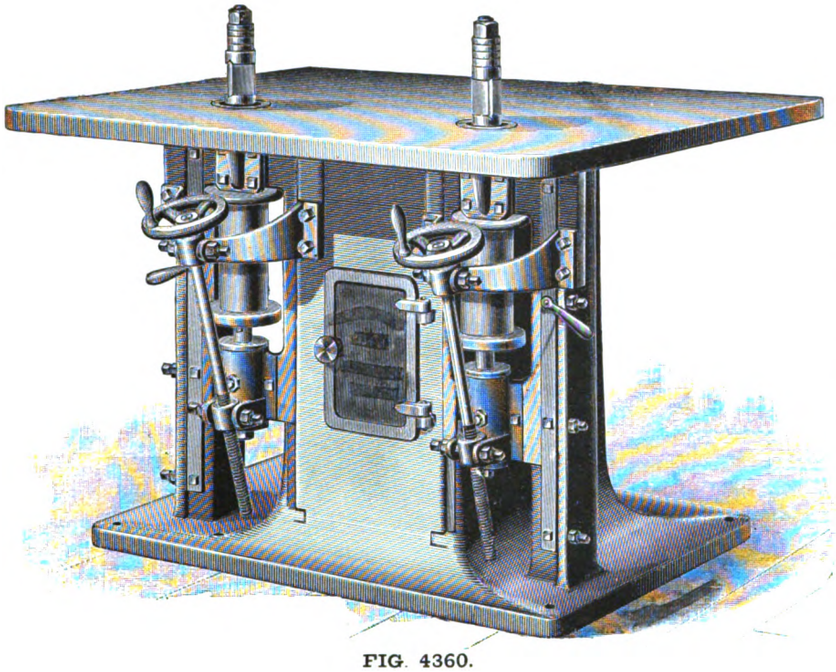


FIG. 4360.

DOUBLE SPINDLE SHAPER.

DESCRIPTION, FIG. 4360. NO. 6.

Spindles are 24 in. apart.

All boxes are of good size and self-oiling; the yokes with spindles are raised and lowered by means of hand-wheel in front, and may be dropped below the line of the table.

The top is of iron or wood, 44 x 54 inches, and is provided with rings of different sizes around the spindles to change the openings.

With each machine are furnished two sets of 2½ and 3 inch heads; other sizes as extras.

The countershaft has tight and loose pulleys, 10 x 6 in., and should make 1,000 revs. per minute.

PRICES, INCLUDING COUNTERSHAFT.

No. 6. Represented by Fig. 4360, weight, 1,500 lbs., $225.00
No. 5. Size table, 42 x 42 inches..... 185.00
No. 0. " " 54 x 64 " 400.00

SINGLE SPINDLE, REVERSIBLE SHAPER, IRON OR WOOD TOP.

DESCRIPTION, FIG. 4361.

The cutter is so arranged as to be instantly reversed to suit the grain of the wood, the cutting edges being exactly the same and remaining so until worn out, insuring a perfect duplicate when reversed, a point exceedingly difficult to obtain when two cutters are used.

The frame in which the spindle revolves is adjusted vertically by screw and hand wheel.

It is planed to fit into the column, so that the pull of the belt comes against the body of the machine.

The table is 43 x 46 inches, of hardwood or iron.

Five table rings, two guards and two loose spindles, ⅜ and ⅝, with each machine. Countershaft should be set 6 feet from spindle.

PRICES.

Wood top..... $150.00
Iron top..... 160.00

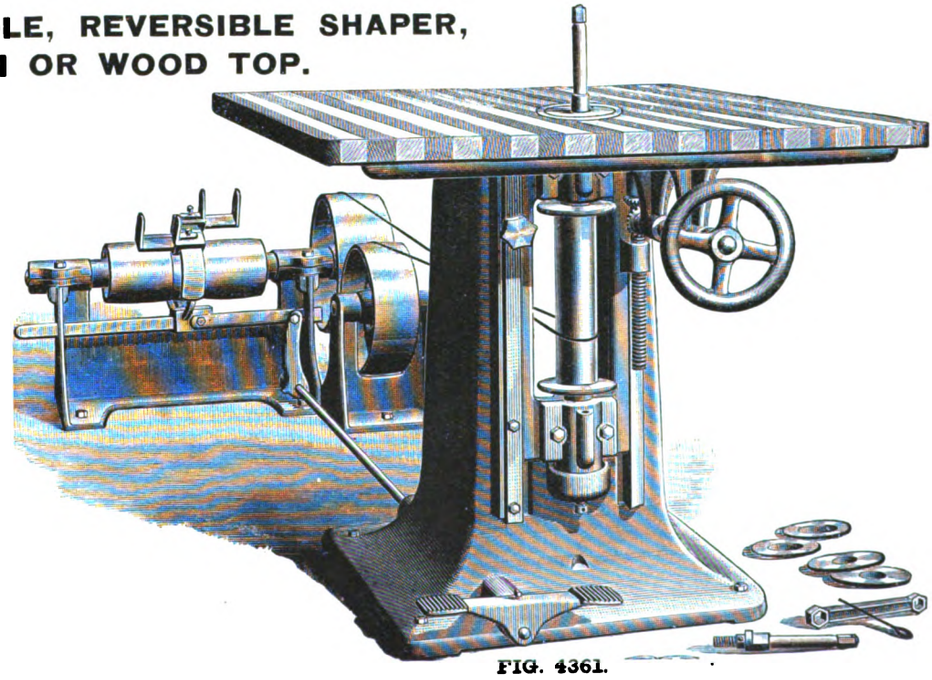


FIG. 4361.

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SOLID MILLED STEEL CUTTERS.

These moulding cutters are adapted for any standard work, as for door, sash, blind, or blind stile cutters, beads, or small mouldings. They are formed by milling into the face of the steel, instead of cutting the desired shape of the moulding on the edge, and then grinding to a bevel. In the latter method the form of the moulding is liable to be changed when sharpening the cutter.

The form of the moulding made by the solid milled cutter is retained permanently by grinding to the standard bevel of the cutter. These cutters are placed on the head with the ground angle toward the direction of the revolution of the head, thus making the cut of the bit come nearly at right angles to the surface, forming a scraping cut and leaving a perfect surface for finishing.

The cutters being made in their dimensions, they are much more easily set than the old form of moulding cutters, and their durability is greater, the methods of sharpening them being much more accurate.

TONGUE AND GROOVE FOR MOULDING MACHINE.

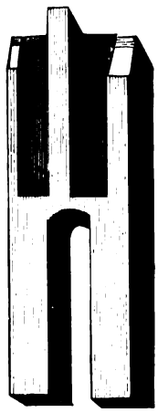


FIG. 4362.

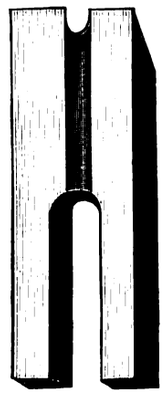


FIG. 4363.

When ordering send the length of cutters and length and size of slot, and size of tongue and groove.

$\frac{1}{2}$, $\frac{5}{8}$, $\frac{7}{8}$, 1 inch and $1\frac{1}{4}$ inch kept in stock.

PRICES.

Per set of four.....$6.00

BEAD AND HALF ROUND CUTTERS.

RETURN BEADS, RIGHT AND LEFT. **HALF ROUNDS.**

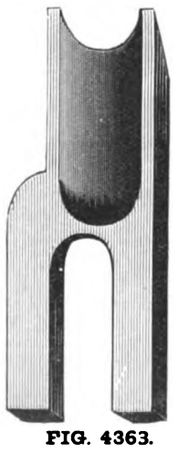


FIG. 4363.

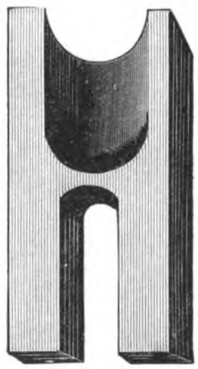


FIG. 4369.

PRICES.

From $\frac{1}{8}$ to $1\frac{1}{2}$ inch by $\frac{1}{16}$.

$\frac{1}{8}$ to $\frac{1}{2}$ inch.....$1\frac{1}{2}$ inch.....$2.50
$\frac{9}{16}$ to 1 " .....$1\frac{3}{4}$ " 2.75
$1\frac{1}{16}$ to $1\frac{1}{2}$ " .....2 " 3.00

When ordering send the size of round, and if $\frac{1}{2}$ or $\frac{5}{8}$ slot in cutter.

TONGUE AND GROOVE.

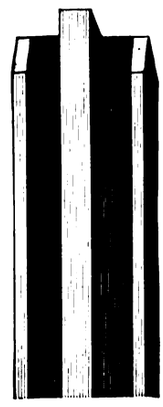


FIG. 4364.

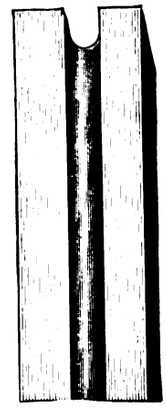


FIG. 4365.

PRICES, PER SET.

Sets of 6 tools each for three (3) winged matcher heads.				Sets of 4 tools each, for two (2) winged matcher heads.
Size T. & G.	Width of cutter.	To dress lumber.	Prices, per set.	Prices, per set.
$\frac{1}{4}$	$1\frac{1}{8}$ in.	$\frac{1}{2}$ in.	$7.25	$5.25
$\frac{3}{8}$	$1\frac{1}{8}$ "	$\frac{5}{8}$ "	7.50	5.50
$\frac{1}{4}$	$1\frac{1}{8}$ "	$\frac{7}{8}$ "	7.75	5.75
$\frac{5}{16}$	$1\frac{5}{8}$ "	1 "	8.00	6.00
$\frac{3}{8}$	$1\frac{5}{8}$ "	$1\frac{1}{4}$ "	8.25	6.25
$\frac{1}{2}$	$2\frac{1}{4}$ "	2 "	8.75	6.75
$\frac{5}{8}$	$3\frac{1}{4}$ "	3 "	12.00	8.00

SASH CUTTERS.

BEVEL. **OGEE.**

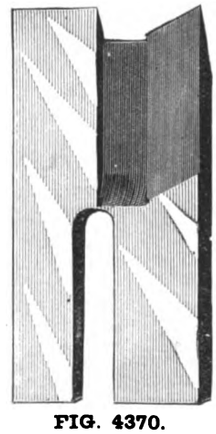


FIG. 4370.

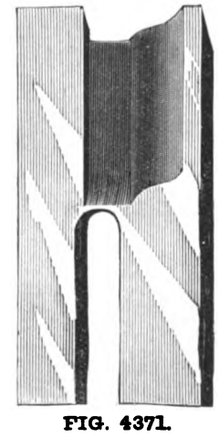


FIG. 4371.

BEVEL, OGEE AND OVOLO.

Thickness of sash.	Width of cutter.	Prices, per pair.
$1\frac{1}{4}$ inch.	$1\frac{1}{2}$ inch.	$2.75
$1\frac{1}{2}$ "	$1\frac{3}{4}$ "	3.00
$1\frac{3}{4}$ "	2 "	3.25
2 "	$2\frac{1}{4}$ "	3.50

BEAD CUTTERS.

RIGHT, LEFT AND CENTER BEAD FOR PLANER AND MOULDING MACHINE.

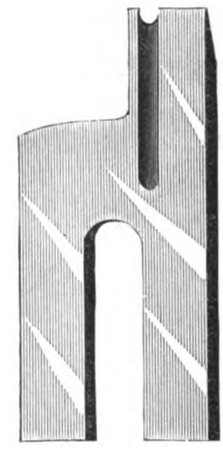


FIG. 4366.

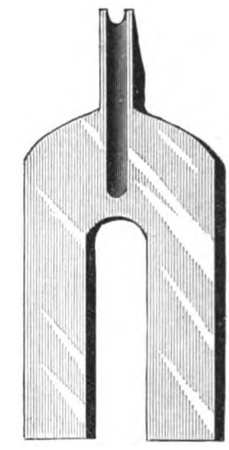


FIG. 4367.

PRICE, $2.00 A PAIR.

$\frac{1}{8}$, $\frac{3}{16}$ and $\frac{1}{4}$ beads for ceiling and flooring. These sizes we keep in stock.

Small slip beads to put under planing machine knives, each 50 cents.

SASH AND MEETING RAIL CUTTERS.

OVOLO SASH. **MEETING RAIL.**

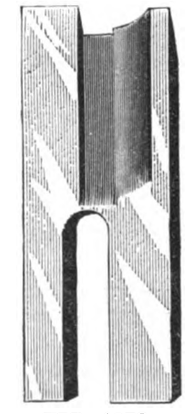


FIG. 4372.

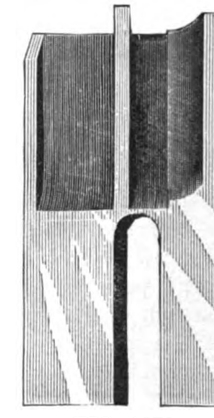


FIG. 4373.

FOR ALL STYLES OF SASH NOW IN USE.

Meeting rail cutters are made one-half inch wider than the sash cutter.

Milled rabbeting cutters for sash made to order.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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SOLID MILLED STEEL CUTTERS.

DOOR CUTTERS.

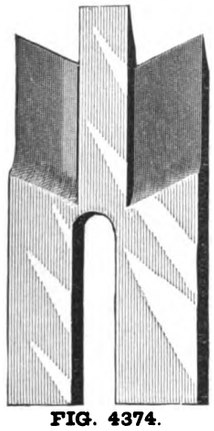


FIG. 4374.

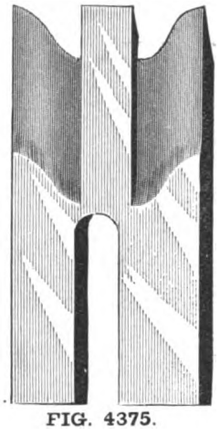


FIG. 4375.

BEVEL AND OGEE.

Thickness of door.	Width of cutter.	Price per pair.	Thickness of door.	Width of cutter.	Prices per pair.
1 in.	1½ in.	$2.75	1¾ in.	2 in.	$3.50
1¼ "	1½ "	3.00	2 "	2¼ "	4.00
1½ "	1¾ "	3.50	2¼ "	2½ "	4.00

When ordering, send the size of groove and size of slot, if ½ or ⅝ in. cutter.

MOULDING CUTTERS.

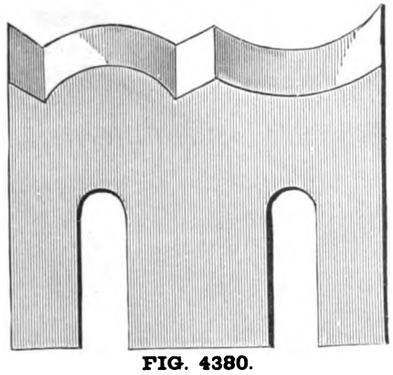


FIG. 4380.

PRICE.

Per lineal inch in width.....40 cents.

Orders for moulding knives must be accompanied by piece of moulding, or exact pattern or drawings of knives required.

TENONING SAW CUTTERS.

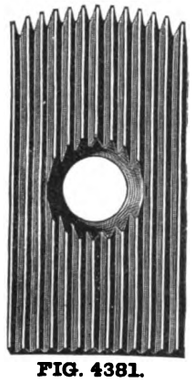


FIG. 4381.

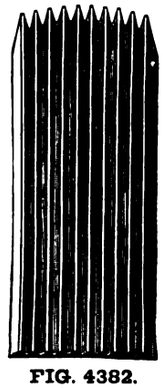


FIG. 4382.

PRICES, PER SET OF FOUR.

Large size, $4.50 Large size, $4.00
Small size, 3.50 Small size, 3.00

These cutters are ground on the bevel, and require no filing made this way; also tenoning machine knives made to order.

BLIND STILE CUTTERS.

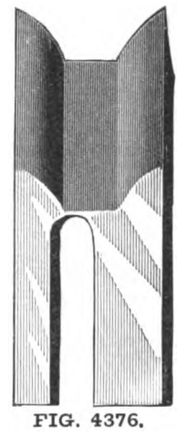


FIG. 4376.
COVE.

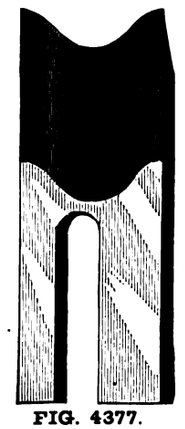


FIG. 4377.
OGEE.

CUTTERS.

PRICE, $2.75 A PAIR.

BLIND RODS AND BLIND SLATS.

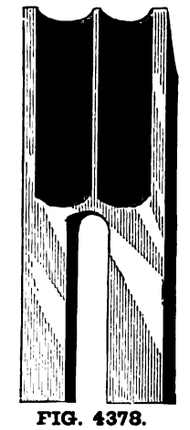


FIG. 4378.
Double blind rods.
All sizes.

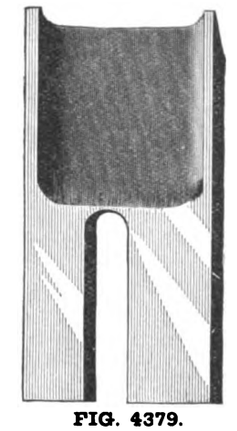


FIG. 4379.
Blind slats.
All sizes.

DOUBLE OR SINGLE.

For ⅜, ⅝ or ¾ inch rods, per pair.....$2.50

PRICES, PER PAIR.

For 1⅛ in. slat.	1½ inches.	$2.50
" 1¼ "	1½ "	2.50
" 1½ "	1¾ "	2.75
" 1¾ "	2 "	2.75
" 1⅞ "	2¼ "	3.00

BLANK CUTTERS.

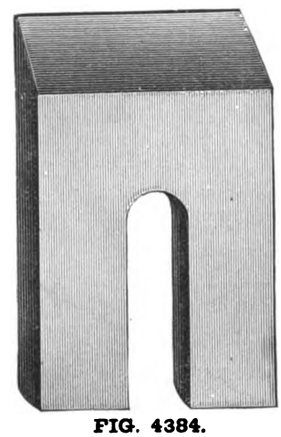


FIG. 4384.

These blanks are all ground and polished on the face, and made from Francis Hobson & Son English warranted best cast steel.

PRICES.

Per lineal inch in width, ¼ in.....14 cts.
" " " " " ⅝ ".....18 "
" " " " " ⅞ ".....22 "

A large stock of these blanks always on hand, and made to order at short notice.

COPING CUTTERS.

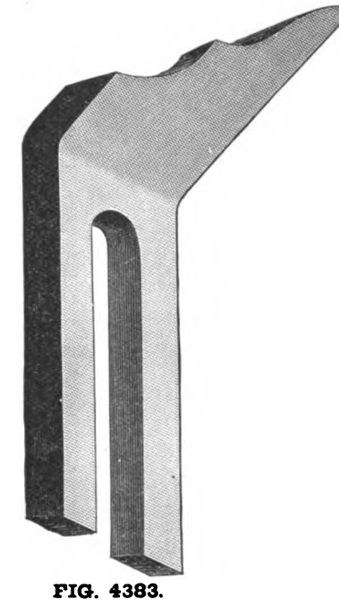


FIG. 4383.

FOR TENONING MACHINE.

PRICE, PER PAIR, $2.00.

MILLED PLOW CUTTERS.

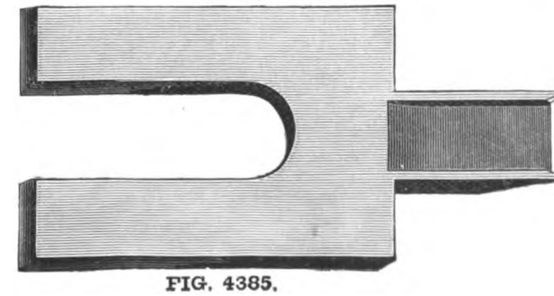


FIG. 4385.

FIG. 4385.

FOR MOULDING AND PLANING MACHINES AND BUZZ PLANERS.

Cutters made in this style are the best, as they do not tear out in cutting across the grain.

PRICE, PER PAIR, $.....

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SOLID MILLED STEEL CUTTERS.

VARIETY CUTTERS.

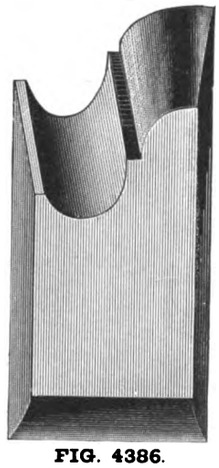


FIG. 4386.

Made to order.

PRICE.

Per lineal inch.....50c.

Send bevel for collars when ordering.

CHAMPION ONE LIPPED CUTTERS.

ROUTER.



FIG. 4392.

BOTTOM.

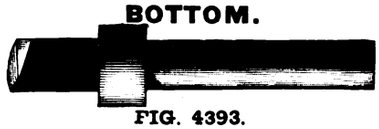


FIG. 4393.

FLUTE.



FIG. 4394.

MORTISE.



FIG. 4395.

MORTISING BITS.



FIG. 4396.

For boring purposes. Made to order.

VARIETY MOULDING HEAD AND TOOLS.

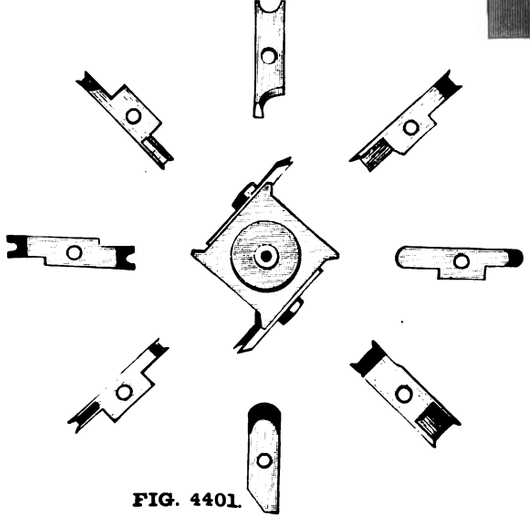


FIG. 4401.

COMBINATION CUTTER.

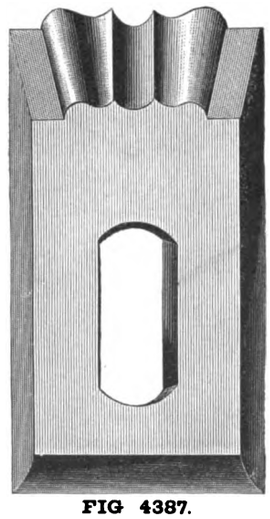


FIG 4387.

For moulding and variety machines.

PRICE.

Per lineal inch.....

SHAPER COLLARS.

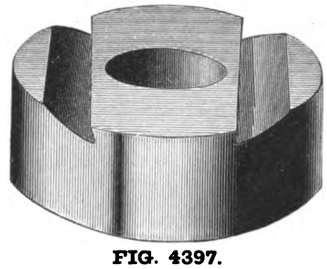


FIG. 4397.

These are made of steel and are warranted to be perfectly true in running.

CUTTER-HEAD BOLTS.

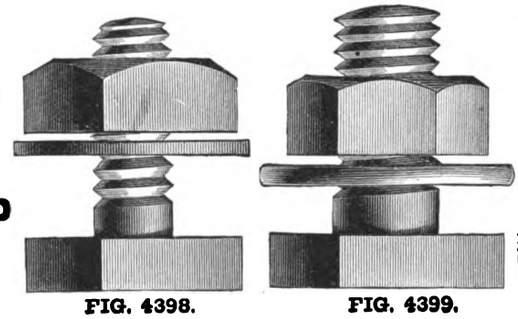


FIG. 4398. FIG. 4399.

PRICE, 30c. and 35c. apiece.

PRICES, FIG. 4401.

Head and 20 double-ended tools.....$28.00

Head and any number of sets or special tools to order.

The engravings of heads illustrated show the manner in which the solid milled cutters should be applied to cap, square and variety heads.

PANEL BITS.

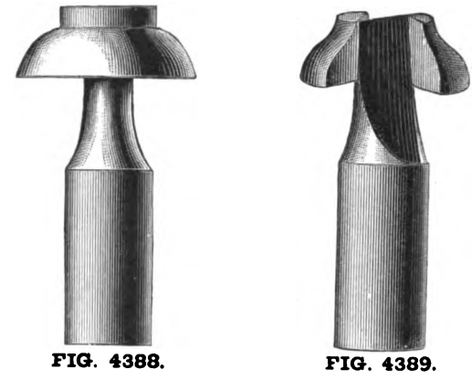


FIG. 4388. FIG. 4389.

Made to order.

DOVETAIL CUTTERS.

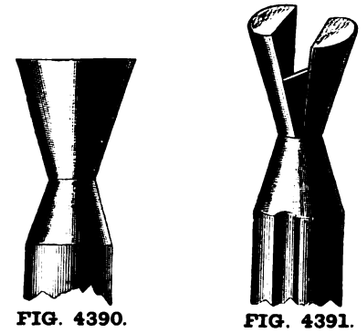


FIG. 4390. FIG. 4391.

Made to order in five different ways.

SLOTTED CUTTER-HEADS.

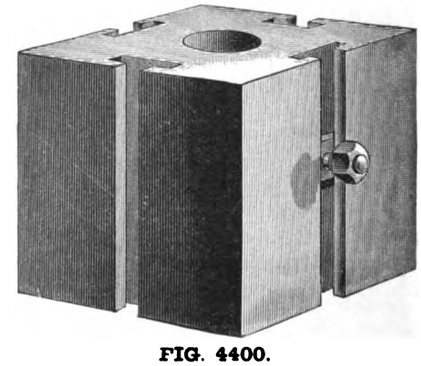
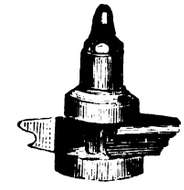


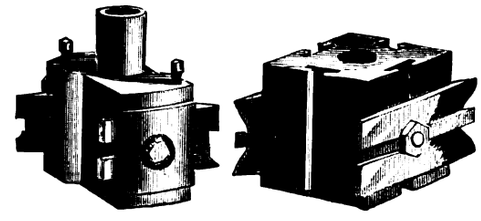
FIG. 4400.

Also heads of any description made from gun metal, wrought iron or steel and thoroughly balanced, made to order.

VARIETY HEAD.



CAP HEAD. SLOTTED HEAD.



MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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MOULDER, ROSETTE AND PANELER.

This machine can be used successfully as a moulder, paneling machine, carver and rosette cutter. When used as a moulder the arm on top of table can readily be removed, and a cutter-head set into a socket provided for it in the lower spindle. This gives a first-class reversible single spindle moulder. For carving, paneling and rosette cutting the arm is replaced on the table and cutters for the kind of work required placed in the upper spindle, so that the cutting is done on top of the stock in full view of the operator. A stem can be placed in the socket of the lower spindle to act as a guide when desired, or the spindle can be lowered so as to be entirely out of the way. For edge-moulding or ornamental work upon furniture, house or car finish it is unsurpassed by any machine in the market. It is rapid and accurate in its work, easily operated, simple in construction and not liable to get out of order.

It can be used for dovetailing with the addition of a cutter and dovetail form made for that purpose.

Weight, 1,100 lbs.

Tight and loose pulleys, 8 x 6 inches.

Floor space, 8 x 4 feet.

PRICE, $230.00.

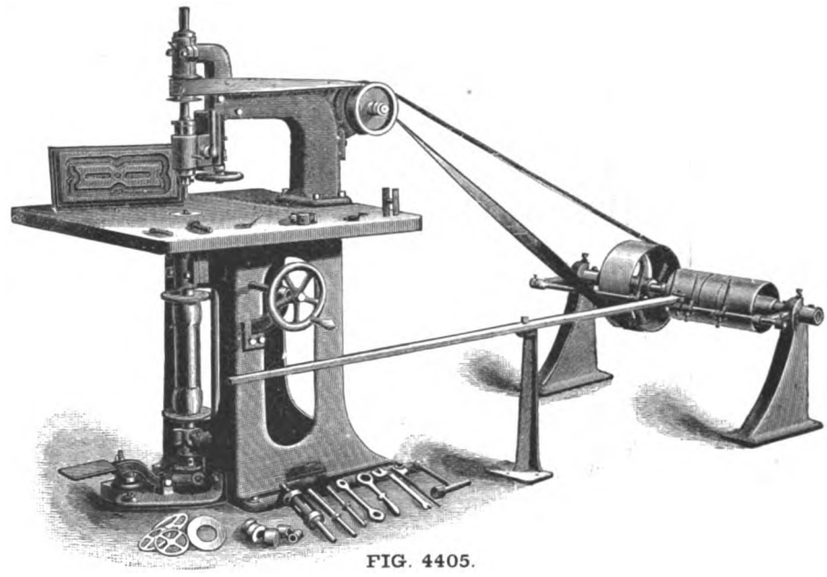


FIG. 4405.

CORNER BLOCK ROSETTE, DOVETAILING AND EDGE-MOULDING MACHINE.

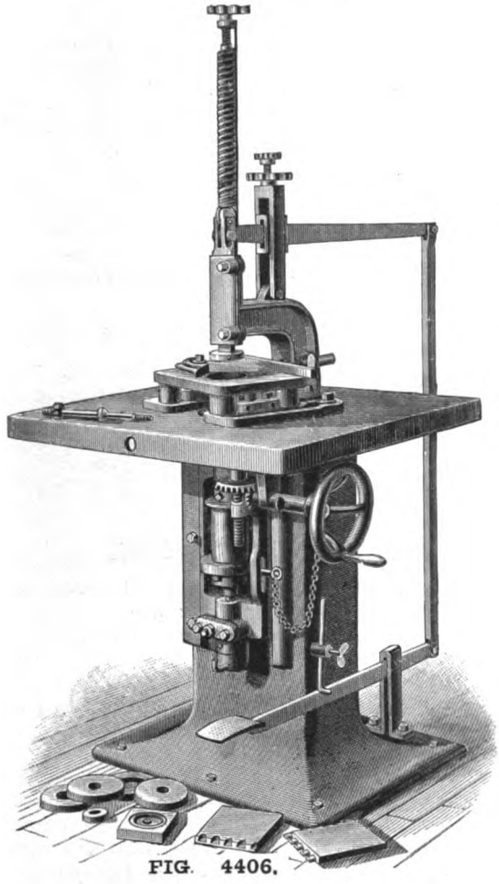


FIG. 4406.

DESCRIPTION, FIG. 4406.

This machine will produce from 15 to 20 corner-blocks or rosettes per minute, and can also be fitted with attachments for doing dovetailing and edge-moulding; the spindle, however, turns only in one direction.

Adjustable gauges are provided for holding corner blocks central, and for guiding long strips that are to have rosettes cut at intervals.

A single movement of the foot clamps the block in place and feeds it down to the cutter.

When detached rosettes are to be made, a special attachment is used which holds them after the corners of the block have been completely cut away, and lifts them off of the cutter when finished.

When moulding is to be done it is not necessary to remove the upper works, but simply to slide them back, which can be done by loosening two screws.

The spindle bearings are arranged so that the oil cannot escape, but is used over and over again, maintaining the most perfect lubrication, and enabling the spindle to run at a high rate of speed.

The spindle pulley is 3½ inches diameter, 5½ inch face, and should make about 6,000 turns per minute. The countershaft generally has a 20 inch pulley for a 3½ inch belt, and 9 inch self-oiling loose and tight for a 4 inch belt. It should then make about 1,050 turns per minute.

In ordering, state for what kinds of work the machine is to be arranged. Weight, with counter, about 925 lbs.

PRICES.

Corner block and rosette machine and countershaft	$250.00
Extra for edge-moulding attachment	25.00
Extra for dovetailing attachment	50.00

BOULT'S EDGE MOULDER AND SHAPER.

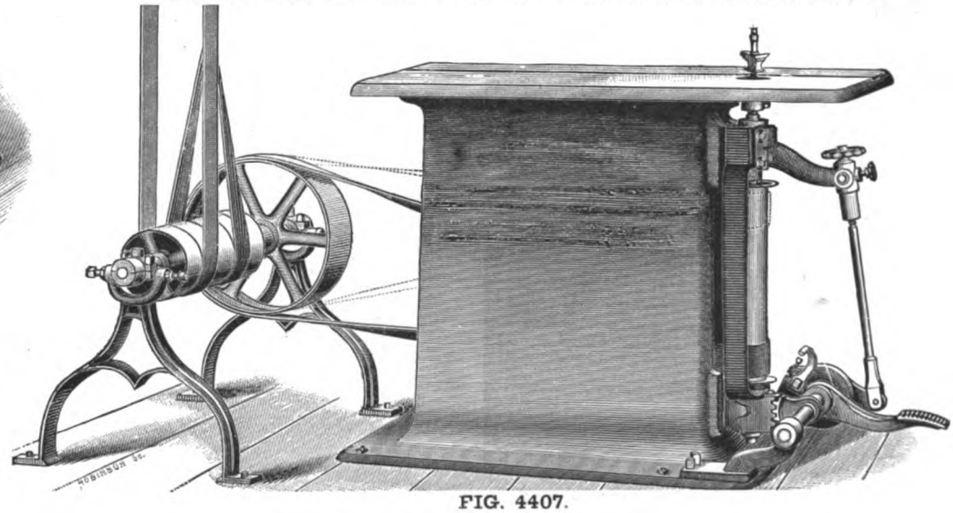


FIG. 4407.

DESCRIPTION, FIG. 4407.

This cut shows machine arranged as an edge moulder and shaper, in which work it has no superior, and has advantages over all, in that the spindles have chucks for holding stem as well as bored cutters for routing and grooving on the surface of lumber, as well as moulding on the edges. This machine is provided with foot treadle for quick rise and fall of the spindle, which adds to the cost, but gives facilities for boring, routing and rosette work, and makes it ready for the surface-moulding attachment at any time.

This machine, with iron top 30 x 43, weight about 1,000 lbs., is furnished with two chucks and seven sample cutters, countershaft, tight and loose pulley, 7 x 3½; speed 765. Driving pulley on line shaft must have 18 inch face. **PRICE, $200.00.**

FOR FURTHER PRICES AND ATTACHMENTS SEE PAGE 453.

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BOULT'S COMBINED SHAPER AND EDGE AND SURFACE MOULDER.

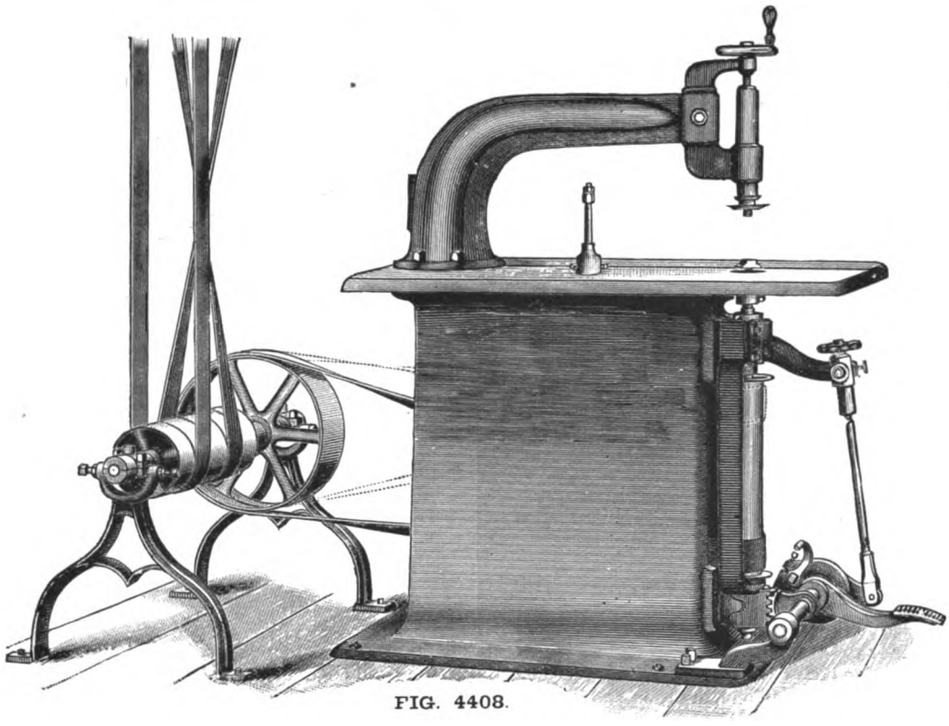


FIG. 4408.

PRICES, FIG. 4408.

With iron top 30 x 43 inches, 2 chucks, 7 cutters, countershaft with tight and loose pulleys 3½ x 7 inches. Speed, 765.

WEIGHT, 1,100 LBS. $300.00.

PENETRATING CUTTER.

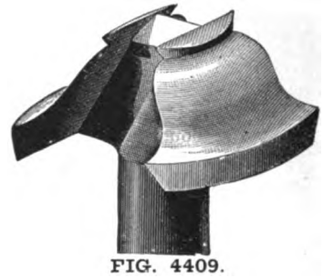
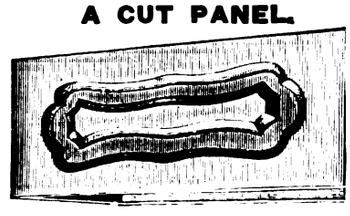


FIG. 4409.

A CUT PANEL.



The machine, as shown, is arranged for paneling and cutting designs on the surface. The small chuck is placed on the spindle, and a penetrating cutter, like Fig. 4409, is inserted in the chuck. The guide head is adjustable, up or down, to the work by means of screw and hand wheel. The cutter is adjusted by the hand screw to come as far above the top of the table as desired to penetrate the work, then, by pressing the foot on the foot latch, the spindle is let down, carrying the cutter below the top of the table out of the way. The work, with the pattern attached on the back, is placed face downward on the table; the guide point is then lowered until it enters the pattern, and the pressure plate comes in contact with it with sufficient amount of pressure to hold the work firmly in position. Motion being given to the spindle, the operator then presses his foot upon the lever, which brings the cutter up into the work, as far as previously adjusted, when the foot latch flies into the catch as the right elevation is attained, and holds it there. The pattern is then moved around against the guide point until the work is complete.

The cutter being moulded, the work is finished when it leaves the machine; and as cutters for this work are made with double cutting edges, and will work equally well when revolving in either direction, the cutting can always be done with the grain of the wood.

Should it be necessary to elaborate the work, it is only necessary to use successive forms or patterns of different designs on the same panel. Each design can be cut with a different style of cutter and at a different depth, producing styles of work limited only by the skill and taste of the operator. The largest circumference and greatest depth should be cut first, the next largest circumference and depth should succeed, and so on as far as desired.

SCROLL MOULDING ATTACHMENT.

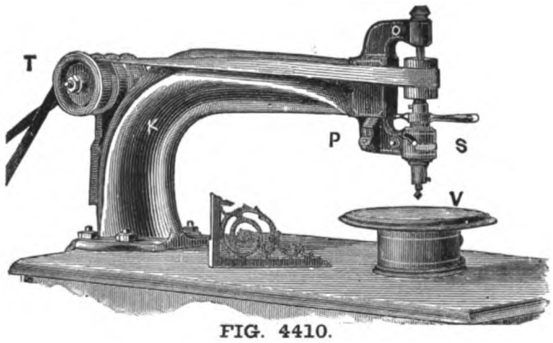


FIG. 4410.

PRICES.

The above attachment consists of head P S, loose pulley T, and small table V, and is furnished with four cutters **$50.00**

Complete, with Fig. 4408 and Fig. 4410..... **350.00**

FOR MOULDING SCROLL OR FRETWORK.

The attachment, Fig. 4410, is arranged for moulding brackets, scroll or fretwork, inlaying brushes, engraving, routing, grounding, and for doing fine moulding of every description. The most delicate points of the most elaborate fretwork are moulded with safety and dispatch. In fact, moulding with this part of the machine is carried to the farthest possible extent. As in the other parts of the machine, reverse motion is used to keep the knife cutting with the grain of the wood. This arrangement consists of a spindle head, P, placed on the arm as shown, and driven by the belt passing from the countershaft over the friction pulleys, T, onto the pulley on small spindle. It is only necessary, when arranging the machine for this work, to take off the belt from large spindle and put on a light belt running to the top spindle. This spindle is moved up or down by means of a pin inserted in the brass box and working in a cam slot in the head. The handle attached to the box is brought around, causing the pin to move up in the slot, carrying with it the spindle. This arrangement is especially convenient in moulding scroll work, as it enables the operator to get at the inside opening. After the work is in position, the cutter is lowered into the opening by the same means that it is raised. When the work is finished, the spindle is again raised, and another opening is brought into position, and so on until the work is finished, all of which is done without stopping the motion of the machine. The cutters are made with a guide point, which can be very much reduced in size, and will follow the smallest opening of a scroll saw. No forms or patterns are necessary. The small table, V, shown as setting on the machine, is easily adjustable up and down, as may be necessary to accommodate the different thicknesses of stuff to be worked. By this arrangement stuff may be worked from 3-16 to 2 inches in thickness. The same cutters can be used on the lower spindle, if thick stuff is to be worked.

FOR INLAYING.

A thin form or pattern is used of the desired shape, affixed to the work. A small router, having a shank of equal size, is used as a bearing or guide for the pattern; and as it is on the top of the work, the cutter is let down through the pattern into the work the desired depth, thus affording facilities for working accurately and rapidly.

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ATTACHMENTS FOR FIGS. 4407 AND 4408.

DOVETAIL ATTACHMENT.

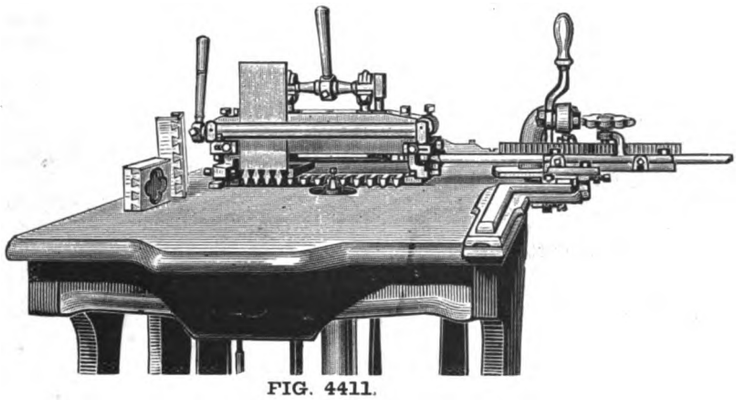


FIG. 4411.

Cut shows dovetail attachment but on old style of base.

PRICES.

Dovetailing attachment, to dovetail 13 in. wide, weight, 200 pounds, $100.00
Dovetailing attachment, to dovetail 18 in. wide, weight, 225 pounds, 125.00
Three cutters furnished free with each attachment.
Either can be used on any number of the Boult moulder or single shaper.

FRICTION GEAR CARVING ATTACHMENT.

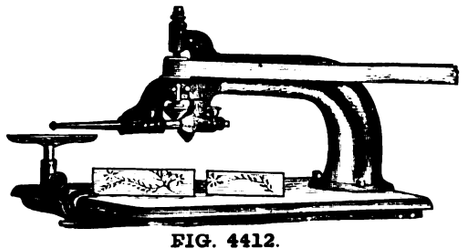


FIG. 4412.

POST ATTACHMENT.

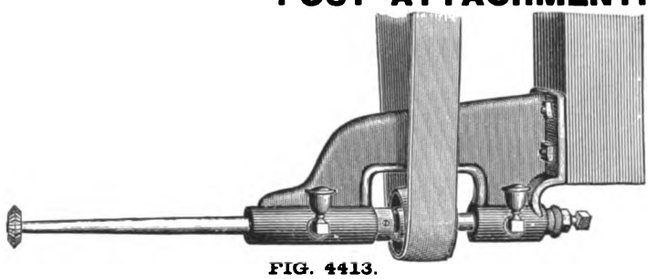


FIG. 4413.

These machines for carving, veining and lining may be attached to Boult's moulder, Fig. 4408, or to a post as shown above.

PRICE, FIG. 4412.

The friction gear attachment, for the Boult machine, has paper and iron friction wheels, which drive it very smooth and noiseless. Price, $50.00.

PRICE, FIG. 4413.

The post attachment is very simple and cheap, and can be used independent of any other machine. Price, $40.00.

GENERAL PRICES.

No. 1, as a shaper and edge moulder, Fig. 4407 ..... $200.00
No. 2, as a shaper, edge and surface moulder, Fig. 4408 ..... 300.00
No. 3, as a shaper, edge and surface moulder, with bracket moulding attachment, Fig. 4408 and Fig. 4410 ..... 350.00
No. 4, as a shaper, with dovetail attachment, Fig. 4411 ..... 300.00
No. 5, as a shaper, edge and surface moulder, with dovetail attachment 400.00
No. 6, as a shaper, edge and surface moulder, with dovetail and bracket moulding attachments 450.00

PRICES, ATTACHMENTS.

Surface moulding attachment, weight 150 pounds, including the arched arm, guide head, socket chuck and three cutters $100.00
Dovetailing attachment, 13 inches wide, weight 200 pounds, including three cutters 100.00
Dovetailing attachment, 18 inches wide, weight 225 pounds, including three cutters 125.00

ENLARGED DOVETAILER.

Fig. 4414 represents our new center draft, twenty-four inch dovetailer, which is designed to meet a demand for a machine to dovetail boxes, bath tubs, flasks, hoppers and any other wide or thick work. It is essentially the same as the "Boult dovetailer" and will work the same range stuff as that machine, and also wider and thicker, with equal facility and accuracy, making a true, solid joint in thick or hard lumber. It is so arranged that it works as much on one side as the other and does not overhang heavily on either side.

Weight, complete, with countershaft, 1,000 lbs. **PRICE,** including countershaft, chuck and three cutters, **$300.00.**

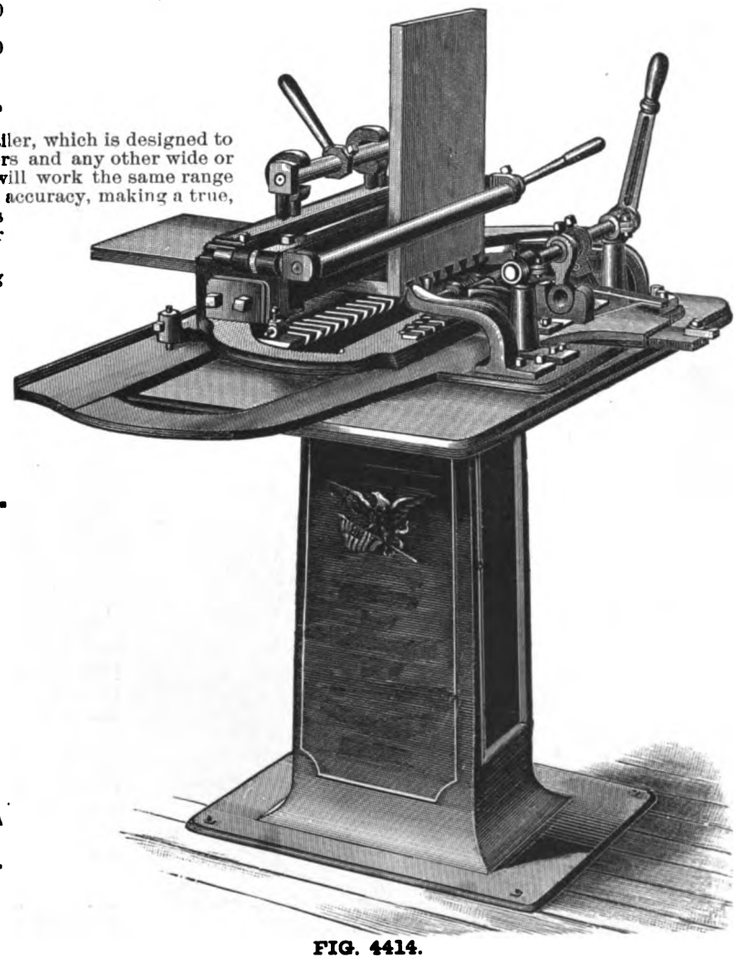
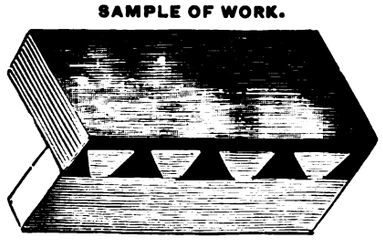
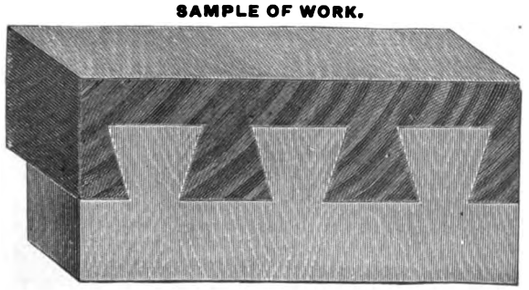


FIG. 4414.

SAMPLE OF WORK.



SAMPLE OF WORK.



CUTTER.



FIG. 4415.

PRICES, EXTRA CUTTERS, ON APPLICATION.

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INDEPENDENT DOVETAILER.

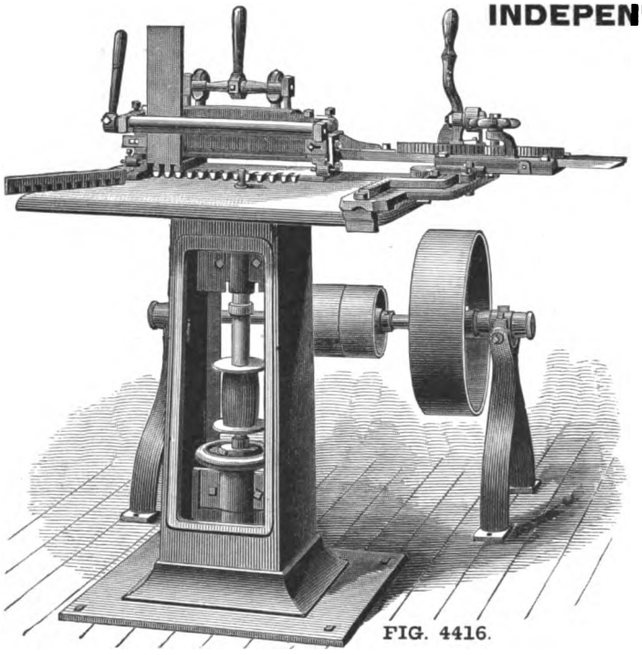


FIG. 4416.

This machine cuts both pin and mortise at one cut; works up to 13 inch width, or if narrow will work two fronts at a time. It works with equal facility any thickness of stuff from ¼ to 1½ inch in thickness.

It is simple, strong and durable. It never fails or flinches in thick or hard lumber.

PRICES.

With 13-inch dovetail attachment, including countershaft, chuck and three cutters.....$200.00

With 18-inch dovetail attachment, including countershaft, chuck, and three cutters.. ..... 225.00

WEIGHT, 750 LBS.

Larger dovetailers made to order.

DESCRIPTION, FIG. 4417.

This machine is very compact, and makes a beautiful and strong joint; retains its adjustment; cutters are easily sharpened, and work with accuracy and despatch. It consists of a cut-off saw, a hollow bit for forming the pins, a bit for making the holes for the pins, and cutters for making the curved joint, all the work being done by a rotary motion. On the countershaft are 10 inch pulleys, 4 inch face, tight and loose, and should make 650 revolutions per minute.

Floor space, 4 x 5 feet.

PRICE, $250.00.

DOWEL JOINT MACHINE.

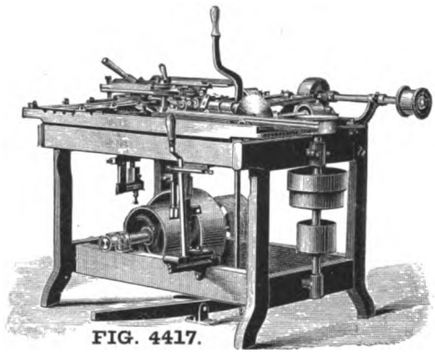
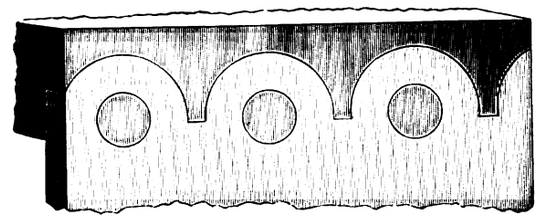


FIG. 4417.

SAMPLE WORK DONE ON FIG. 4417.



COMBINED FLUTING AND TWIST MACHINE.

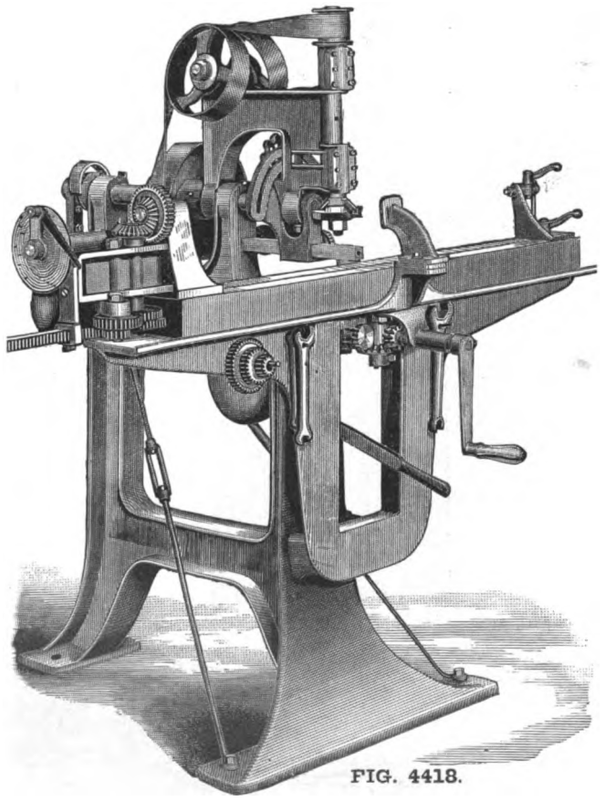
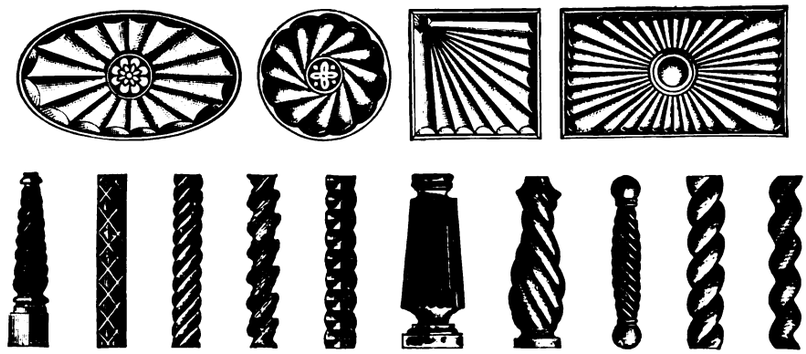


FIG. 4418.

SAMPLES WORK DONE ON FIG. 4418.



This machine will produce all kinds of spiral or rope mouldings, either straight, tapered, curved or oval. It will make right, left, and pineapple cuts, and will do straight fluting. It will cut from one to six threads on a piece, and will make any degree of twist, from one turn in one and one-half inches of length to one in ten and one-half inches. This machine will swing eight inches, and will take 42 or 60 inches between centers, according to length ordered.

A medallion fluting attachment will produce radial fluting on flat work up to 8½ inches square or 6 x 12 oblong. This fluting can be either perfectly flat or can be swelled or waved. It can run direct to the center or tangent to a central circle. The same cutters are used as for the twist work.

The countershaft has 10 inch tight and loose pulleys for a 3½ inch belt. Should make 400 revolutions per minute.

WEIGHT, 550 LBS.

Price of 42-in. machine, $..... Price of 60-in. machine, $.....

Medallion attachment, $.....

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CARVING MACHINE.

DESCRIPTION, NO. 1 MACHINE.

This machine is designed for carving panels, busts, statuettes, medallions, heads and ornaments of all kinds.

As the illustration shows it works from a pattern and forming pin, producing an exact copy of the original and in several sizes from one pattern, either enlarged or reduced, but not of the same size.

It will take in work 18 inches long and will swing 10 inches.

The upper arm is set in a spring, forming a ball and socket joint, so as to move up, down and sideways. The pattern and carving block can be set in any required position, and moved forward and back by turning the hand wheel at the front of the machine.

The machine is 6 feet long, 4 feet high and 2½ feet wide, and runs at a speed of 8,000 revolutions per minute.

PRICE.

Including 12 cutters, 6 forming pins, and complete countershaft, $.....

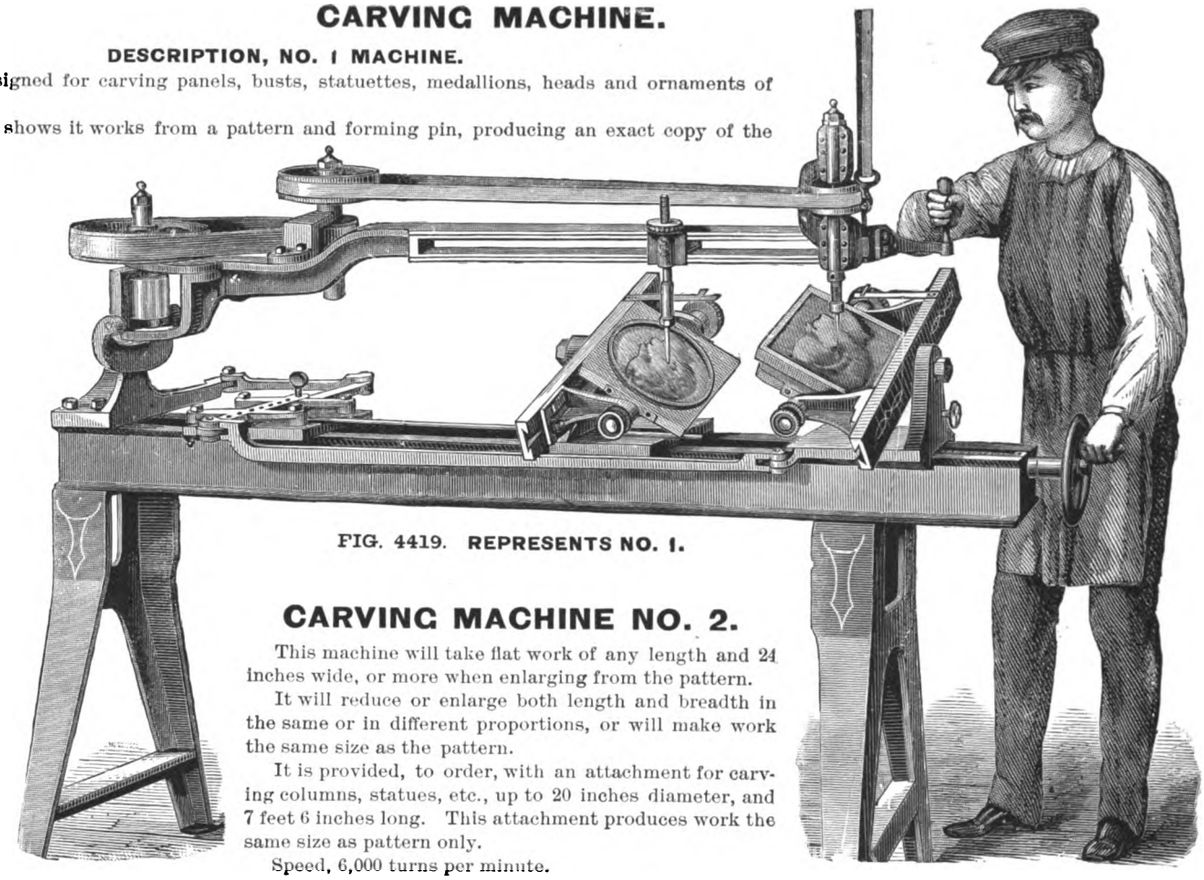


FIG. 4419. REPRESENTS NO. 1.

CARVING MACHINE NO. 2.

This machine will take flat work of any length and 24 inches wide, or more when enlarging from the pattern.

It will reduce or enlarge both length and breadth in the same or in different proportions, or will make work the same size as the pattern.

It is provided, to order, with an attachment for carving columns, statues, etc., up to 20 inches diameter, and 7 feet 6 inches long. This attachment produces work the same size as pattern only.

Speed, 6,000 turns per minute.

PRICE, $.....

CARVING MACHINE NO. 3.

PHOTOGRAPH ON APPLICATION.

This machine produces work the same size as pattern only.

It will carve two pieces at once, each 12 inches wide by any length, or one piece 18 inches by any length.

The work and pattern table rest upon anti-friction rollers, which make it practically frictionless, and enable the operator to feel the pattern.

The cutter and forming pin are held by a swinging frame, supported by a spring. This arrangement also is practically frictionless.

An attachment for carving round work, such as statuettes, etc., is made to order.

The countershaft has an eighteen inch pulley for a 3 inch belt, and 10 inch self-oiling tight and loose for a 3½ inch belt. It should then make 665 turns per minute. This will give the cutter a speed of 8,000.

PRICE, $.....

PANEL RAISER.

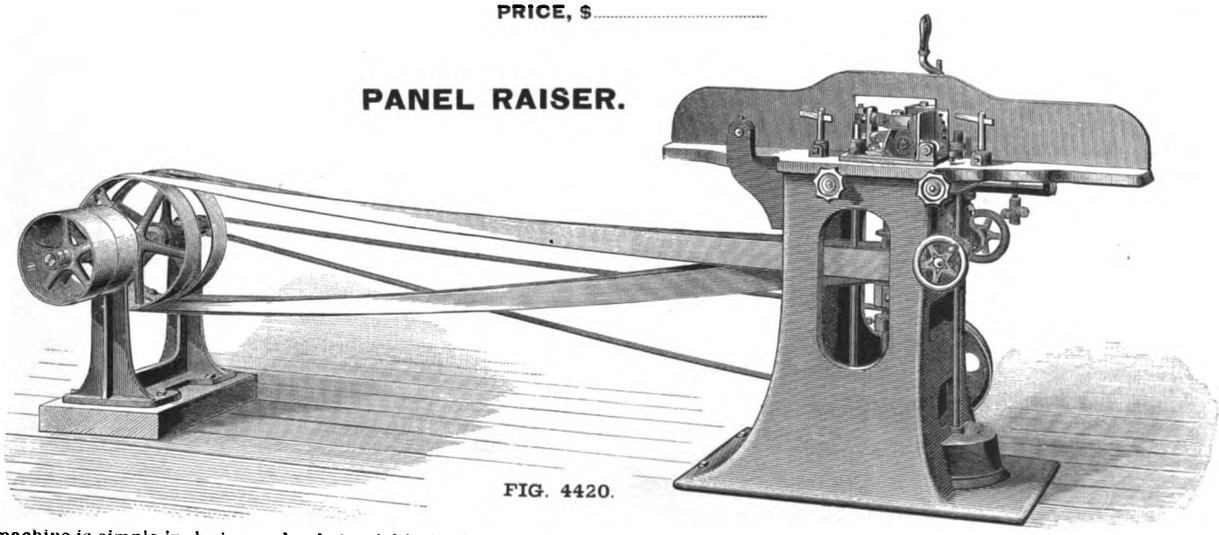


FIG. 4420.

This machine is simple in design and substantial in its framing, and will work panels on one or both sides at a time. The peculiar form of cutters gives them a drawing cut, working readily on either hard or soft woods, and so smoothly that the work needs no further preparation for painting. The machine is provided with new combination heads, which admit of changing the moulding cutters so as to produce shoulder, bevel or O. G. on the panel as desired, without disturbing the other cutters.

The heads and headstocks are adjustable vertically and laterally; can also be set on any angle ever required. It is also provided with two feed rolls, and no care has been wanting to make this machine all that could be desired.

It has countershaft, with tight and loose pulleys 10 x 4; they should make 900 revolutions per minute.

WEIGHT, 900 LBS. PRICE, $175.00.

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PANEL RAISER.

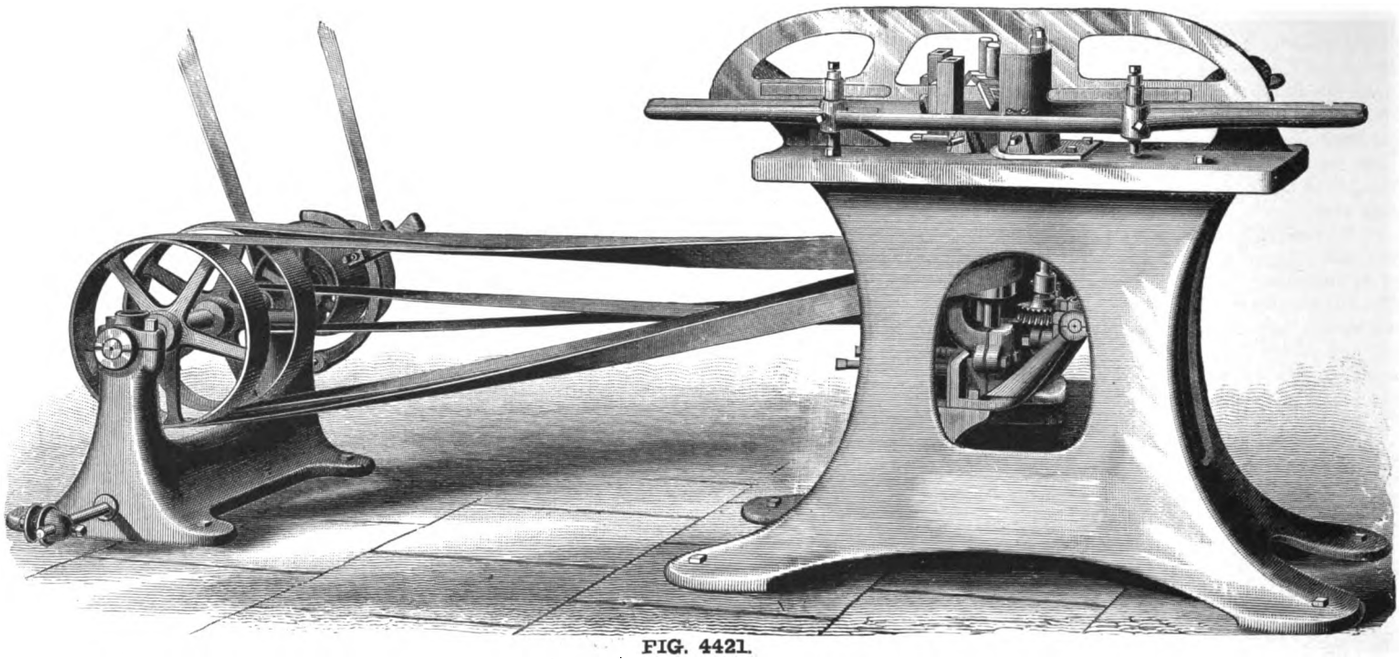


FIG. 4421.

This machine is for raising panels of any style, width or thickness. It is arranged with guards or pressure-bars so as to produce even and smooth work while cutting both sides of the panel at once. The fence or main guide is adjustable for thick or thin stuff, and with the table may be raised or lowered for different widths.

The table is hinged and may be thrown back when sharpening the knives.

The cutters are arranged on the head so as to make a continuous drawing cut throughout their entire width, leaving the work clean and smooth.

The countershaft has tight and loose pulleys 8 inches in diameter and 5 inch face, and should make 1,050 revolutions per minute. Weight, 950 pounds.

POWER FEED, $200.00. HAND FEED, $150.00.

DOUBLE AUTOMATIC CUT-OFF SAW.

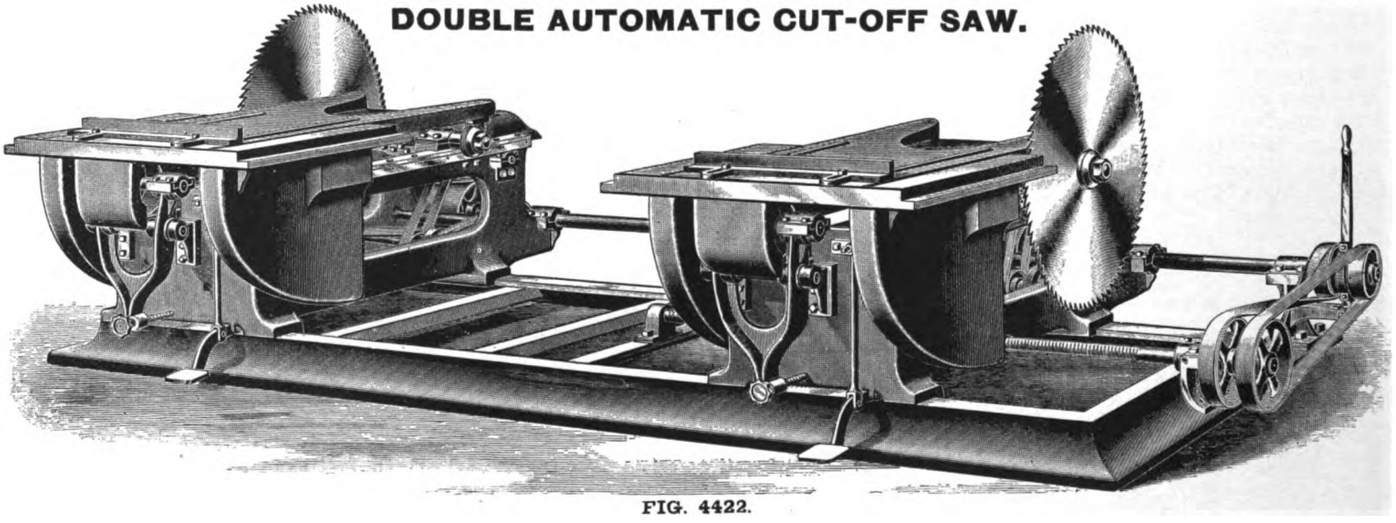


FIG. 4422.

This style of machine has just been introduced for double cross-cutting of any description, from light flooring or siding up to 14 inch timbers. Its main advantage is that it cuts off both ends at one operation, with one handling. There are three rates of feed.

One lever controls the feed of both machines on our lighter machine, operated by one man. On the No. 3 machine, designed for cutting off heavy timbers, there are two treadles, one each for the operator and helper. The countershaft, with tight or loose pulleys, are on the machine on end of main shaft.

One end is stationary, the other can be adjusted laterally by power, using the upright lever. On each single machine the arbor is arranged so that the saw can be placed on the inside or outside of machine. By placing the saws on the inside, with the adjustable machine set for shortest length of cutting, the minimum cut is two feet. We can furnish the machine for maximum length of cutting of 18 feet. For the cutting of long sills, say for freight work, a single machine is placed at one end, and a machine with 10 foot bed is placed 30 feet from it, thus being capable of cutting off sills 30 to 40 feet long, at both ends, at one operation.

PRICES.

No. 2, for cutting	1 x 22 in., or	6 x 12 in.,	from 2 ft. to 10 ft.	lengths,	or longer if ordered.	With	2	saws,	24	in.	and	counter,	$
No. 2½, "	1 x 36 in., or	6 x 24 in.,	from 2 ft. to 10 ft.	"	"	"	"	2	"	24	"	"	$
No. 3, "	1 x 32 in., or	12 x 22 in.,	from 2 ft. to 10 ft.	"	"	"	"	2	"	40	"	"	$

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DOUBLE CUT-OFF SAW, WITH ELEVATING ARBORS.

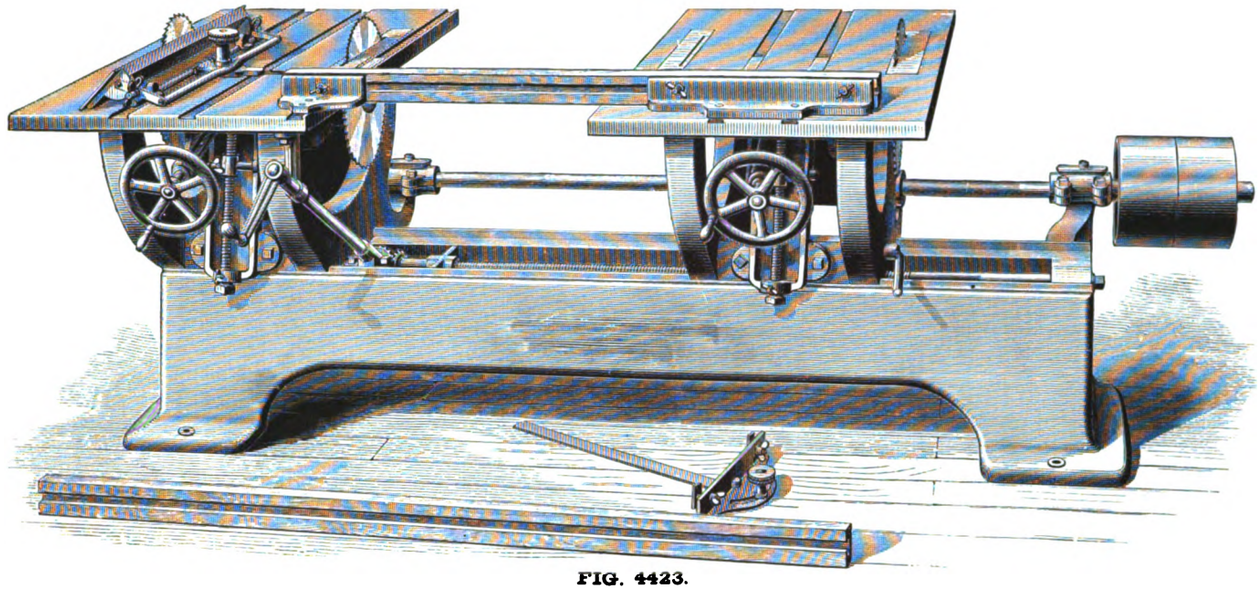


FIG. 4423.

The platens are made of iron, with grooves planed in them for receiving the gauges. Wood packing plates are inserted around the saws which can be taken out for grooving purposes. The tables can be brought together so that material 8 inches in length can be cut on both ends perfectly square, or they can be separated so as to cut off material up to 6 feet 6 inches long.

The machine is furnished with a sliding cross-cut gauge quickly adjustable for different widths, which is provided with stops to regulate the distance desired to cut, and can be instantly removed or replaced. The stationary table frame is provided with a ripping gauge which can be beveled to varying angles or reversed for sawing upon the opposite side of the table. An important feature of this machine is that no sliding carriages are necessary, as the arrangement of the gauges that accompany the machine is such that one operator can work with the grooving saw, and another man cut both ends of the material at once, any length from 22 inches to 5 feet.

The countershaft has tight and loose pulleys 10 x 5 inches, and should make 700 revolutions.

PRICES ON APPLICATION.

AUTOMATIC RAILWAY CUT-OFF SAW, POWER FEED.

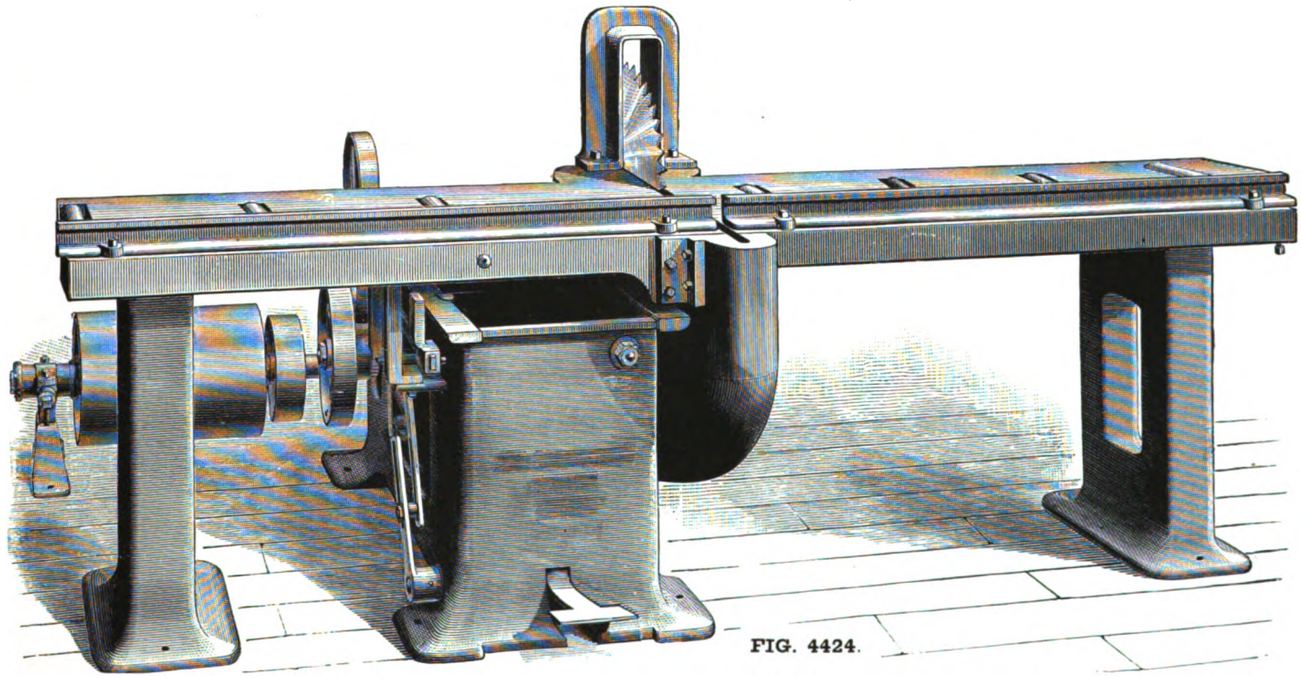


FIG. 4424.

The novel feature of this machine is the traversing of the saw carriage by friction, so that the rate of advance is always under the control of the operator while the saw is running, and it can be automatically stopped in either direction, as stops are provided for regulating the distance of its travel when it is desired to cut off a large number of pieces of a certain size.

A fence extends the entire length of the table, and a scale is marked on the top of the fence to aid the operator in cutting off pieces to accurate lengths. When the machine is running, and there is no pressure upon the foot treadle, the carriage remains at the extreme distance from the fence.

The saw carriage may be started or stopped at any point intermediate from the point of its travel, and the speed of its movement is also governed by the foot lever to suit different kinds of work. By pressing hard, the full speed is obtained when sawing light work; by giving a lighter pressure, the speed may be lessened.

It will receive a saw up to 36 inches in diameter. With this size of saw a timber 13¾ inches thick and 18 inches wide can be cut off. A saw guard or shield conveys away the sawdust, and also affords protection to the operator.

The tight and loose pulleys are 14 inches by 8 inches, and should make 600 revolutions.

PRICES ON APPLICATION.

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AUTOMATIC CUT-OFF SAW.

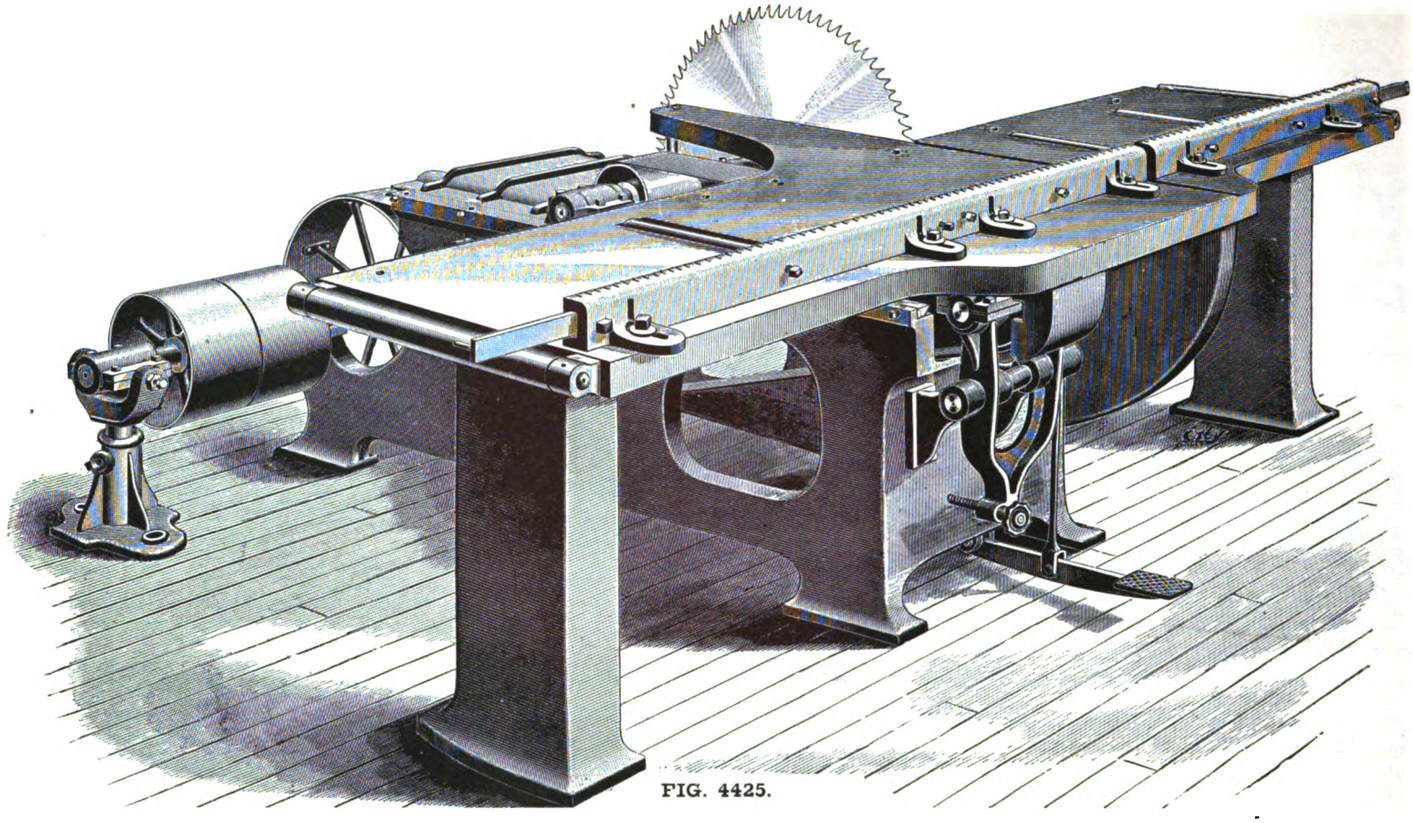


FIG. 4425.

This machine is intended for the heaviest timber cross-cutting of railroads and car works, planing-mills, etc. The iron bed is 9 feet long, having outside supports and with bed and end rollers as shown. The gauge is graduated by hand into inches and fractions and has extension iron stop-rods. It has a stroke of 32 inches and will cut 14-inch timbers with a 40-inch saw. We furnish machine as shown, or without extension bed.

PRICE.

With all-iron top and end rollers complete, with saw and countershaft.....$.....

40-INCH RAILWAY CUT-OFF SAW, POWER FEED.

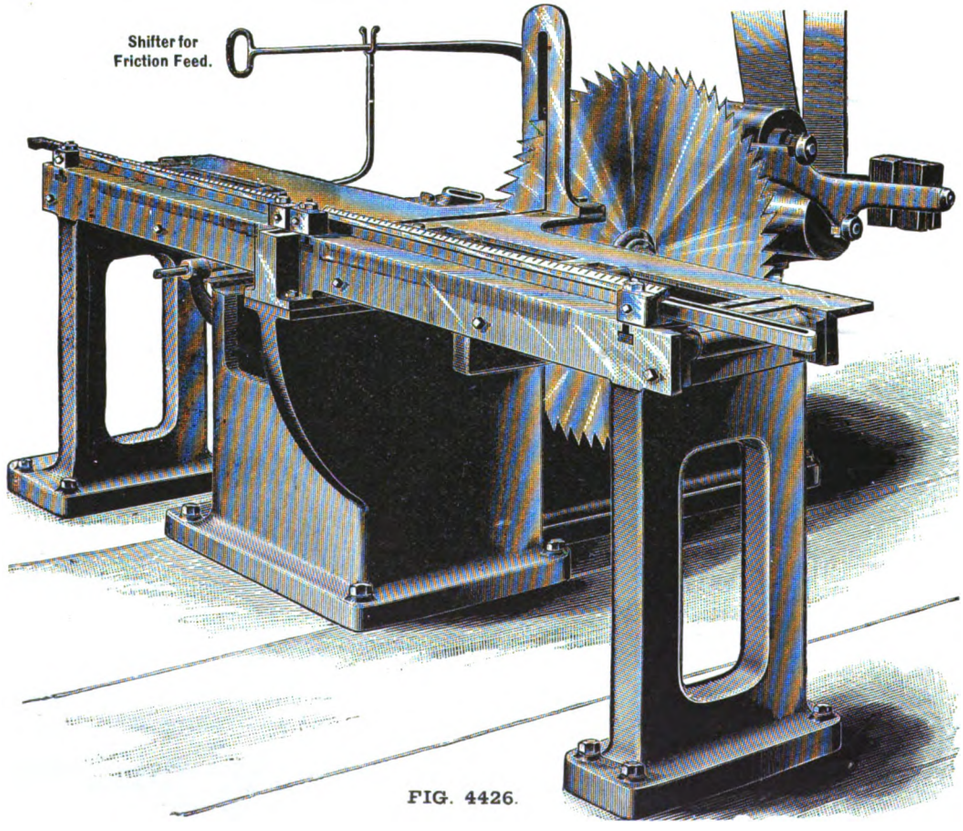


FIG. 4426.

Construction.—The frame is a heavy-cored casting, with large base, on which is mounted the saddle, carrying the saw and its arbor, which is strongly belted from the countershaft overhead through a swinging arm attached to the saddle, thereby giving belt of good length and easy access.

Tables are eight feet in length, planed true on the top, fitted with wrought-iron idler rolls, and supported at each end from the floor by substantial framing. Each table is provided with T slots, so that the fence may be set at any desired point from the saw. The fence is accurately divided into feet and inches, and provided with gauges that can be set at any length required.

Feed, both forward and backward, is controlled by a slight movement of the handle located above the table and handy to the operator which engages a strong, seven-inch face, paper friction gear, that will move the carriage either fast or slow, and may be stopped or started at any point of its travel at the will of the operator.

Saw arbor is made of the best cast steel 2¼ inch diameter, mounted in long, substantial bearings, with the pulley between them, and driven from countershaft above through a swinging arm which always maintains a correct tension of belt, either in light or heavy cutting.

Speed.—Tight and loose pulleys are 16 inch diameter, 8 inch face, and for a 40 inch saw should make 275 revolutions per minute.

Details supplied are one 40 inch saw, countershaft and a full set of wrenches.

WEIGHT, 3,800 LBS. **PRICE, $450.00.**

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AUTOMATIC RAILWAY CUT-OFF SAW.

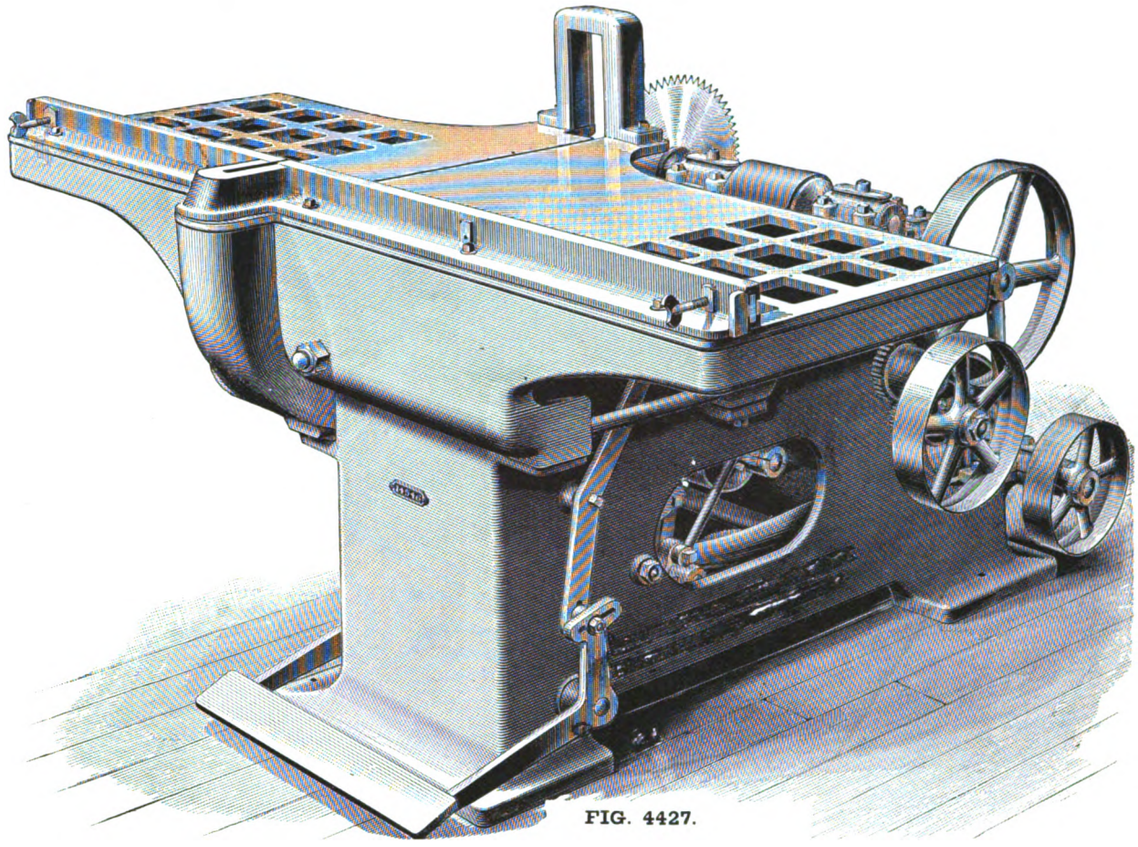


FIG. 4427.

The frame is formed of one heavy casting, with large floor base, rendering it self-contained. The countershaft is attached to the base of the machine, and can be belted from above or below the floor.

The guide rails for supporting the traveling carriage are specially wide and heavy, and cast to the frame, securing great permanence in this most important part of the machine.

The arbor is $1\frac{3}{16}$ inch diameter where the saw is received, made of the best steel, and runs in a connected gateway, having self-oiling bearings. The end of the arbor is provided with a device for increasing the size, allowing the use of saws with varying sizes of holes without the necessity of bushing. The sliding gateway is actuated on the planed guides of the frame by feed mechanism, which, by simply pressing upon the lever that extends across the front of the base of the machine, causes the saw to travel in either direction, as may be desired. Adjustable stops are provided for regulating the distance the saw is made to travel in, to suit the different widths of material to be cut off. Saws up to 22 inches diameter can be used which are only furnished at a small additional cost.

The table is made of iron, and attached to the machine in the most substantial manner, and provided with a board measure accurately spaced into inches for convenience to the operator.

The tight and loose pulleys are 10 x 6 inches, and should make 700 revolutions. **PRICE, $**.....

RAILWAY CUT-OFF SAW.

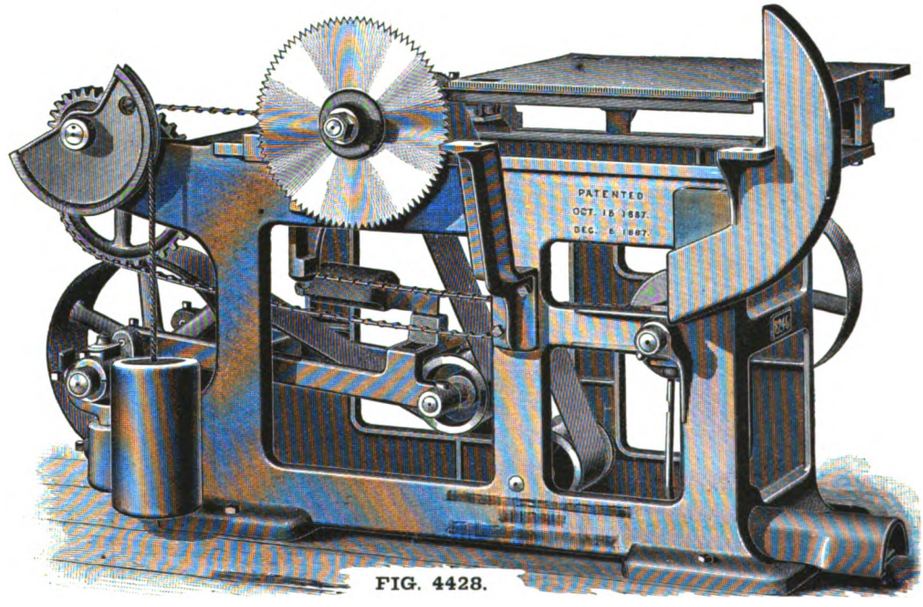


FIG. 4428.

It is very compact, and occupies comparatively small floor space. The frame is formed of one heavy casting with internal ribs, and the guide rails for the saw carriage are cast with the frame—securing permanent stability in this important part of the machine.

The saw arbor is made of the best steel, and is journaled in self-oiling bearings on a sliding carriage, which is moved to the work by means of a pair of very sensitive friction discs, controlled by the treadle at front end of the machine in a very convenient position. The speed of the saw forward is controlled and regulated by pressure on the treadle, from a very slow to a fast movement, varying from a short stroke to the full width of 24 inches. Upon releasing the pressure the saw carriage is quickly drawn back—by weight shown in cut.

It will be seen that the operator having the use of both hands can more readily handle the stock, and by standing on the floor firmly with both feet, using the toe of one foot only to move the treadle, the work is not so laborious, and he can handle and cut up almost double the amount of stock as with the old style machines where he has to either pull the saw forward by hand, or to lift his foot from the floor, and force the saw through the lumber by his own weight.

The saw is driven by an endless belt—supplied with machine—running from the large pulley on the driving shaft around tighteners to the saw arbor pulley, and kept at proper tension by means of a weighted idler.

The table is of iron, secured to the frame in a most thorough manner, which has brackets on both sides for the attachment of extension tables,—usually needed.

Tight and—self-oiling—loose pulleys are 12 x 6 inches, and should make 550 revolutions per minute.

To carry saw up to 16 inches diameter. **WEIGHT, 1,400 LBS. PRICE, $250.00.**

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RAILWAY CUT-OFF SAW.

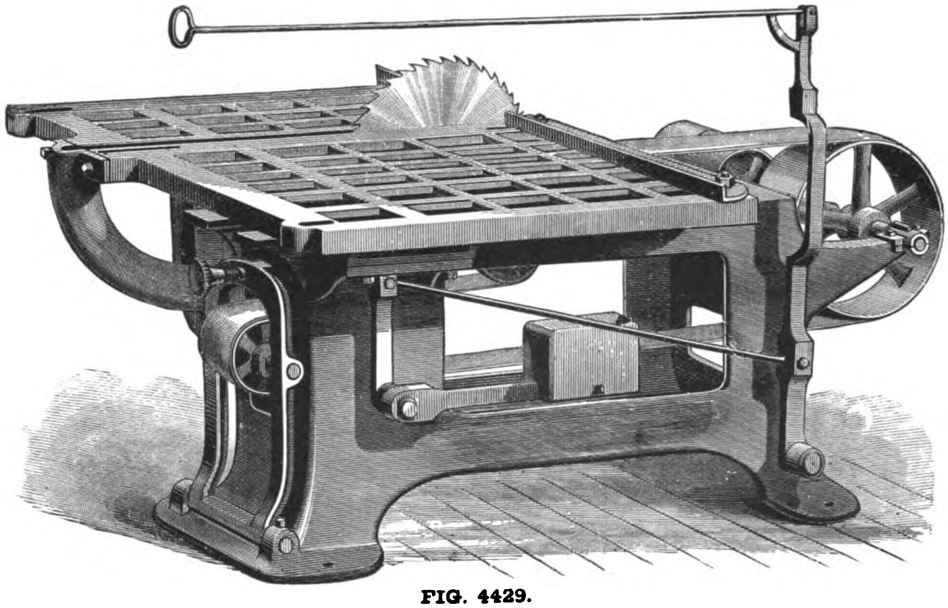


FIG. 4429.

The slides on which the mandrel moves are cast on the frame, making a very solid and durable bearing for the yoke which carries the saw.

The mandrel is cast steel, and the boxes and bearings are self-oiling, and lined with genuine Babbitt metal.

The mandrel has the patent expansion device in it, enabling the operator to use saws of different size holes, and yet run true. Any saw up to 20 in. can be used.

The table is very heavy and solid, being well ribbed and braced. It rests on two brackets cast one on each side of the machine. The fence is adjustable and can be used on the front or back of the table.

The L. & T. pulleys are 10 in. x 5½ in., and should run 650 revs. per minute.

PRICES, WITH BELT TIGHTENER.

Complete, without the iron table, and with 20 in. saw and countershaft, weight, 1,200 lbs. $145.00

Same as above, but with table, weight, 1,600 lbs. $180.00

COLUMN BRACKET CUT-OFF SAW.

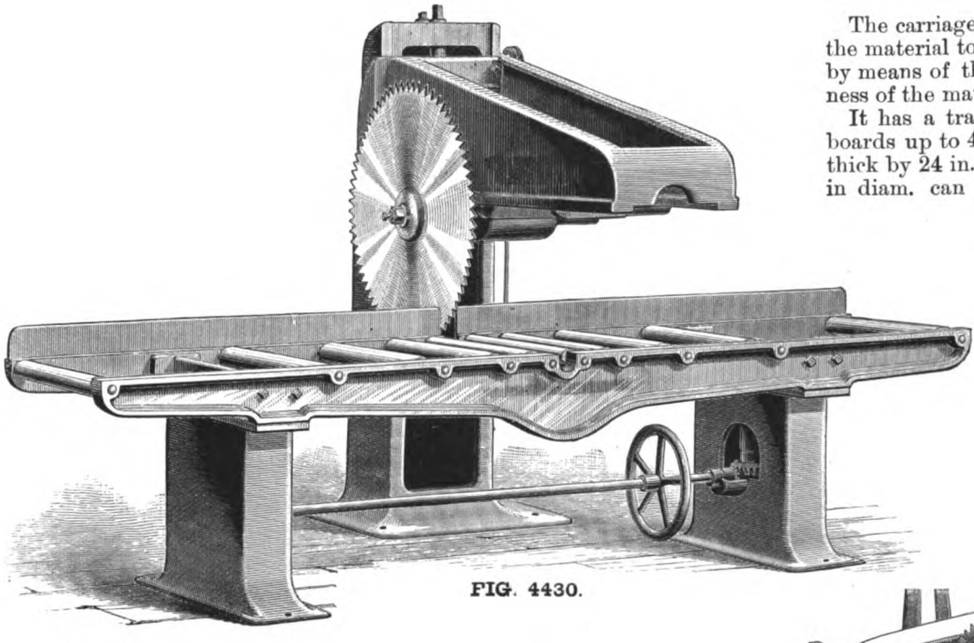


FIG. 4430.

The carriage is long, with a series of friction rolls for the material to rest upon, and has a vertical adjustment by means of the hand wheel in front, to suit the thickness of the material being cut, also the wear of the saw.

It has a traverse movement of 36 in., and will saw boards up to 4 in. thick by 24 in. wide, and timber 12 in. thick by 24 in. wide, or 12 in. square. Saws up to 36 in. in diam. can be used. It is a substantial machine, capable of performing a great variety of work. The countershaft is placed above at right angles to the arbor, the belt traversing across the face of a drum pulley as the saw is moved back and forth.

The tight and loose pulleys are 14 in. x 8 in., and should make 600 revs.

PRICE, $ .....

BRACKET CUT-OFF SAW.

Fig. 4431 represents a wall or bracket cut-off saw. It will carry saws 40 in. diam. It consists of a long heavy bracket, on which the saw carriage is mounted, bolted to a heavy plate fastened to the wall or other suitable support. The table is 10 ft. long, supplied with wrought iron friction rolls.

We furnish with each machine one 30 in. saw, countershaft, belt tightener and a full set of wrenches. Tight and loose pulleys are 14 in. x 8 in., and make 500 revs. per minute. Weight, 3,900 lbs.

PRICE, $450.00.

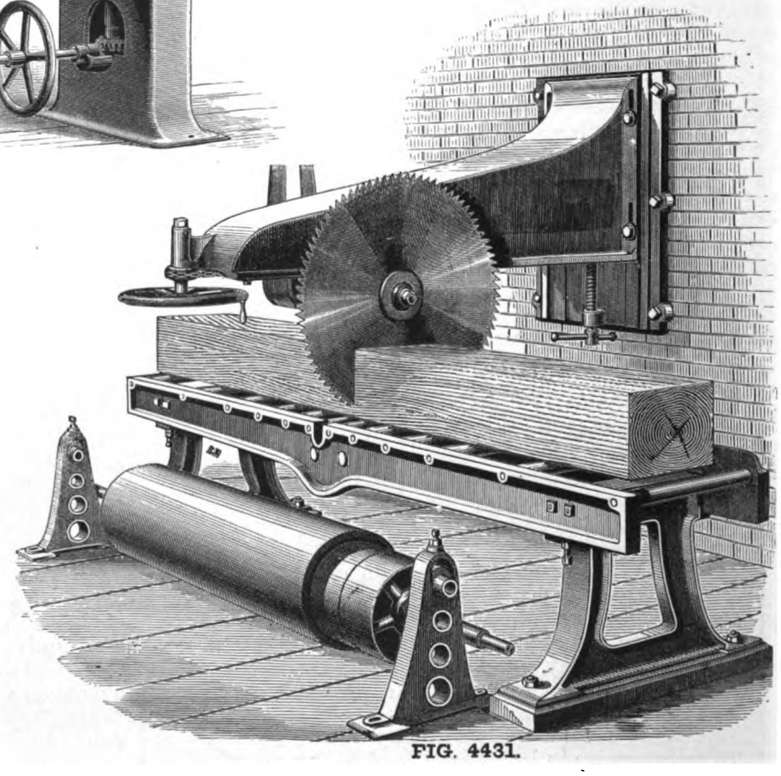


FIG. 4431.

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HEAVY SWING SAWS.

Fig 4432 represents a heavy swing cut-off saw, which is specially adapted for use in car shops, for cutting off heavy car timbers, and in saw-mills for cutting off slabs and shingle butts, and in all factories where heavy stuff is required to be cut into equal lengths with perfectly square ends.

The patent counter-balance has overcome what has heretofore been the greatest objection to swing saws, that of having the ponderous weight, used as a counter-balance, always to lift in operating the saw.

The shaft which the saw swings on is stationary, set-screwed in the hanger, as shown in the cut. It will be seen that this tends to make it perfectly rigid, and not liable to get out of line.

The pulley that runs the saw and the driving pulley are fastened together on an oil-chambered sleeve, thus leaving all pulleys virtually loose on the countershaft. The saw being once properly placed remains so, there being no journals to wear or throw it out of line.

This saw works equally as well under the bench as above it. Please state in order whether wanted to work above or under the bench.

Regular length from base of hangers to center of arbor, 7 ft. 2 in., but can make it any required length and right or left hand.

Saw arbor, 1¾ in. diam. ; countershaft, 2½ in. diam.

Tight and loose pulleys, 12 x 8, and should make 420 revs. with 36-inch saw. Weight, 1,400 lbs.

PRICE, WITH 36-INCH SAW, $150.00.

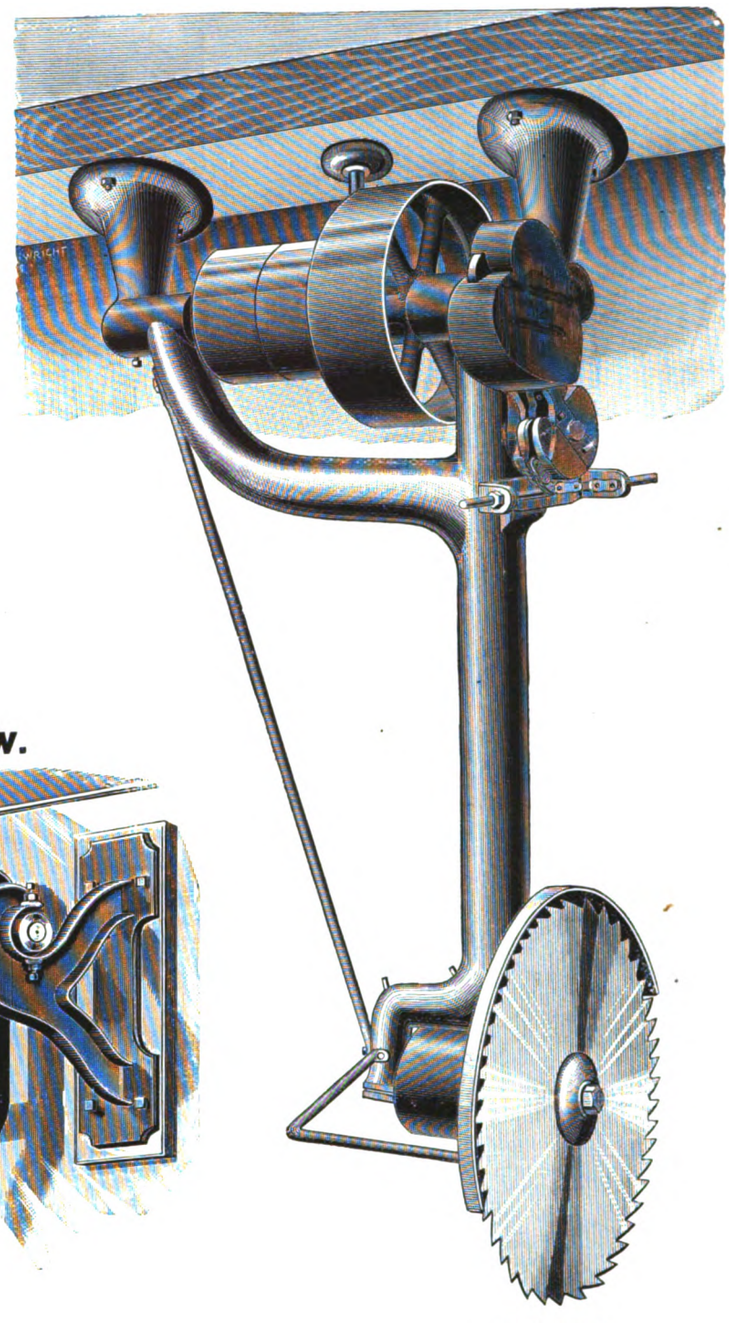


FIG. 4432.

HEAVY SWING SAW.

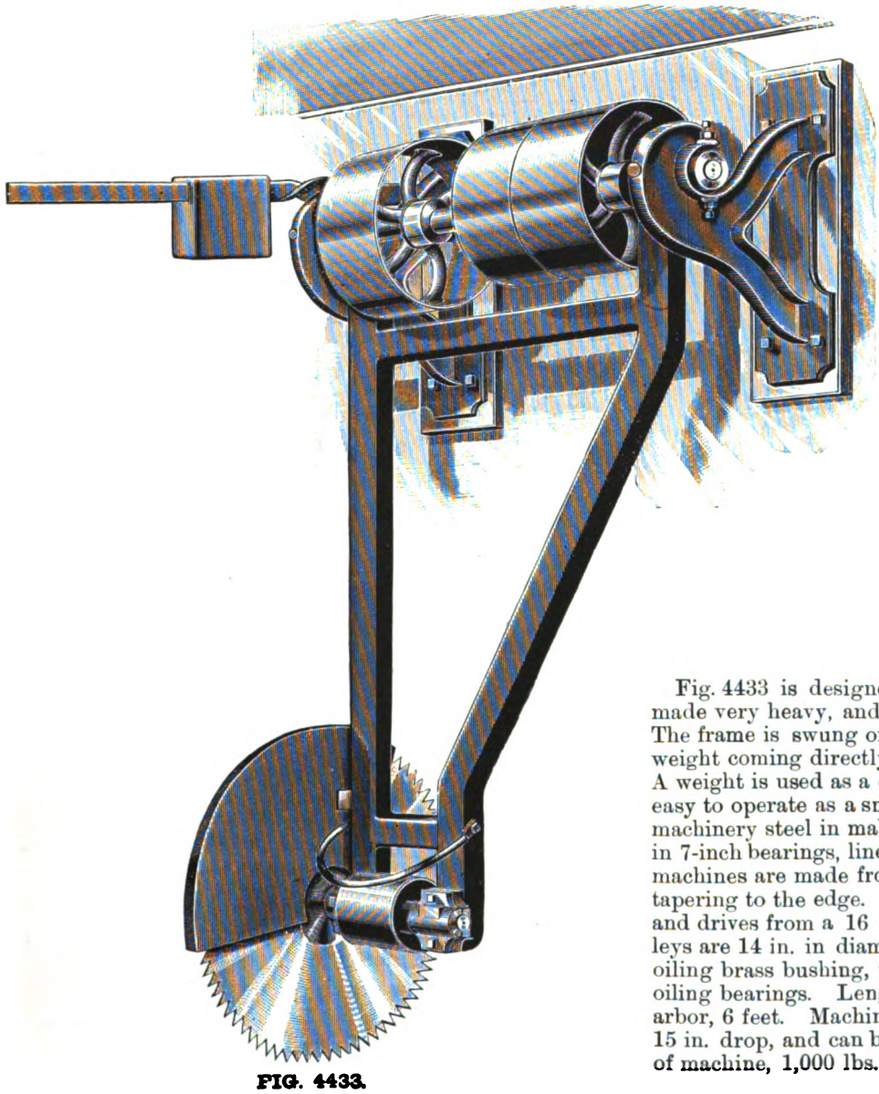


FIG. 4433.

Fig. 4433 is designed to do the heaviest kinds of work. The frame is made very heavy, and is strongly ribbed and braced to prevent all spring. The frame is swung on the end of the journal boxes, which prevents any weight coming directly on the shaft, thereby preventing friction and wear. A weight is used as a counter-balance, and thereby making the machine as easy to operate as a smaller machine. We use the best quality of crucible machinery steel in making the mandrel, which is 1¾ in. in diam. and runs in 7-inch bearings, lined with the best babbitt metal. The collars on these machines are made from ⅝ in. steel plates, and are 9 in. in diam., turned tapering to the edge. Pulley on saw arbor is 8 in. in diam. and 8 in. face, and drives from a 16 inch pulley on countershaft. Tight and loose pulleys are 14 in. in diam. and 8 in. face. The loose pulley has patent self-oiling brass bushing, which we warrant to equal any device made for self-oiling bearings. Length of frame from center of countershaft to center of arbor, 6 feet. Machine carries from 24 in. to 40 in. saw. Hangers are 15 in. drop, and can be used to bolt from above or from the side. Weight of machine, 1,000 lbs.

PRICE, $100.00.

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DOUBLE ARM SWING CUT-OFF SAWS.

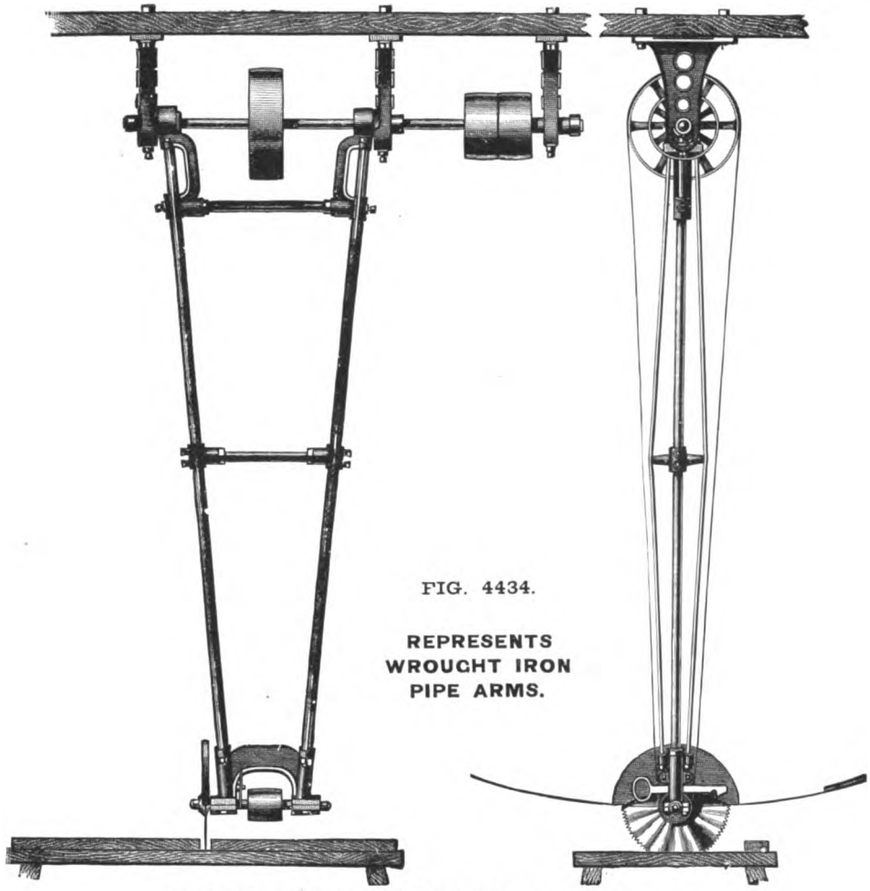


FIG. 4434.

REPRESENTS WROUGHT IRON PIPE ARMS.

CAST-IRON CORED ARMS.

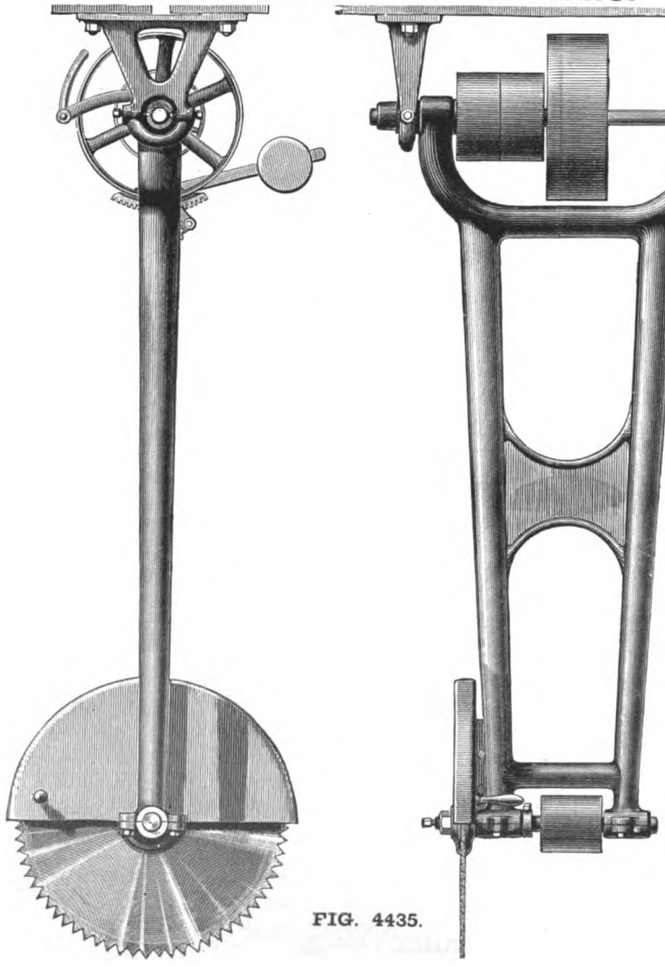


FIG. 4435.

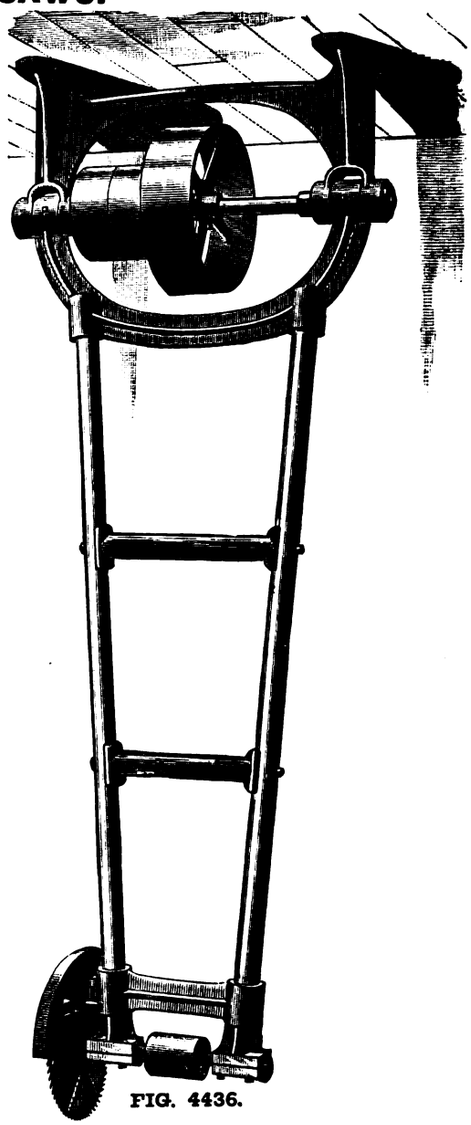


FIG. 4436.

Fig. 4434. Length arm to suit height ceiling.

Size saw.	Tight and loose pulleys.	Speed.	Weight.	Prices, including saw.
20 inch.	12 in. x 6 in.	400	500	$85.00
30 "	14 " x 7 "	350	700	100.00

Fig. 4435. Small machine made in lengths 7 ft. 11 in. and 6 ft. 11 in., and the larger one 8 ft. 1 in. from center of arbor to base of hanger.

Size saw.	Tight and loose pulleys.	Speed.	Weight.	Prices.
20 inch.	10 in. x 5 in.	600		$
30 "	12 " x 6 "	600		$

Fig. 4436 represents a tubular frame swing cutting-off saw; the swinging frame, which is attached to the hangers, and not to the shaft, is so rigid as not to admit of any torsion.

Tight and loose pulleys are made 9 inches in diameter and 4 inches face and should make 600 revolutions per minute.

WEIGHT, 375 LBS. PRICE, WITHOUT SAW, $75.00.

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DOUBLE AND SINGLE ARM CUT-OFF SAWS.

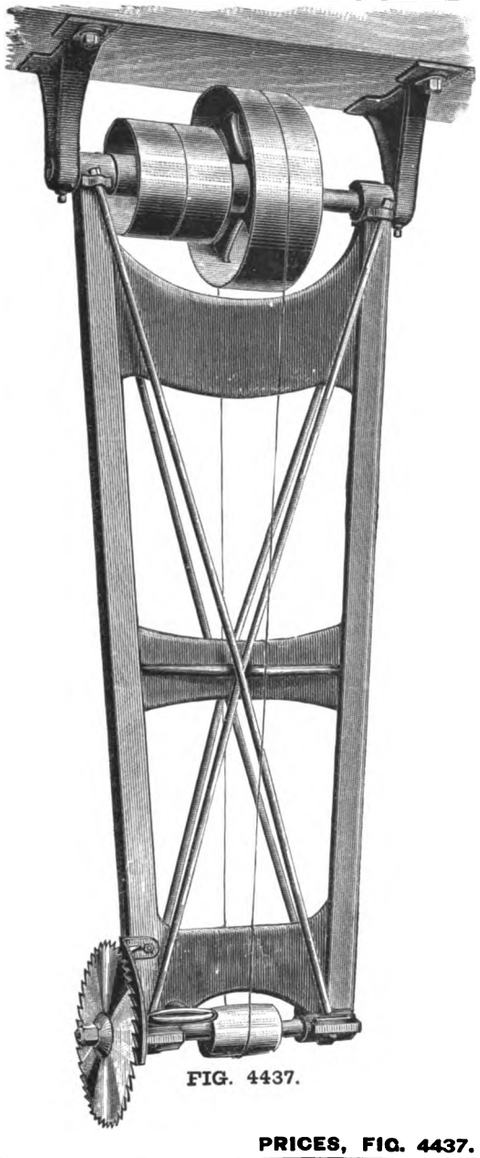


FIG. 4437.

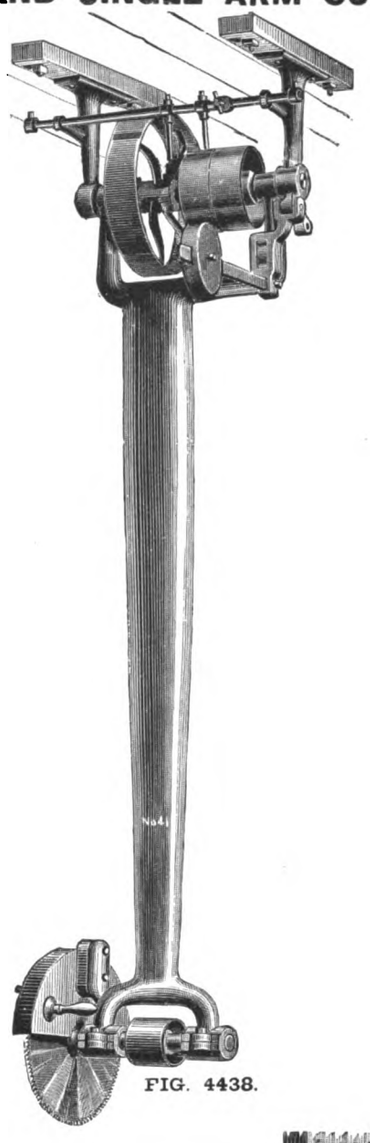


FIG. 4438.

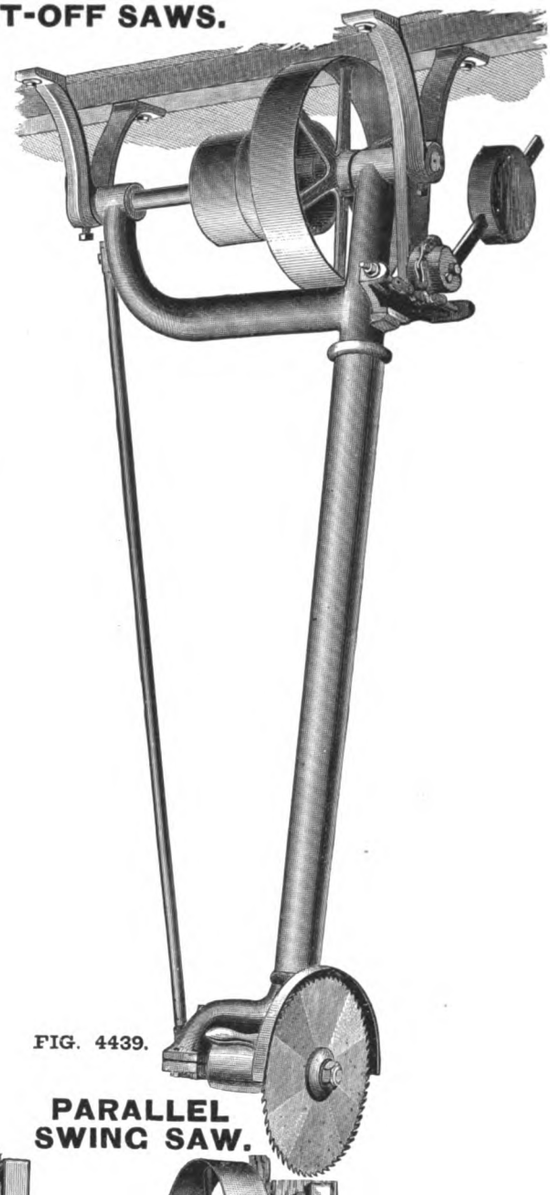


FIG. 4439.

PRICES, FIG. 4437.

Swings a saw	Tight and loose pulleys.	Speed.	Distance between shafts.	Prices, without saws.
16 inch.	9 in. x 4 in.	600	6 feet.	$50.00
30 "	10 " x 6 "	500		100.00

Extra length of drop per foot, $5.00.

PRICES, FIG. 4438.

Swings a saw	Tight and loose pulleys.	Speed.	Drop.	Weight.	Prices.
16 inch.	10 in. x 4 in.	700	9 feet.	550	$60.00
16 "	10 " x 4 "	700	8 "	500	55.00
16 "	10 " x 4 "	700	7 "	450	50.00
16 "	10 " x 4 "	700	6 "	400	45.00
16 "	10 " x 4 "	700	5 "	350	40.00
16 "	10 " x 4 "	700	4½ "	325	37.50

Heavy machine for 24 inch saws. Extra, $7.50 for each length above.

PRICES, FIG. 4439.

With one 14 inch saw, tight and loose pulleys, 10 in. x 5 in.; 500 revolutions; weight, 500 lbs.; drop, 7 ft. 2 in., center to center of shafts.....$75.00

PRICES, FIG. 4440.

With this machine the saw arbor travels in a perfectly straight line instead of rising and falling as with the ordinary swing-saw machine. This enables a comparatively small saw to be used for wide and thick lumber, and also allows the use of a dado head for grooving, graining, rabbeting, tenoning, moulding, etc.

In ordering, give height of floor to bottom of beam overhead, and height from floor up to center of main shaft.

This price does not include saws or posts.

The small machine takes saw 18 inches, which will cut off plank 6 in. x 24 inches wide.....$135.00

The large machine takes saw 24 inches, which will cut off plank 8 in. x 30 inches wide.....$200.00

PARALLEL SWING SAW.

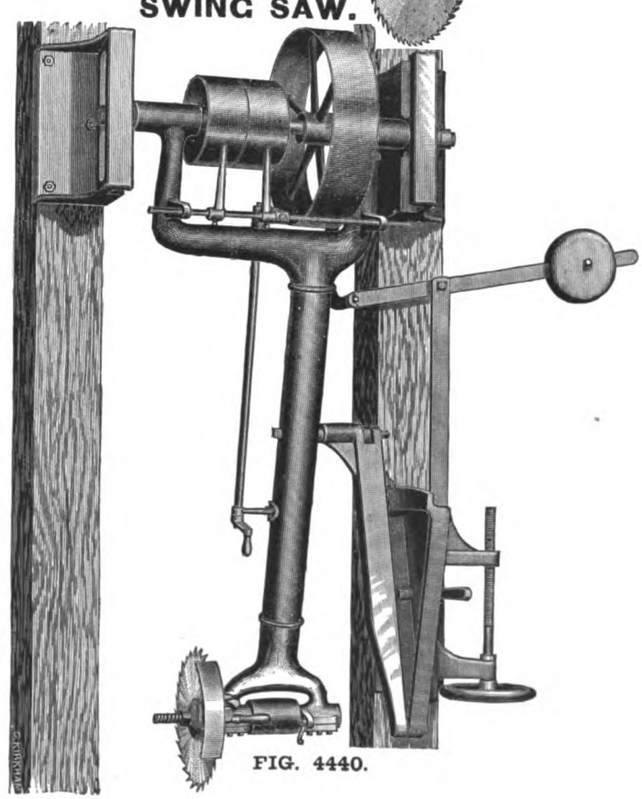


FIG. 4440.

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LIGHTNING AUTOMATIC CUT-OFF SAWS.

The saw returns automatically when pressure is removed from the treadle.

There is no binding of the saw, as with a swing saw or various styles of railway saws, as the long carriage runs in a gibbed frame. Owing to this perfectly straight feed, the saw can be speeded and the stock fed much faster, and with less proportionate wear on the saw. The length of the stroke can be regulated by stops. The gauges can be placed at the back or front of machine, as desired.

The feed works are exceedingly simple, and are entirely inside of the frame. This machine has three rates of feed. Instead of link or leather belt for operating the carriage, it is actuated by a screw, making a very powerful and positive feed, which is under the control of the operator at every point of stroke.

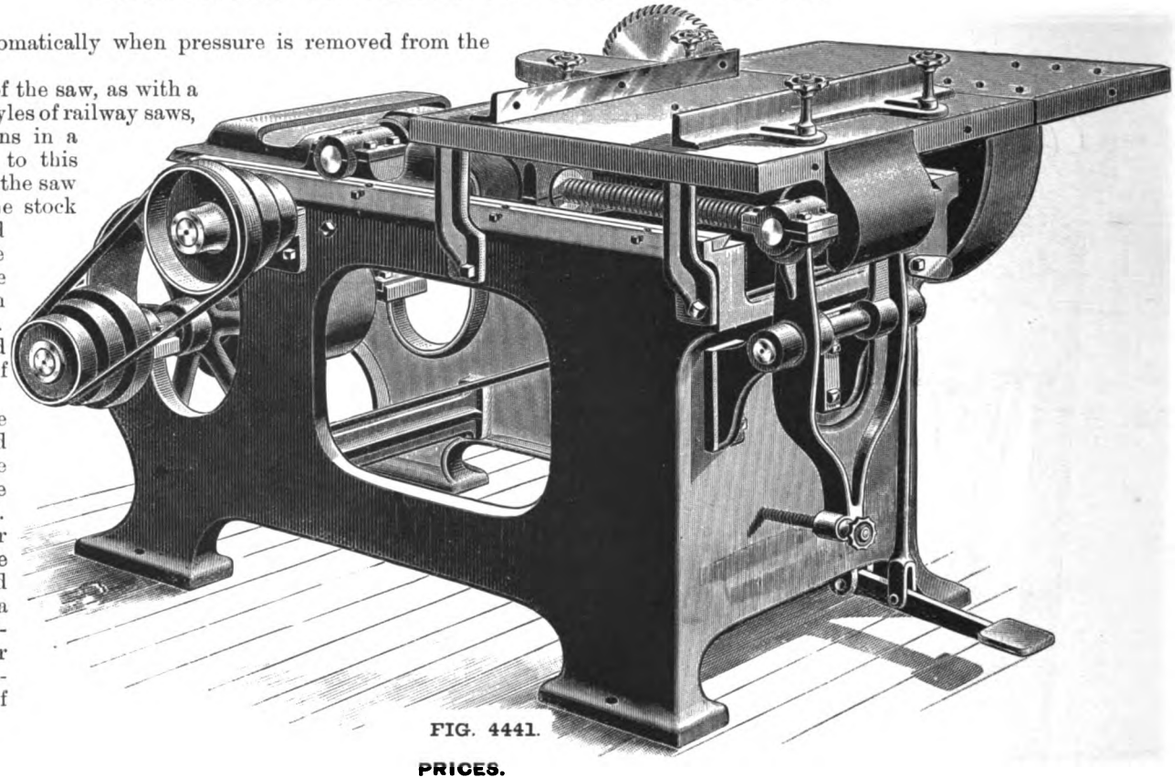


FIG. 4441.

PRICES.

	Largest saw that can be used.	Range of cross cutting.	Size of tight and loose pulleys.	Speed of countershaft.	Weight of machine.	Prices.
No. 1	16 inch.	1 x 16 in. or 3 x 14 in.	10 in. x 6 in.	700	950	$
No. 2	24 "	1 x 22 " or 6 x 12 "	10 " x 8½ "	700	1,800	
No. 2½	24 "	1 x 36 " or 6 x 24 "	10 " x 8½ "	700	2,400	
No. 3	40 "	1 x 32 " or 12 x 22 "	12 " x 8½ "	350	3,000	
No. 3 without extension bed	40 "	1 x 32 " or 12 x 22 "	12 " x 8½ "	350	2,100	

NO. 1 SELF FEED SAW TABLE.

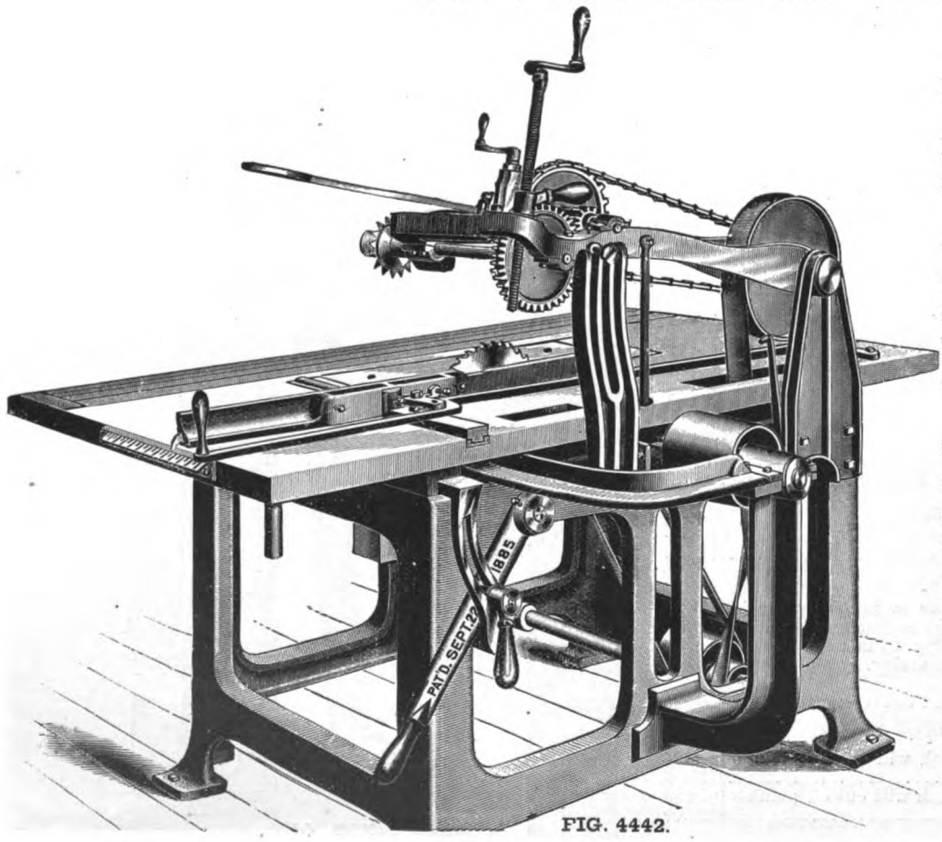


FIG. 4442.

Made with hinged wood and iron tops and patent top-raising attachment.

The top of table is either all wood, made of hard wood strips, or of wood and iron, having iron center 16 inches wide, or all iron top.

The top-raising attachment is worked by the lever at the side. The top can be raised or lowered parallel with the frame, or horizontally. The weight of the top is counterbalanced by weights, and the top can be clamped at any point.

The feed works adjust themselves to varying thicknesses of stuff, or can be set to rip any thickness up to five inches or twelve inches, according to the size of the machine. The feed has three speeds. If desired, the feed works can be raised out of the way, and the machine used as a common saw table.

SEE TABLE, PAGE 466, FOR DIMENSIONS, ETC.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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NO. 2 SELF-FEED SAW TABLE AND ATTACHMENT.

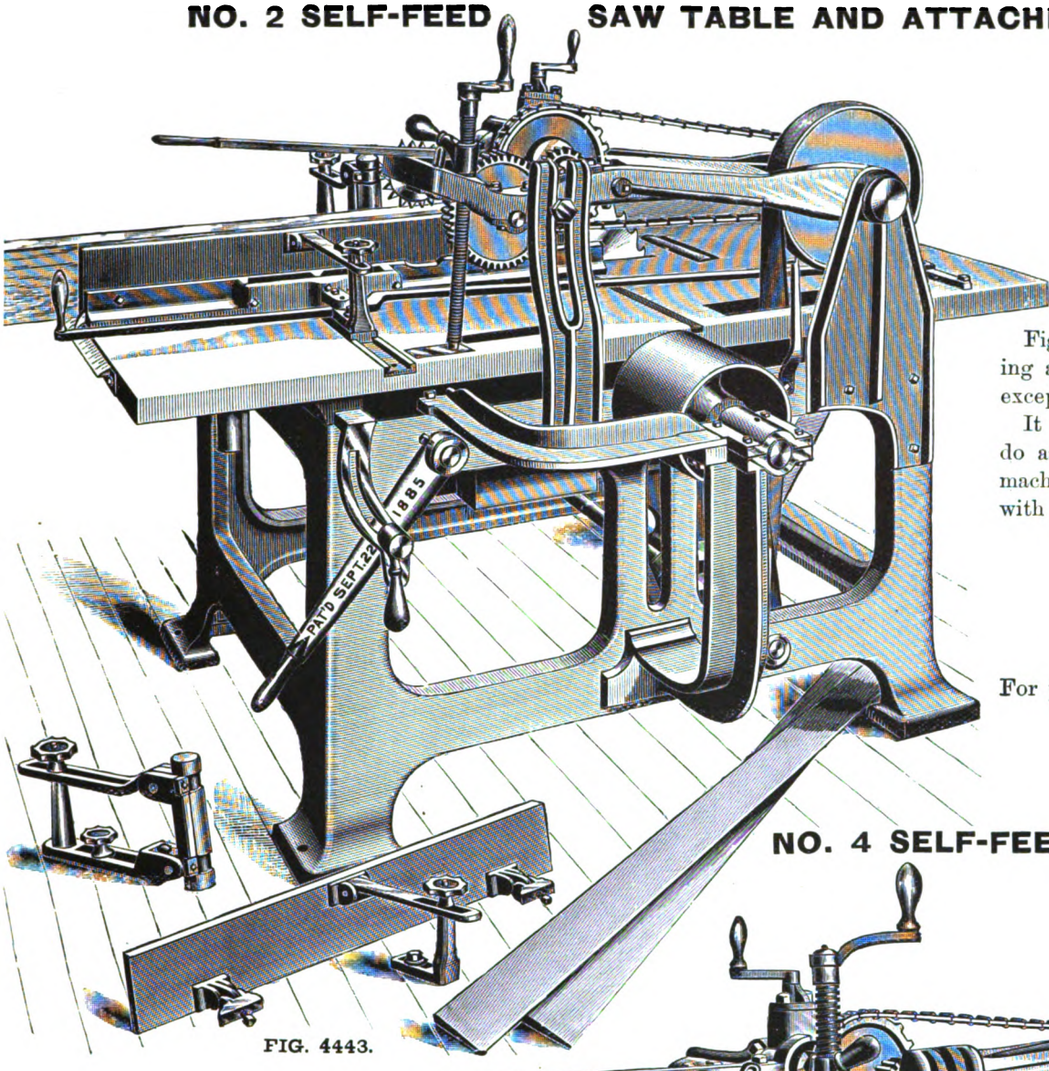


FIG. 4443.

Fig. 4443 shows the resawing or siding attachment applicable to all sizes except No. 0 and No. 1.

It will make perfect siding and will do as fast work as a regular resawing machine; a special saw should be used with this attachment.

See description, page 464.

For prices, Figs. 4443 and 4444, see page 466.

NO. 4 SELF-FEED SAW TABLE.

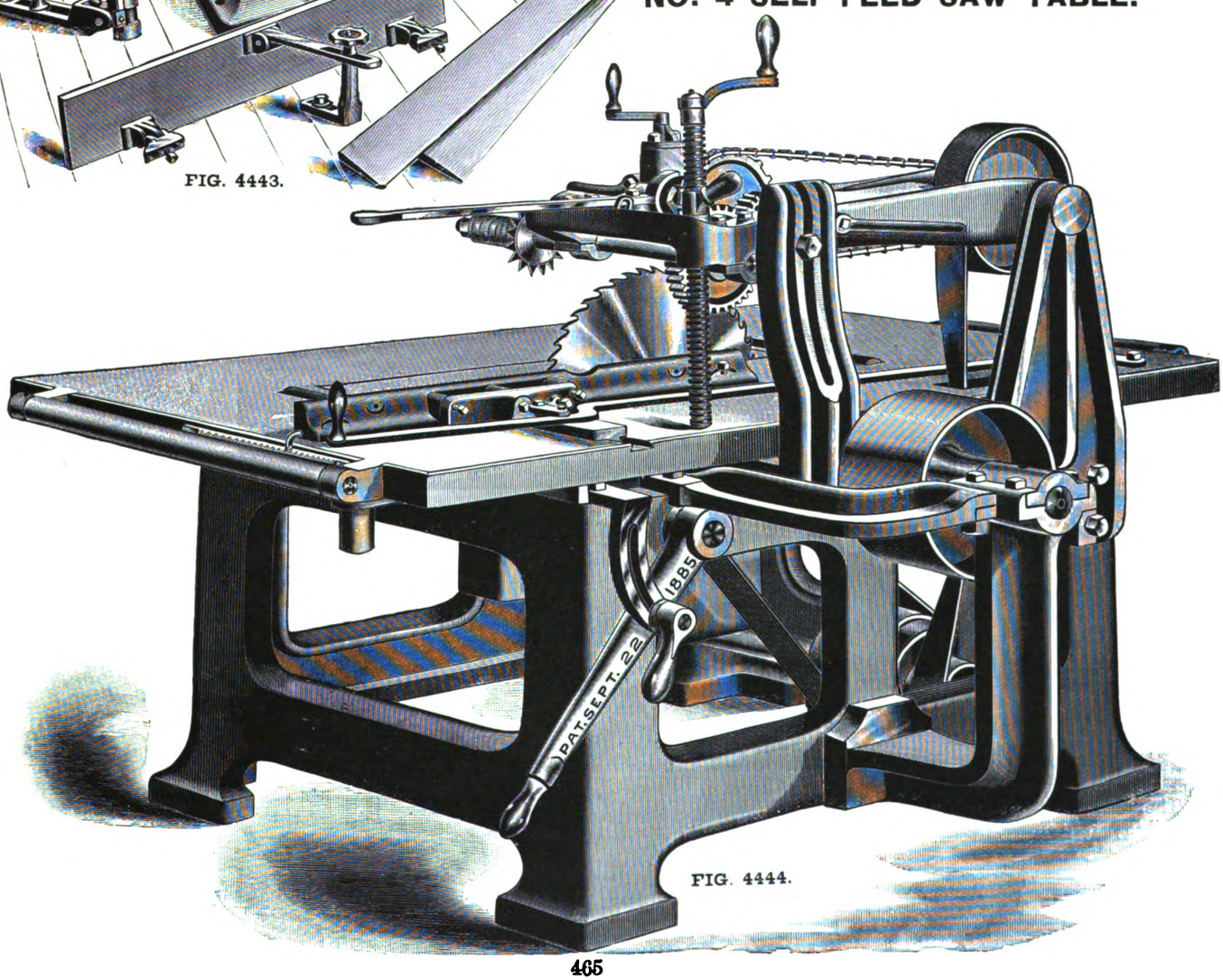


FIG. 4444.

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PRICES, FIGS. 4442, 4443 AND 4444.

	Largest saw that can be used.	Length of gangs of collars.	Width and thickness of sawing.	Diameter and face pulley on arbor.	Weight of machine.	Prices, including saw and countershaft.
No. 0. With all wood top, hinged	14 in.	2 in.	13 in. x 2 in.	5 in. x 5½ in.	900	$
No. 0. With all iron top, hinged	14 "	2 "	13 " x 2 "	5 " x 5½ "	1,100	
No. 1. With wood and iron top, hinged	18 "	3 "	15 " x 4 "	6 " x 6½ "	1,300	
No. 1. With wood and iron top, patent top raising attachment	18 "	3 "	15 " x 4 "	6 " x 6½ "	1,500	
No. 1. With all iron top, patent top raising attachment	18 "	3 "	15 " x 4 "	6 " x 6½ "	1,650	
No. 2. Wood and iron top, hinged	24 "	4 in. to 6 in.	16 " x 6 "	8 " x 8½ "	1,500	
No. 2. With wood and iron top, patent top raising attachment	24 "	4 " " 6 "	16 " x 6 "	8 " x 8½ "	1,700	
No. 2. With all iron top, patent top raising attachment	24 "	4 " " 6 "	16 " x 6 "	8 " x 8½ "	1,900	
No. 3. All iron top, and end rollers	30 "	4 " " 6 "	17 " x 10 "	10 " x 8½ "	2,100	
No. 4. All iron top, and end rollers	32 "	4 " " 6 "	18 " x 12 "	12 " x 8½ "	3,000	
Resawing or siding attachment, extra						35.00

SELF-FEED RIPPING SAW TABLE.

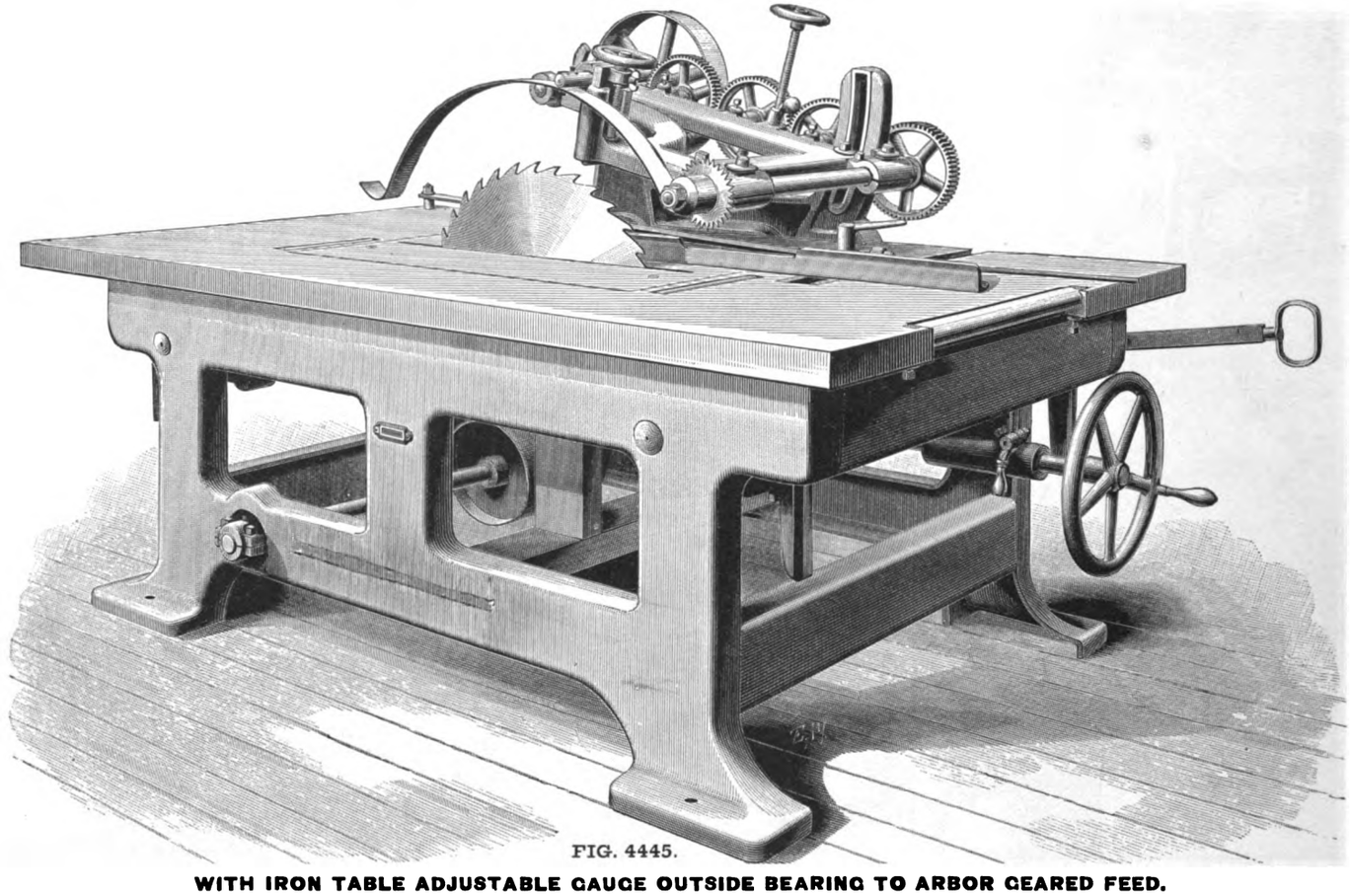


FIG. 4445.

WITH IRON TABLE ADJUSTABLE GAUGE OUTSIDE BEARING TO ARBOR GEARED FEED.

The feed consists of a combination of gearing and belts operating a toothed feeding-disc acting on the top surface of the lumber in the same line the saw cuts. It is under perfect control by the hand lever, and can be started or stopped instantly.

The feeding-disc has three speeds of feed, 47 feet, 84 feet and 130 feet, and can be retained at any desired height from the table by means of a hand wheel and screw, and the entire feeding mechanism may be elevated and thrown back out of the way, if it is desired to do ordinary ripping.

The mandrel is of steel, large in diameter, and arranged so that several saws may be used at a time, and by using several feeding-discs on the feed-shaft will bring the machines to the fullest capacity. A long outside bearing supports the pulley. Each machine is provided with an improved adjustable fence that can be instantly fixed at any point. There is also a hold-down which prevents the material from being carried back by the saw, and which acts as a guard, being attached to and moving with the feeding-frame.

The table is 6 feet 6 inches by 3 feet 10 inches, made of iron, and has a hand wheel at the front end for raising it parallel. A friction roll is placed in the table, just below the feeding-disc, to relieve the material from friction. The arbor where the saw goes on is 1⅝ inches diameter.

The saw-arbor pulley is 12 x 8 inches, and should make 1,800 revolutions.

When desired, a countershaft is furnished with the machine at a small extra cost. The tight and loose pulleys are 12 x 8 inches, and should make 845 revolutions.

PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SELF-FEED SAW TABLE.

No. 1 machine carries an 18 inch saw, and will cut stock up to 15 inches wide and 5 inches thick. It has a parallel guide, also a very simple device for raising and lowering the saw. The steel spur feed wheel is placed directly in line with the saw. The table is made of iron; one half attached firmly to the frame, the other half movable in order to allow free access to the saw.

Tight and loose pulleys on counter, 10 x 6.

Speed, 650 revolutions.

WEIGHT, 1,200 LBS.

PRICES.

No. 1 takes 18 saw table 42 x 36.....$225.00
No. 2 takes 24 saw table 42 x 44..... 275.00

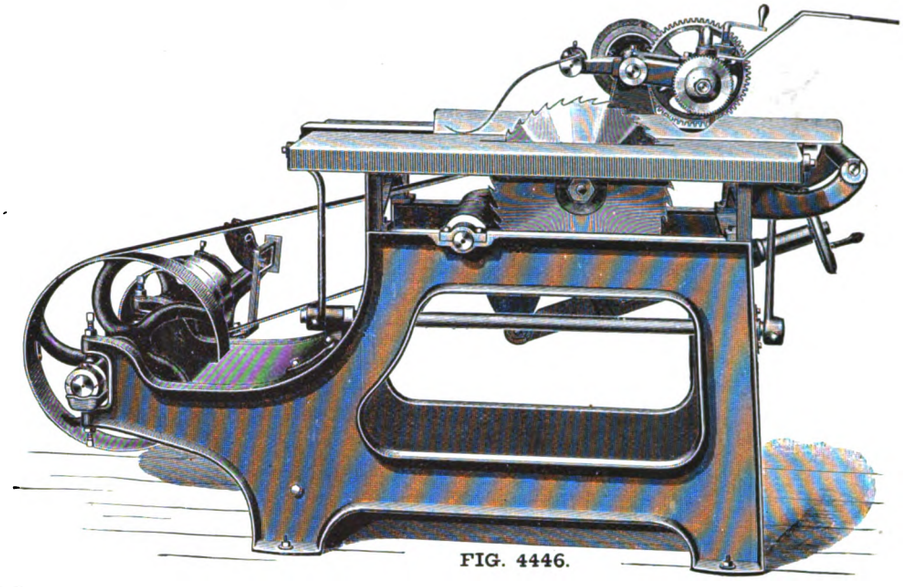


FIG. 4446.

SELF-FEED VERTICAL SAW, WITH DADO ATTACHMENT.

The table has an adjustment to and from the column to suit the different diameters of saws. It also has a radial adjustment for angle sawing. The large machine is sometimes fitted with a head for gaining. We furnish with each machine one saw, countershaft and a full set of wrenches.

20 inch machine, tight and loose pulleys, 12 in. x 4 in.; speed, 400 revolutions.
WEIGHT, 1,650 LBS. PRICE, $275.00.

40 inch machine, tight and loose pulleys, 16 in. x 7 in.; speed, 350 revolutions.
WEIGHT, 2,600 LBS. PRICE, $450.00.

20 inch machine, hand feed, 12 in. x 4 in.; speed, 400 revolutions.
WEIGHT, 1,700 LBS. PRICE, $225.00.

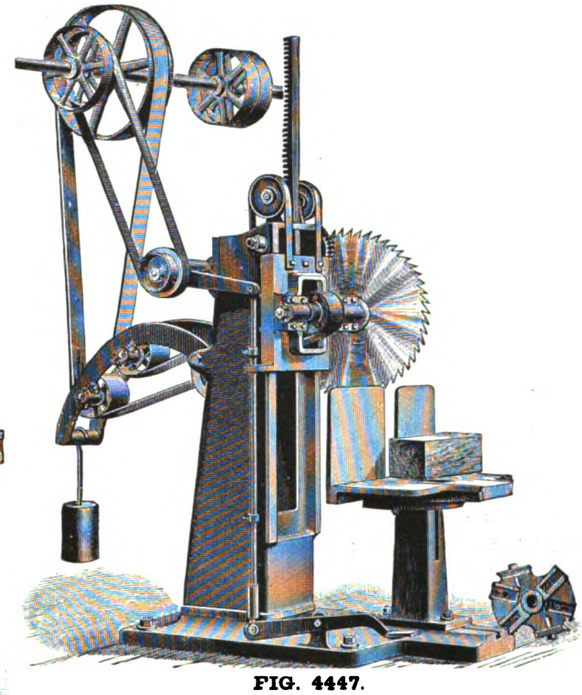


FIG. 4447.

36 INCH RIP SAW BENCH.

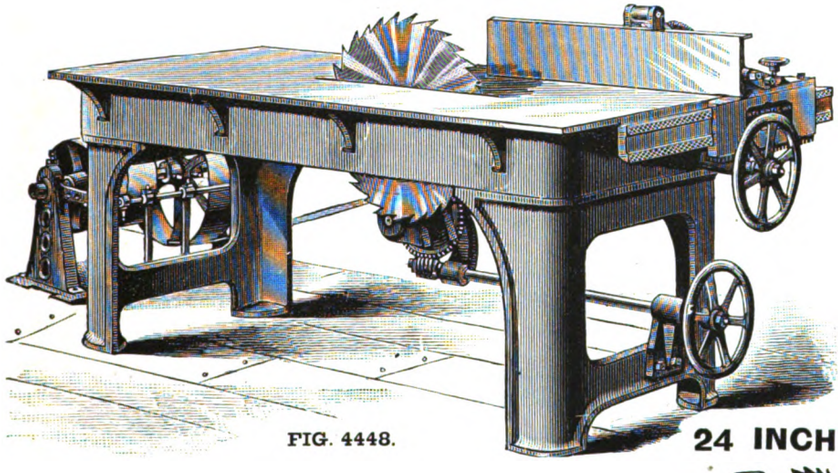


FIG. 4448.

DESCRIPTION, FIG. 4448.

Iron table, 40 x 99 inches; saw mandrel raises and falls; gauges for square and bevel; tight and loose pulleys, 16 x 7; speed, 500 revolutions.

PRICE.

With one 30 inch saw, wrenches and countershaft.....$400.00
WEIGHT, 3,500 LBS.

24 INCH RIP SAW BENCH.

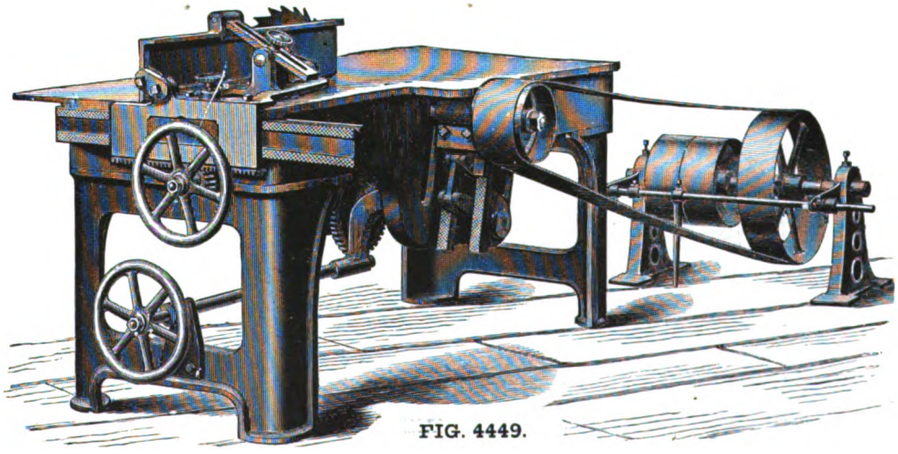


FIG. 4449.

DESCRIPTION, FIG. 4449.

Iron table, 33 x 75 inches; saw mandrel raises and falls; gauges for square and bevel; tight and loose pulleys, 12 x 5; speed, 700 revolutions.

PRICE.

With one 20 inch saw, wrenches and countershaft.....$275.00
WEIGHT, 2,000 LBS.

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18 AND 12 INCH RIP SAW BENCHES.

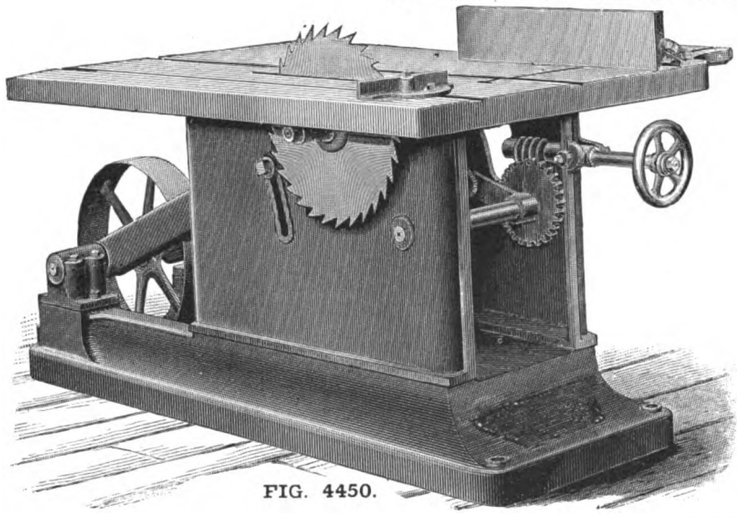


FIG. 4450.

DESCRIPTION, 18 INCH.

Iron table, 30 x 60 inches; saw mandrel rises and falls; gauges for square and bevel; tight and loose pulleys, 10 x 4 inches; speed, 500 revolutions.

PRICES.

With one rip saw, 18 inch; wrenches, countershaft, etc., complete; weight, 1,700 lbs..... .....$250.00

DESCRIPTION, 12 INCH.

Iron table, 36 x 48 inches; saw mandrel rises and falls; gauges for square and bevel; tight and loose pulleys, 8 x 4 inches; speed, 700 revolutions.

PRICES.

With one each 12 inch rip and cross-cut saw, wrenches, countershaft; weight, 1,300 lbs $225.00

CIRCULAR SAW, WITH BORING ATTACHMENT.

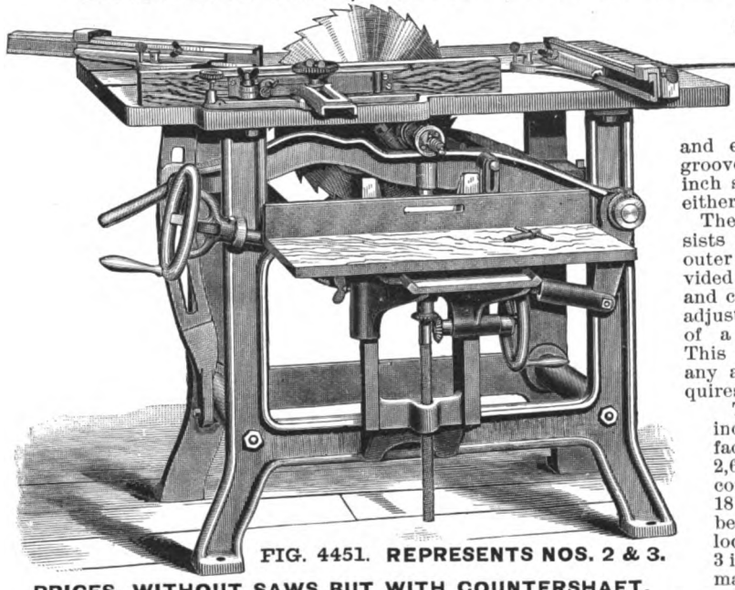


FIG. 4451. REPRESENTS NOS. 2 & 3.

DESCRIPTION, FIG. 4451.

The table is of iron, with a wooden throat piece, which gives access to the arbor, prevents injury to the saw, and enables wabble saws or groovers to be used; it takes a 16 inch saw and a rip gauge and either one or two cross-cut slides.

The boring attachment consists of a sliding table at the outer end of saw arbor, provided with an adjustable stop and carried on a knee, which is adjustable, vertically, by means of a hand wheel and screw. This attachment takes hardly any additional room, and requires no extra shafting or belts.

The arbor pulley is 3½ inches diameter, 4½ inches face, and should make about 2,625 turns per minute. The countershaft generally has an 18 inch pulley for a 3 inch belt, and 9 inch self-oiling, loose and tight pulleys for a 3 inch belt. It should then make about 510 turns per minute.

PRICES, WITHOUT SAWS BUT WITH COUNTERSHAFT.

		Boring attachment.
No. 1 takes a 30-inch saw; weight, 1,800 lbs.,	$.....	$.....
No. 2 " 20 " " " 850 "	$.....	$.....
No. 3 " 16 " " " 700 "	$.....	$.....

SHOP SAW BENCH.

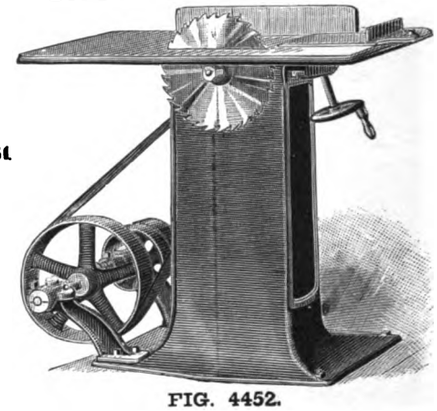


FIG. 4452.

This cut shows a new shop saw, calculated for pattern or cabinet shops. It has an iron top, hinged on a solid iron trunk, with countershaft attached. The top is grooved and cross-grooved for cut off and slitting gauges, which have fine adjustments for cutting right and left angles. It will be found an accurate and reliable saw, with all the gauge facilities required for doing the best class of work.

WEIGHT, 650 LBS.

PRICE.

Including one 12 inch saw.....$75.00

IRON FRAME WOOD TOP SAW TABLE.

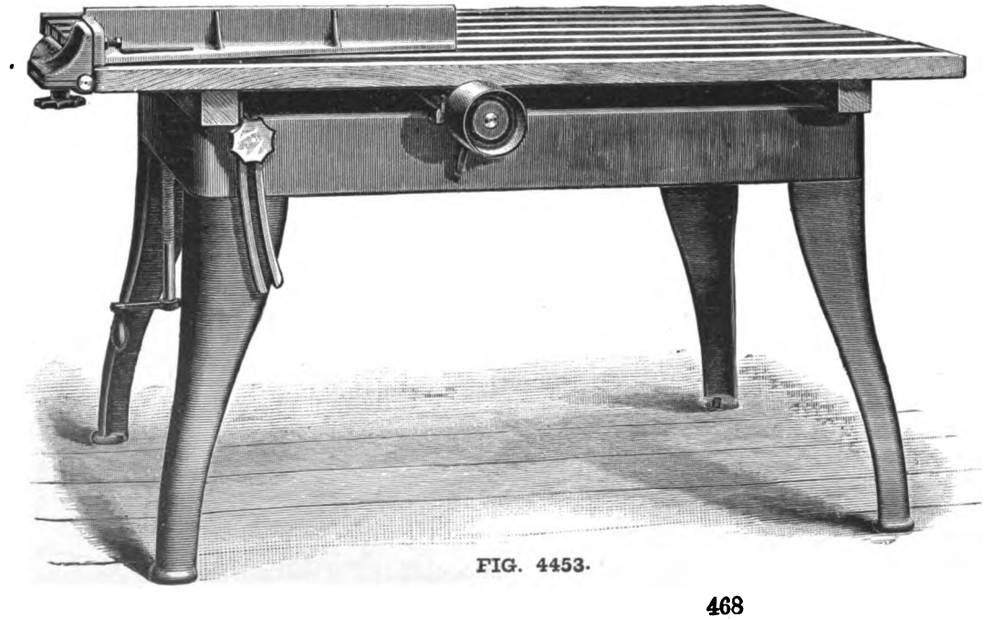


FIG. 4453.

No. 2 size will take a 16 inch saw.

The arbor pulley is on the outside, but may be placed on the inside, between the boxes, if desired, and should be so specified when ordering. A cross-cut gauge may be supplied at slight additional cost.

This machine is also built of a heavier pattern, with a No. 3 arbor, and the table is raised by a cam.

Pulley on arbor of the No. 2 is 4½ x 5 inches, and should run about 3,000. Hole in saw, 1 inch.

Pulley on the arbor of the No. 3 is 5 x 5½ inches, and should run about 2,500. Hole in saw, 1⅛ inch.

WEIGHT, 500 LBS.

PRICES.

No. 2, saws extra. $55.00
No. 3, " " 70.00

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SMALL IRON FRAME SAW BENCH.

The arbor is of steel, and will carry saws up to 14 inches in diameter; the table is 2 11-12 feet long by 2 4-12 feet wide, and is provided with rip gauge and two cross-cut or miter gauges; countershaft is attached to the frame. Tight and loose pulleys are 8 inches in diameter and 3 inches face, and should make 750 revolutions per minute.

WEIGHT, 485 LBS.

PRICE, WITHOUT SAWS, $100.00.

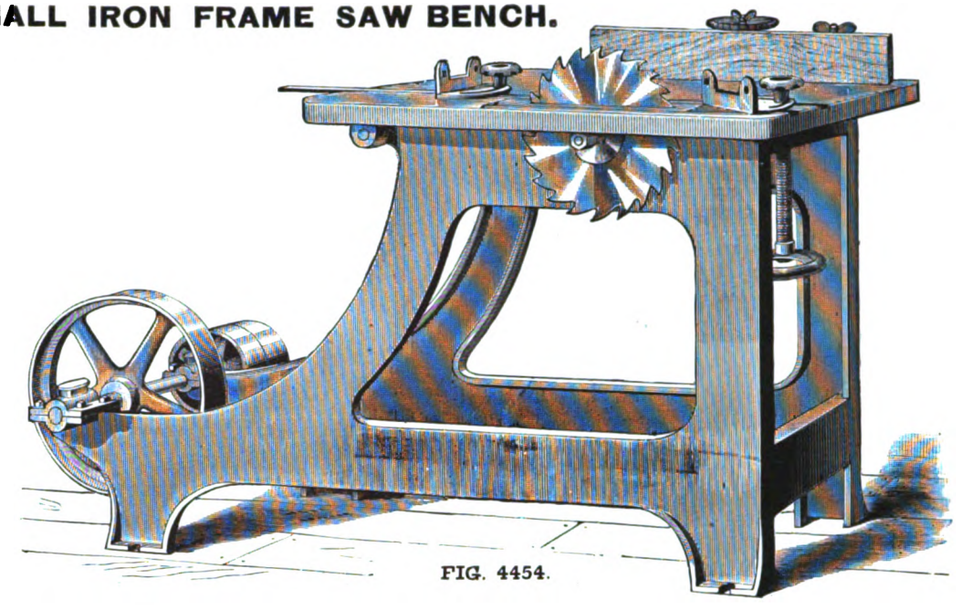


FIG. 4454.

WOOD FRAME RIP AND CROSS-CUT SAW BENCH.

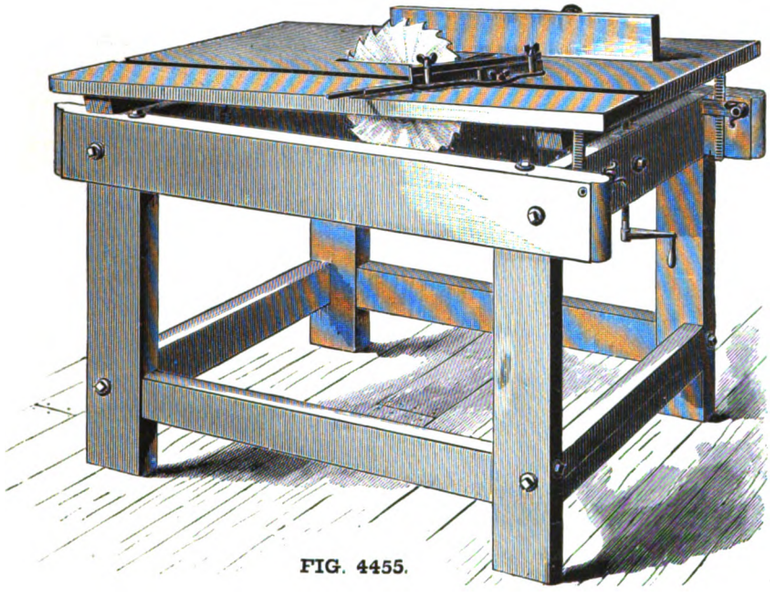


FIG. 4455.

PRICES, WITHOUT SAWS.

No. 1 table is 2 feet 6 inches by 4 feet, carries saw from 6 inches to 12 inches.....Price, $55.00
No. 2 table is 2 feet 10 inches by 4 feet 8 inches, carries a saw 12 inches to 16 inches.....Price, 60.00
No. 3 table is 3 feet by 5 feet, carries a saw 16 inches to 20 inches.....Price, 66.00
No. 5 table is 3 feet 6 inches by 6 feet, carries a saw up to 24 inches.....Price, 80.00
No. 6 table is 3 feet 8 inches by 6 feet, carries a saw up to 30 inches.....Price, 88.00
Cross-cut attachment extra for Nos. 1, 2, 3 and 5.... 8.00
" " " " 6..... 12.00

WOOD FRAME SLIDING TABLE CROSS-CUT AND RIP SAW BENCH.

No.	Size of arbor.	Size for hole in saw.	Size of pulley.
1	1 inch.	⅞ inch.	4 x 5 inch.
3	1¼ "	1⅛ "	4½ x 6 "

No.	Width of bed.	Length of bed.	Tight and loose pulleys on countershaft.	Width it will cross-cut.
1	33 inch.	54 inch.	9 x 4½ inch.	22 inch.
3	38 "	60 "	11 x 5½ "	26 "

PRICES.

Prices include countershaft complete, one slitting, one cross-cut and one miter gauge.

No. 1.....$90.00
No. 3.....120.00

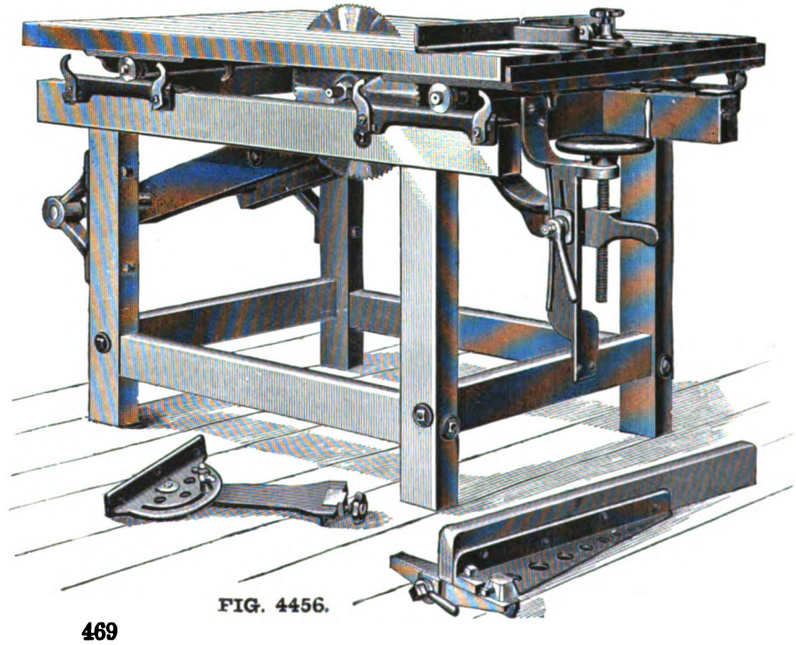


FIG. 4456.

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CORDON DOUBLE SAW BENCHES.

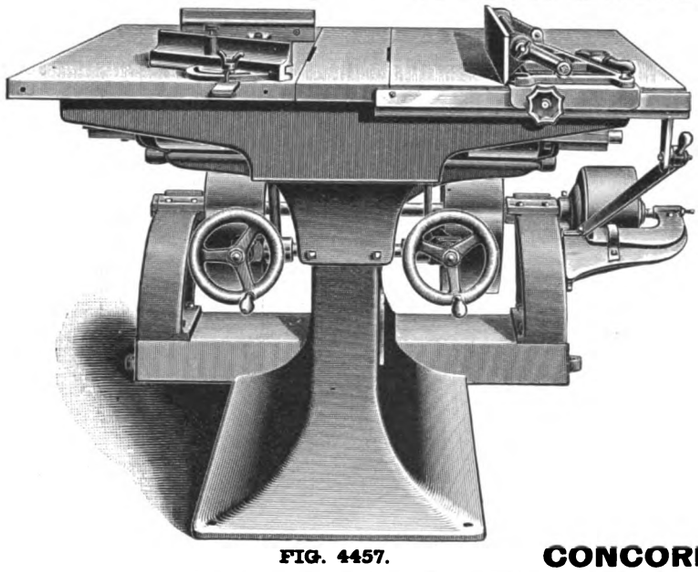


FIG. 4457.

On this machine the arbors are so arranged as to raise and lower at will without changing the position of the table.

The counter is attached direct to the frame and started and stopped by a friction clutch, making a very compact and powerful arrangement. The center section of the table between the saws is of wood and may be raised instantly so as to allow of removing the saws.

Table of iron, 48 x 42 inches.
Weight, 1,600 lbs.
Driving pulley, 10 inches x 6 inches.
Speed of counter, 650 revolutions.
Arbors 1 inch in diameter, and will carry 14 inch saws.
Floor space, 7 feet x 6 feet.

PRICES, NO SAWS, $200.00.

CONCORD SAW BENCH.

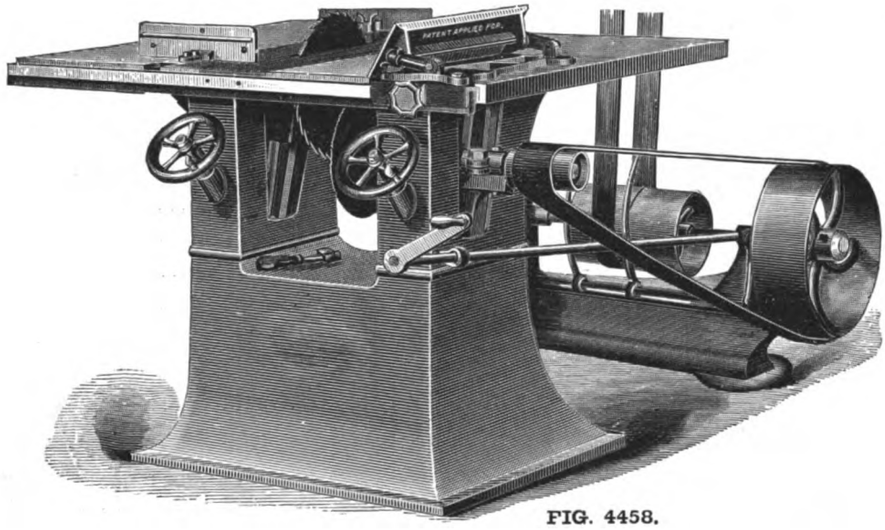


FIG. 4458.

An improvement not shown in this cut is a box outside the belt pulley. The arbors are attached to a carriage, gibbed to the frame on an incline, to keep the tension of belt the same, and is raised by bevel gears, each independent of the other. The table is iron, and is 3 feet 10 inches x 3 feet 6 inches. It has a center strip of wood, through which the saws run, 6 inches wide, which can be removed for a grooving head. This machine is furnished with a patent bevel, splitting and squaring rest, countershaft, with self-oiling tight and loose pulleys, 8 inches diameter x 6 inches face. Speed of countershaft should be 650 revolutions.

WEIGHT, 1,200 LBS.

PRICE.

With adjustable saw arbor and countershaft, no saws..... ....$200.00

DUNCKLEE'S ADJUSTABLE SAW BENCHES.

HEAVY PATTERN.

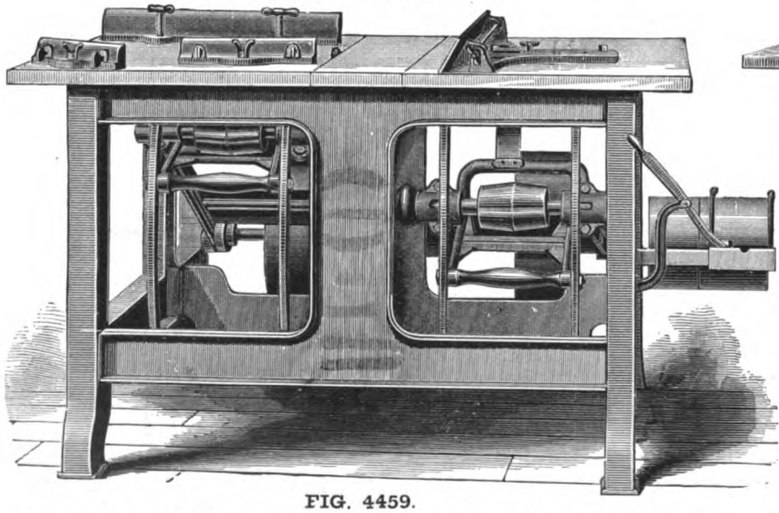


FIG. 4459.

The table is 56 x 48 inches. The section between the two saws can be readily removed in case a grooving head is to be used upon one of the arbors. It is furnished with a bevel rest, two short squaring rests, one swiveled for mitering. All these rests can be easily removed to admit of sawing long stuff.

The saw arbors are swung from the bearings of the countershaft, and are so adjusted that only one saw appears above the table at a time. One saw can be dropped and the other raised to any desired height above the table, and fastened there, in two seconds. Tight and loose pulleys, 10 inches x 6 inches. Speed, 650 turns per minute.

WEIGHT, 1,500 LBS. PRICE, WITHOUT SAWS, $250.00.

MEDIUM PATTERN.

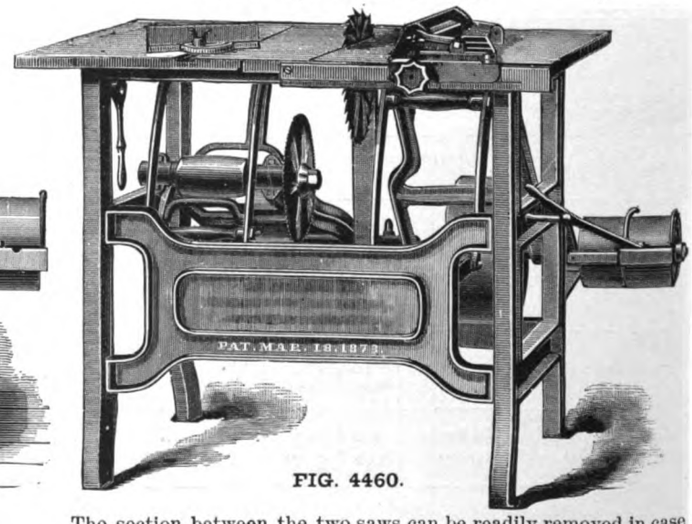


FIG. 4460.

The section between the two saws can be readily removed in case a grooving head is to be used upon one of the arbors. It is furnished with a bevel rest, two short squaring rests, swiveled for mitering, and can be easily removed to admit of sawing long stuff.

The saw arbors are swung from the bearings of the countershaft as before, and are so adjusted that only one saw appears above the table at a time. Tight and loose pulleys, 8 inches x 4 inches. Speed, 700 revolutions. Table is 38 x 43 inches.

WEIGHT, 800 LBS.

PRICE, WITHOUT SAWS, $160.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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DOUBLE UNIVERSAL SAW BENCH.

The top is of iron, except the center strip between the saws, and is 5 ft. x 4 ft.

Saws up to 20 inch diameter may be used; hole, 1 inch.

A countershaft with good adjustable hangers is furnished, the tight and loose pulleys of which are 10 x 6, and should make 400 to 500 revolutions per minute, according to size of saws.

WEIGHT, 1,100 LBS.

PRICE.

Without saw, $200.00

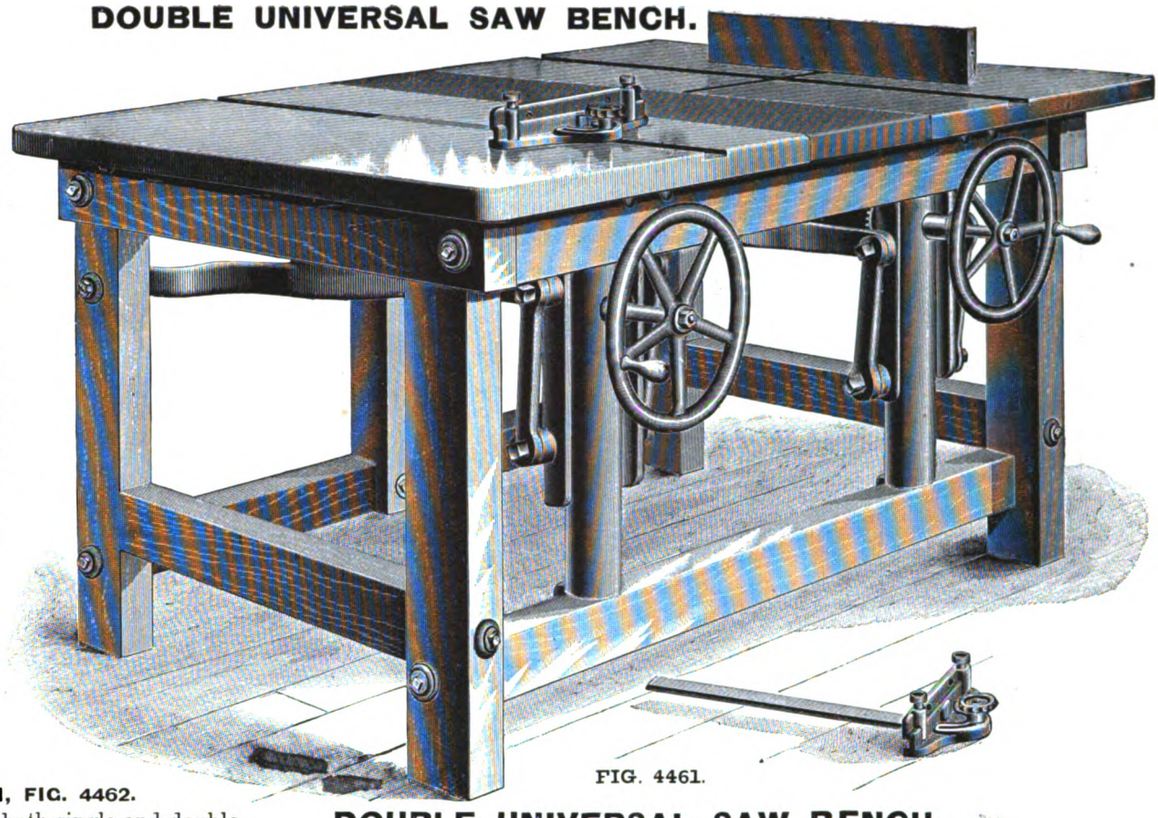


FIG. 4461.

DESCRIPTION, FIG. 4462.

This machine is made both single and double. The frame is of seasoned ash, 2½ x 4½ inch timber, with either iron or wood top, provided with squaring off or mitering rest. It also has an adjustable splitting gauge, which can be thrown back out of the way so that the narrow part can be used for thin work.

Tight and loose pulleys are 6 inches face and 12 inches diameter, and should make 500 revolutions per minute. **WEIGHT, 1,000 LBS.**

PRICES.

Double, wood frame, iron top.....$225.00
Single, " " " " 150.00

DOUBLE UNIVERSAL SAW BENCH.

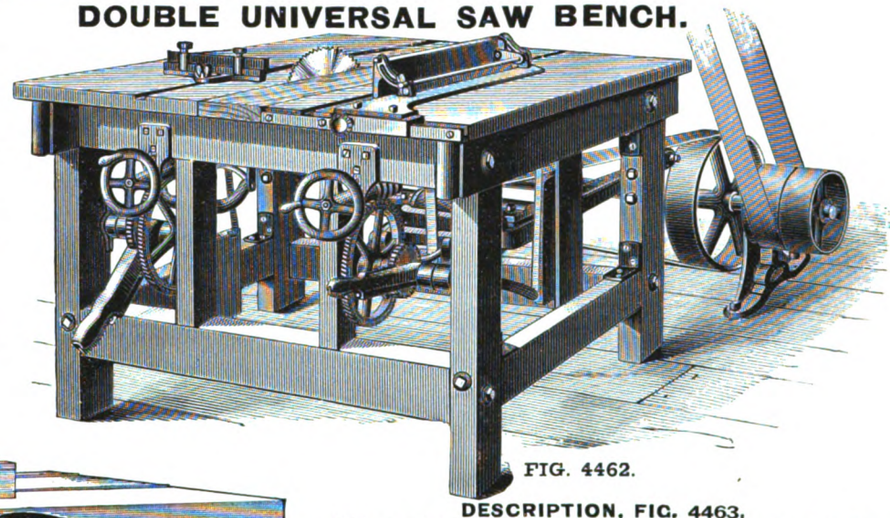


FIG. 4462.

SINGLE UNIVERSAL SAW BENCH.

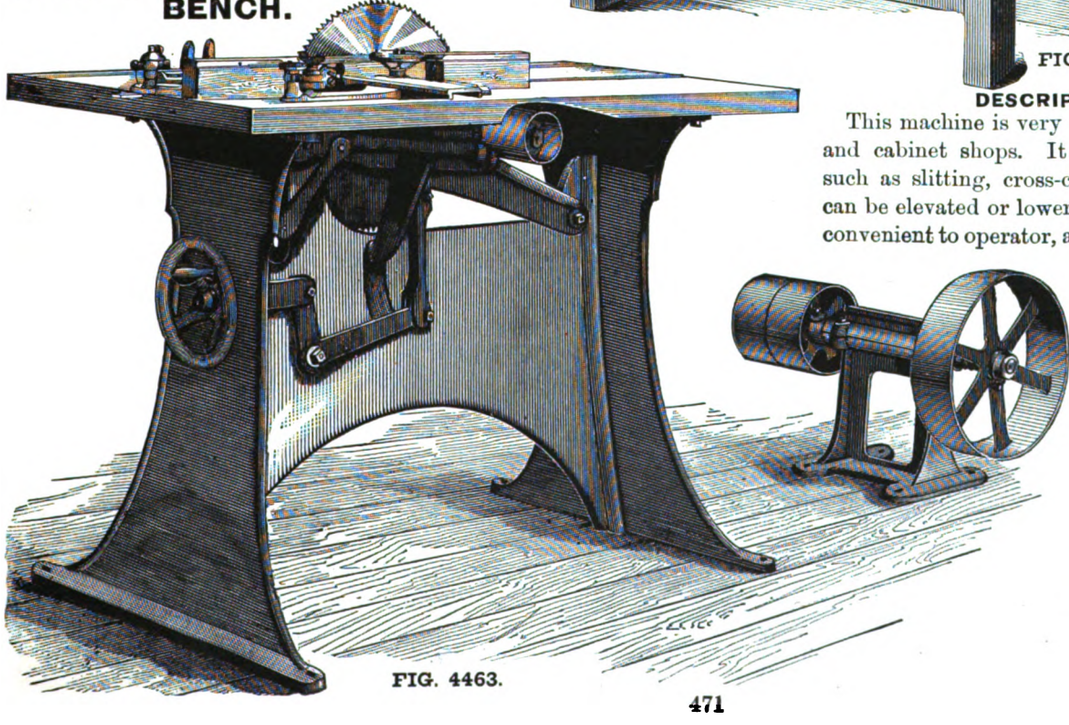


FIG. 4463.

DESCRIPTION, FIG. 4463.

This machine is very valuable in car, sash and door and cabinet shops. It is adapted to a variety of work, such as slitting, cross-cutting, mitering, etc. The saw can be elevated or lowered by means of a hand wheel, convenient to operator, and will carry saws up to 24 inches in diameter.

One 12 inch saw, right and left miter gauges and slitting gauge are furnished with this machine. Countershaft has tight and loose pulleys, 9 inches in diameter and 4 inches face, and should make 750 revolutions per minute. The center of counter should set 4½ feet from center of saw. This will allow you to raise or lower the saw without slacking the belt.

WEIGHT, 660 LBS.

PRICE, $125.00.

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SINGLE UNIVERSAL SAW BENCH.

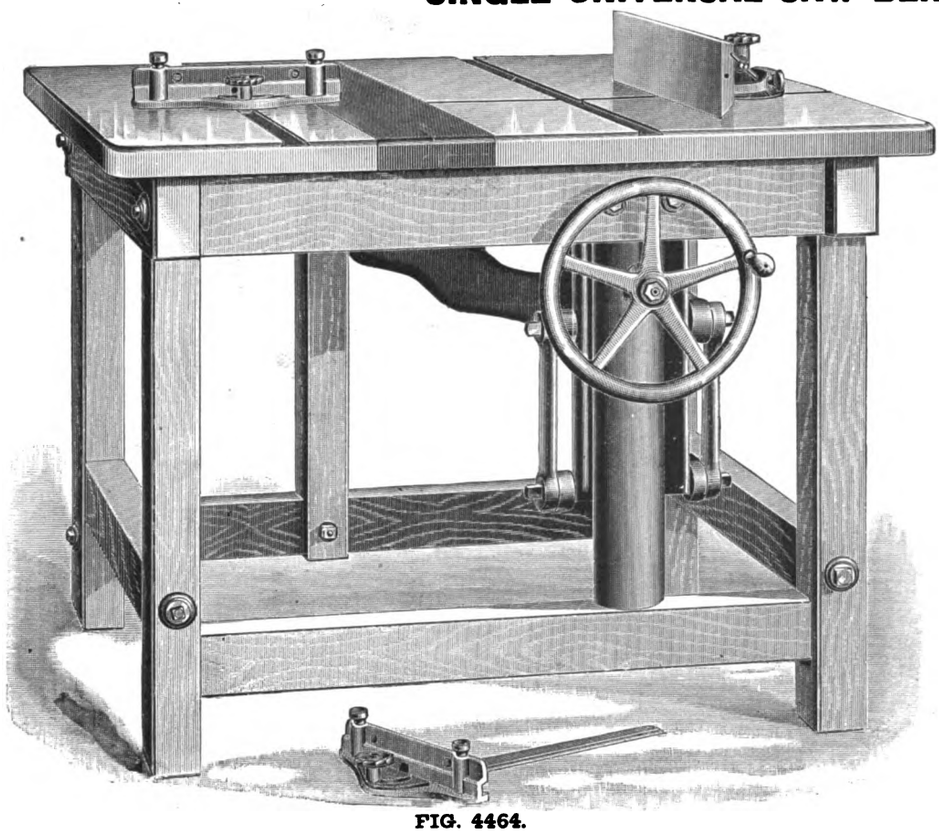


FIG. 4464.

TOP, 4 FT. x 3 FT. 8 IN.

This machine is designed to meet the demand for a general splitting and cutting-off saw table. It has substantial wood frame with iron top 3 feet 8 inches by 4 feet, supplied with iron bevel splitting gauge and two cut-off gauges adjustable for angular work, and provided with a device for holding stop gauges to regulate length of cut. The arbor is held in swinging yoke and frame, attached firmly to back end of frame, and is raised and lowered in front by means of large hand-wheel. Saws of various sizes may be used, up to 20 inches in diameter.

Size of arbor for saws, 1 inch.

Tight and loose pulleys are 10 x 6, and should make from 400 to 500 revolutions per minute, according to size of saws.

PRICE, $120.00.

RIP AND CROSS-CUT SAW BENCH.

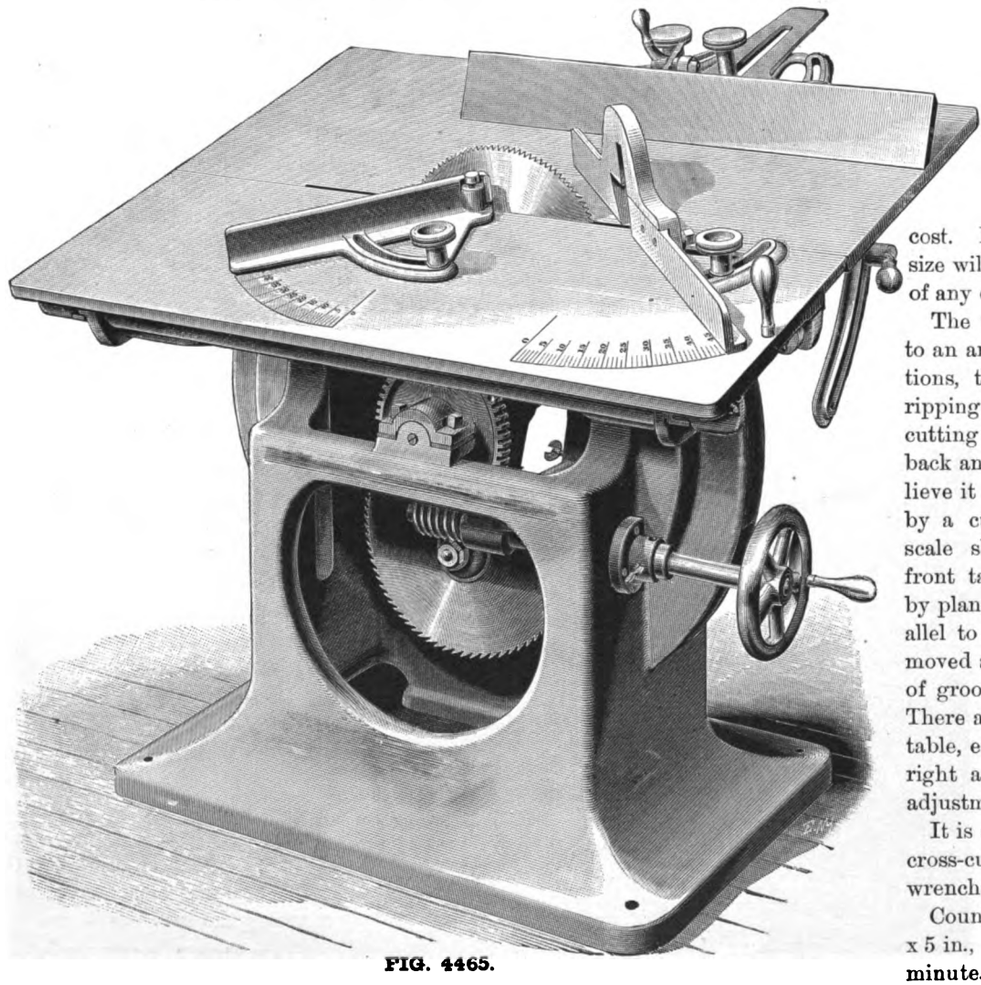


FIG. 4465.

DESCRIPTION, FIG. 4465.

This machine is designed, with solid frame and tipping table, for ripping and cross-cutting light materials, and in cabinet, pattern, sash and carriage shops its application is almost unlimited.

Two saws are used, one for ripping and one for cross-cutting, and both are driven by one belt from a countershaft placed below the floor directly under the machine, and so arranged that when either saw is in position to work, the other saw remains at rest. If desirable to belt the machine at any time from a countershaft on the same floor, we furnish an idler and pulleys to accomplish it, at a small extra cost. Either saw can be so adjusted to cut all its size will admit, or any depth less, so that a groove of any depth can be made.

The table is 44 in. x 34 in., can be adjusted up to an angle of 45 degrees. It is made in two sections, the right-hand side being stationary for ripping purposes. The left-hand section for cross-cutting purposes is 19 inches wide. It moves back and forth past the saw, over rollers that relieve it of friction. It is retained in its position by a curved slotted bar having a graduated scale showing the angle of inclination. The front table is moved upon rollers and guided by planed surfaces retaining it in its position, parallel to the saw. This part of the table can be moved away from the saw to allow different widths of groover heads to be placed on the mandrels. There are two graduated quadrants on the front table, each having an adjustable fence, by which right and left angles may be cut without re-adjustment.

It is equipped with one each 14 inch rip and cross-cut saw, ripping, cutting-off and miter fences, wrenches, etc.

Countershaft has tight and loose pulleys, 10 in. x 5 in., that should make 600 revolutions per minute.

PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 11 AND 113 LIBERTY STREET, NEW YORK

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HAND AND FOOT POWER CIRCULAR SAW.

No. 1, without boring table, with two 7 inch saws, one each cross-cut and rip, two cutting-off gauges, one wrench, and two crank handles, balance wheel weighing 40 lbs.....$60.00

No. 1, with boring table and side treadle, with two 7 inch saws, one each cross-cut and rip, two cutting-off gauges, one wrench, and two crank handles, weight of balance wheel, 40 lbs..... 67.00

No. 2, without boring table, two 7 inch saws, one each cross-cut and rip, two cutting-off gauges, one ripping gauge, one wrench, and two crank handles, 70 lb. balance wheel..... 65.00

No. 2, with boring table and side treadle, two 7 inch saws, one each cross-cut and rip, two cutting-off gauges, one ripping gauge, one wrench, and two crank handles, 70 lb. balance wheel..... 72.00



FIG. 4466.

ADJUSTABLE TOP SAW TABLE.

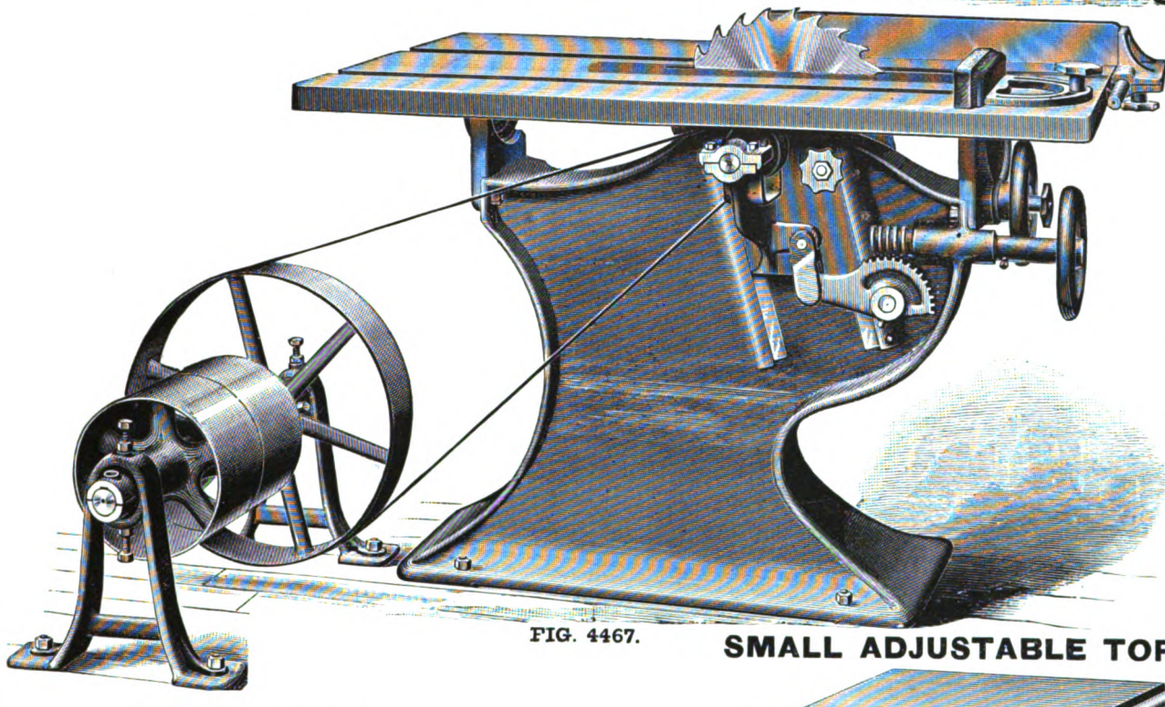


FIG. 4467.

PRICES, FIG. 4467.

With iron top, 4 ft. 4 in. x 3 ft.; can be set at any angle; has ripping and cross-cut gauges and miter; will take a 16 in. saw; countershaft, tight and loose pulleys, 10 in. x 6 in.; speed, 500 revolutions; weight, 850 lbs.

Without saw..**$140.00**

SMALL ADJUSTABLE TOP SAW TABLE.

DESCRIPTION, FIG. 4468.

It has a boring attachment.

The table is 34½ in. long and 28 in. wide, and can be tilted at any angle to 45 degrees. The positions for cutting angles are shown by a graduated scale at the fastening screw.

The slitting gauge will open 14 inches, and slides on a bar at the front of the table, and is easily moved to the right or left of the saw, making it both a right hand and left hand machine; and can be instantly removed when not wanted. Hole in saw, 1 inch.

Countershaft has tight and loose pulleys, 8 in. diam., 4 in. face, and should run 500.

PRICES.

Small adjustable top saw table.....$80.00
The same, with boring attachment.....105.00
The same, with boring attachment and countershaft.....120.00

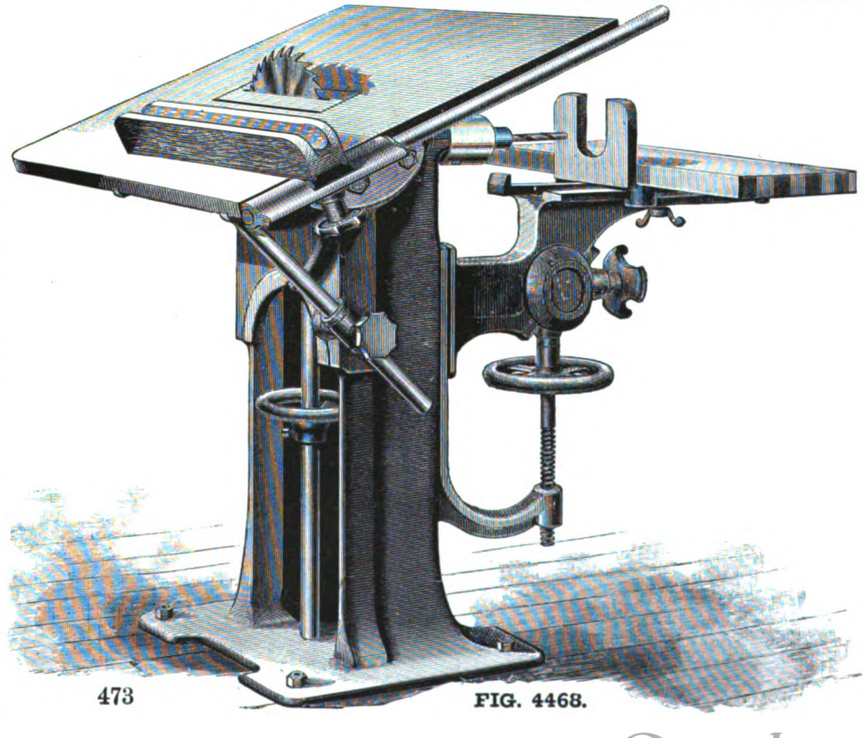


FIG. 4468.

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TILTING TOP RIP AND CROSS CUT SAW TABLE.

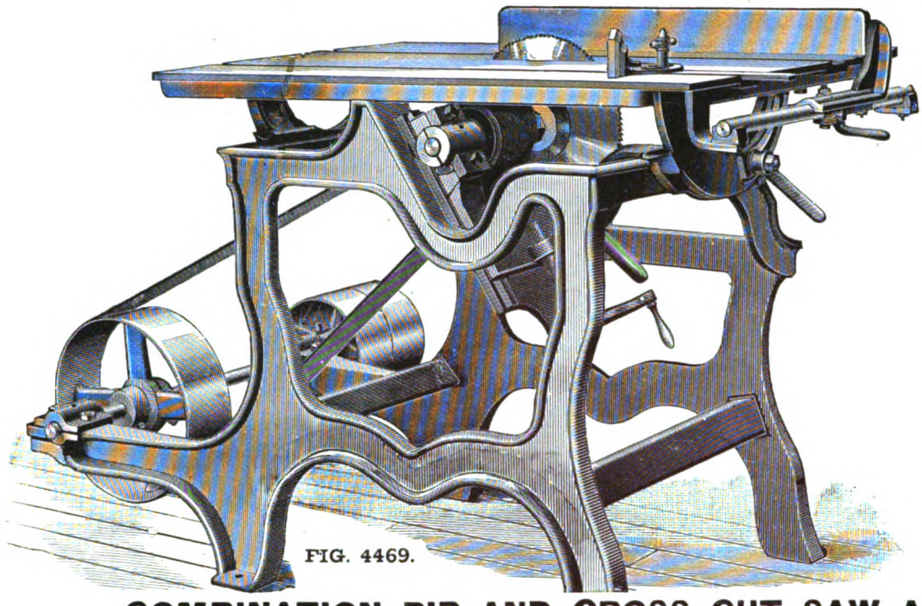


FIG. 4469.

The frame which carries the saw is fitted to a second frame, securely bolted to main frame, and slides in grooved ways set square with the table, and is raised and lowered by a ⅞ screw, with an eccentric lever, to secure the same in any position.

The table is a heavy solid casting, planed perfectly true, having two grooves running its entire length, so that cut off and miter gauges can be used either side of saw. Table can be set at any angle up to 45°. Tight and loose pulleys are 9 inches x 4½ inches. Speed, 650 revolutions.

PRICE.

Complete, including one slitting gauge, one miter gauge, one square cut off gauge, one 14 inch slitting saw and one 14 inch cross cut saw..... ..$125.00

COMBINATION RIP AND CROSS CUT SAW AND DADO MACHINE.

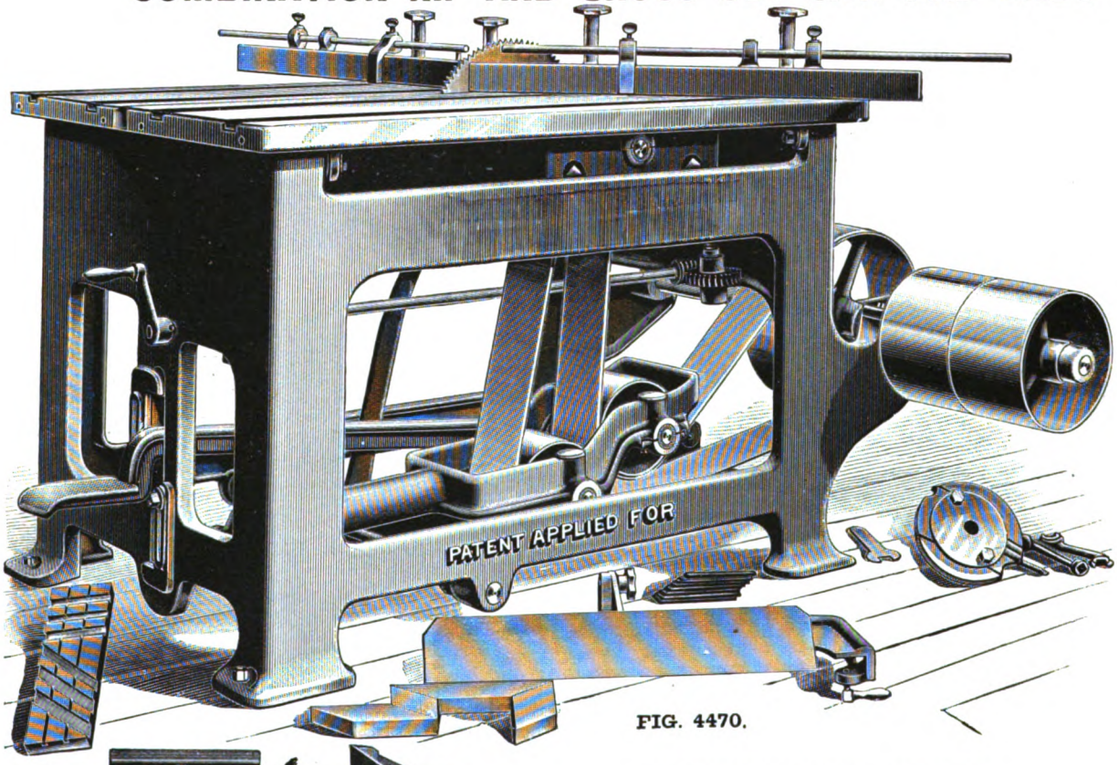


FIG. 4470.

This machine is intended for cutting off or dadoing on a square or at any angle, and for general ripping. Travel of saw 24 inches, and cuts 4 inches deep. Table top is in two pieces; right hand side swings upward. Top of table is 36 x 49 inches. We furnish with each saw, countershaft, stops and gauges for cutting off and ripping, 1 rip saw, 14 inch, and 1 dado head with 5 pairs cutters, from ⅜ to 1¼ inch.

Tight and loose pulleys, 10 inches x 5 inches. Speed, 900 revolutions.

WEIGHT, 1,600 LBS.

PRICES.

With saw and dado head.....$250.00
With saw and no dado head..... 225.00

MITER SAW BENCH.

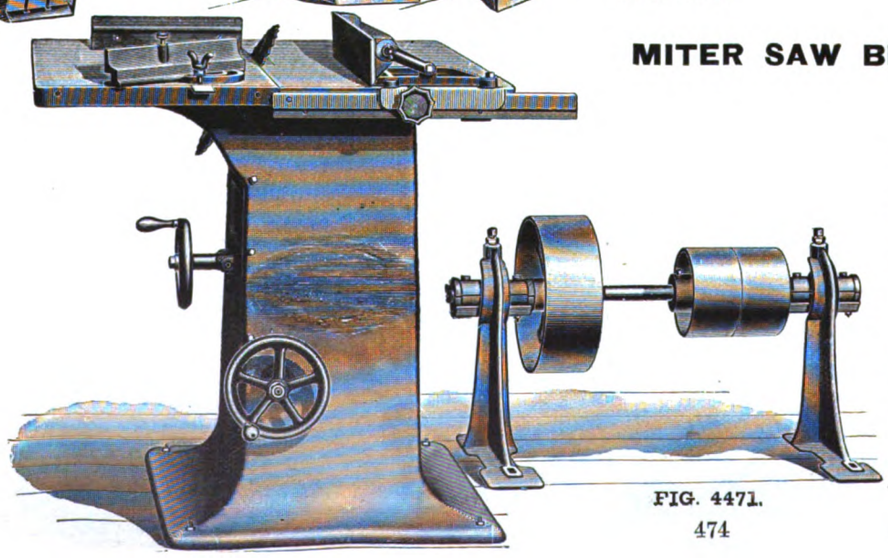


FIG. 4471.

DESCRIPTION, FIG. 4471.

It has an improved tipping arbor, so arranged as to be instantly set at any angle from 90 to 45 degrees by means of a hand wheel attached to the frame, under the table. The saw is also adjustable vertically by the hand wheel on the front of the machine most convenient to the operator.

The tables are gibbed to the frame in such a manner as to have a horizontal movement and to admit of a false table if desired, for any special work.

Tight and loose pulleys are 8 x 6 inches, and should make 750 revolutions per minute.

WEIGHT, 900 LBS.

PRICE, NO SAWS, $135.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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COMBINATION RIP SAW AND DADO MACHINE.

It is intended for ripping, sawing at any angle to 45 degrees, plowing, grooving, dadoing, etc.

The carriage is fitted with rollers that travel on ways.

The ways are fitted to the main frame of the machine and are raised or lowered by worm and worm wheel, operated by the crank.

The hand wheels are for adjusting the sliding tops apart, for using dado head, changing saw, etc.

The friction device for moving the carriage is operated by the foot treadle which connects the power to the saw carriage and brings it forward at any rate from 5 to 100 feet per minute, at the will of the operator.

By removing the pressure from the treadle, the power is disconnected and the carriage is returned to its position by the swing tightener, which answers a double purpose; one is that it draws the carriage back to its proper position, and the other is that it keeps the driving belt always tight. With each machine we furnish an endless driving belt.

The iron table tops are laid out in degrees for cutting at any angle desired to 45 degrees.

Size of table, 3 feet x 3 feet 4 inches. Tight and loose pulleys, 8 inches diameter x 4 inches face, and should run 900 revolutions per minute.

WEIGHT, 900 LBS.

PRICES.

Including dado head, etc., complete, as shown in cut..$190.00
Without dado head..... 165.00

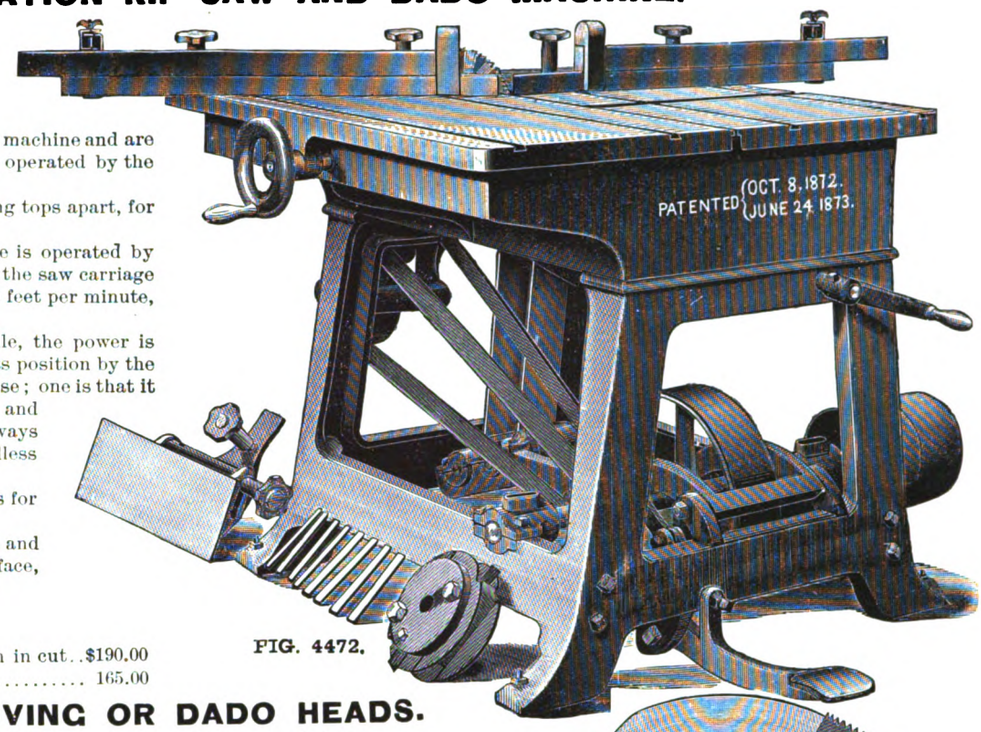


FIG. 4472.

GROOVING OR DADO HEADS.

PRICES.

No. 1 is a double head carrying knives from ¾ inch up to any width, secured to head by bolts, but will not admit of any change in width of knives on the same head, and is adapted to an independent shaft, or can be put on a tenoning machine arbor.

Cast iron..... $22.00
Steel or gun metal..... 28.00

No. 2 is a double head carrying knives from ¾ inch up to any width, secured to head by bolts, but will not admit of any change in width of knife on the same head, and is adapted to a saw arbor.

Cast iron $22.00
Steel or gun metal.... 28 00

No. 3 is a double head carrying knives from $\frac{3}{16}$ to ¾ inch, secured to head by clasp bolts, and will admit of changes of knives of any intervening widths between $\frac{3}{16}$ and ¾ inch, and is adapted to a saw arbor.

Cast iron.....$22.00
Steel or gun metal. 28.00

No. 4 is a double head on an independent arbor, in which the screw-nut forms a pulley with which to drive it, and is adapted to railroad car and other heavy, deep and wide gaining.

Cast iron.....$26.00
Steel or gun metal..... ... 32.00

No. 5 is a triple head carrying knives from 1 inch up to any width, secured to head by bolts, but will not admit of any change in width of knives on the same head, and is adapted to an independent shaft, or can be put on a tenoning machine arbor.

Steel or gun metal..... $32.00

No. 6 is a triple head on an independent arbor, in which the screw-nuts form pulleys with which to drive the same, and is adapted to railroad car and other heavy, deep and wide gaining.

Cast iron.....$34.00
Steel or gun metal..... 47.00

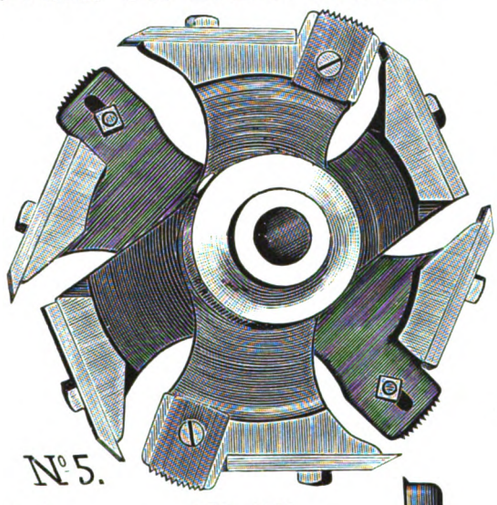


FIG. 4473.

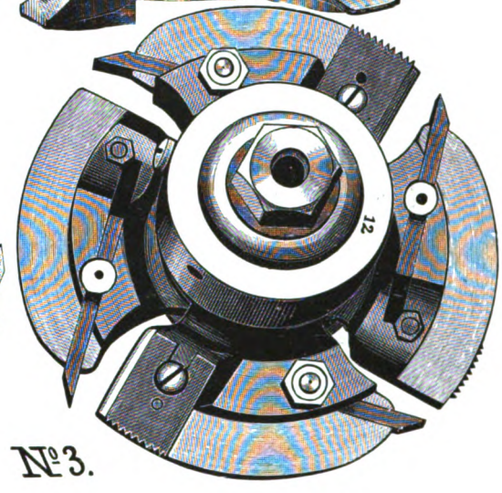


FIG. 4474.

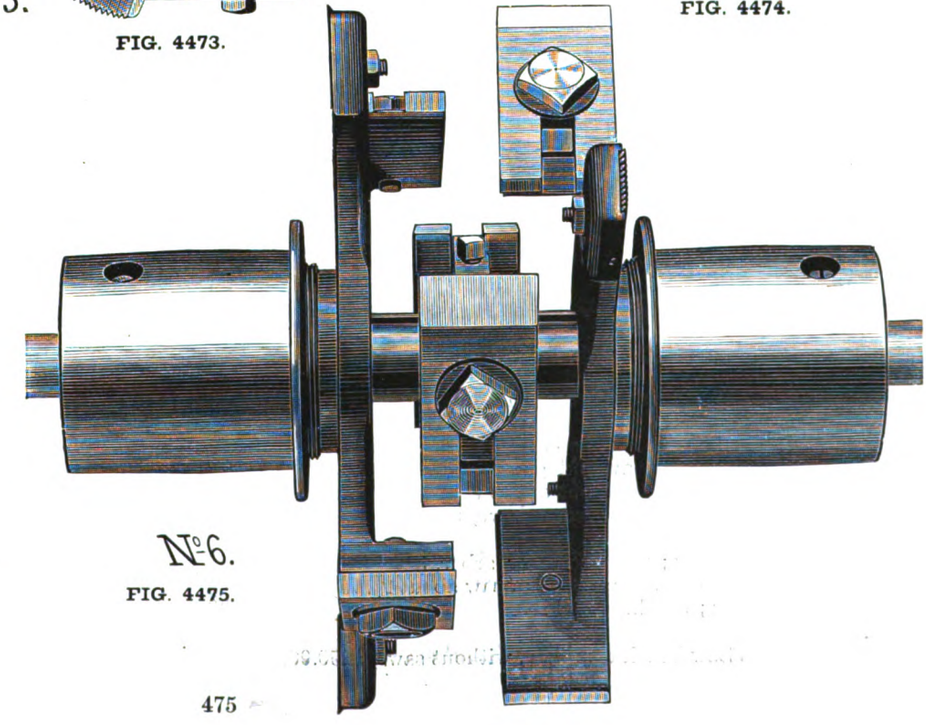


FIG. 4475.

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ADJUSTABLE DADO OR GROOVING HEAD.

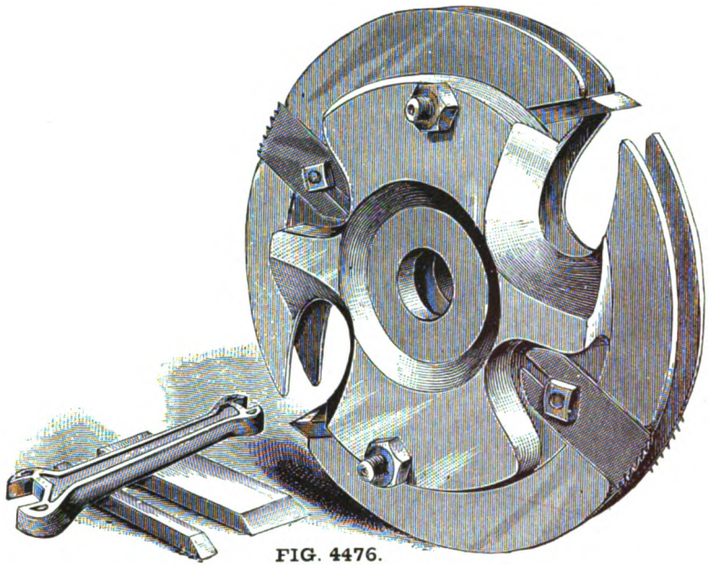


FIG. 4476.

This is designed for use with regular saw tables and with the parallel swing saw machine. With the latter machine it can be very advantageously used with formed knives for moulding pilasters and other work, as well as for tenoning, rabbeting, etc.

It consists of two composition brass flanges provided with scoring knives, which can be adjusted to compensate for wear, and with interchangeable routing cutters of a width to correspond with the grooves to be cut.

The room required on the arbor between nut and fixed flange (the loose flange being removed) is 1⅛ for a $\frac{5}{16}$ inch groove, to $2\frac{5}{16}$ for a 1½ inch groove.

In ordering, state size of hole required, and widths of grooves to be cut, and also whether the pulley is at the right hand or the left hand side of the saw when standing in front of the table.

8½ inches diam., to cut $\frac{5}{16}$ to 1½ inch wide and up to 1 inch deep.
10½ " " " ½ to 1½ " " " 1½ "

Either size can be arranged to cut up to 3 inches wide if so ordered.

UNIVERSAL SAW BENCH.

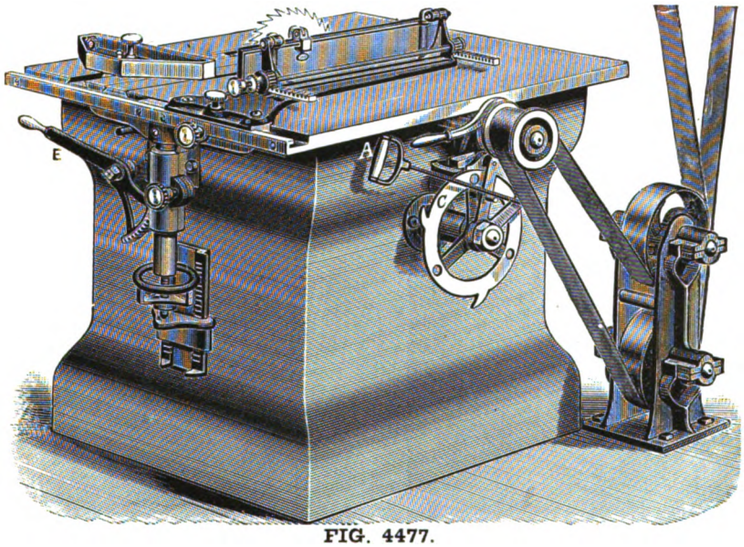


FIG. 4477.

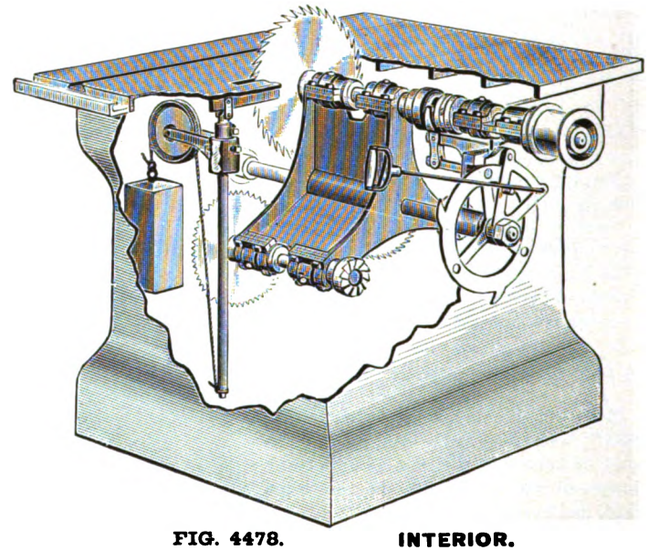


FIG. 4478. INTERIOR.

To the frame is attached all the running gear. It encloses most of the running gear, and makes a receptacle for all of the sawdust; there is a door at the back for removing the same. This machine has three steel arbors for saws and cutter-heads, running in self-oiling babbitt boxes adjustable to take up all wear. On one end of these arbors are the saws, on the other clutches; the clutches engage with a sliding clutch on the driving shaft, thus, when engaged, making one continuous shaft. To change saws, take hold of handle, A, pull towards you and rotate the sector. Now the pall in sector has come in contact with one of the projections on locking wheel; this causes the shaft to which the spider is attached to turn, brings the next arbor into axial line, also the pin into the locking wheel by means of a spring.

The table is raised by means of the lever in front, and clamped in any position and held perfectly secure. The hand wheel underneath is for very fine adjustment of table. First raise by means of the lever to nearly the height required and clamp, then bring up the shoe till the lower point of wheel rests upon it, the toothed racks hold it in position; then loosen the clamp; this lets the whole weight of table rest upon shoe; then turn the screw by means of hand wheel; this will raise or lower table as required. The table is planed true and has an adjustable opening, 3½ inches wide, for rabbeting, matching, grooving, tenoning, etc.

The cutting-off gauge is so made that you have a square and miter without any change; it is also adjustable from 0 to 45 degrees, and by turning one-quarter will give a double miter, that is, will cut both ends without turning the work over or changing ends. The side gauge, or splitting-fence, is fastened in front of the table. This does away with the cross slot in table; this gauge is also made to set on any angle from 0 to 45 degrees; it has a rack and pinion for moving it in and out from the saw and a very simple and effective device for holding it in any position from the saw; also an adjustment to give it more or less lead. We have also added an attachment to be clamped to the top edge of fence, to be used when cutting a series of pieces to a certain length by means of the cut-off gauge. The inconvenience and danger of so doing is that the pieces, being of a length to fill the space between the saw and slitting gauge, are liable to catch between the saw and gauge and fly in the face of the operator. By this attachment all such danger is avoided. When not in use it can be turned back out of the way or removed entirely. It is also made to be attached to any wooden gauge.

This machine can be belted from above, below or horizontally; the carrier stand, with pulleys shown on floor, is to take the place of counter when driven from above.

Table, 44 x 34 inches; pulley on saw arbor, 3¾ inches diameter, 4 inch face; hole in saw, 1⅛ inches; will take three saws—one 15 inches, two 14 inches diameter; speed of saw about 2,700; tight and loose pulleys on countershaft, 8 inches diameter, 6 inch face; should make 450 revolutions; weight, 1,050 lbs.

PRICES.

Saw bench complete, without saws, $250.00. Extra for countershaft. Extra for floor carrier.

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UNIVERSAL SAW BENCH.

The table on the right carries a splitting fence, which has a movement over the entire width of this table, and sets to cut any desired angle. This fence also sets diagonally with the saw for hollowing out core boxes, which work is performed with great rapidity and perfect accuracy.

The whole main table is also adapted to swing on the housing, as shown in Fig. 4480. This change is of great value in sawing out staves for cylinder, column and similar patterns, and on such work as newel posts, cisterns, etc., and for sawing double or flaring angles.

Dimensions.—Stationary table, 38 x 19½ inches; sliding table, 38 x 16 inches. It carries two 12 inch saws, which are furnished with the machine; or it will carry one 9 inch and one 16 inch saw, or one 18 inch, as desired.

The pulleys on saw arbors are 4 inches diameter, 5 inch face, and should run 2,800 revolutions per minute.

The countershaft has tight and loose pulleys, 8 inches diameter by 6 inch face, and should run 800 revolutions per minute.

Price of universal saw bench, including 2 saws.....$250.00
Price of countershaft..... 20.00

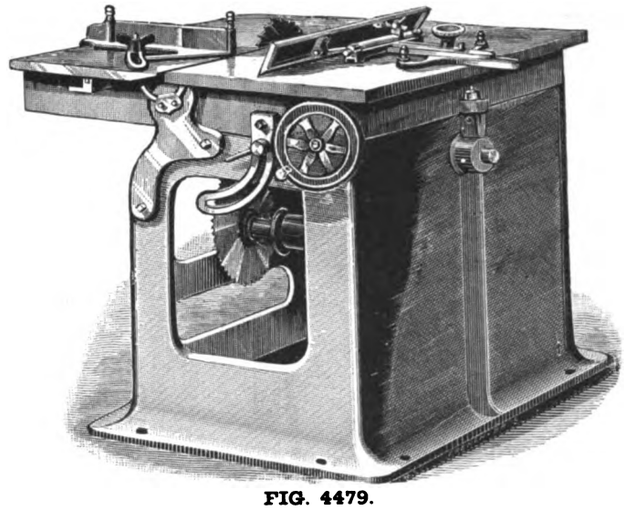


FIG. 4479.

CIRCULAR SAW MANDRELS.

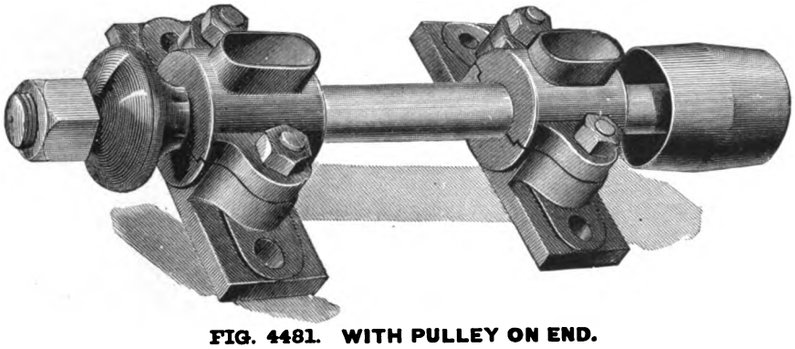


FIG. 4481. WITH PULLEY ON END.

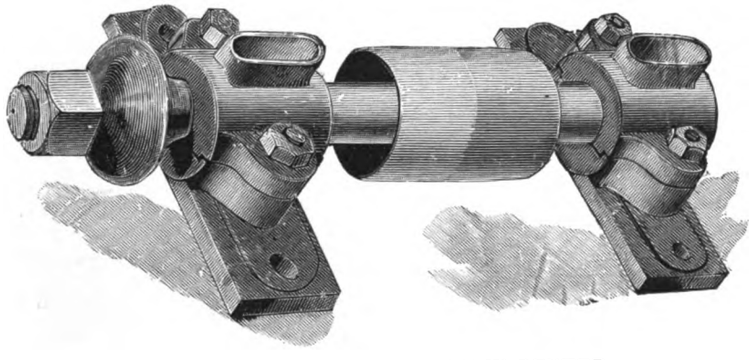


FIG. 4482. WITH PULLEY IN CENTER.

PRICES.

	Diameter of pulley.	Face of pulley.	Diameter of flange.	Length of shaft, Fig. 4481.	Length of shaft, Fig. 4482.	Prices, Fig. 4481.	Prices, Fig. 4482.
No. 1	2½ in.	3½ in.	2½ in.	16½ in.	14 in.	$7.70	$7.00
" 2	3 "	4 "	3 "	19 "	16 "	8.50	8.00
" 3	3½ "	4½ "	3½ "	21½ "	18 "	9.00	8.50
" 4	4 "	5 "	4 "	24 "	20 "	10.75	9.75
" 5	4½ "	5½ "	4½ "	26 "	22 "	12.00	11.00
" 6	5 "	6 "	5 "	28 "	24 "	13.75	12.50
" 7	5½ "	6½ "	5½ "	30½ "	26 "	15.00	13.75
" 8	6 "	7 "	6 "	32½ "	28 "	17.00	15.50
" 9	7 "	8 "	6 "	37 "	32 "	23.50	21.50
" 10	8 "	8 "	6 "	41 "	36 "	28.00	25.75

Larger sizes made to order.

When ordering saw mandrels, send sketch and give distance from saw to end of mandrel if the pulley is between the bearings. If the pulley is on the end of mandrel, give distance from saw to inside edge of pulley; also, whether the pulley is on the right or left hand side of mandrel when saw is running toward you.

Our mandrels are made with pulley on right hand side with left hand thread, unless otherwise ordered.

The above are standard sizes. Special sizes made to order. Mandrels for gangs of saws, with separating collars, for dovetailing box corners, made to order. Also, mandrels and gangs of saws for making wood pulp, and for other purposes, made to order.

BLIND RABBETING ATTACHMENT.

Fig. 4480 shows more clearly the method of tipping the table to any degree from a level position to a miter.

An attachment is made for rabbeting blinds, and in this and similar cases an advantage is gained by having the cutter-head set diagonally to the plane of the face of the blind, thereby cutting the rabbet clean and smooth on both faces.

Price of blind rabbeting attachment..... $25.00

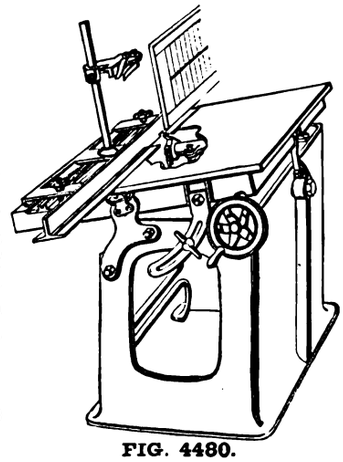


FIG. 4480.

EXPANSION DADO HEAD FOR FIG. 4479.

DESCRIPTION, FIG. 4483.

The machine will take head up to 3 inches; a ¾ head will expand to 1½ inches; heads will work across or with the grain.

PRICES.

Head, any width up to 1 inch, cast iron..... $16.00
Head, any width up to 1 inch, steel or brass. 25.00

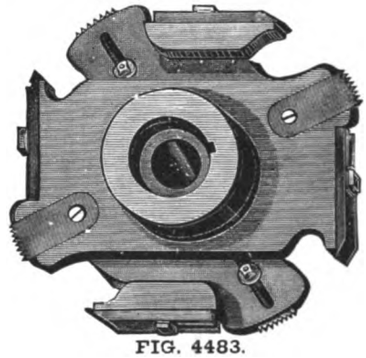


FIG. 4483.

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SELF-OILING CIRCULAR SAW ARBORS.

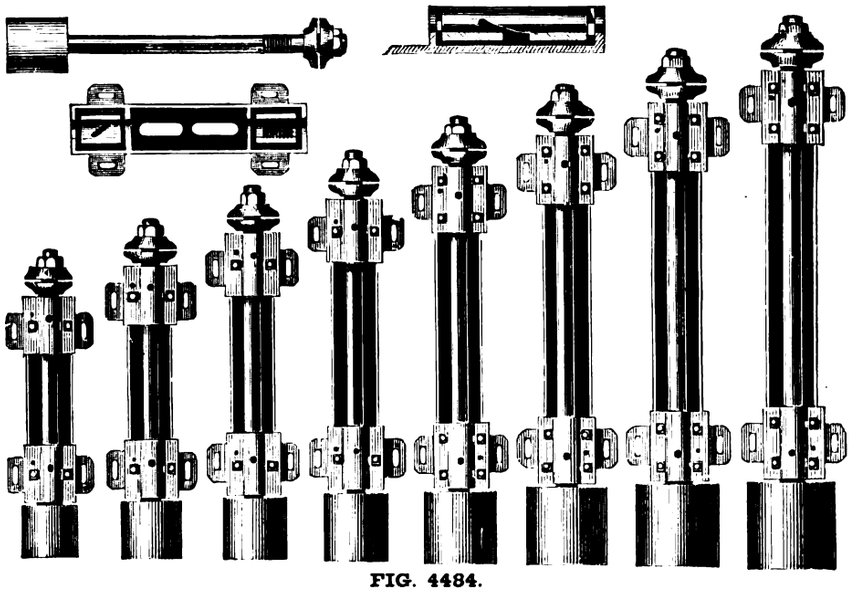


FIG. 4484.

CONE BUSHING

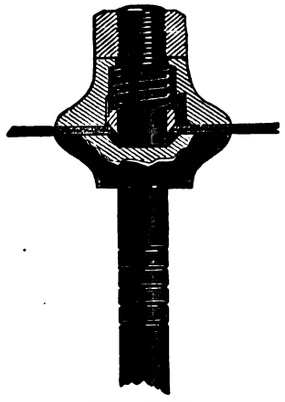


FIG. 4485.

FIG. 4484.

These arbors are furnished with the self-centering cone bushings as shown in section, Fig. 4485. They are self-oiling.

Numbers.	Dist. from center to center of ear pieces.	Dist. between pulley and saw.	Diameter of pulleys.	Face of pulleys.	Diameter of collar.	Diameter of arbors.	Hole in saw varying with bushing, from	Prices.	Numbers.	Dist. from center to center of ear pieces.	Dist. between pulley and saw.	Diameter of pulleys.	Face of pulleys.	Diameter of collar.	Diameter of arbors.	Hole in saw varying with bushing, from	Prices.
1	9	15	3	4	3	7/8	3/4 to 1 1/8	$14.00	7	15	21	5	5	4	1 1/4	1 1/8 to 1 1/2	$21.00
2	11	17	4	4	3 1/4	1	7/8 " 1 1/4	16.00	8	19	25	5	5	4	1 1/4	1 1/8 " 1 1/2	22.00
3	13	19	4 1/2	4	3 1/2	1	1 " 1 3/8	17.00	9	15	21	5	6	4 1/2	1 3/8	1 1/8 " 1 1/2	24.00
4	13	19	4 1/2	5	3 1/2	1 1/8	1 " 1 3/8	18.00	10	19	25	6	6	4 1/2	1 3/8	1 1/8 " 1 1/2	26.00
5	15	21	4 1/2	5	3 1/2	1 1/8	1 " 1 3/8	19.00	11	19	27	6	6	5	1 1/2	1 3/8 " 1 3/4	30.00
6	17	23	5	5	3 1/2	1 1/8	1 " 1 1/2	20.00	12	21	29	7	7	5 1/2	1 3/4	1 3/8 " 1 3/4	37.00

IMPROVED YOKE ARBORS.

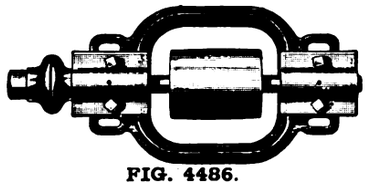


FIG. 4486.

Numbers.	Whole length of bed.	Dist. from center to center of ear pieces.	Diameter of pulleys.	Face of pulleys.	Diameter of collars.	Diameter of arbors.	Hole in saw varying with bushing, from	Prices.
1	15	11	3 1/2	4	3	7/8	3/4 to 1 1/8	$14.00
2	16 1/2	13	4	5	3 1/4	1	7/8 " 1 1/4	16.00
3	18	14	4 1/2	5	3 1/2	1 1/8	1 " 1 3/8	19.00
4	20	15	4 1/2	5	4	1 1/4	1 1/8 " 1 1/2	21.00
5	22	15	5	6	4 1/2	1 3/8	1 1/8 " 1 1/2	24.00
6	23	17 1/2	5 1/2	8	5	1 1/2	1 3/8 " 1 3/4	30.00

A deduction of $3.00 will be made from above lists when arbors are ordered without the cone bushing.

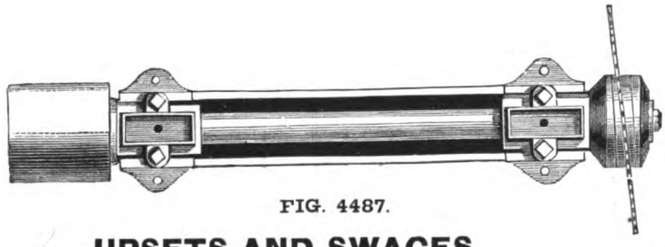


FIG. 4487.

SAW CROOVER AND ARBOR.

The arbors have self-oiling boxes. We send with each groover a set of collars to use with a common saw for cutting off and splitting. We furnish with each a 10 inch saw, which will cut from 1/8 to 1 1/4 in. groove.

The arbor has a pulley 4 1/2 in. diam., 5 in. face, and should make 2,000 revolutions per minute.

Power required to drive groover, 2 horse power. The driving belt should be 4 in. Price, $30.00.

UPSETS AND SWAGES.

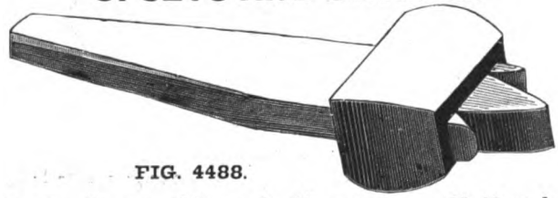


FIG. 4488.

No. 1. Improved large double swage.....$3.00 each.
No. 2. " small " " ..... 2.50 "
No. 3. " single swage ..... 2.00 "
Side file or tool for regulating set..... 1.50 "

BEST CAST STEEL SAW SET.



FIG. 4489.

FOR BENDING THE POINTS OF SAW TEETH.

Large size ...$3.50 each. Small size....$2.00 each.

ADJUSTABLE SETTING STAKE FOR CIRCULAR SAWS.



FIG. 4490.

This valuable tool can be adjusted to set any saw from 6 to 30 in. in diam. The cone is moved in or out to suit the diam. of the saw, and raised or lowered, as may be required. The movable anvil is made of hardened steel, and some portions of the face being beveled more than others, the operator can regulate the amount of set as desired. Price, $5.00.

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SOLID TOOTHED CIRCULAR SAWS.

Diameter. Inches.	Thickness. Gauge.	Size of hole. Inches.	Prices. Ground and tempered.	Extra, for each additional gauge (heavier).	Prices for beveling new saws. (Grinding or beveling old saws, extra.) Per gauge.
1	24	3/8	$0.50	$0.01	$0.06
1½	24	3/8	.55	.01	.07
2	23	3/8	.60	.01½	.08
2½	22	3/8	.65	.02	.09
3	21	1/2	.70	.02½	.10
3½	20	1/2	.80	.03	.12
4	19	3/4	1.00	.03	.14
5	19	3/4	1.20	.04	.16
6	18	3/4	1.40	.05	.18
7	18	3/4	1.70	.06	.20
8	18	7/8	2.00	.08	.22
9	17	7/8	2.50	.10	.25
10	16	1	3.00	.12	.28
11	16	1	3.50	.14	.30
12	15	1	3.75	.17	.35
14	15	1 1/8	4.50	.21	.40
16	14	1 1/8	5.50	.25	.50
18	13	1 1/4	7.00	.30	.60
20	13	1 5/8	8.50	.35	.70
22	12	1 5/8	10.00	.45	.80
24	11	1 3/8	12.00	.55	.90
26	11	1 3/8	14.00	.65	1.05
28	10	1 1/2	16.00	.80	1.20
30	10	1 1/2	18.00	.90	1.30
32	10	1 5/8	20.00	1.00	1.40
34	9	1 5/8	22.50	1.20	1.55
36	9	1 5/8	25.50	1.40	1.70
38	9	1 5/8	30.00	1.75	1.85
40	9	2	35.00	2.00	2.00
42	8	2	42.00	2.50	2.20
44	8	2	50.00	3.00	2.40
46	8	2	60.00	3.50	2.60
48	8	2	70.00	4.00	2.80
50	7	2	80.00	4.50	3.00
52	7	2	90.00	5.00	3.25
54	7	2	100.00	6.00	3.50
56	7	2	115.00	7.00	3.75
58	7	2	130.00	8.00	4.05
60	6	2	145.00	9.00	4.35
62	6	2	160.00	10.00	4.65
64	6	2	180.00	12.00	5.00
66	6	2	200.00	15.00	5.35
68	5	2	225.00	18.00	5.75
70	5	2	255.00	21.00	6.15
72	5	2	290.00		
74	5	2	330.00		
76	5	2	375.00		

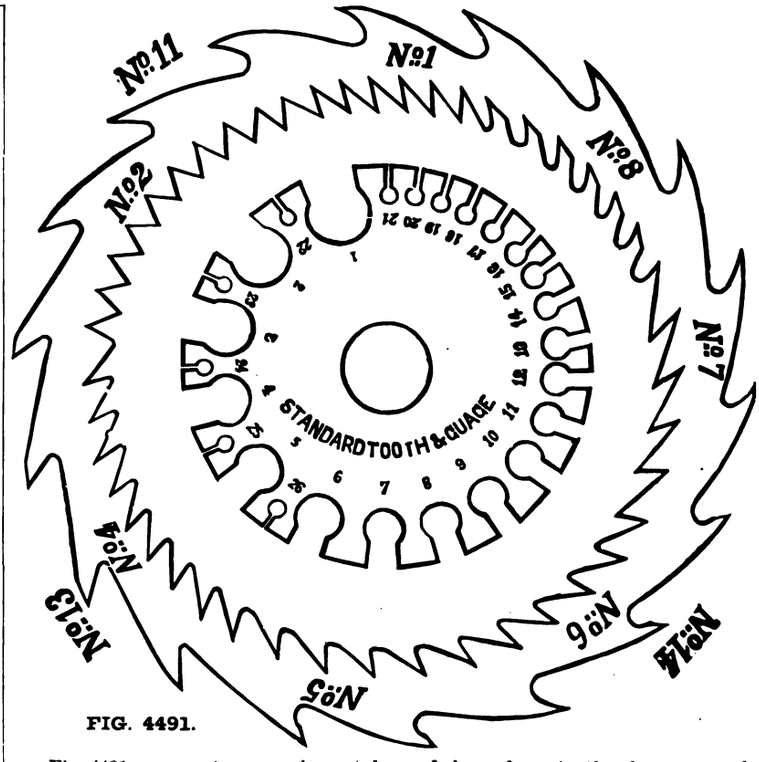


FIG. 4491.

Fig. 4491 represents our various styles and sizes of saw teeth; also our standard gauge. By consulting it a person will be enabled to inform us of the size and style of tooth, and also the gauge of any saw he may desire.

When ordering circular saws, the following directions should be explicitly given:

Diameter of saw, in inches; thickness or gauge of saw at rim; thickness or gauge of saw at center; log side, right or left hand, saw cutting toward you; number of teeth in saw; kind and number of tooth, as shown above; size of mandrel hole; size of pin holes; distance between pin holes from center to center.

No extra charge for saws one gauge thinner than list. One gauge beveling allowed on all circular saws larger than 38 inches. All circular saws 48 inches and larger, if thinner than 10 gauge, are not warranted and add 10 per cent. for each gauge thinner than No. 10.

TOOLS FOR REPAIRING SAWS.

SWAGE BAR.

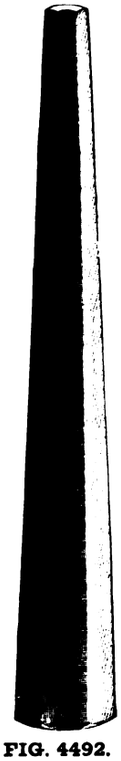


FIG. 4492.

SWAGE BAR HAMMER.

PRICES, FIG. 4492.
EITHER 8 OR 6 SIDED.

Length. Inches.	Diam. large end. Inches.	Diam. small end. Inch.	Each.
14	2	1	$6.50
12	1¾	¾	4.50
10	1½	½	3.00

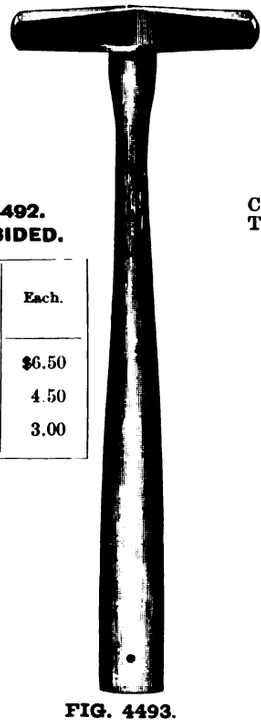
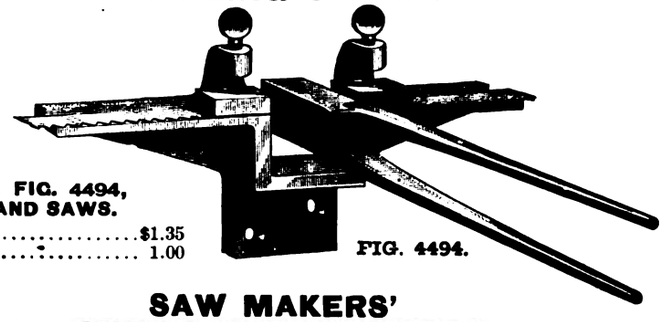


FIG. 4493.
PRICE, $1.00 EACH.

BRAZING CLAMPS.



PRICES, FIG. 4494,
FOR BAND SAWS.

Clamps, each $1.35
Tongs, " 1.00

FIG. 4494.

SAW MAKERS' ANVILS AND HAMMERS.



FIG. 4495.

PRICES, SAW MAKERS' HAMMERS.

2½ to 3 lbs. ..... $1.60 each.
3½ to 4 lbs. ..... 2.00 "
4½ to 6 lbs. ..... 3.20 "

PRICES, SAW MAKERS' ANVILS.

Face, 5½ x 8 in.. Height, 6 in..... Weight, 70 lbs... } $11.50 each.	Face, 5½ x 8 in... Height, 7½ in... Weight, 100 lbs.. } $16.00 each.	Face, 6 x 10 in..... Height, 8½ in..... Weight, 150 lbs.... } $20.00 each.

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CHISEL TOOTH CIRCULAR SAWS.

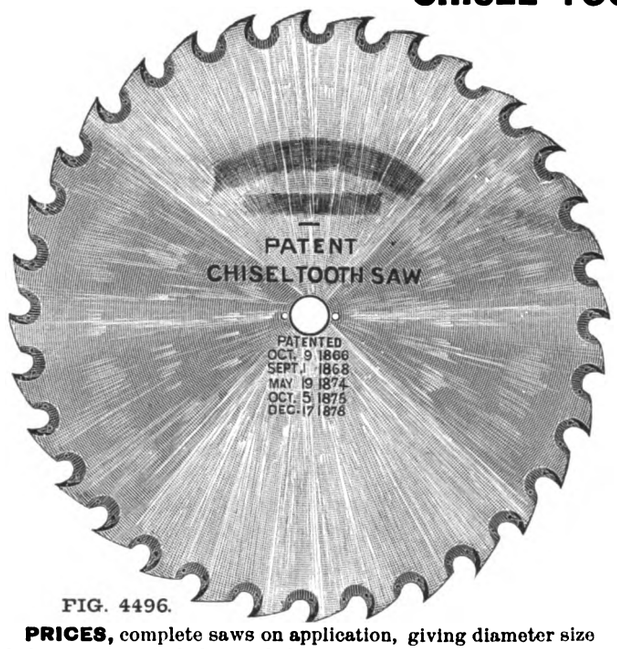


FIG. 4496.

PRICES, complete saws on application, giving diameter size hole, position pin holes, and class of work saw is to perform.

STYLES OF BITS.

NO. 2.

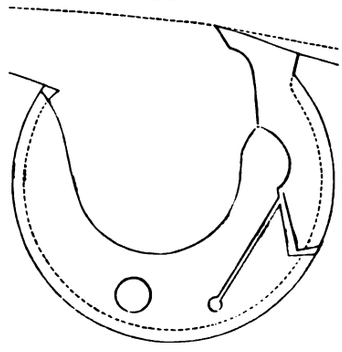


FIG. 4497.

NO. 3.

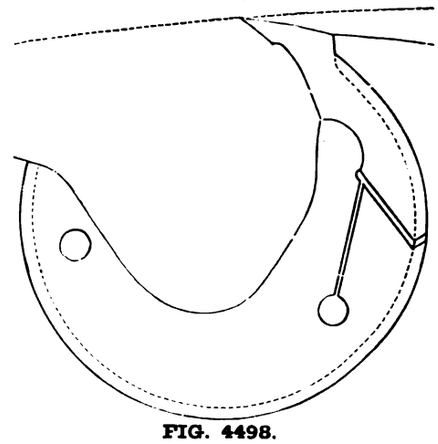


FIG. 4498.

These shapes represent full size of chisel bit.

The No. 2 is used in bench work and on gang edging machines.

The No. 3 is used in miscellaneous sawing, hard wood and frozen timber.

The No. 4 is used in the soft and pitchy timber of southern and tropical countries.

NO. 4.

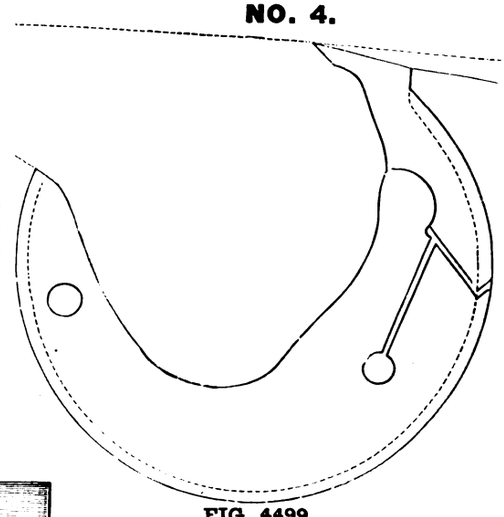


FIG. 4499.

PRICES, PARTS.

Price of chisel bits, No. 1, 2 or 3	$3.00 per 100
" " " No. 4	3.50 per 100
" straight back bits	3.00 per 100

Packed in boxes, each containing 500.

Prices of shanks for chisel tooth saws	No. 1	20 cents each.
	No. 2	25 " "
	No. 3	30 " "
	No. 4	38 " "
	Straight back	75 " "

TEMPERED AND GROUND GANG SAWS.

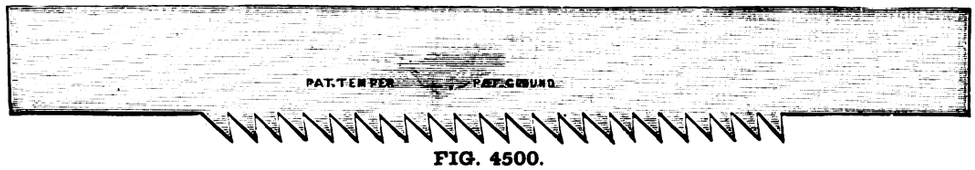


FIG. 4500.

All gang saws made narrower at ends than in center, unless otherwise ordered.

Black gang saws 10 cents per foot less list.

Extra width, extra price. When ordering gang saws, give length and width of saw; also thickness by gauge, space of tooth from point to point, and distance from top of saw to first tooth and distance from bottom of saw to last tooth.

PRICES, FIG. 4500.

Nos. 10	and 11	gauge,	8	inch,	$1.10 per foot.
" 12	" 13	"	8	"	1.10 "
" 14	" 15	"	8	"	1.05 "
" 15	" 16	"	7	"	.95 "
" 10	" 11	"	9	"	1.20 "
" 12	" 13	"	9	"	1.20 "
" 14	" 15	"	9	"	1.15 "
" 13	" 14	"	6	"	.90 "
" 13	" 14	"	7	"	1.00 "

TURNING WEBS, THIN BACKS.

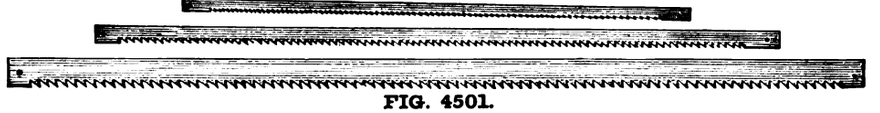


FIG. 4501.

PRICES.

10 inches	22 gauge	$1.35	per dozen	$\frac{3}{16}$ to $\frac{1}{4}$	inch wide.
12 "	21 "	1.45	"	$\frac{3}{16}$ to $\frac{5}{16}$	"
14 "	21 "	1.60	"	$\frac{3}{16}$ to $\frac{5}{16}$	"
16 "	20 "	1.80	"	$\frac{1}{4}$ to $\frac{3}{8}$	"
18 "	20 "	2.00	"	$\frac{1}{4}$ to $\frac{1}{2}$	"
20 "	20 "	2.25	"	$\frac{1}{4}$ to $\frac{5}{8}$	"
22 "	20 "	2.50	"	$\frac{1}{4}$ to $\frac{5}{8}$	"
24 "	19 "	2.80	"	$\frac{1}{4}$ to $\frac{3}{4}$	"
26 "	19 "	3.10	"	$\frac{1}{4}$ to $\frac{3}{4}$	"
28 "	19 "	3.45	"	$\frac{1}{4}$ to $\frac{7}{8}$	"
30 "	19 "	3.80	"	$\frac{1}{4}$ to 1	"
32 "	18 "	4.20	"	$\frac{1}{4}$ to 1	"
34 "	18 "	4.60	"	$\frac{1}{4}$ to 1	"
36 "	18 "	5.00	"	$\frac{1}{4}$ to 1	"

One extra gauge in thickness, no extra charge. When two gauges heavier than the above list, special prices will be charged. Extra width, 10 per cent. extra for each additional $\frac{1}{8}$ inch wide.

WEBS FOR FOOT POWER MACHINES.

6 x $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$ inches	$0.90 per dozen.
7 x $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{2}$, $\frac{5}{16}$ inches	1.00 "
8 x $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$, $\frac{1}{4}$ "	1.10 "
9 x $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$, $\frac{1}{4}$ "	1.25 "

FAY'S PATENT SCROLL SAWS.

Length, inches,	8	9	10	11	12	13
Price, per dozen,	$2.50	2.75	3.00	3.25	3.50	3.75
Length, inches,	14	16	18	20	22	24
Price, per dozen,	$4.00	4.50	5.00	5.50	6.00	6.50

Webs to 16 inch over $\frac{3}{4}$ inch wide, extra price. Webs from 18 to 24 inch over 1 inch wide, extra price. We make the above webs from 13 to 16 gauge in thickness.

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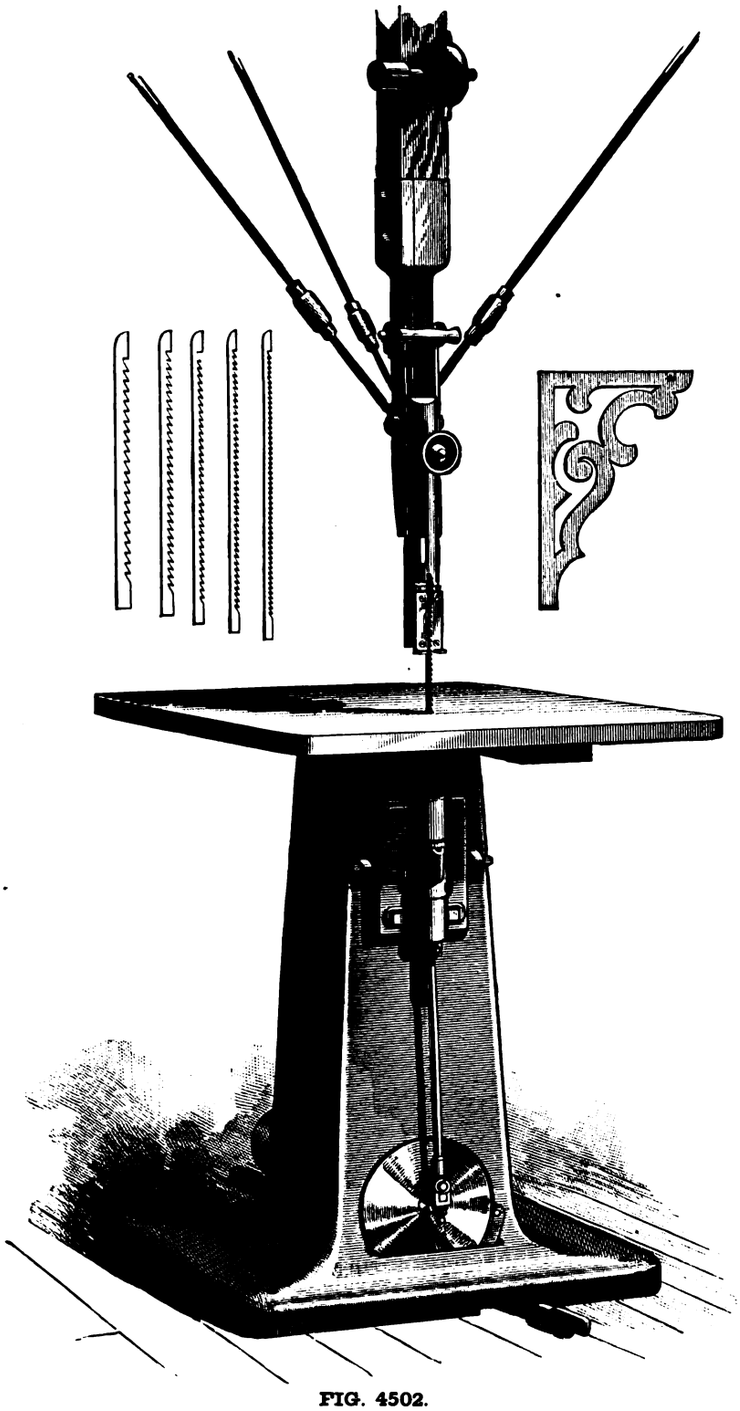


FIG. 4502.

This machine has adjustable guide and automatic brake and shipper.

The reciprocating slide is made hollow and octagonal in shape. The pitman is connected by socket joint to the lower end of the slide. The lower end of the saw blade is rigidly fastened to the top of the slide by means of split pins.

The guide allows of freely turning the work while the sawing is progressing, a clear, open space being left between the guide and the table. It is also adjustable in any direction to keep the saw square with the table. The saws are changed quickly, and the machine is very easy to operate and keep in order.

It is furnished with a noiseless fan blower for displacing the sawdust, twelve assorted saws and wrenches necessary.

The tight and loose pulleys are 6 inches by 3 inches, and should make 1,000 revolutions per minute.

PRICES ON APPLICATION.



FIG. 4503.

This machine has deflecting strain tripping table, brake and shipper.

The tension of the machine is flexible, the upper end of the saw being attached to a strap, which is connected with a segment pulley and eccentric roller, to which are attached two straps, connecting with steel springs, constructed of a series of plates.

The springs are attached to a sliding cross frame adjustable to and from the table for different lengths of saws. The table is made of alternate strips of maple and walnut glued up, and is 38 inches by 32 inches. It has a new and important feature in the table being made to tip to an angle of 30°, when desirous of sawing raking brackets, or for any other kind of bevel scroll sawing. When desired, we can furnish iron table at small extra cost.

It has an efficient brake and shipper attached for starting and stopping. The crosshead is made adjustable, and can be quickly set to any desired rake.

The tight and loose pulleys are 6 inches by 3 inches, and should make 1,100 revolutions.

PRICES ON APPLICATION.

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SCROLL OR JIC SAWS.

TILTING TABLE NO. 1.



FIG. 4504.

STATIONARY TABLE NO. 2.

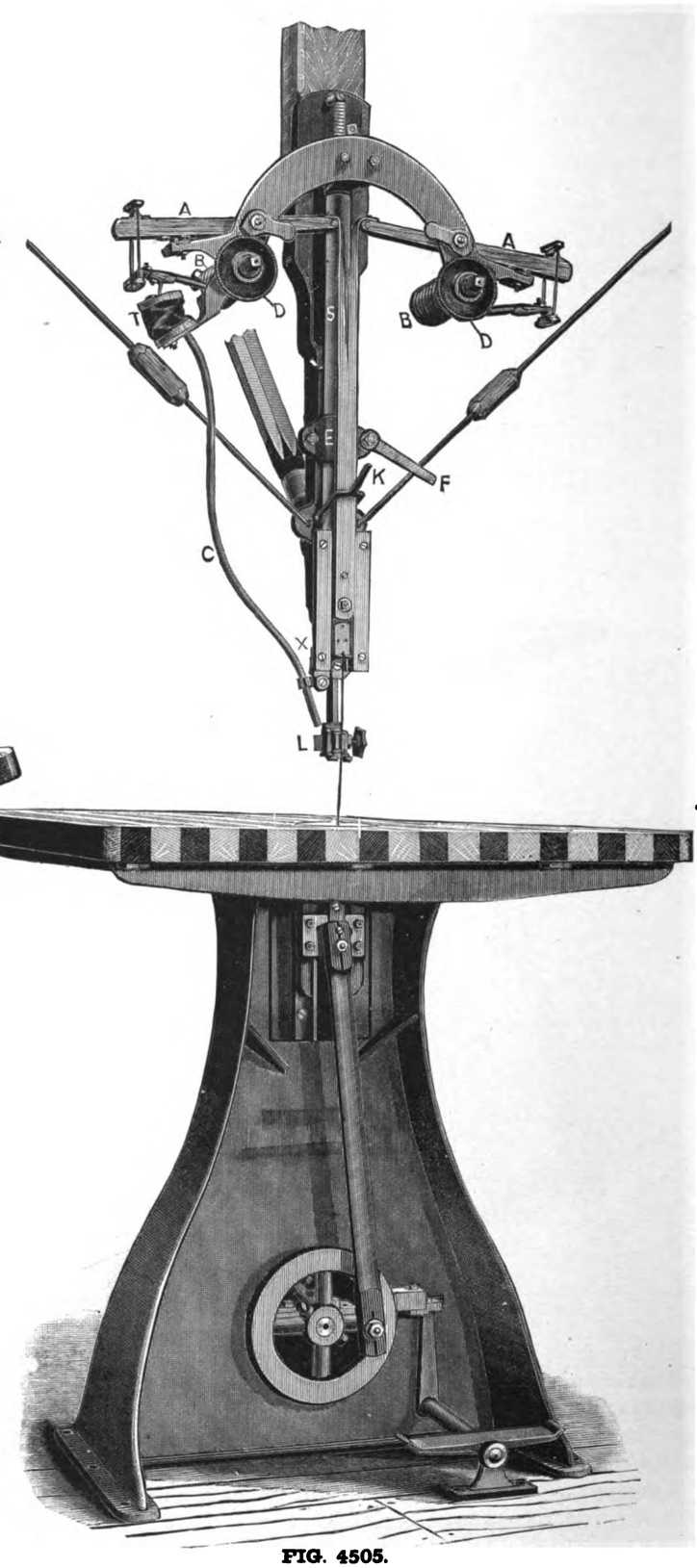


FIG. 4505.

These machines have tables 38 x 40 inches, with center plate of iron, 8 inches diameter. The air pump, T, is noiseless. When the saw is running it will not jar the sawdust on the table.

Driving pulley on back of machine runs constantly. The treadle in front is used to stop or start the saw. The springs, air pump, guide-ways, cross-head and steel bearing, with all their connections, are attached to the tubular shaft, S, secured to the heavy cast back support by the box, E, and eccentric lever, F. By raising lever, F, this shaft, being balanced by spring O, is free to move up or down to suit any length saw, which can be done in a moment. The step, L, for holding down the work, carries an adjustable steel bearing for supporting back and sides of saw.

PRICES.

No. 1 saw, complete, with set of saws set and filed $110.00
" 2 " " " " " " 95.00

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SCROLL OR JIG SAWS.

STATIONARY TABLE NO. 3.

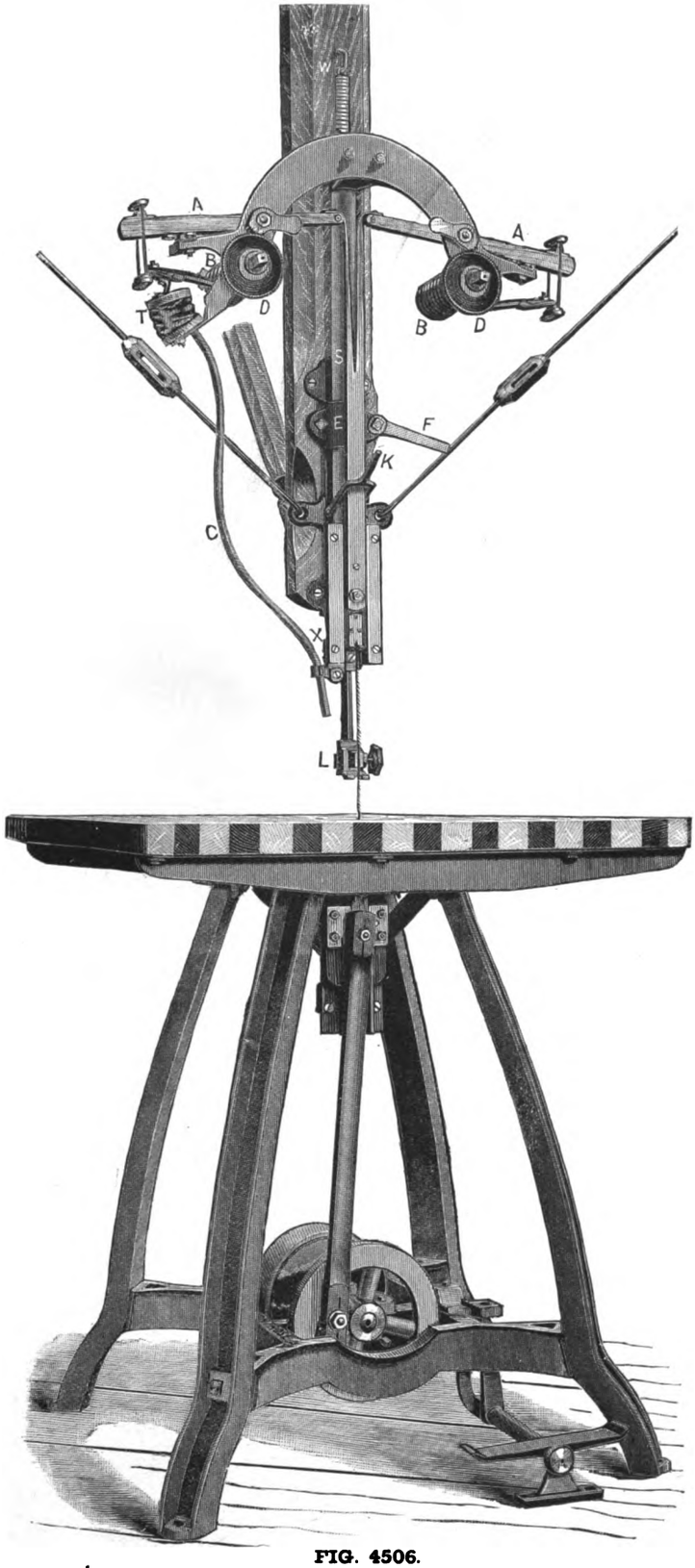


FIG. 4506.

STATIONARY TABLE NO. 4.

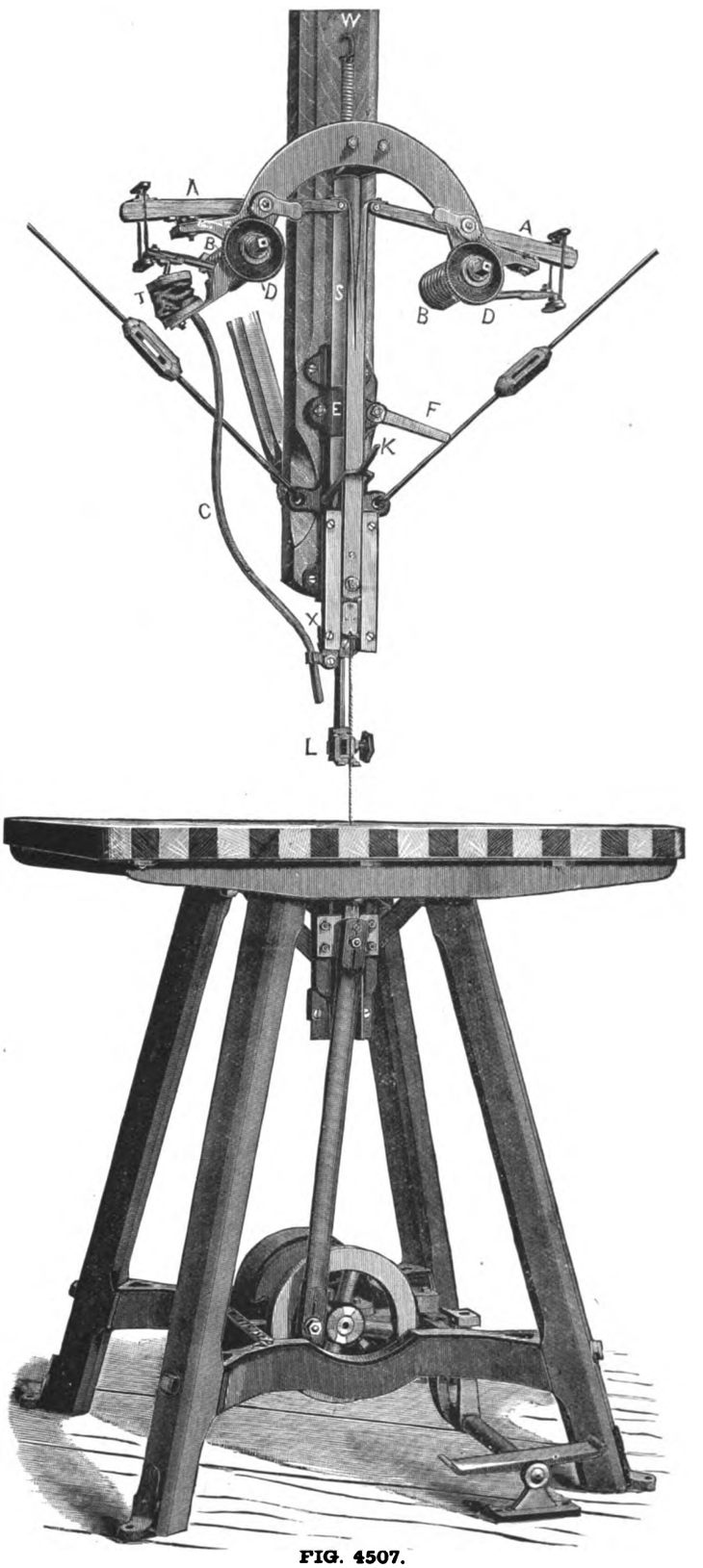


FIG. 4507.

Dimensions, etc., same as for Figs. 4504 and 4505.

Instead of the ordinary tight and loose pulleys, each machine is provided with a friction pulley and combination brake, by which the saw is made to start and stop instantly by a single movement of the foot without shifting the belt.

No. 4 is same as No. 3 except it has rockmaple legs instead of iron legs.

PRICES.

No. 3 saw, complete, with set of saws set and filed..... $75.00
" 4 " " " " " " 60.00

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PRICES, FIG. 4509.

It has patent wheels, the lower one having a heavy center, the momentum of which has a tendency to maintain a uniform speed, and in combination with shipper, which moves the belt onto the tight pulley gradually, prevents any sudden strain on the saw when starting.

It has also combined weight and spring for maintaining a uniform tension and compensating for the expansion and contraction of the blade. It has an iron table, 35 x 37 inches, which can be tipped to any necessary angle. The wheels are 42 inches in diameter, and will carry any saw up to 1½ inch—21 feet 4 inches long. The guide can be raised 18 inches. Countershaft has tight and loose pulleys, 14 in. diam., 5 in. face, and should run 400. One saw, brazing clamp and tongs furnished with each machine.

WEIGHT, 2,300 LBS. $250.00.

42 INCH.

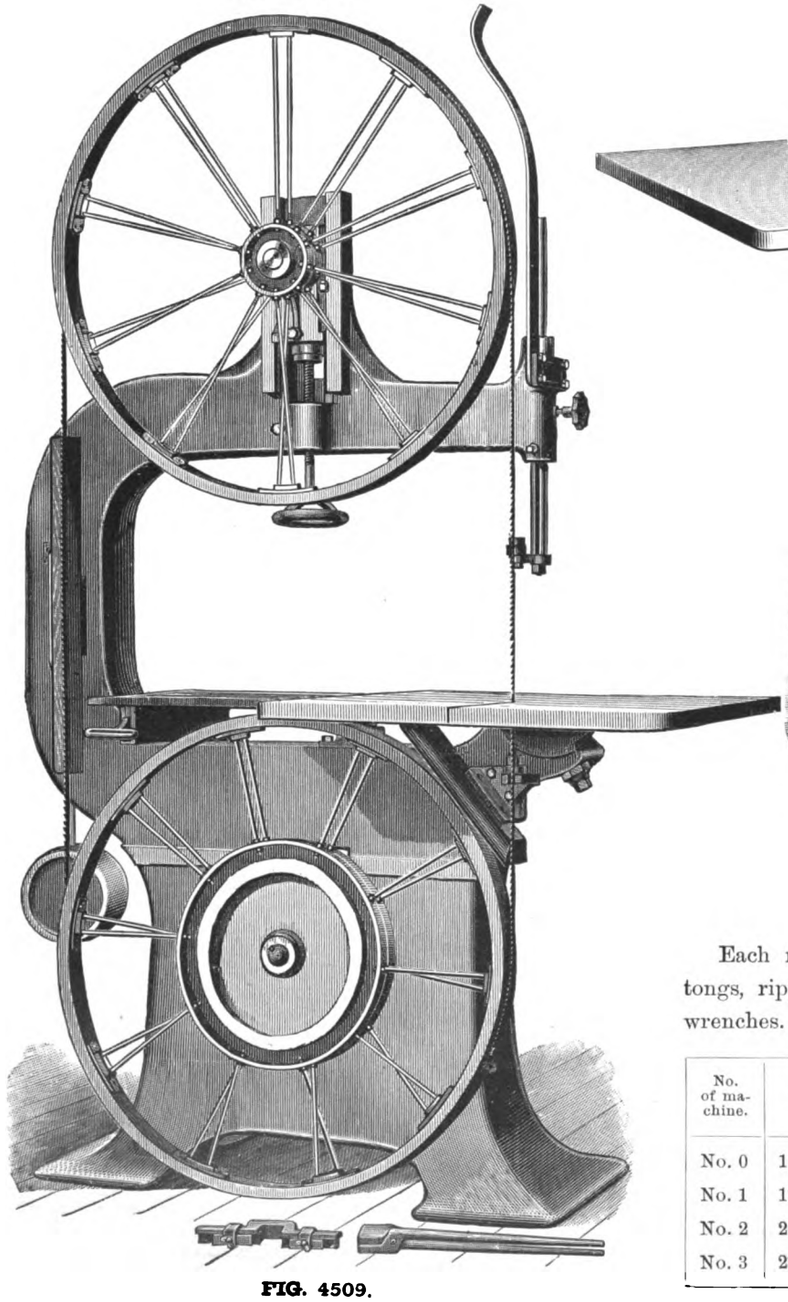


FIG. 4509.

44, 40, 38 AND 36 INCH.

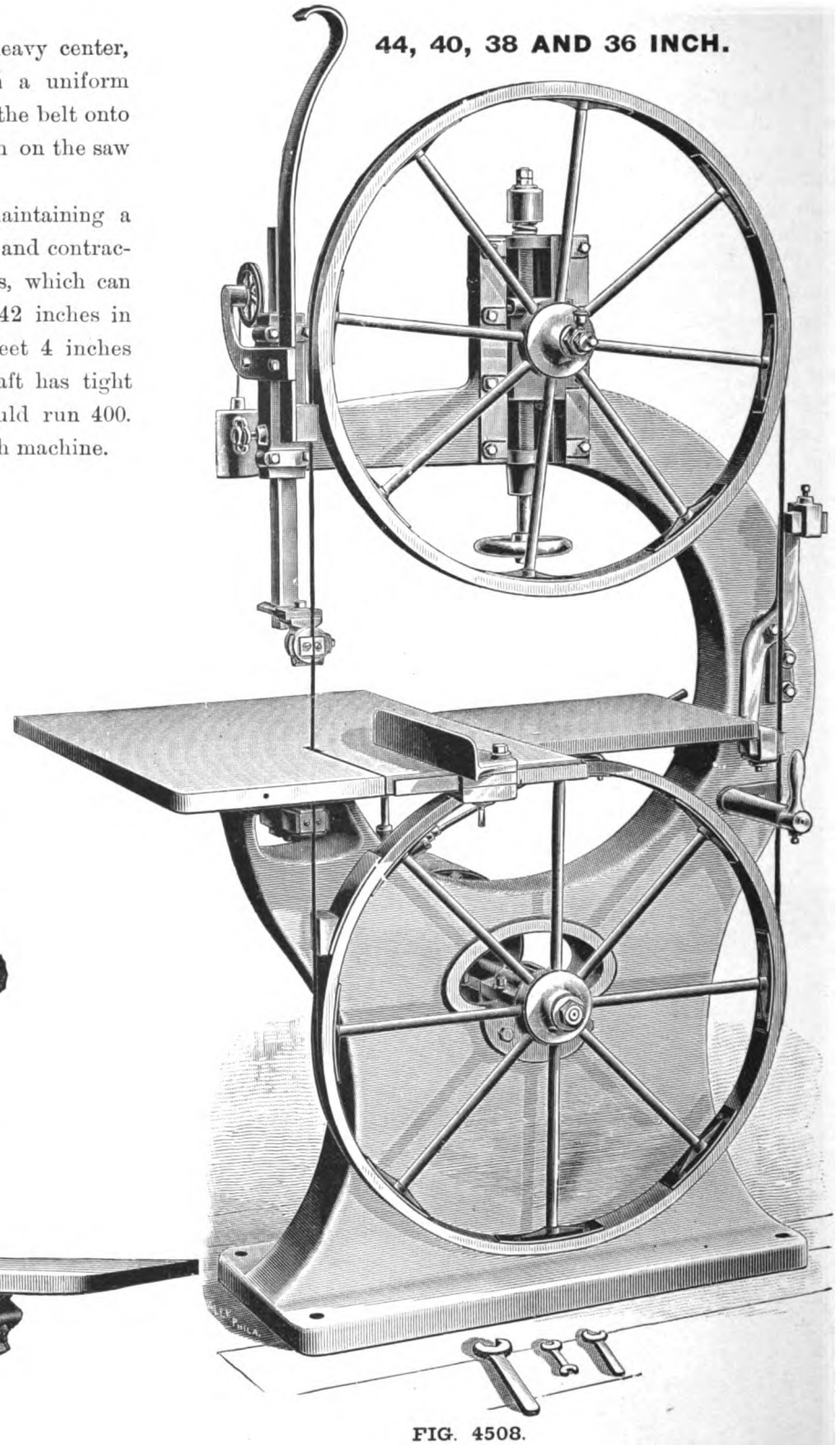


FIG. 4508.

PRICES, FIG. 4508.

Each machine is furnished with belt shifter, one saw, soldering tongs, ripping gauge, scarfing frame, and a full set of forged steel wrenches.

No. of machine.	Length of saw.	Diameter of wheel.	Size of tight and loose pulleys.	Speed.	Weight.	Prices.
No. 0	18 ft.	36 in.	12 in. x 4 in.	530 rev.	1,100 lbs.	$175.00
No. 1	19 "	38 "	14 " x 4 "	500 "	1,800 "	260.00
No. 2	20 ft. 6 in.	40 "	14 " x 4½ in.	480 "	2,000 "	350.00
No. 3	23 " 6 "	44 "	16 " x 4½ "	435 "	3,085 "	450.00

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WOOD OR IRON TOP BAND SAWS.

36 INCH.

This machine has wheels 36 inches diameter, and will carry a saw up to 1¼ inches in width, 18 feet 6 inches long. The combined weight and spring for maintaining uniform tension provide for expansion and contraction of the saw and any sudden strain on the saw.

The shipper moves the belt onto the tight pulley gradually, preventing strains from sudden start of the wheels. The table is 36 inches square, made of iron or wood, as ordered, and can be set at an angle. The guide can be raised 18 inches.

One saw, brazing clamp and tongs furnished with each machine.

WEIGHT, 1,450 LBS.

PRICES.

Iron top	$160.00
Wood top	150.00

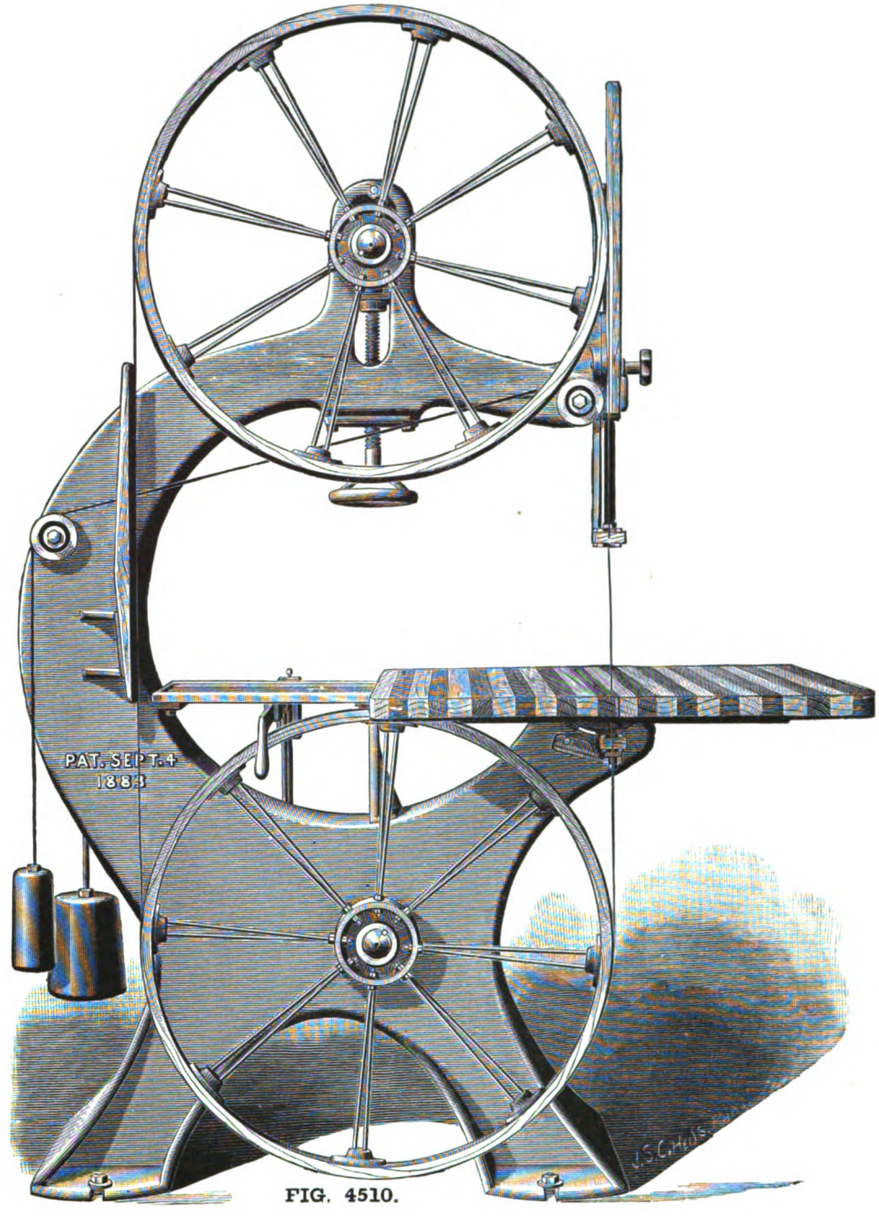


FIG. 4510.

The wheels are of iron, 36 inches in diameter, and have rubber tires to give them elasticity and increased cohesion with the saw.

The wheel shafts run in self-oiling boxes hung on pivots, and by means of hand screws are easily tilted to change the track of the saw blade; the tension of the saw is regulated by the upper wheel, which is hung in a gibbed frame, and is quickly adjusted by means of the large hand wheel. The guides are of improved design, and the upper one adjusts to 13 inches above the table, and is provided with a compensating balance weight hung inside the column. The table is of wood, glued up in narrow strips to prevent warping, and has an adjustment for bevel sawing.

Each machine is supplied with brazing vise and tongs, and one ½ inch French saw blade. We can furnish as extras any size of blade desired.

Tight and loose pulleys on the machine are 12 inch diameter and 4 inch face, and should make 350 revolutions.

SHIPPING WEIGHT, 1,650 LBS.

PRICE, $175.00.

36 INCH.

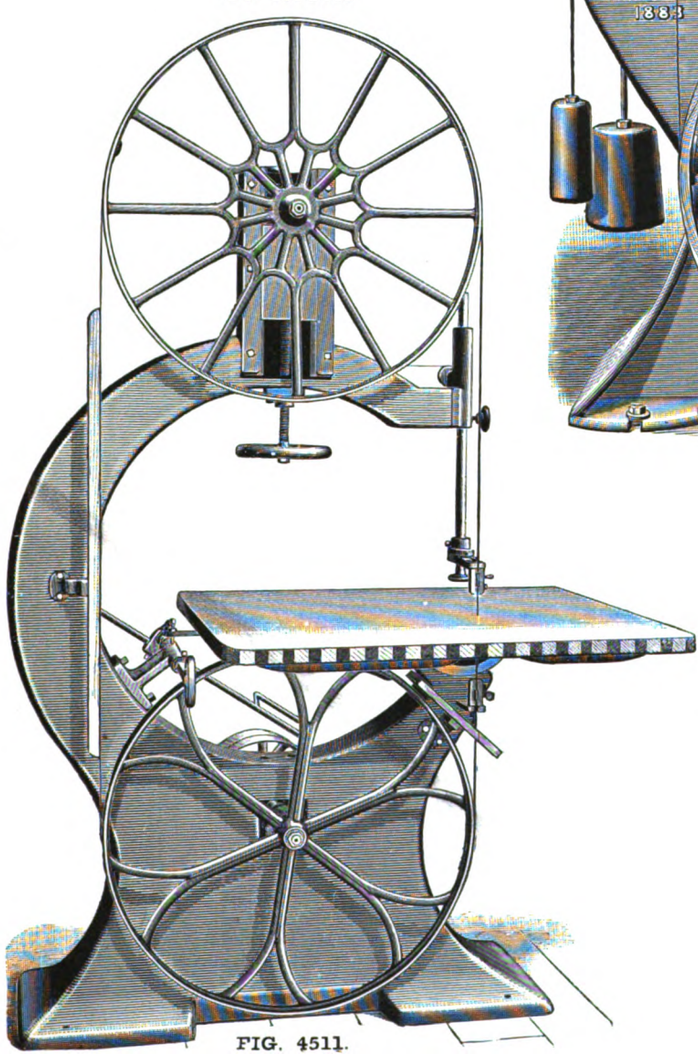


FIG. 4511.

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BAND SAWS.

38, 30 AND 26 INCH.

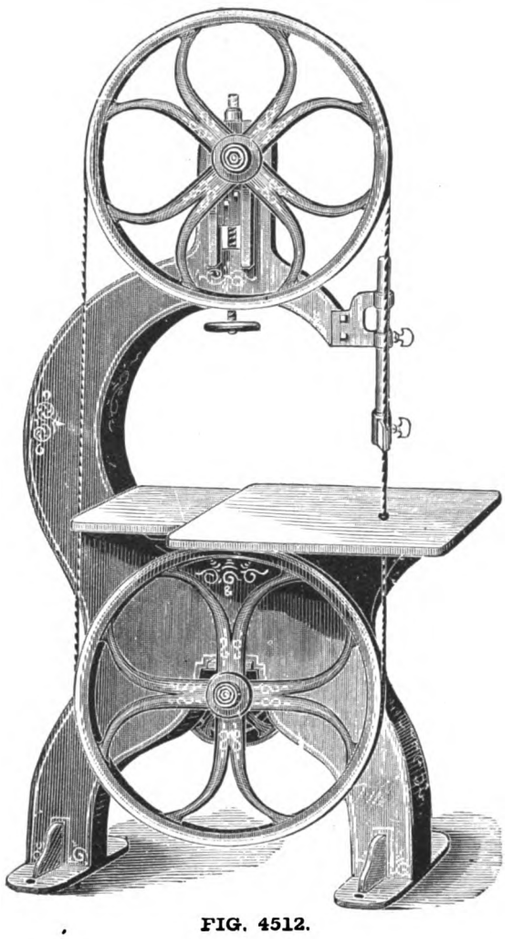


FIG. 4512.

PRICES.

No. 3 has	38	inch	wheels	and	tilting	table . . . $180.00
No. 3 "	38	"	"	"	plain	" 150.00
No. 2 "	30	"	"	"	"	" 100.00
No. 1 "	26	"	"	"	"	" 75.00

Prices include 1 saw blade and welding apparatus.

BEVEL JIC SAW MILL.

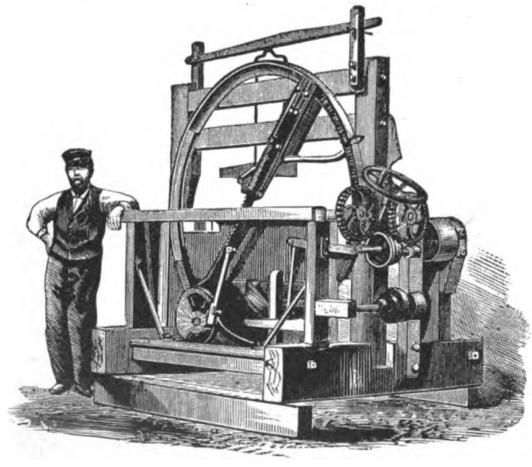


FIG. 4514.

POST BAND SAW.

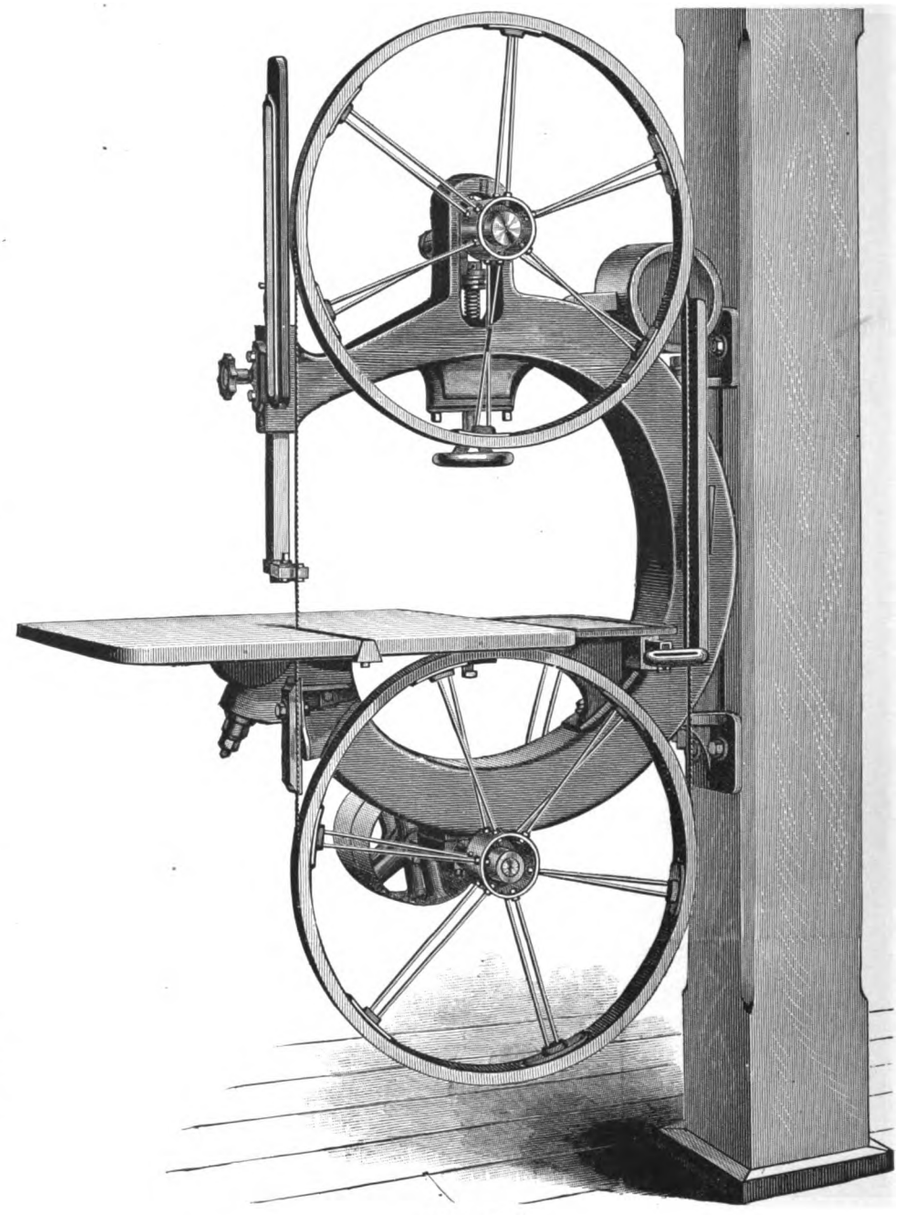


FIG. 4513.

The post band saw is intended to go into rooms where it would be difficult to put a saw with the ordinary large frame, and for a class of work where a large saw is not needed, such as ordinary pattern and light work. In designing it we have dispensed with the large base only, all the working parts being the same as in large saws. It can be attached to any ordinary post or wall plate. It has combined weight and spring for maintaining a uniform tension on the saw and providing for any sudden and unusual strain. To provide against any sudden strain in starting, we put on a shipper which moves the belt on to the tight pulley gradually, but moves it off instantly. It has wheels 30 inches in diameter. The wood rims have no joints across the periphery. The tables, of either wood or iron, as may be desired, are 31 inches square and can be set at an angle. The guide can be raised 12 inches. It will carry any saw up to 1 inch, 15 feet 3 inches long. One saw, brazing clamp and tongs furnished with each machine.

WEIGHT, 600 LBS.

Countershaft has tight and loose pulleys, 12 inches diameter, 3 inches face, and should run 600.

PRICES.

Post or bracket band saw, iron table	$90.00
" " " " wood table	85.00

This machine is especially designed for use in ship or boat building yards, and will saw timber and knees at any angle, bevel or crook, or can be used if desired on straight work. All these movements are under perfect control of the operator, and can be made without stopping machine or changing the speed. It will take in and saw timber 20 inches thick on perpendicular. With each machine are furnished two 4-wheel trucks, one saw, oil can and wrenches, and sample bevel board. Speed of saw should be about 300. Size of pulley on mill, 8 inches diameter, 16 inches face, and should make 300 revolutions per minute.

PRICE ON APPLICATION.

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HAND AND FOOT POWER BAND SAW.

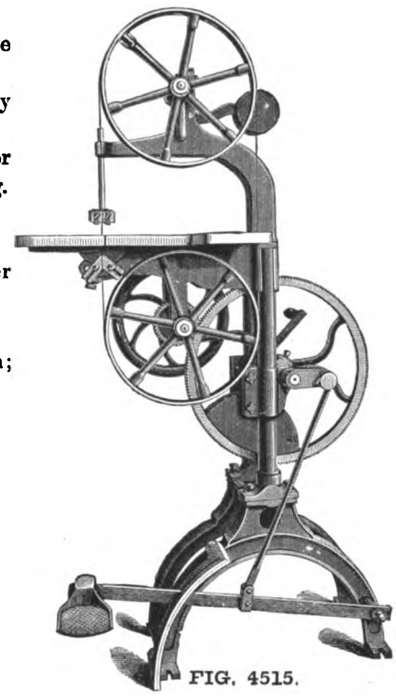


FIG. 4515.

This machine is made to run by foot power, and additional power can be applied by using the crank that is furnished with each machine.

It will do all kinds of outside sawing, and cuts much faster than the jig saw. It has a capacity of 6 inches under the top guide and will swing 15 inches between saw and frame.

The table is 3 feet 6 inches from the floor, with surface of 18 x 21 inches, and is arranged for cutting on a bevel. There is also a stationary table, which is 6 inches wide by 24 inches long. Guides for the saw blade are placed both above and below the table.

The shafts are made of Bessemer steel, lathe-turned.

The upper saw shaft has an adjustment to bring the upper band wheel into line with the lower band wheel.

Saw pulleys are covered with endless rubber bands cemented to the iron wheel.

PRICE includes two saw blades, $\frac{3}{16}$ and $\frac{1}{4}$, set and filed, one crank handle, and one wrench; net weight of machine, 255 lbs. **$50.00.**

Same, arranged to run by belt only. **PRICE, $45.00.**

BAND SAW GUIDE.

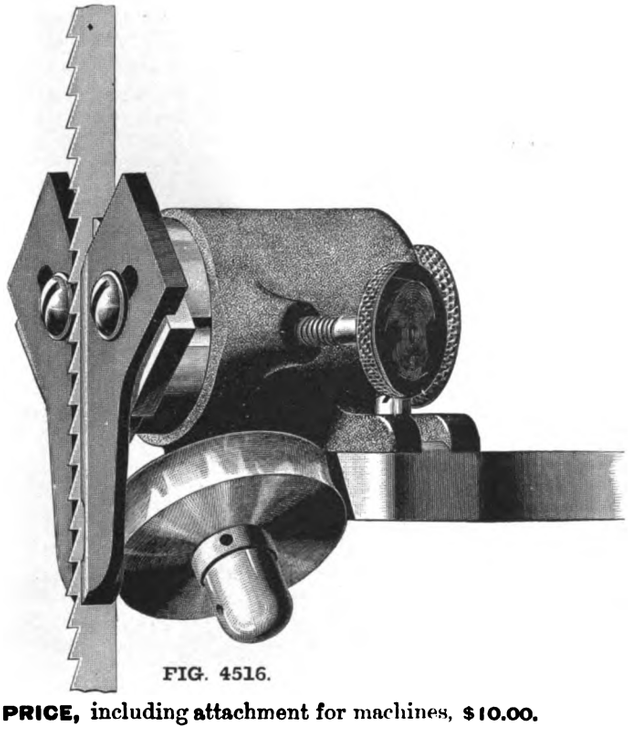


FIG. 4516.

PRICE, including attachment for machines, **$10.00.**

HOW'S AUTOMATIC BAND SAW FILING AND SETTING MACHINE.

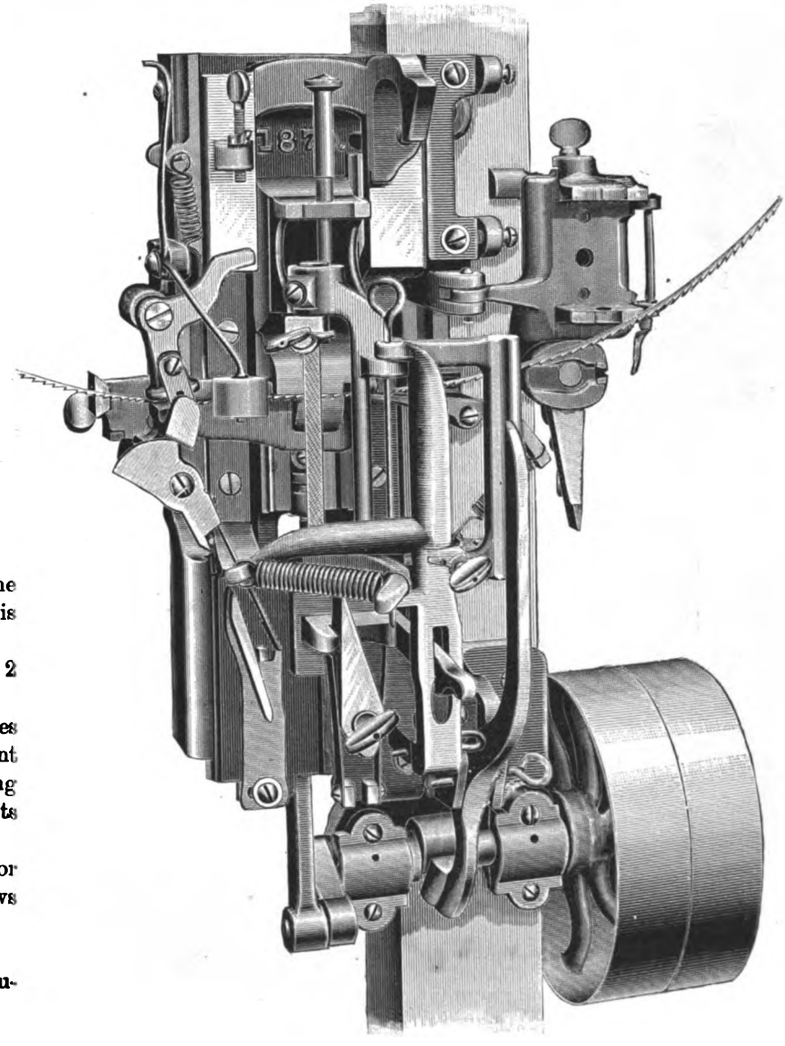


FIG. 4517.

DESCRIPTION, FIG. 4517.

The cut shows the machine arranged for filing, with the setting device swung back. To set the saw, the filing device is removed and the setting device swung forward over the vise.

The machine will file and set saws of any width up to 2 inches, with teeth of any length up to $\frac{5}{8}$ of an inch.

Each machine is set up and run by power before it leaves the factory, and a piece of the saw, filed and set by it, is sent with it; the machine, being adjusted for this saw, by putting the piece in the machine and operating it, all its movements may be seen.

With each machine are furnished two wood pulleys for suspending the saw, an extra rubber roll, three files, and screws to fasten the machine to the post.

Full printed directions accompany each machine.

Pulleys, 8 inch diameter, 1½ face; speed, 75 to 90 revolutions.

WEIGHT, 90 LBS. **PRICE, $75.00.**

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AMESBURY BAND SAW FILER AND SETTER.

FILER.

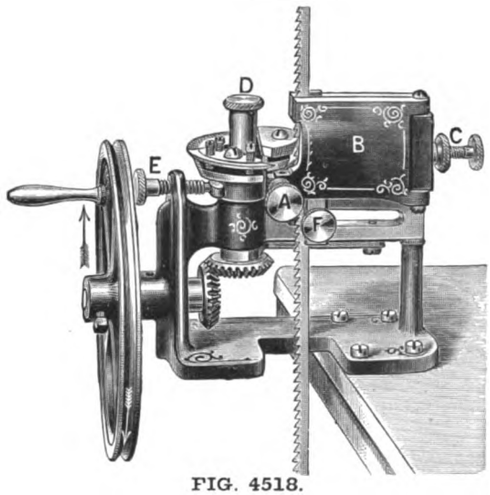


FIG. 4518.

PRICES.

Machine, with 20 files.....$25.00
Thin files, per doz..... 1.20
Thick " " 1.80

DESCRIPTION, FIG. 4518.

Filing by hand is always irregular and uncertain, as is shown by high and low teeth in the blade; and it is evident that it will not do as much work as it would if the cutting points were on a line. It is also a fruitful source of the breaking of saws by making weak places in the blade. In this machine the back of the blade is held firmly against the guide while the teeth are being filed; the distance to the point being graduated from the back, insures perfect evenness and accuracy of the points, and leaves no weak place in the blade. Files with different bevels are made to suit different work. It will file saws up to 2 inches wide, and teeth up to $\frac{5}{8}$ inch from point to point. It can be worked either by hand or power, and any boy who can turn a crank can file a saw in ten minutes more accurately than any expert filer can in one hour.

DESCRIPTION, FIG. 4519.

It is arranged to work by an easy, uniform crank motion, and when the tooth to be set is fed into position, the blade is firmly locked between the steel jaws of a vise, and remains immovable while the tooth is set to any degree required. As the crank goes forward the blade is released, when the next tooth is fed up to the dies, the blade again locked in the vise, and this tooth set in the opposite direction. All these movements are automatic, and can be carried on at a speed of 300 teeth per minute. The feeder picks up only the tooth that is to be set, consequently each tooth is fed to its proper position, regardless of their irregularity. The band saw is simply hung up over the machine, on a wooden bracket, and the lower part left pendent near the floor. It will set saws from $\frac{1}{8}$ to 2 in. wide.

SETTER.

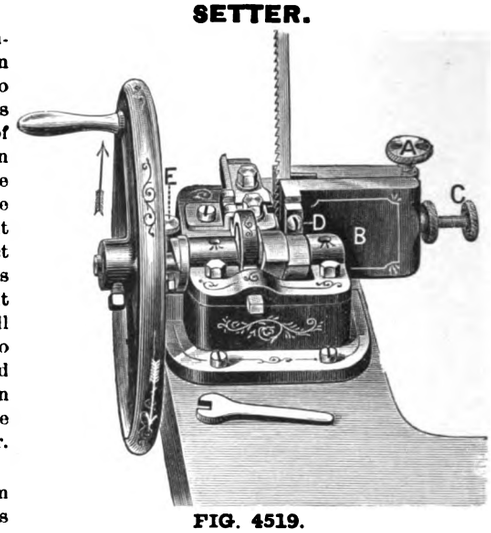


FIG. 4519.

PRICE.

Machine, complete.....$20.00

UPSETTING MACHINE.

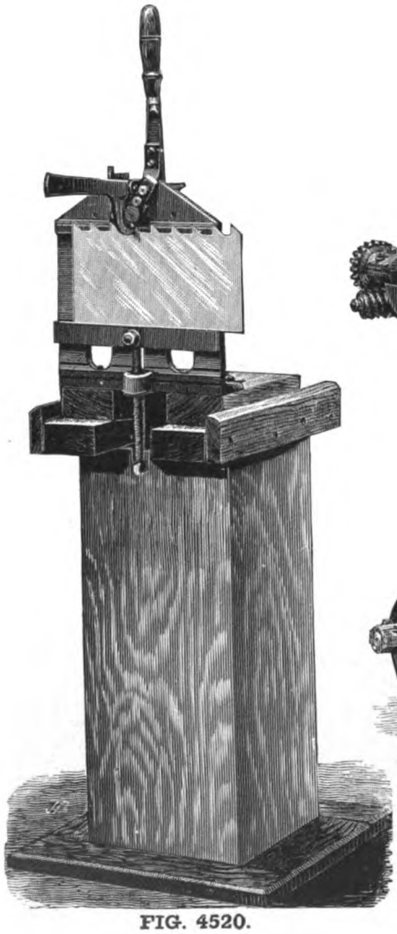


FIG. 4520.

This upsetting machine is an indispensable tool for swaging the points of the teeth, and by its use the teeth are perfectly jointed, thus keeping the points of the teeth at a uniform distance from the back of the blade and causing each tooth to do its share of the cutting. Weight, 50 lbs. Price, $40.00.

SAW SHARPENER.

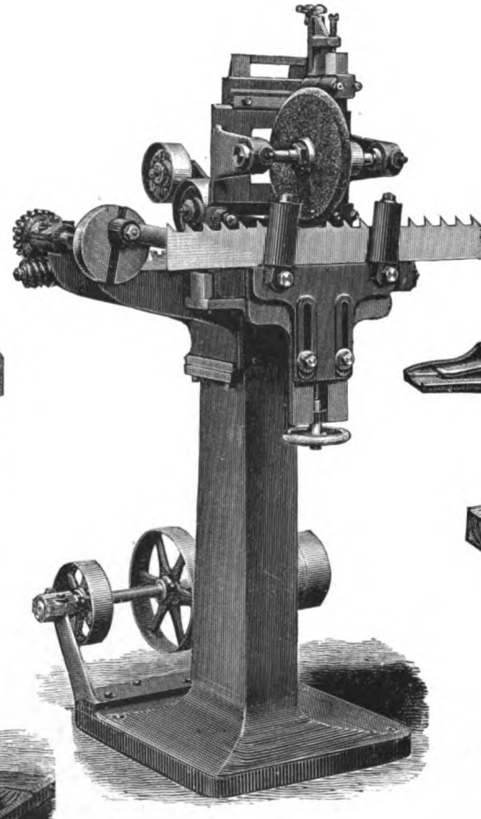


FIG. 4521.

After it has been properly adjusted to the pitch and angle of tooth, it requires no attention while in operation; and after passing through the machine the saw is ready for use on the band mill. Weight, 1,100 lbs. Price, $150.00.

BRAZING CLAMP.

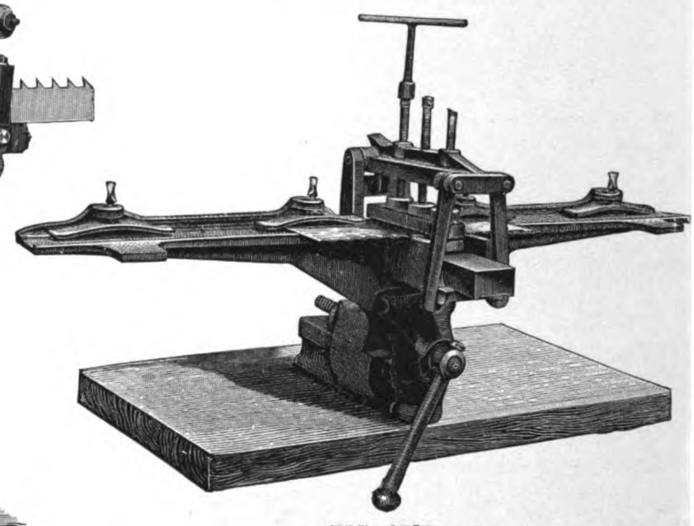


FIG. 4522.

PRICE, $25.00.

Silver solder furnished, rolled to proper thickness...$2.00 per oz.
Ajax metal, rolled same..... 1.00 "

Fig. 4522 shows a device for holding saws while brazing.

Construction.—It consists of a long cast iron frame, planed true on top and back. An opening is left in the center to carry a wedge, on which rests the lower piece of hot iron. At either side of this opening are two lugs for thumb screws to clamp the saw. On the top and over the center is hung a bar, carrying three set screws, and on one end two hooks, that, by their gravity, when the bar is closed, hook under the main casting, holding that end firm while the screws are set on the saw. The bottom has a flange to go in an ordinary bench vise, as shown in cut.

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BAND SAW BLADES.

PRICES, FIG. 4523.

¼ in.	⅜ in.	½ in.	⅝ in.	wide.
7	8	10	12	cents per foot.
¾ in.	⅞ in.	1 in.	1⅛ in.	wide.
14	16	18	20	cents per foot.
1¼ in.	1⅜ in.	1½ in.	1¾ in.	wide.
23	26	28	34	cents per foot.

Not joined, set nor filed.

Prices, wider blades, on application.

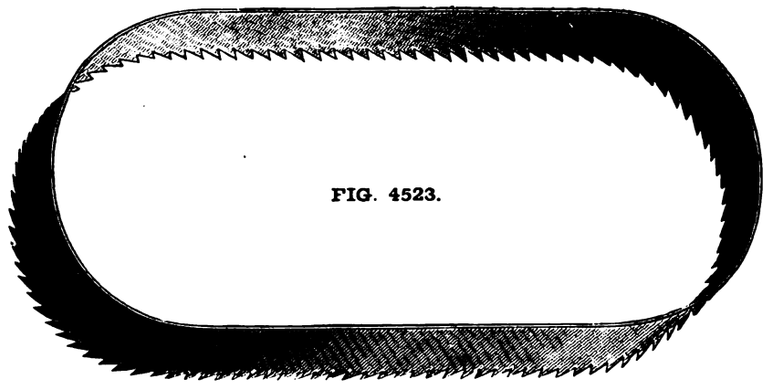


FIG. 4523.

SILVER SOLDER.

40 W. G.....per Troy oz., $1.25

PRICES, PUECEOT FRERES' BAND SAWS, NOT JOINED, SET NOR FILED.

Width,	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1⅛ in.	1¼ in.	1⅜ in.	1½ in.	1¾ in.	2 in.	2¼ in.	2½ in.
18 feet long.....	$0.67	$0.67	$0.88	$0.99	$1.30	$1.57	$1.80	$2.11	$2.52	$2.93	$3.69	$4.14	$4.80	$5.40	$6.30
20 " "	.75	.75	.98	1.10	1.45	1.75	2.00	2.35	2.80	3.25	4.10	4.60	5.35	6.00	7.00
22 " "	.82	.82	1.08	1.21	1.60	1.93	2.20	2.58	3.08	3.57	4.50	5.06	5.90	6.60	7.70
24 " "	.90	.90	1.18	1.32	1.74	2.10	2.40	2.82	3.36	3.90	4.92	5.52	6.42	7.20	8.60
26 " "	.98	.98	1.27	1.43	1.89	2.27	2.60	3.05	3.64	4.22	5.33	5.98	6.95	7.80	9.10

Band saws can be had in coils of one continuous length of 190 to 250 feet, varying with width of saw; or in 500 feet lengths with as few connections as possible when ordered for import.

Prices given on application for band saws, 2¾ to 12 inches wide.

PRICES, FIG. 4524.

No. 1 screw-feed sawing machine, same as No. 2, without gearing, calculated for high-geared powers. Weight, 900 lbs.

PRICE, $80.00.

No. 2 screw-feed sawing machine, with increased gearing, calculated for low-geared powers. Weight, 950 lbs.

PRICE, $85.00.

No. 3 screw-feed sawing machine, without gearing, with heavy frame, three sills, extra heavy shaft and saw and an extra band wheel, calculated for steam power. Weight, 1,300 lbs. **PRICE, $100.00.**

Loose pulley for No 3, $5.00 extra.

Horse power and No. 2 sawing machine, complete. Weight, 1,900 lbs.

PRICE, $150.00.

Every machine is furnished with a track, truck roller, saw, maul, wrench, rope and weight.

NO. 5 DRAG SAW.



FIG. 4524.

PRICE, NO. 5. Tight and loose pulley, 24x6 inches; speed, 200 to 250. **WEIGHT, 1,400 LBS. $125.00.**

DRAG SAW.

PRICE.

WITHOUT POWER,

WEIGHT, 545 LBS.,

$50.00.

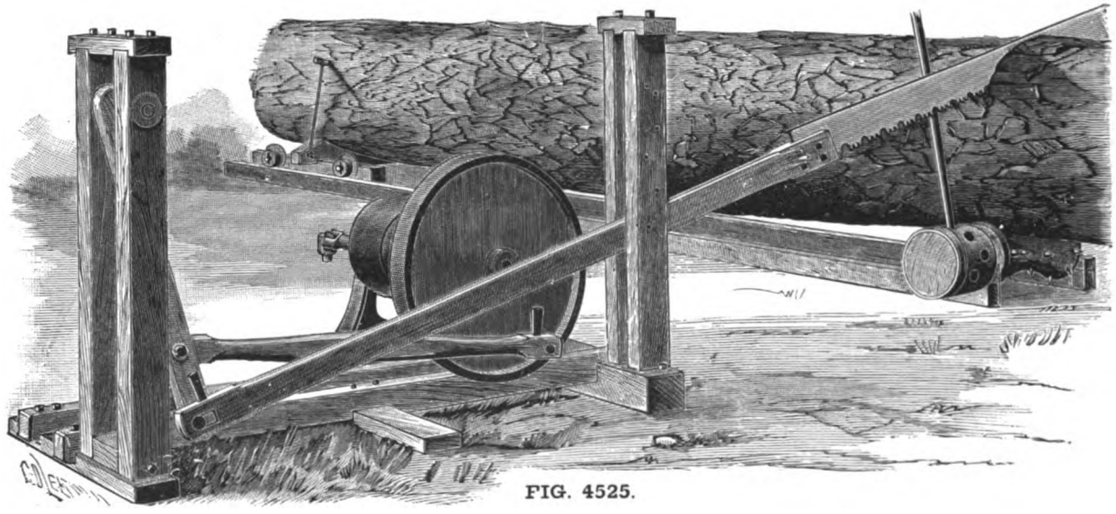


FIG. 4525.

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WOOD SAWS AND SPLITTERS.

PLAIN WOOD SAW.

LEFT HAND.

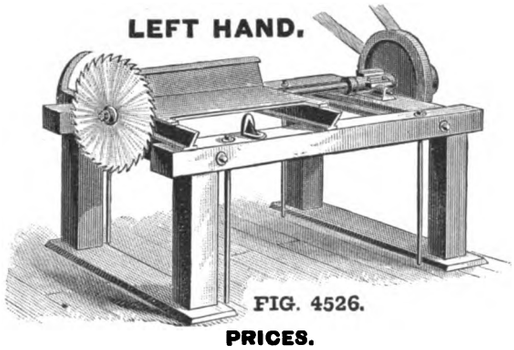


FIG. 4526.

PRICES.

With sliding ways, not including saw..$60.00
With anti-friction rollers and gauge.... 75.00

This machine is designed for cutting long kindlings or fire wood. The mandrel is steel, similar to the more expensive saw. The carriage is made either to slide on ways or anti-friction rollers, as may be desired. The saw is 24 to 30 inches in diameter, with a speed of 1,800 revolutions. Driving pulley, 5 x 6 inches.

WEIGHT, 600 LBS.

CIRCLE WOOD MILL.

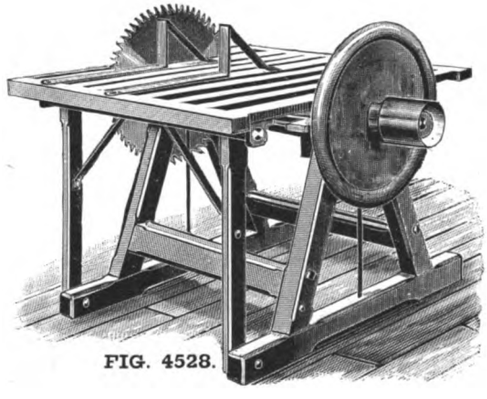


FIG. 4528.

NEW FEED SPLITTER NO. 1.

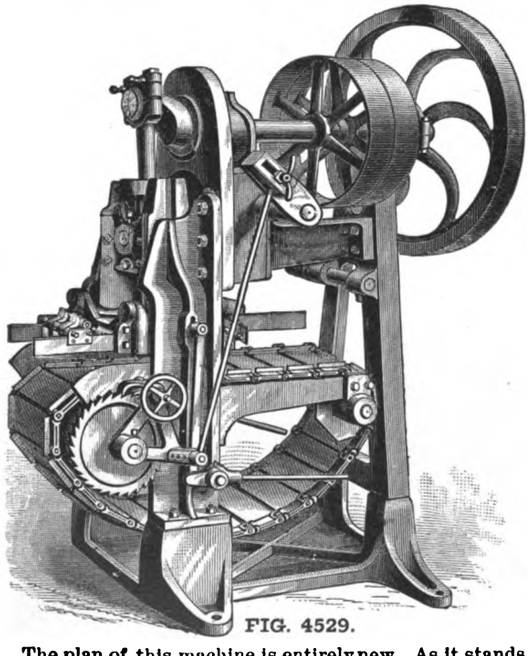


FIG. 4529.

The plan of this machine is entirely new. As it stands parallel to the saw table, it occupies the least possible space, and is made either right or left hand. Knives are in X form. The crank and connecting rod are made of steel. It has a tight and loose pulley, enabling it to be driven from the main shaft. There are over 50 of them in successful operation, splitting all kinds of wood from 2½ to 11 inches in length. Driving pulley, 26 x 7 inches.

WEIGHT, 5,200 LBS. PRICE, $500.00.

KINDLING WOOD SAW.

RIGHT HAND.

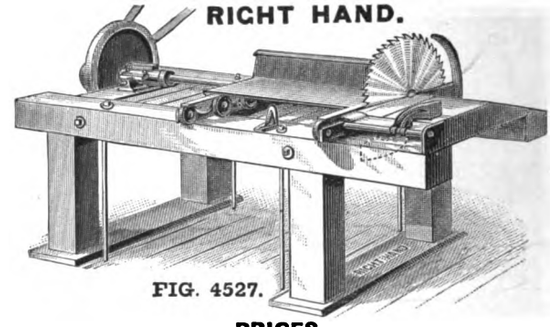


FIG. 4527.

PRICES.

Not including saw.....$105.00
When sold with splitter..... 100.00

In this machine the saw is from 30 to 32 inches in diameter, with a speed of 2,000 to 2,200 revolutions. The mandrel is made of 2 inch steel, running in long pivoted journal boxes. The carriage works easily on large anti-friction rollers with steel studs, and the long roller frame can be moved to take up the lost motion or wear. The gauge is adjustable and can be swung back when cutting long wood. Driving pulley, 6 x 7 inches.

WEIGHT, 800 LBS.

NEW FEED SPLITTER NO. 2.

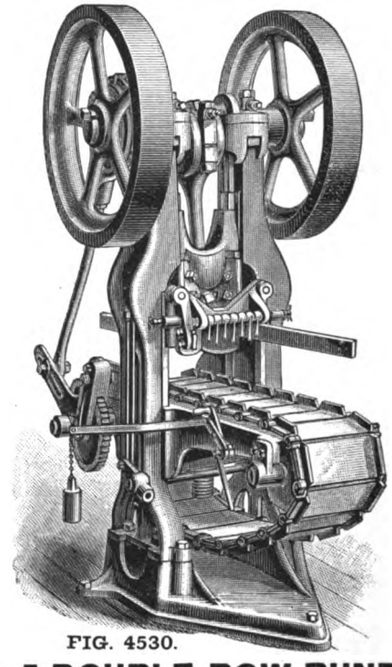


FIG. 4530.

NO. 5 DOUBLE BOW BUNDLER.

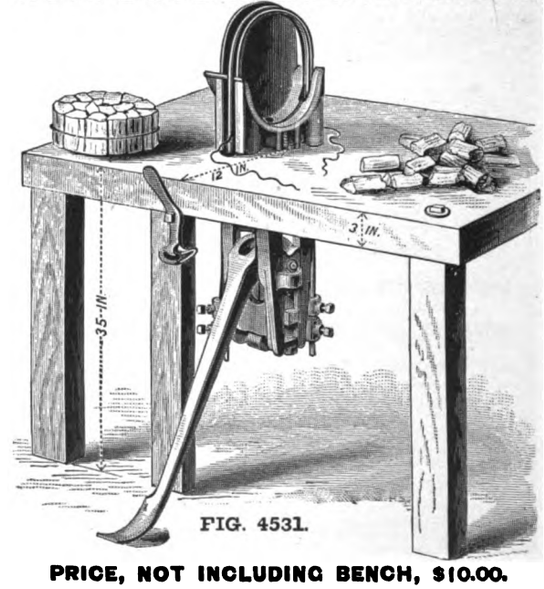


FIG. 4531.

PRICE, NOT INCLUDING BENCH, $10.00.

PRICES, FIG. 4528.

It has a steel arbor 1½ inch diameter. They are intended for cutting long poles, or four foot wood into short lengths. They are put up with the saw at the right or left hand, as desired.

Price, with 24 inch saw.....$50.00

BELTING EXTRA.

WEIGHT, 350 LBS.

DESCRIPTION, FIG. 4530.

In both machines the clearing plate, chain feed bed and feed works can be adjusted while the machine is in motion, and the feed stopped or started at will. The spring side guides, chisel pointed fingers and restraining weights attached to the clearing plate guide and hold the wood while feeding under the knives. All the small shafts and studs are made of steel with their wearing joints hardened. The chain is made of wrought iron plates with malleable links.

Their speed should be 95 to 100 revolutions, to take the wood from one saw, and 105 to 110 from two saws.

WEIGHT, 4,800 LBS.

PRICE, $475.00.

DESCRIPTION, FIG. 4531.

It is made either with a single or double bow, as desired, but the latter is usually preferred as it makes a handsomer bundle while the string is tied in the center, and the bows are not so liable to cut into the wood. Its power is much greater than the old machine, besides being stronger and more durable as the bows and toggle pins are made of steel.

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FUEL WOOD SPLITTERS.

NO. 1 SPLITTER.

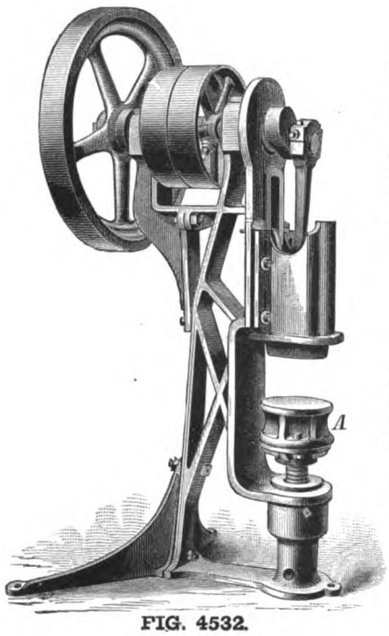


FIG. 4532.

DESCRIPTION, FIG. 4532.

This cut needs but little explanation, as every vital part can be easily seen. The connecting rod and crank shaft are made of steel for strength and durability. The extra table plate, A, as shown in the cut, is for wood from 3 to 9 inches long; but by removing this the capacity is increased to 16 inches. It will split all kinds of wood.

Driving pulleys, 16 x 4 inches; speed, 160 revolutions; floor space, 3 x 3 feet.

WEIGHT, 1,300 LBS. PRICE, $175.00.

DESCRIPTION, FIG. 4533.

This machine is designed for splitting large and long wood, but by the aid of the table plate, A, as shown in the No. 1 splitter, and the adjustable clearing plate, its capacity is increased to split any kind of wood, from 6 to 20 inches in length.

Size of wheels, 32 x 4 inches; speed, 130 revolutions; floor space, 4 x 4 feet.

WEIGHT, 2,500 LBS. PRICE, $275.00.

NO. 2 SPLITTER.

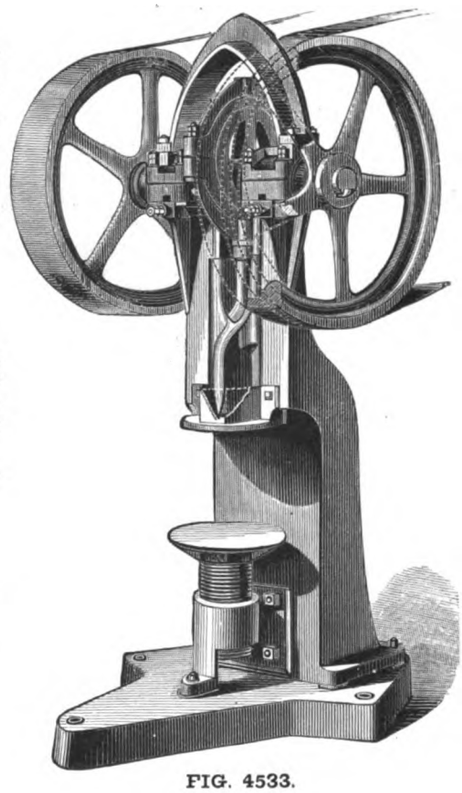


FIG. 4533.

DOUBLE ACTING TENONING AND DUPLICATING MACHINE.

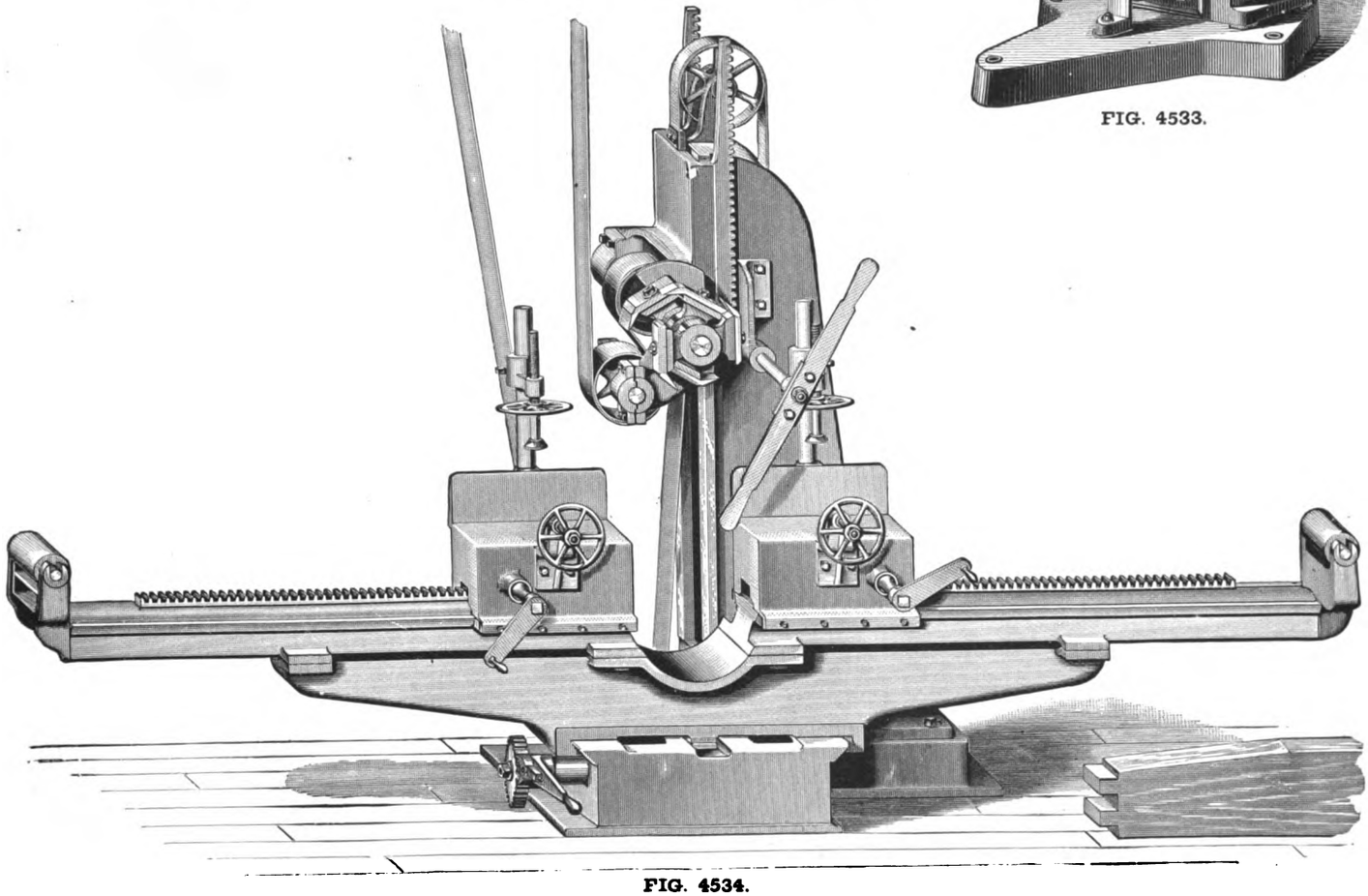


FIG. 4534.

To cut single, double or triple tenons on both ends of long sills or other pieces without turning them about; also, to duplicate irregular work from a pattern, as in beveling the outside sills of flat cars.

Tables are arranged with two movements, one across the heads to locate the tenons, and the other lengthwise of the table to cut duplicate work.

Capacity.—The table receives timber 16 x 14 inches and is only limited in amount of work done by the quantity of material presented. Each table is provided with a horizontal and vertical clamp screw, for holding the timber, and also a rack movement, for moving it endways.

Speed.—Countershaft has tight and loose pulleys, 14 inches diameter, 6 inches face, and should make 600 revolutions per minute.

Details supplied.—One each, 2, 3 and 6 inches, steel heads and cutters, countershaft, and a full set of wrenches.

WEIGHT, 6,000 LBS. PRICE, $1,050.00.

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UNIVERSAL CAP CAR TENONER.

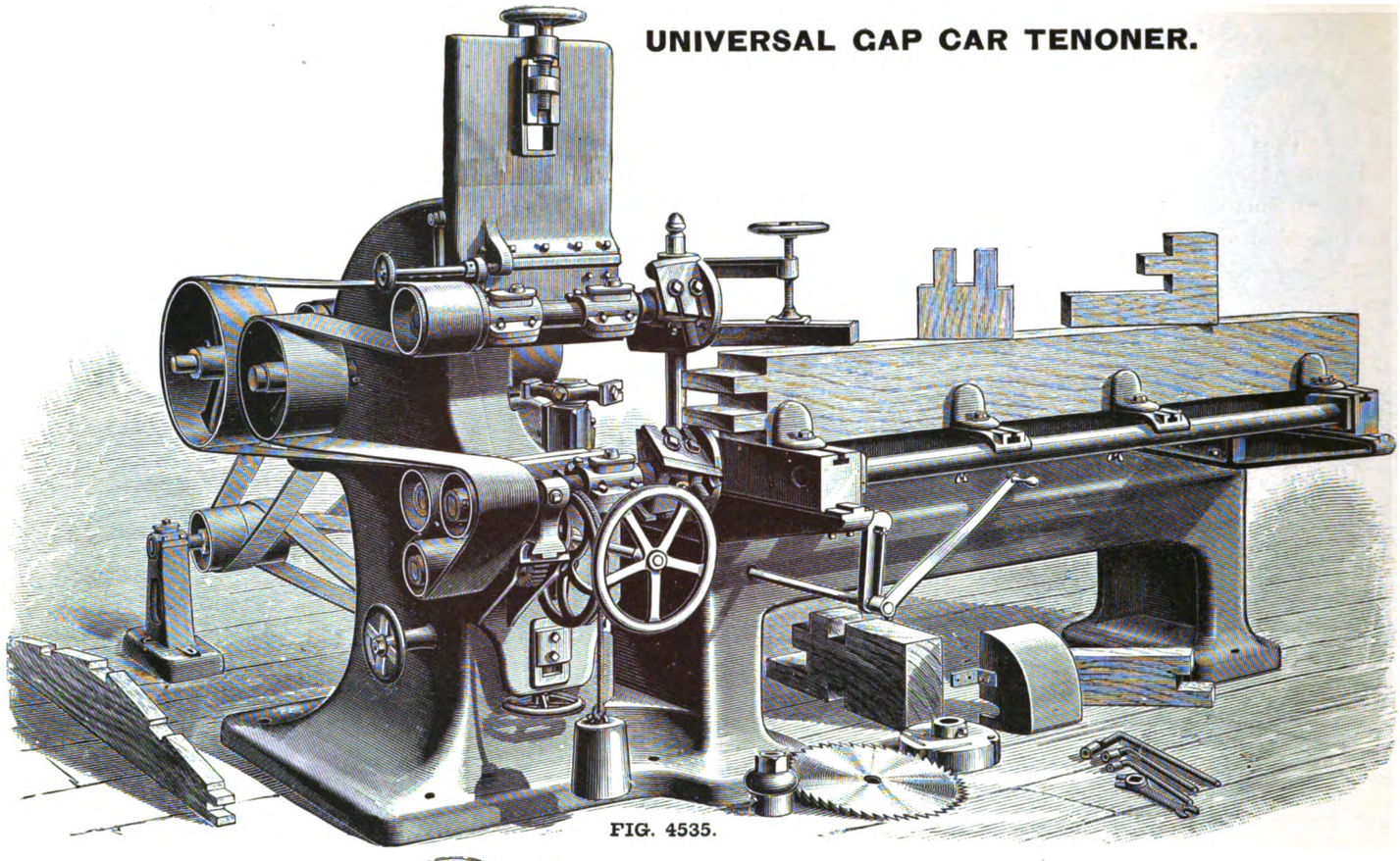


FIG. 4535.

VERTICAL CAR TENONER.

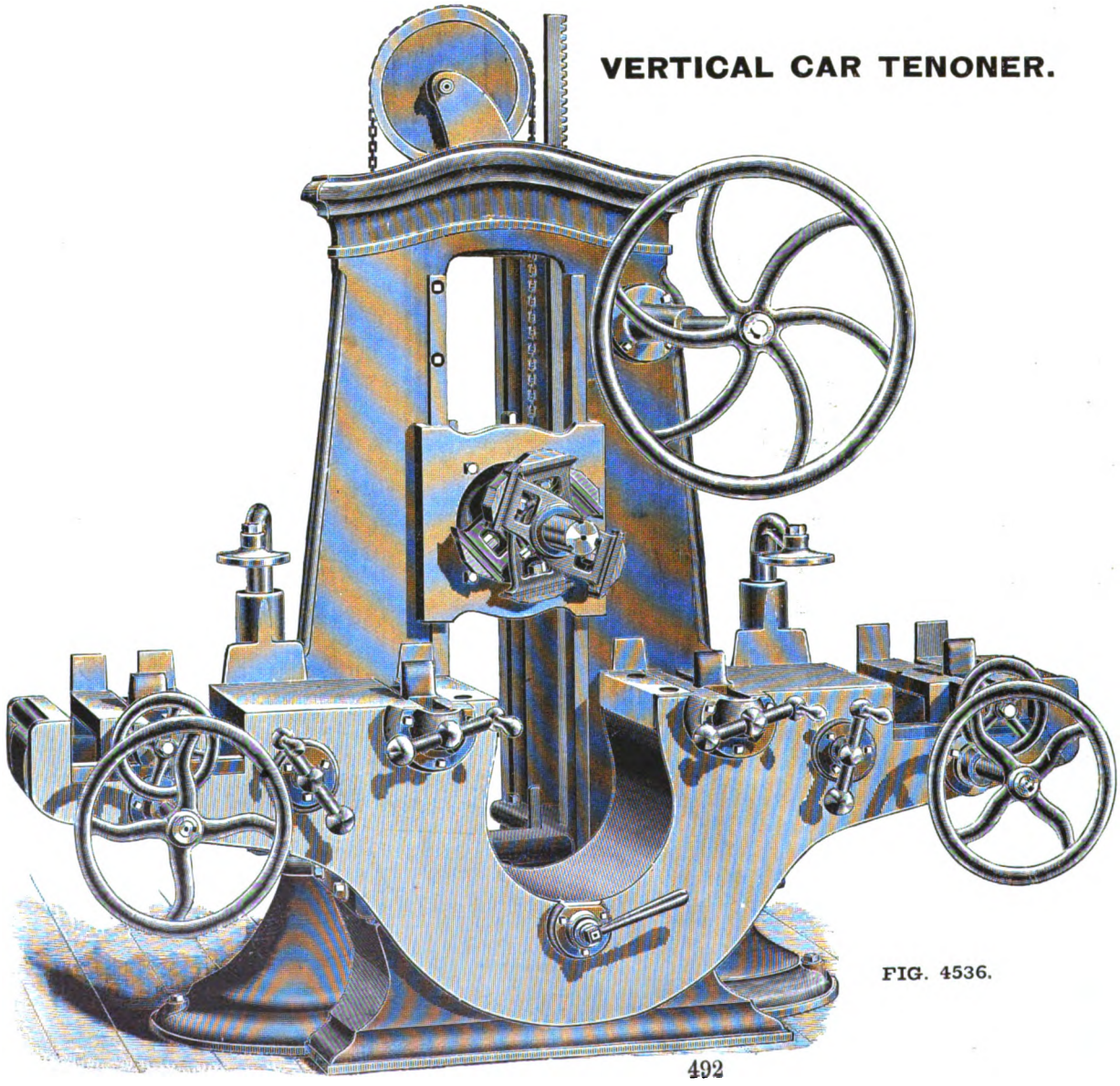


FIG. 4536.

DESCRIPTION, FIG. 4535.

Cuts single, double and triple tenons, gaining, etc.; will at one cut make tenons 6 in. long and repeating any length.

Tight and loose pulleys, 12 x 6 in.; speed, 700 revolutions.

PRICE, $ .....

DESCRIPTION, FIG. 4536.

Cuts double tenons; works on timber up to 16 inches square.

Tight and loose pulleys, 12 x 8 inches; speed, 400 revolutions.

WEIGHT, 5,800 LBS.

PRICE, $900.00.

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TENONING MACHINE FOR CAR SHOPS.

The object of this machine is to form single and double tenons on long sills, without turning them about, or for cutting timber ends into any shape required, as any shape cutter can be placed on the heads.

Lumber 16 inches thick and 14 inches wide can be worked.

The machine as made now has four clamp screws, two vertical and two horizontal, for holding the timber during cutting.

The machine is furnished with a countershaft and one 2 inch and two 3 inch heads and cutters.

When required we put horizontal boring spindles on each end of the bed, so arranged that we can bore in the ends of sills for joint bolts, and they are operated independent of the machine, and are entirely out of the way when not wanted.

Tight and loose pulleys, 14 x 6 inches, and should make 600 revolutions.

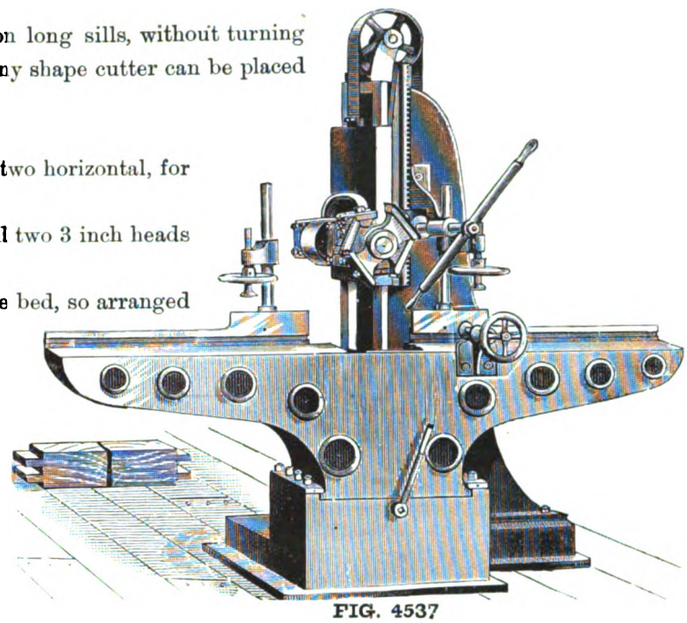


FIG. 4537

PRICES.

With horizontal boring spindle, weight, 6,000 lbs..... ...$1,050.00
Without " " " " 5,200 " 850.00

HORIZONTAL CARRIAGE TENONING MACHINE.

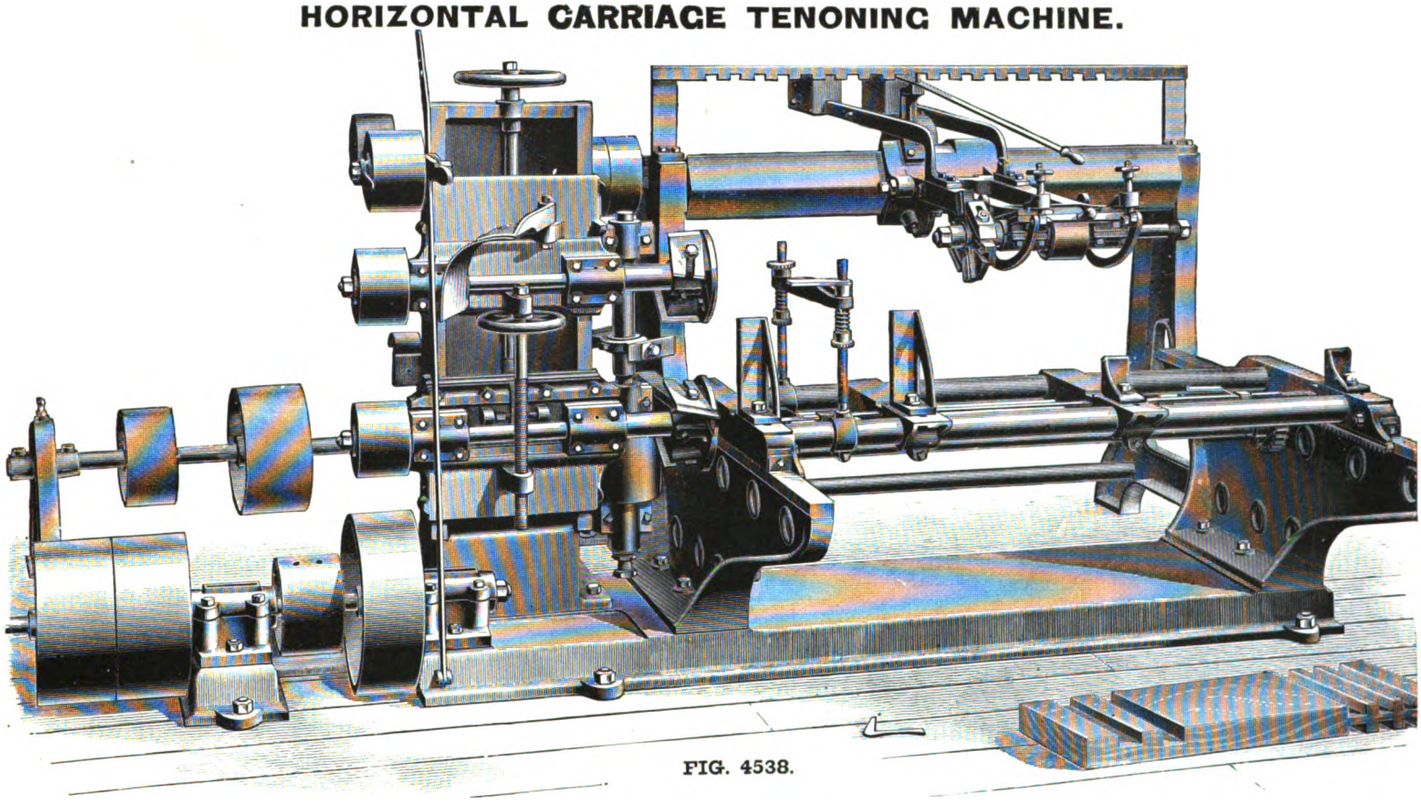


FIG. 4538.

This machine is intended for single or double tenons. Also arranged with gaining attachment that will gain on any part of the table. Several parts of the machine are bolted to a sole plate, 5 in. deep, that will keep the whole true and in line. The carriage is constructed of wrought and cast iron, mounted on rollers, provided with gear wheels which cause the end of the table to move uniformly. The cutter-heads are 10 in. diameter, spindle pulleys are 8 in. diameter, driving belts are 5 in. wide.

Tight and loose pulleys are 16 in. diameter, 7 in. face, and should make 1,000 revolutions per minute.

PRICES.

Plain machine for cutting single tenons, without gaining attachment, weight, 3,800 lbs.....$650.00
Machine with vertical spindles for cutting double tenons, weight, 4,523 lbs..... 725.00
Machine for cutting double and triple tenons, with gaining attachment, weight, 6,000 lbs 925.00

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LARGE CAR TENONING AND GAINING MACHINE.

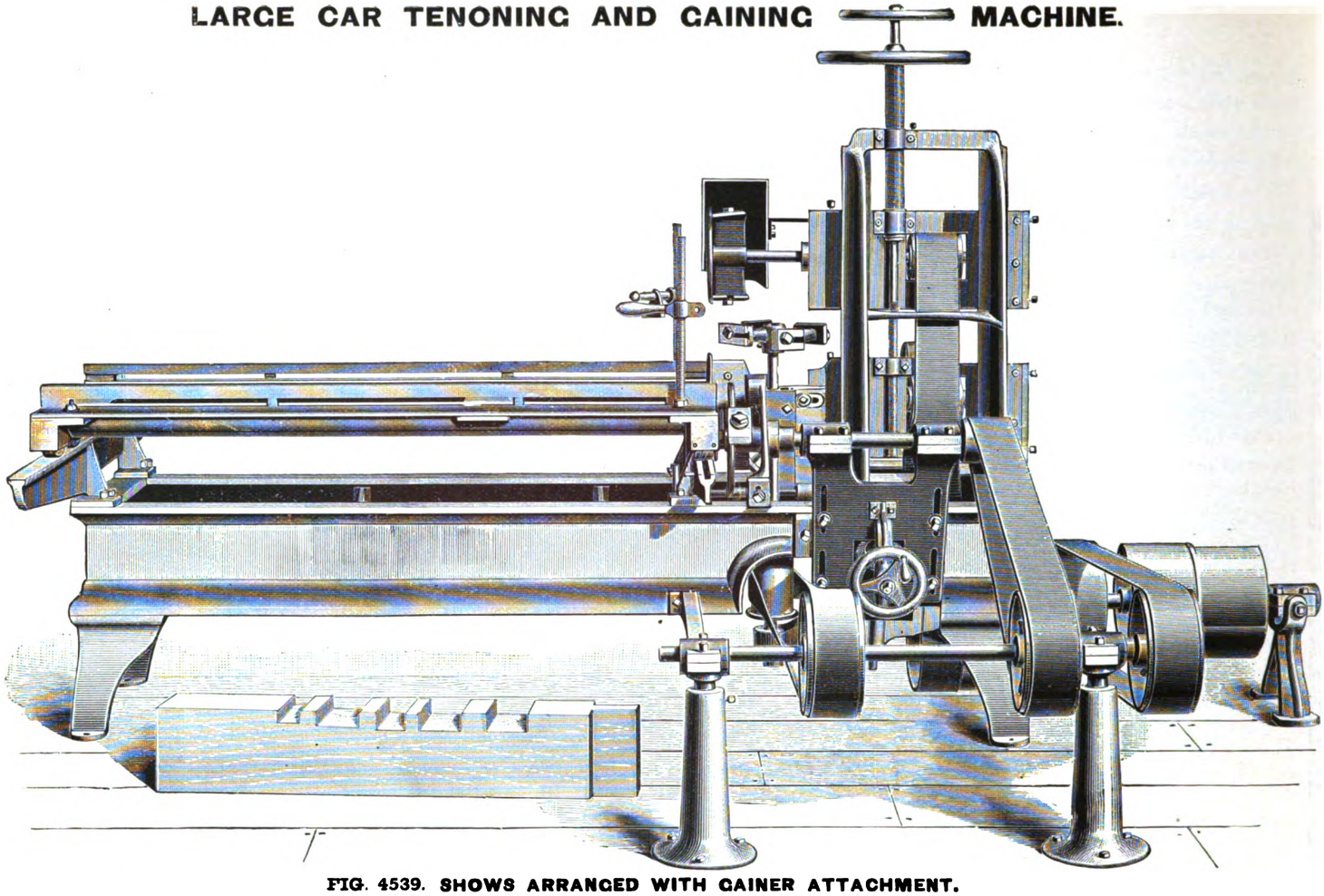


FIG. 4539. SHOWS ARRANGED WITH GAINER ATTACHMENT.

Cutter-heads are 10 inches diameter and expand to take in 12 inch timber. The lower head can be dropped below the carriage so as to cut relishes.

It has a gaining attachment for cutting gains operating on the under side of the timber, which is placed on the carriage and passed over the head. An expanding head is used that will cut from ⅛ to 3 inches deep and from 2 to 4 inches wide.

The countershaft that drives the vertical shaft and the gaining head is a part of the machine. When it is used as a gaining machine it is operated from the back side; when used as a tenoning machine, from the front side. When it is being used as a gaining machine the other part is idle, simply by casting off a belt, and the same with the gainer head when the tenoner is in use.

It is furnished with 1, 1½ and 2 inch throating heads.

The tight and loose pulleys are 12 x 6 inches, and should make 650 revolutions per minute.

WEIGHT, 2,000 LBS. PRICE, $700.00.

STANDARD GAINER.

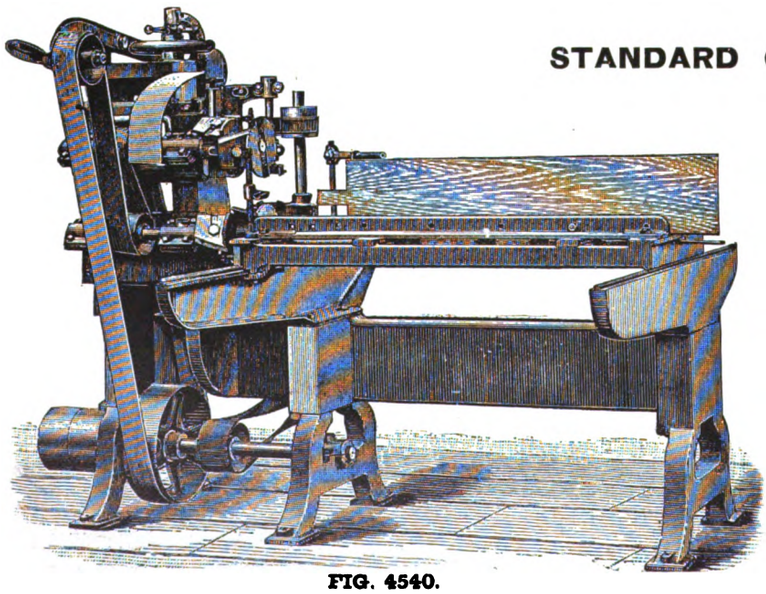


FIG. 4540.

This machine differs from any in the market, in having the frame made to allow the operator to pass along with the work with his body, instead of bending over the carriage, making it much easier to operate.

The upper head will raise 8 inches above the table, and will cut tenons 7½ inches long.

Tight and loose pulleys, 8 x 4 inches, and should make 1,000 revolutions.

PRICES.

Double heads and double copes,	weight,	1,470 lbs.,	$239.00
Single " " " "	"	1,400 "	223.00
Single " " single "	"	1,400 "	215.00
Single " " no copes,	"	1,400 "	200.00

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PEDESTAL TENONER.

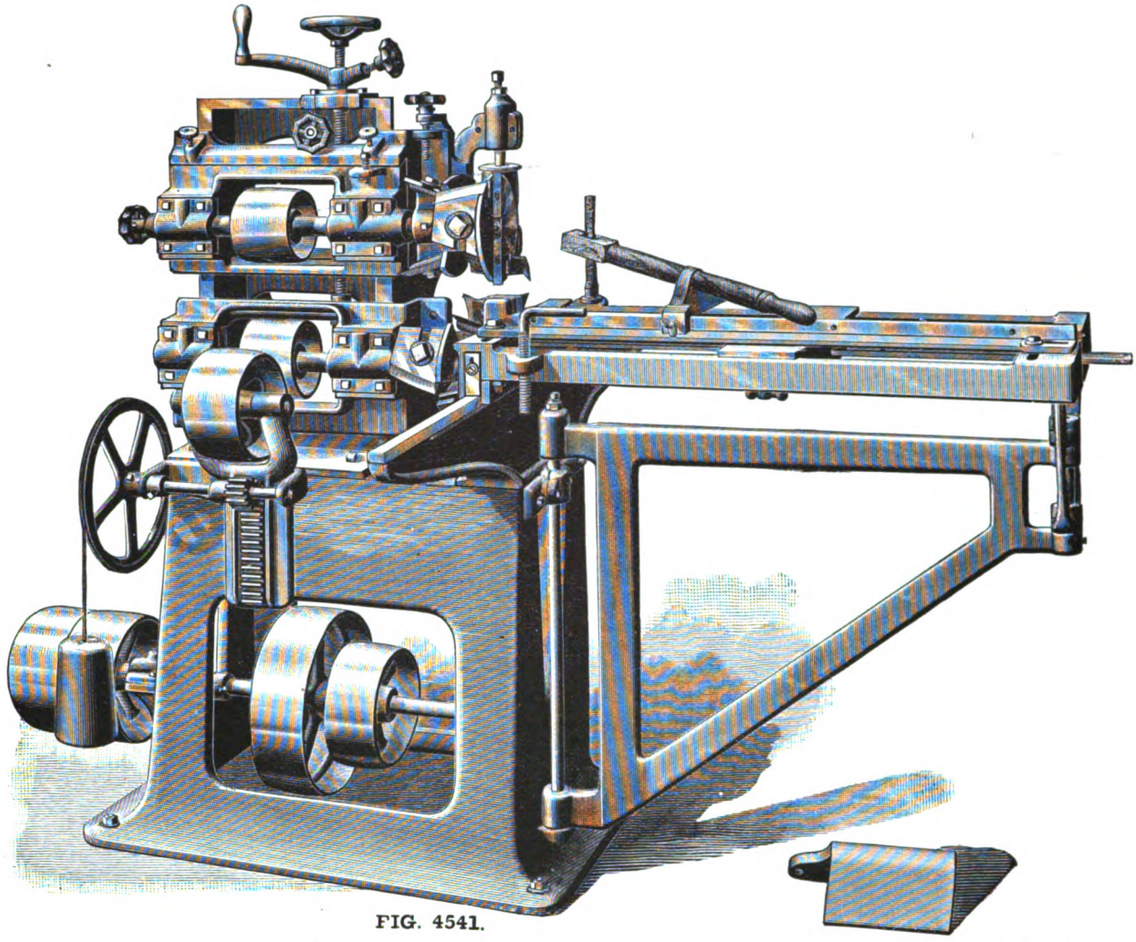


FIG. 4541.

It will cut a tenon 6½ inches long, and by running through twice will cut 9 inches long. The mandrels are steel; the table is light and very strong, has extension bar and stops adjustable to any length of tenon. The swinging support at the outer end supports both sides of table; the table is gibbed to the way and cannot by any possible accident be run into the cutters or off the way. The top headstock is adjustable laterally for variation of shoulder; the boxes carrying the top head spindle are connected and slide in gibbed ways; the copes are attached to the headstocks, move with them, and have both vertical and lateral adjustment. The belt that drives the cutter-head shafts is central between the boxes, and by a device both heads can be raised or lowered together without altering the thickness of the tenon, or either head can be adjusted without altering the position of the other—this is done by means of one screw. The countershaft has tight and loose pulleys, 9 inches in diameter and 4 inch face, and should make 900 revolutions per minute. Weight, 1,350 lbs.

PRICES.

Double heads and two copes	$240.00	Single heads and one cope	$215.00
Double heads without copes	215.00	Single heads without copes	200.00
Single heads and two copes	225.00	Cut-off saw attachment, extra	15.00

PRICES, FIG. 4542.

NO. 2 MACHINE.

This machine will cut a tenon 6½ inches long at one cut, and 9 inches by running through twice.

The countershaft has tight and loose pulleys, 9 inches in diameter and 4 inches face, and should make 900 revolutions per minute. Weight, 1,150 lbs.

PRICES.

Double heads and two copes	$240.00
Double heads without copes	215.00
Single heads and two copes	225.00
Single heads and one cope	215.00
Single heads without copes	200.00
Cut-off saw attachment, extra	15.00

NO. 3 MACHINE.

Tight and loose pulleys, 9 inches in diameter and 4 inches face, and should make 950 revolutions per minute. Weight, 1,025 lbs.

PRICES.

Single heads and two copes	$195.00
Single heads and one cope	185.00
Single heads without copes	170.00
Cut-off saw attachment	15.00

NO. 2 AND 3 TENONER.

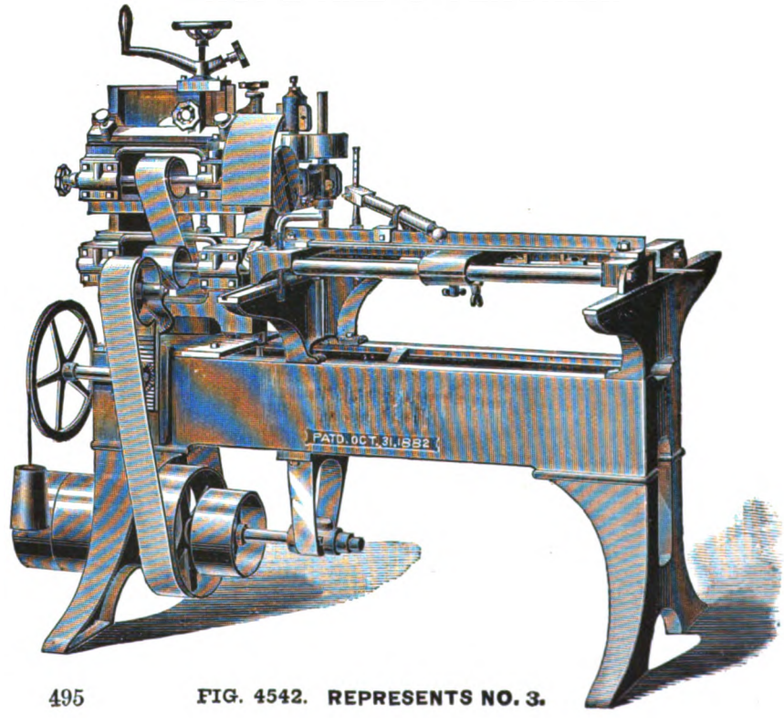


FIG. 4542. REPRESENTS NO. 3.

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NO. 2 TENONING MACHINE.

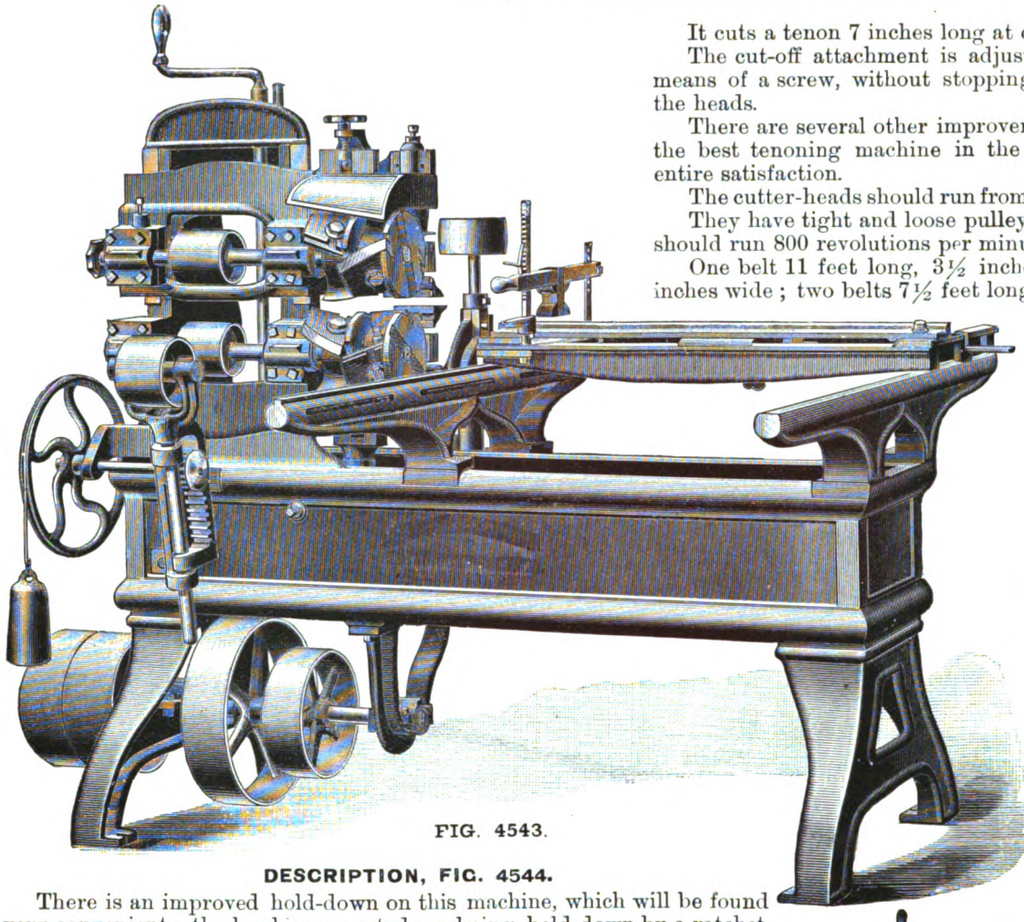


FIG. 4543.

It cuts a tenon 7 inches long at one operation.

The cut-off attachment is adjustable to any length tenon desired, by means of a screw, without stopping, and is run with the same belt as the heads.

There are several other improvements not mentioned. In fact, this is the best tenoning machine in the market, and we guarantee it to give entire satisfaction.

The cutter-heads should run from 3,000 to 3,500 revolutions per minute.

They have tight and loose pulleys, 4 inch face, 10 inch diameter, which should run 800 revolutions per minute.

One belt 11 feet long, 3½ inches wide; one belt 8½ feet long, 2½ inches wide; two belts 7½ feet long, 2 inches wide.

WEIGHT, 1,000 LBS.

PRICES.

Double heads and two copes	$240.00
Double heads and no copes	215.00
Single heads and two copes	225.00
Single heads and one cope	215.00
Single heads and no cope	200.00
Cut-off saw attachment	15.00

DESCRIPTION, FIG. 4544.

There is an improved hold-down on this machine, which will be found very convenient; the lumber operated on being held down by a ratchet, which operates instantly, holding the shortest pieces firmly in place.

The cut-off attachment is adjustable to any length tenon desired, by means of a screw, without stopping, and is run with the same belt as the heads.

They have tight and loose pulleys, 3 inch face, 10 inch diameter, which should make 900 revolutions per minute.

WEIGHT, 750 LBS.

PRICES.

Single heads and two copes	$195.00
Single heads and one cope	185.00
Single heads and no cope	170.00
Cut-off saw attachment, extra	15.00

NO. 3 TENONER.

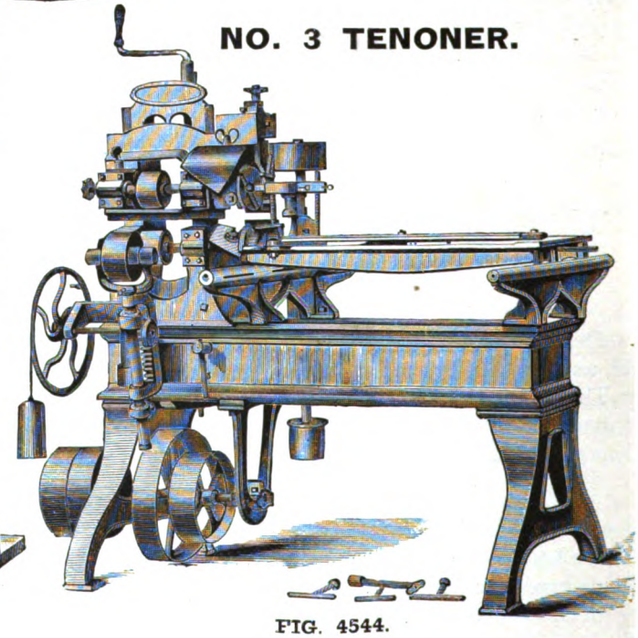


FIG. 4544.

PEDESTAL TENONER.

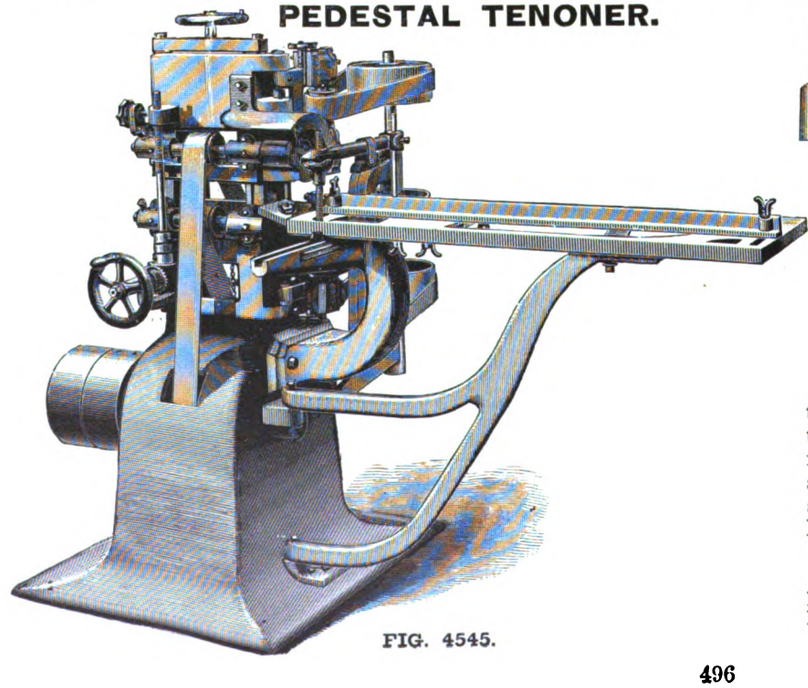


FIG. 4545.

DESCRIPTION, FIG. 4545.

It will cut a tenon from ¼ to 4 inches long—longer tenons can be made by passing the stock through a second time. The upper and lower heads raise together or separately, as may be desired. The cope heads are attached to, and raise and lower with, the horizontal heads. The tight and loose pulleys are 10 x 4 inches. Speed, 1,000 revolutions.

WEIGHT, 1,200 LBS.

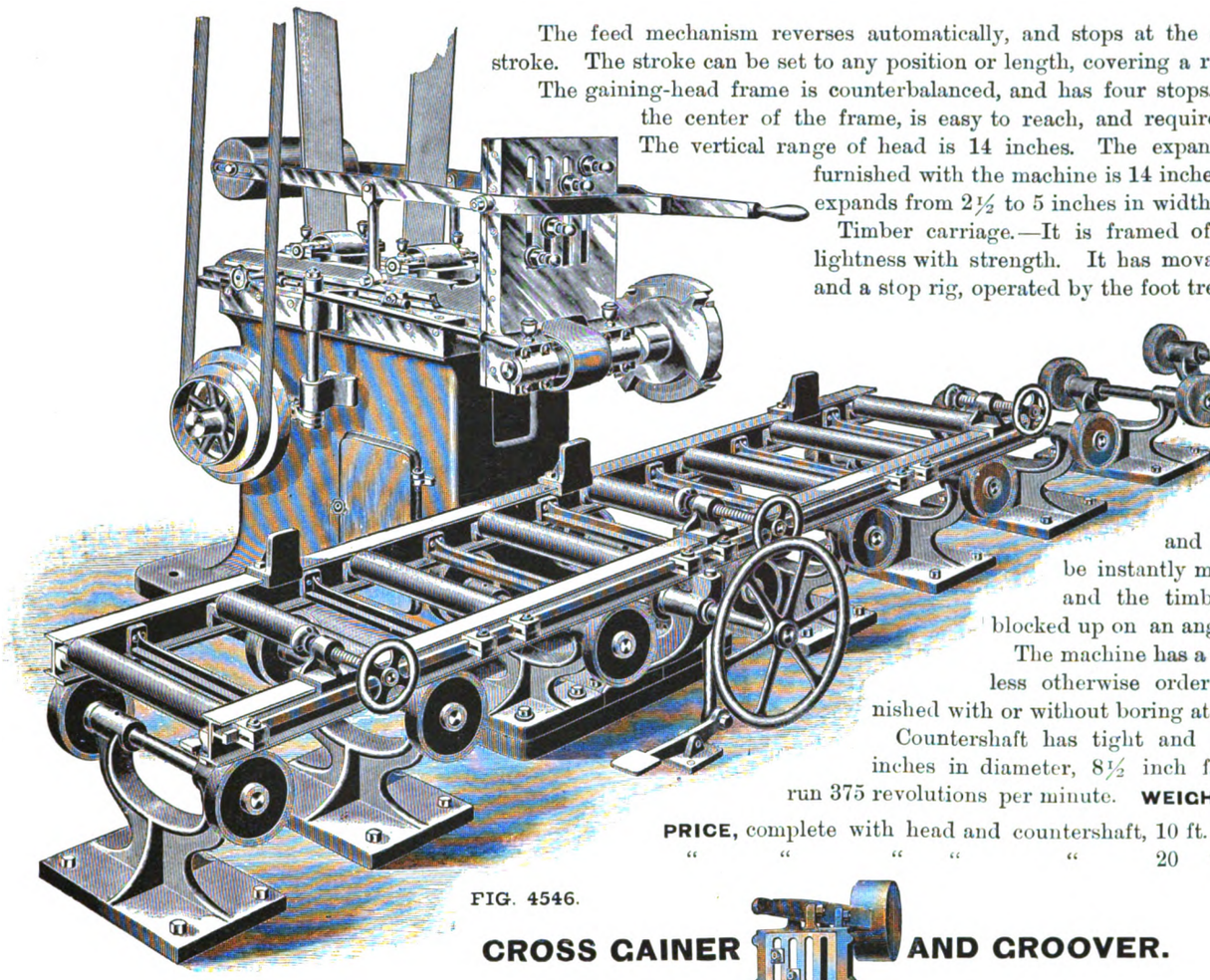
PRICES.

No. 1, 4 inch, with two copes	$215.00
No. 2, 6 inch, with two copes	240.00

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AUTOMATIC CAR GAINER.



The feed mechanism reverses automatically, and stops at the end of the return stroke. The stroke can be set to any position or length, covering a range of 22 inches. The gaining-head frame is counterbalanced, and has four stops. The lever is in the center of the frame, is easy to reach, and requires no adjustment. The vertical range of head is 14 inches. The expansion gaining-head furnished with the machine is 14 inches in diameter, and expands from 2½ to 5 inches in width.

Timber carriage.—It is framed of steel to combine lightness with strength. It has movable screw clamps, and a stop rig, operated by the foot treadle.

We draw attention to the open carriage bed, with rollers. The timber is easily handled; there is no trouble with chips; the front and back clamps can be instantly moved or taken off, and the timber can be readily blocked up on an angle, etc.

The machine has a 10 foot table, unless otherwise ordered. Machine furnished with or without boring attachment.

Countershaft has tight and loose pulleys, 14 inches in diameter, 8½ inch face, which should run 375 revolutions per minute. **WEIGHT, 6,500 LBS.**

PRICE, complete with head and countershaft, 10 ft. bed, $.....
" " " " " 20 " .....

FIG. 4546.

CROSS GAINER AND GROOVER.

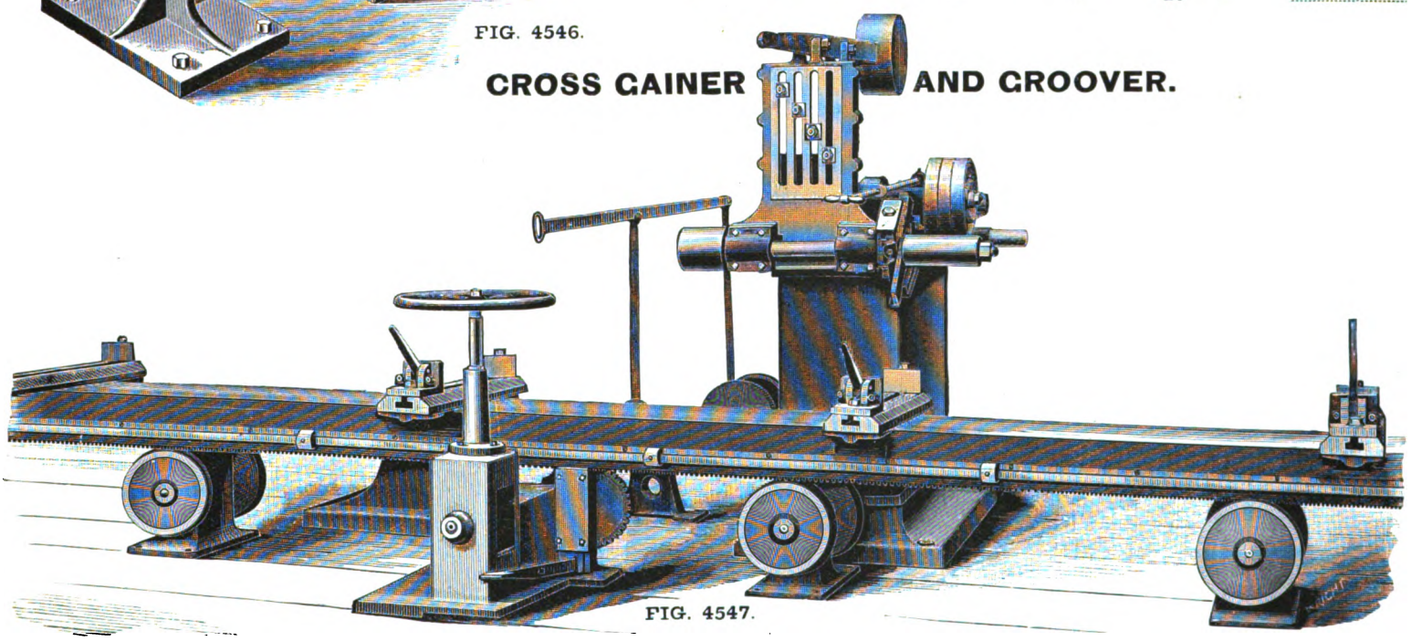


FIG. 4547.

Carriage is fitted with bolsters to take on timber 24 inches wide and 16 inches thick.

Duplicating work.—The table is provided with twelve stops which are set to locate the position of gains lengthwise of the timber, and the depth to which the cutters act is determined by the movable stops in the front saddle on which the spindle is carried, so that when the machine is once set for a particular kind of work, no laying out is required for duplication.

When desired, the machine is provided with boring attachment which has a horizontal movement of 16 inches and a vertical movement of 12 inches; also a radial adjustment by means of which angular holes can be bored.

One cutter-head, countershaft, and a full set of wrenches are furnished.

Tight and loose pulleys, 16 inches diameter, 6 inch face, should make 300 revolutions.

PRICES.

14 ft. table, weight 6,700 lbs	$850.00
34 " " 7,300 lbs	950.00
Boring attachment, extra	125.00

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POWER FEED GAINER OR SAW.

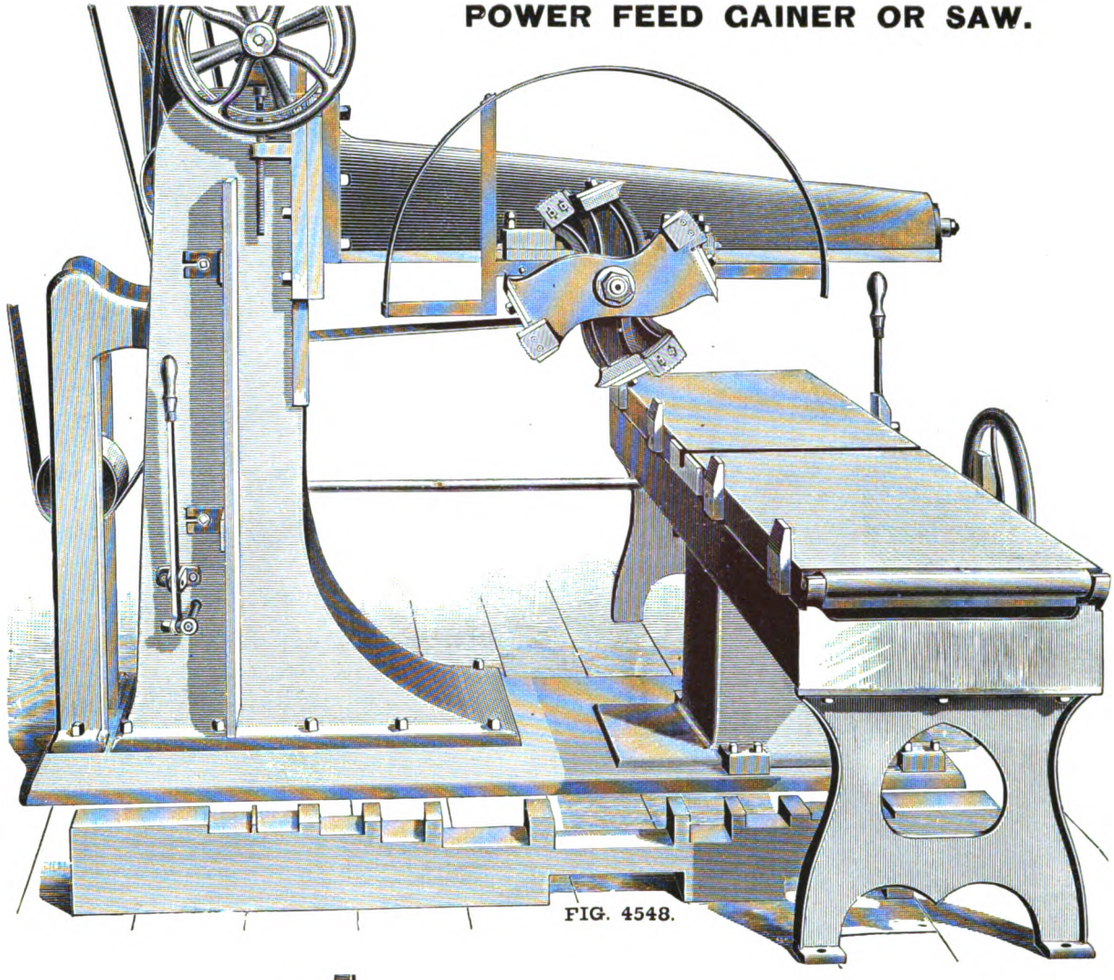


FIG. 4548.

The machine will carry from an 18 inch to 34 inch saw, or a 14 inch gainer head. The countershaft furnished with the machine has tight and loose pulleys, 14 x 8 inches, and should make 365 revolutions per minute.

Weight of machine, 4,500 lbs.

PRICE, with gainer, **$700.00.**

In gaining, the timber should be keyed to the table, so that it may be moved accurately to the next cut by means of the large hand wheel in front. When sawing it is not necessary to dog the stuff, as the saw which revolves over onto the timber has a tendency to draw it up to the fence, thus adding to the safety of the operator, as all splinters are carried from him.

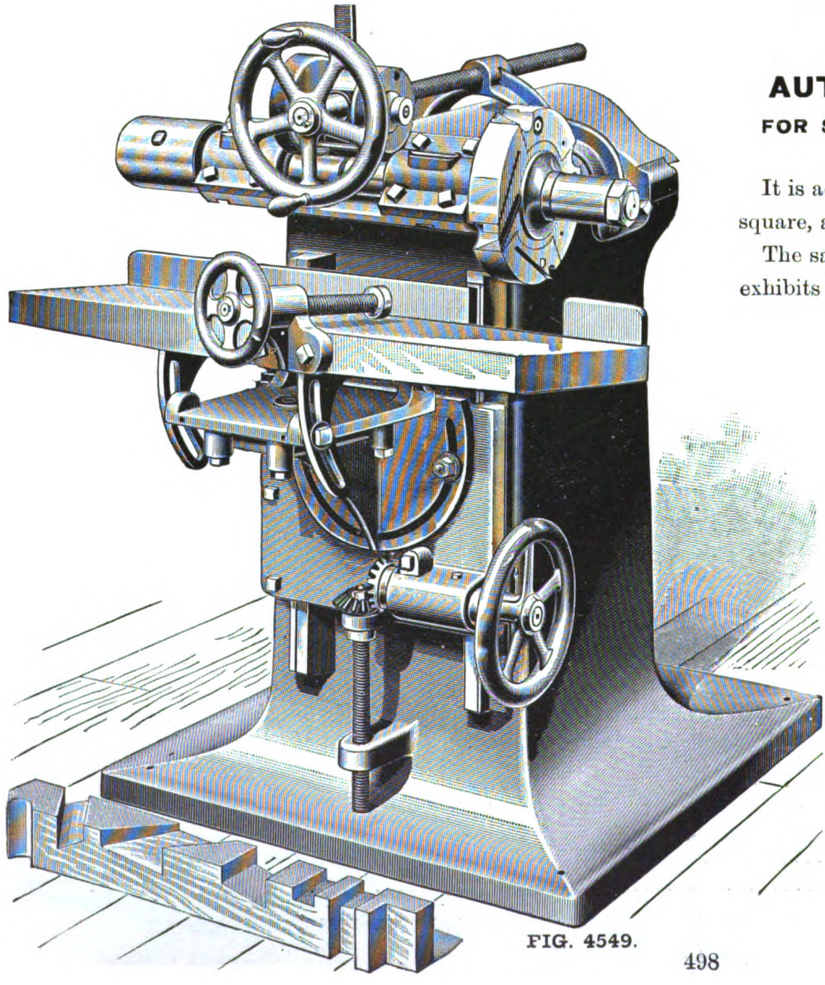


FIG. 4549.

AUTOMATIC TRAVERSING GAINER.

FOR STRAIGHT OR ANGULAR GAINING, WITH POWER OR HAND FEED.

It is adapted for all the various requirements of cross-gaining, square, angular and double angular.

The sample piece of material shown at the base of the machine exhibits gains of various widths, depths and angles, all of which, with many others, this machine is capable of producing.

We furnish with each machine one adjustable gaining head. This head consists of two separate halves, adjusting to cut all sizes by 16ths up to twice its narrowest width, or width when closed.

One or more gaining heads may be used at the same time, to make cuts from $\frac{5}{16}$ of an inch wide up to a width of seven inches or more if desired.

The weight of the machine is about 1,300 lbs.

The countershaft furnished with the machine is provided with an adjusting idler to secure a uniform tension of the belt. It is placed overhead nearly in the center of the traversing motion of the cutter-head. The tight and loose pulleys are deferential, the loose pulley being of smaller diameter than the tight. The latter is 10 in. in diameter by 5¼ in. face, and should made 600 revolutions per minute.

PRICE, $350.00.

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HOLLOW CHISEL MORTISER.

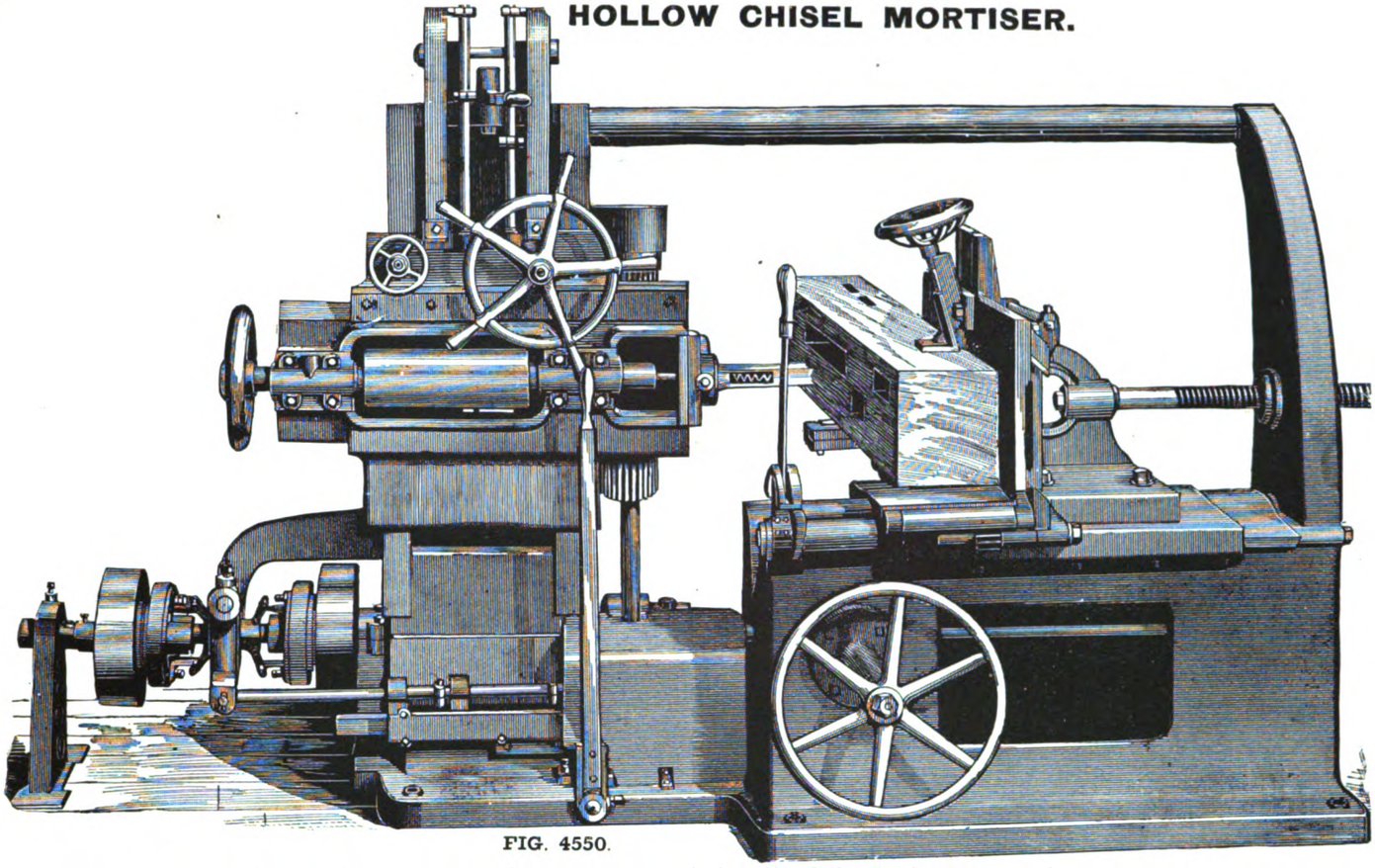


FIG. 4550.

One each, ¾, ⅞, 1, 1¼ and 1½ inch chisels and augers, countershaft, and a full set of steel wrenches are furnished with counter, 12 x 6. Speed, 800 revolutions. **WEIGHT, 5,600 LBS. PRICE, $900.00.**

SQUARE CHISEL MORTISER.

PRICE, No. 2, complete, with 4 chisels and augers to suit, **$1,150.00.** Same, with auxiliary boring attachment and three augers for same, **$1,200.00. WEIGHT, 4,800 LBS.**

The machines will take stock up to 16 wide and 14 inch deep, and will cut a gain on top of a 12 inch stick. Size of hollow chisels, ½, ¾, 1 and 1½ inch, with augers to suit.

Tight and loose pulleys, 12 x 6½ inches. Speed, 650 revolutions.

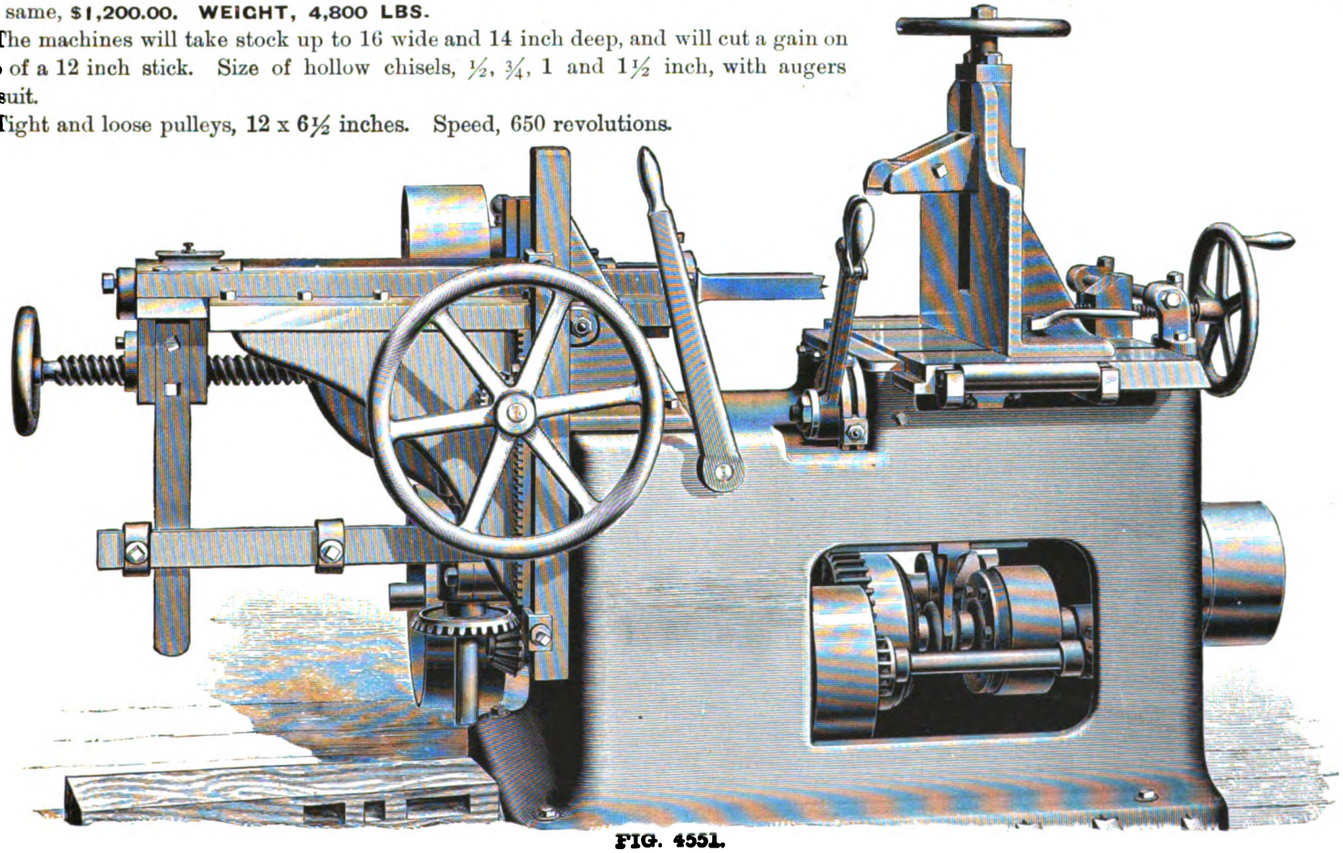


FIG. 4551.

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NO. 6 HOLLOW CHISEL MORTISER.

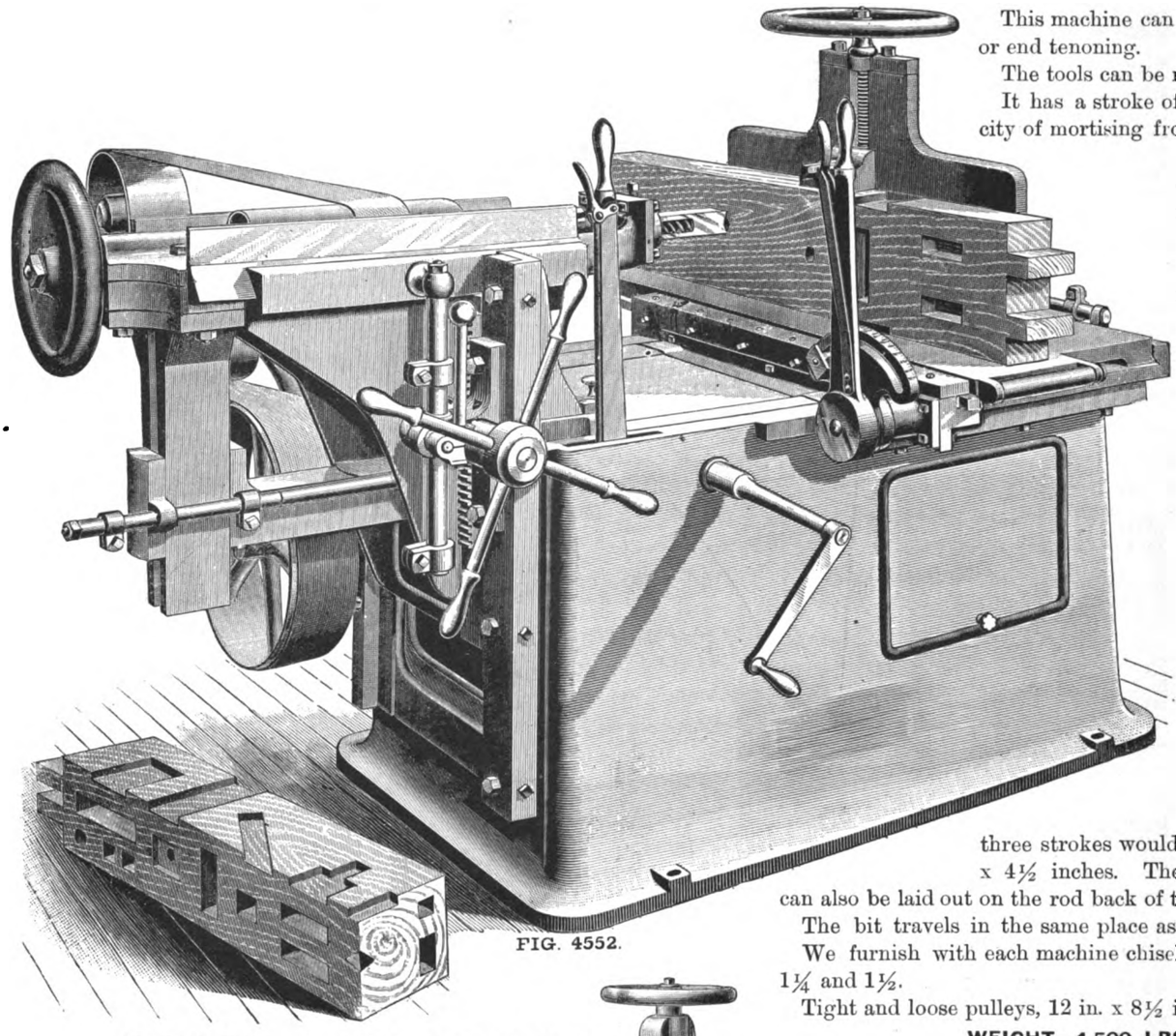


FIG. 4552.

This machine can be used for gaining or end tenoning.

The tools can be moved vertically.

It has a stroke of 7 inches, and capacity of mortising from ⅝ to 2 inches.

The carriage is counterbalanced and moved vertically by a hand wheel to stops on the vertical rod.

The table on which the timber is clamped has end rollers, and is moved forward or back by the crank on side of the machine. The table with timber is movable lengthwise by the hand lever, and the length of throw of each full stroke of lever can be laid out on the graduated arc. Thus, if the chisel is 1½ inches square, and the stop on arc is set to 1½ inches, three strokes would make a mortise 1½ x 4½ inches. The lengths of mortises can also be laid out on the rod back of the table.

The bit travels in the same place as the mortising tools.

We furnish with each machine chisels and bits ¾, ⅞, 1, 1¼ and 1½.

Tight and loose pulleys, 12 in. x 8½ in. Speed, revs.

WEIGHT, 4,500 LBS.

PRICE.

Complete with countershaft, $.....

Extra for boring attachment, $.....

HOLLOW CHISEL MORTISER.

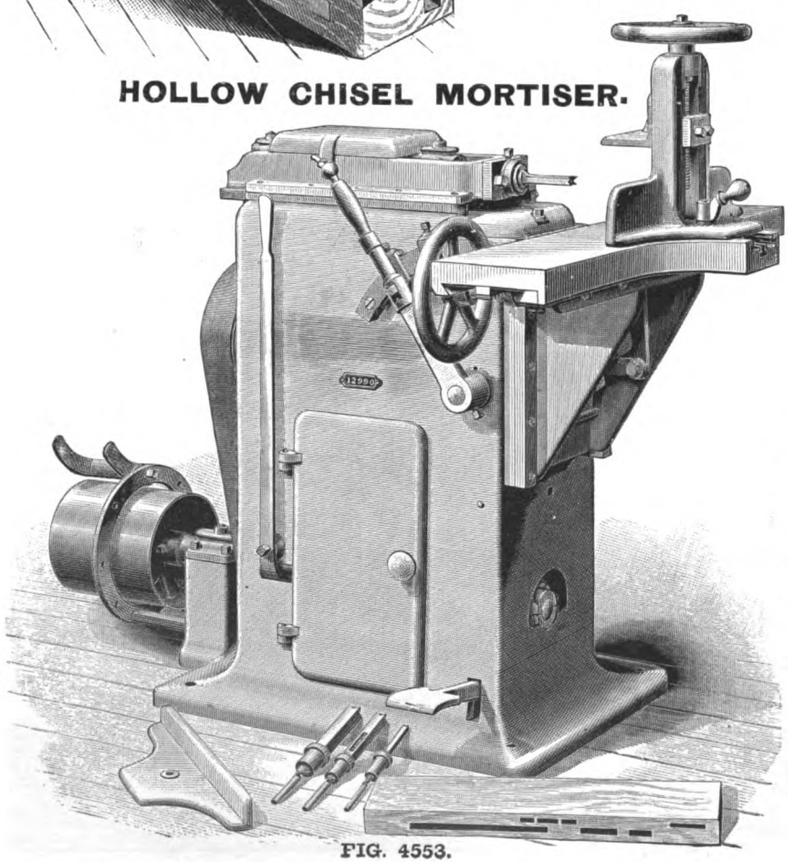


FIG. 4553.

DESCRIPTION, FIG. 4553.

The table is counterbalanced, and is adjusted vertically by a lever provided with stops, by which one or more mortises can be made as in double mortising. It has an adjustment endwise for regulating the length of the mortise, by a hand wheel operating a rack and pinion.

We furnish with the machine, bits ½ inch, ¾ inch, ⅞ inch and 1 inch square.

The tight and loose pulleys are 10 inches x 5 inches, and should make 875 revolutions.

PRICES ON APPLICATION.

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HOLLOW CHISEL MORTISER.

The machine can be used for single and double mortising, for boxing, gaining, countersinking, end tenoning and boxing. The chisel has a travel of 10 inches in depth, and the vertical range of work is 12 inches. Mortises can be made up to 2½ inches square. An auxiliary boring attachment can be added to the machine if desired. The machine is furnished with ¾, ⅞, 1, 1¼ and 1½ inch chisels and augers.

The tight and loose pulleys are 12 x 6 inches, and should make 1,000 revolutions.

Prices on application.

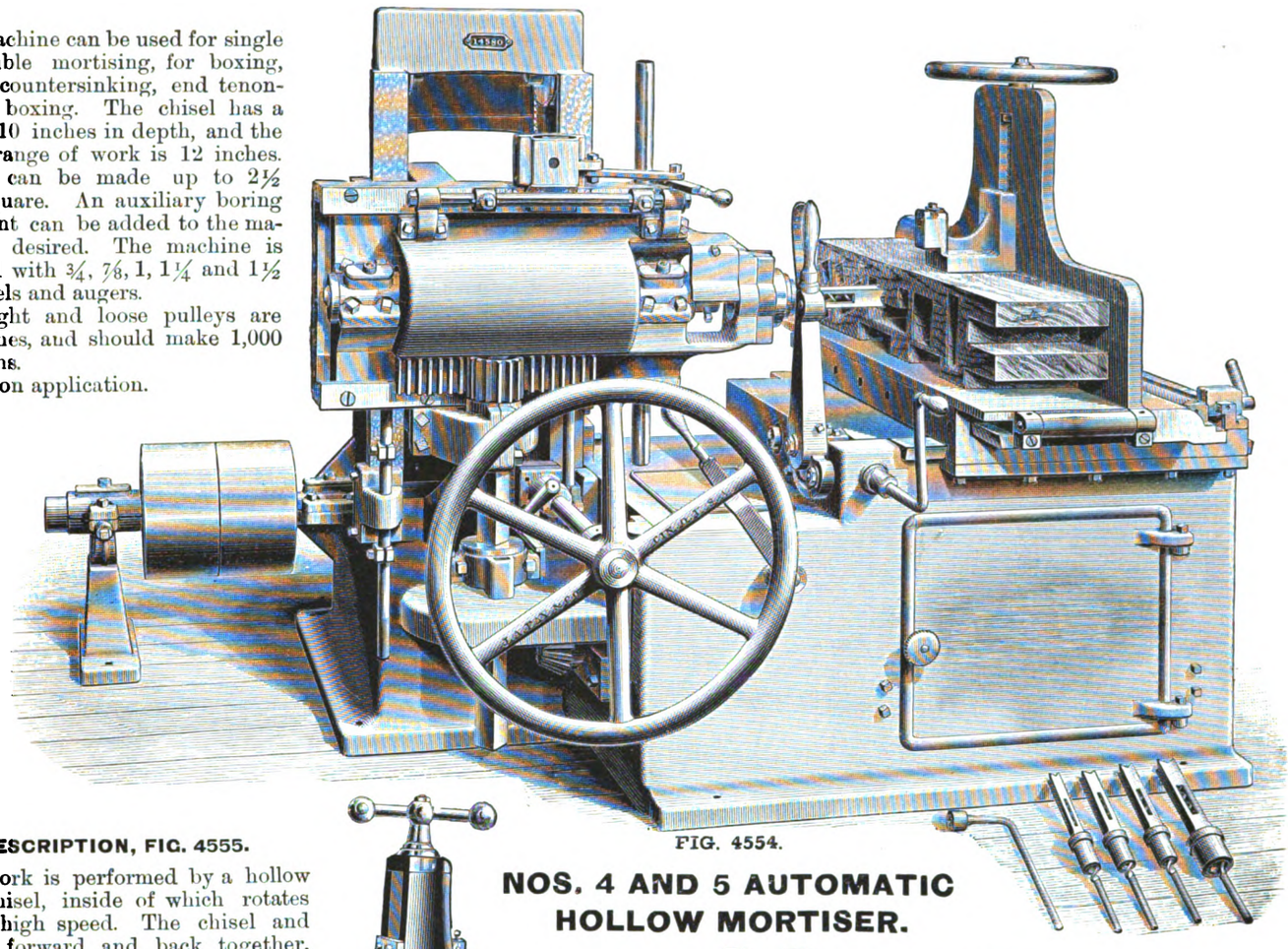


FIG. 4554.

DESCRIPTION, FIG. 4555.

The work is performed by a hollow square chisel, inside of which rotates a bit at high speed. The chisel and bit feed forward and back together, automatically, when once started. The chisel cuts out the corners, the bit removing the chips in one operation. The length of the stroke is regulated by stops on the shifting rod. The shorter the stroke the quicker the machine reverses in proportion.

NOS. 4 AND 5 AUTOMATIC HOLLOW MORTISER.

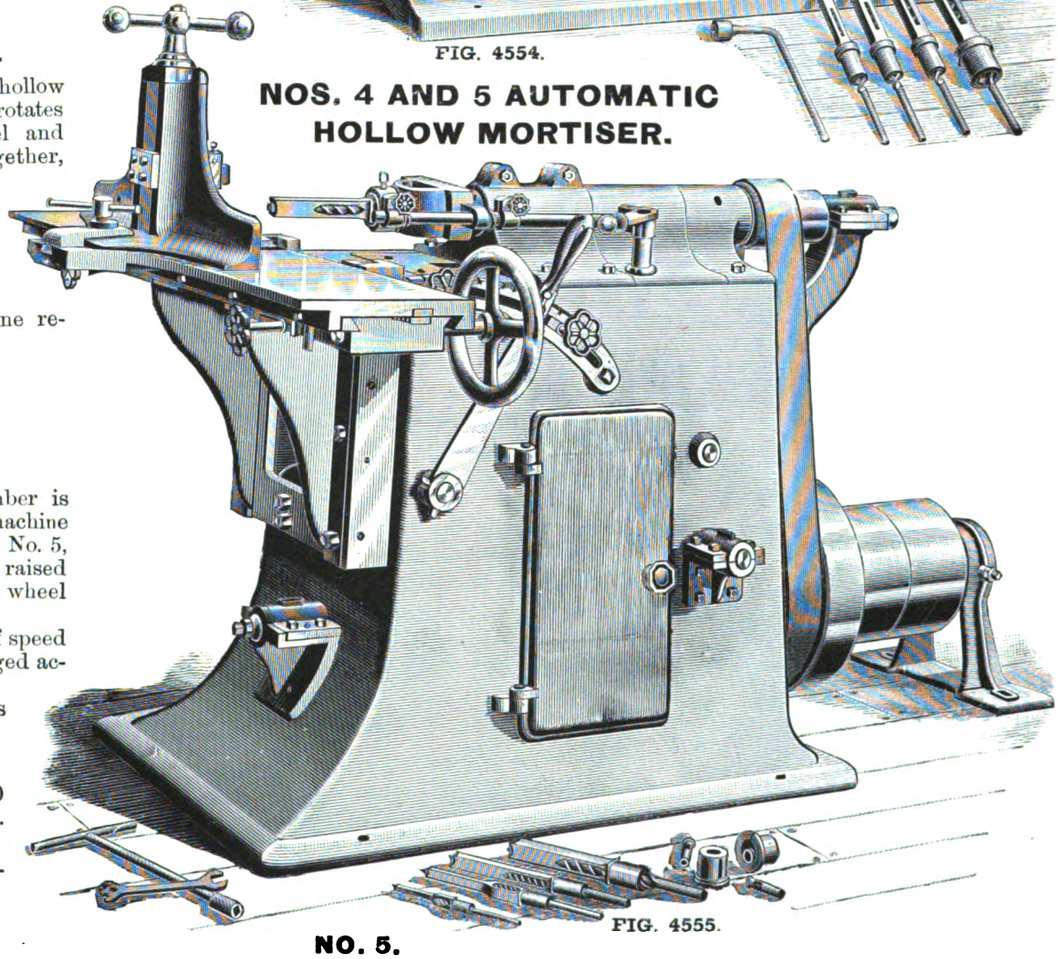


FIG. 4555.

NO. 4 MORTISER.

The table to which the timber is clamped works to stops. The machine is the same in construction as the No. 5, Fig. 4555, except that the table is raised and lowered to stops by a hand wheel under it.

There are two different rates of speed for the bit, so that it can be changed according to the size of bit used.

We furnish with machine chisels and bits, $\frac{5}{16}$, ⅜, ½, ⅝, ¾ inch.

WEIGHT, 1,400 LBS.

Tight and loose pulleys are 10 inches diameter by 6 inch face. Speed, 1,000 revolutions.

PRICE, complete with countershaft, $.....

NO. 5.

The table works to stops and is raised and lowered to stops by the lever at the side of the machine. The clamp on table has a stop device for use with wooden stop rod to lay out location of mortises. We furnish chisels and bits, ⅜, ½, ⅝, ¾ and 1 inch.

WEIGHT, 1,700 LBS.

Tight and loose pulleys are 10 in. diam. by 6½ in. face. Speed, 1,000 revolutions. **PRICE,** complete with countershaft, $ .....

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NO. 7 AUTOMATIC VERTICAL MORTISER.

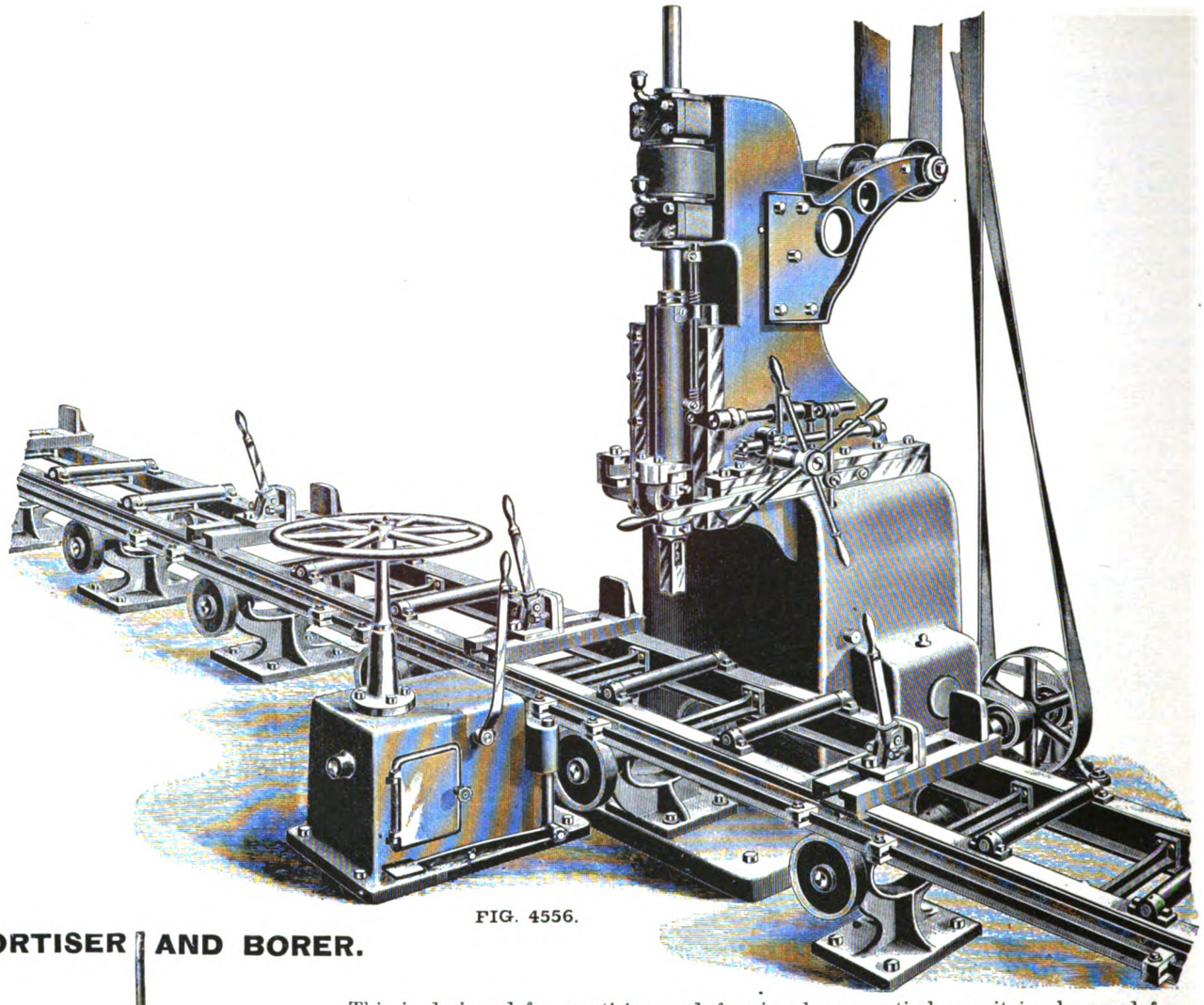


FIG. 4556.

MORTISER AND BORER.

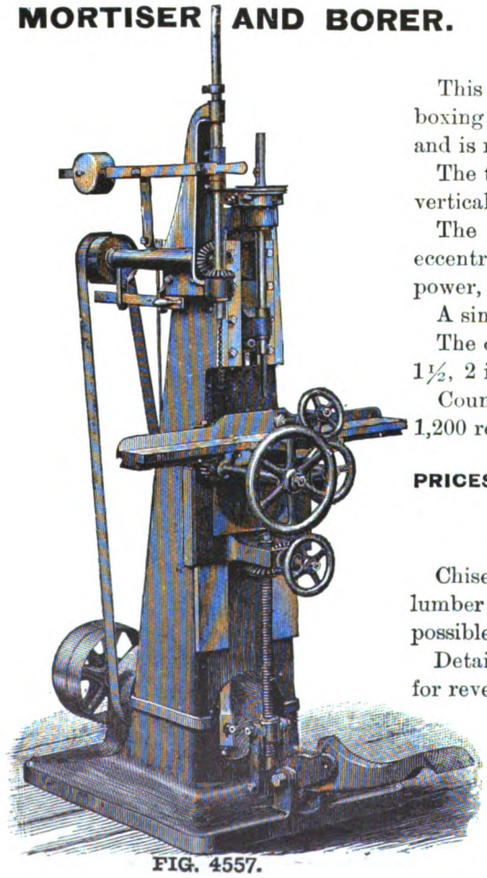


FIG. 4557.

This is designed for mortising and framing long car timbers; it is also used for gaining, boxing and end tenoning and routing; no laying out work is required. Range of stroke 16 inch, and is regulated by stops to any position or length.

The tool frame has a transverse horizontal adjustment of 12 inches, movable to stops by the vertical hand wheel.

The carriage is framed of steel, as light and strong as possible. Has bed rollers, adjustable eccentric clamps, and a stop arrangement for laying out all mortises. The carriage is fed by power, using the vertical lever, or by hand, using the hand wheel.

A single or double boring attachment can be supplied with the machine.

The carriage is furnished of any length, from 10 to 60 feet. Tools furnished, ¾, ⅞, 1, 1¼, 1½, 2 inch chisels and bits.

Countershaft has tight and loose pulleys, 14 inch diameter, 8½ inch face, which should run 1,200 revolutions per minute. Weight, with 40 foot carriage, 14,000 lbs.

PRICES, with power feed on table, countershaft and tools,
10 foot carriage.....$.....
40 " " ....
60 " " ....

DESCRIPTION, FIG. 4557.

Chisel bar.—Is reversed by power and has a uniform stroke of 4½ inches, the table with the lumber being raised by the jointed treadle, which can at all times be kept as near the floor as possible and avoid raising the foot higher than necessary.

Details furnished.—One each ¼, ⅜, ½, ⅝ and ¾ inch chisels, with auger bit to match, belts for reversing chisel and running boring attachment, and a full set of wrenches.

Speed.—Machine has tight and loose pulleys, 12 inches diameter, 3 inches face, and should make 500 revolutions per minute.

PRICES.

Compound table and boring attachment, weight,	1,400	lbs.	.....	$300.00
" " no " " "	1,300	"	.....	250.00
Plain " " " " "	1,100	"	.....	200.00

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CAR MORTISER AND BORER.

This machine will cut mortises up to 2½ inches. It has graduated stroke and auxiliary borers.

The bed will receive timber up to 17 inches square, and the chisel will beat a mortise 6¾ inches deep, or, by changing the face of the timber, it can be made to mortise clear through a thickness of 13½ inches.

It has two boring attachments, one on a line with the chisel to bore for the mortises, which will bore to 10 inches from the center of column; also, an adjustable auxiliary boring attachment, for boring bolt holes, which will bore 17 inch material.

With each machine is furnished 9 chisels and 9 augers to correspond; sizes, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½ inches, also long augers for boring joint bolts, sizes, $\frac{9}{16}$, $\frac{11}{16}$, $\frac{13}{16}$.

The tight and loose pulleys are 16 inches x 4 inches, and should make 275 revolutions.

PRICES ON APPLICATION.

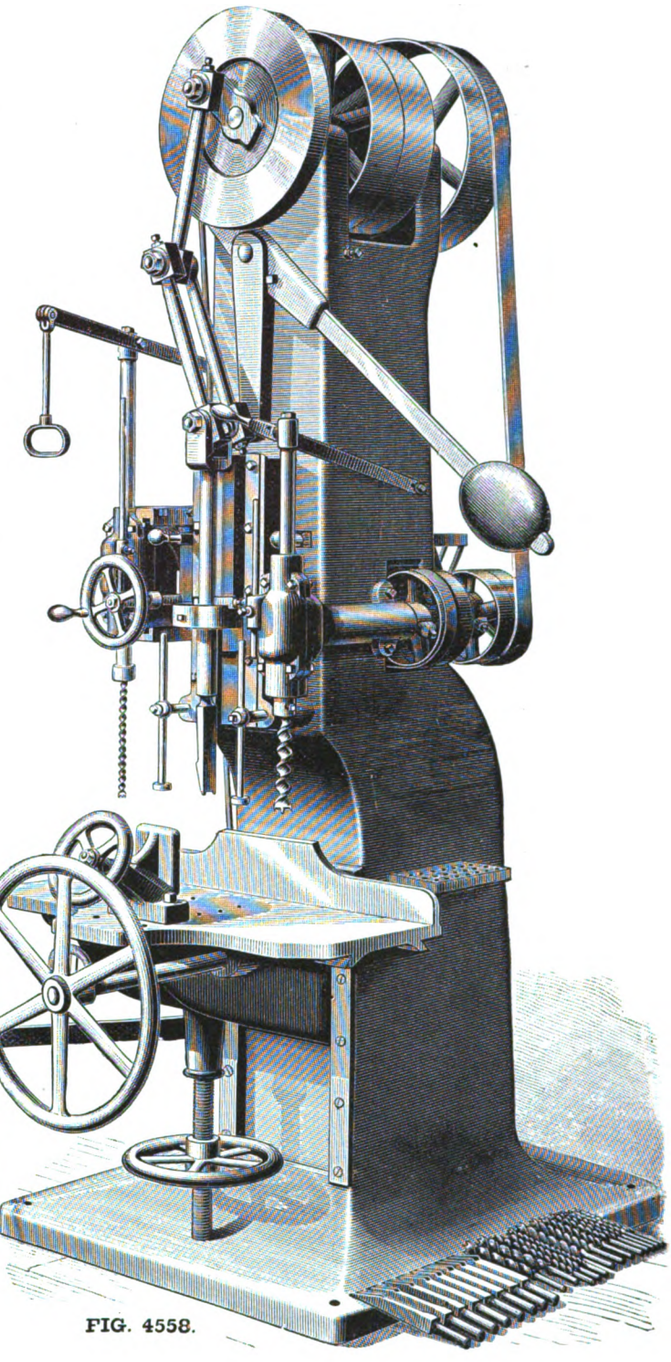


FIG. 4558.

CAR MORTISER AND BORER.

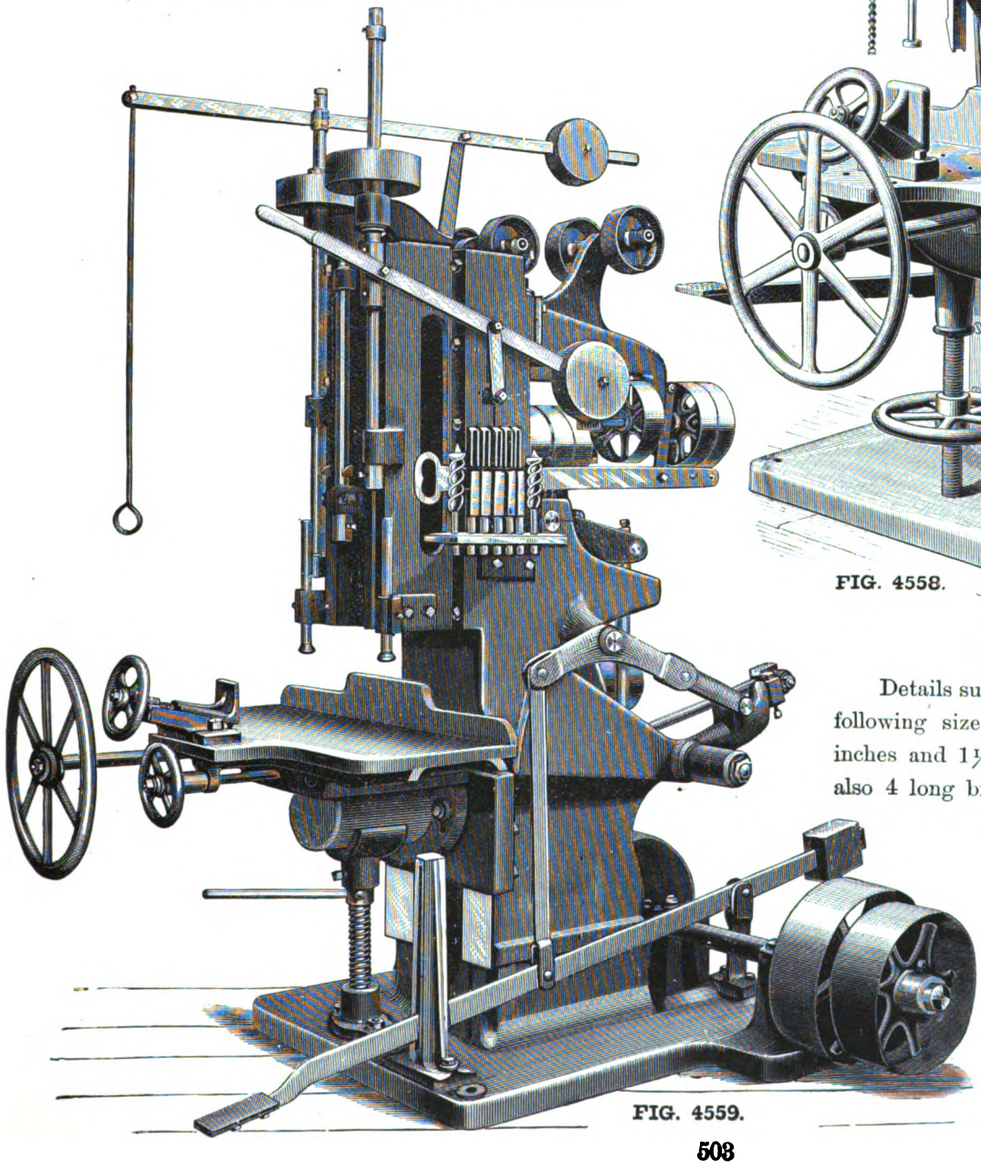


FIG. 4559.

DESCRIPTION, FIG. 4559.

Details supplied.—A set of chisels is supplied of the following sizes, ½ inch, ⅝ inch, ¾ inch, 1 inch, 1¼ inches and 1½ inches, with boring bits to correspond; also 4 long bits, 9, 11, 13 and $\frac{15}{16}$ inch, for the auxiliary boring attachment, countershaft and a full set of wrenches.

Speed.—Countershaft has tight and loose pulleys, 12 inches diameter, 5 inches face, and should make 250 revolutions per minute.

WEIGHT, 4,100 LBS.

PRICE, $750.00.

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MORTISERS AND BORERS.

NO. 1.

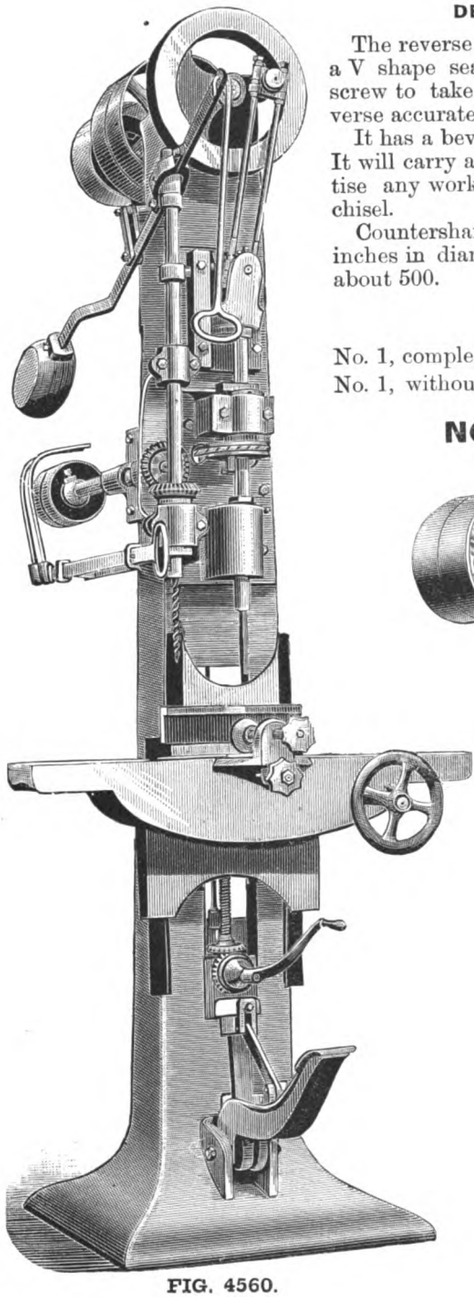


FIG. 4560.

DESCRIPTION, FIG. 4560.

The reverse box has a taper "feather" resting in a V shape seat in the spindle with an adjusting screw to take up any wear, making the chisel reverse accurately.

It has a bevel table, screw clamp and wheel-feed. It will carry any chisel up to 1¼ inches, and mortise any work not too heavy to be raised to the chisel.

Countershaft has tight and loose pulleys, 12 inches in diameter, 3½ inch face, and should run about 500.

WEIGHT, 1,300 LBS.

PRICES.

No. 1, complete as mortiser and borer.....$250.00
No. 1, without borer..... 225.00

NO. 2 MORTISER.

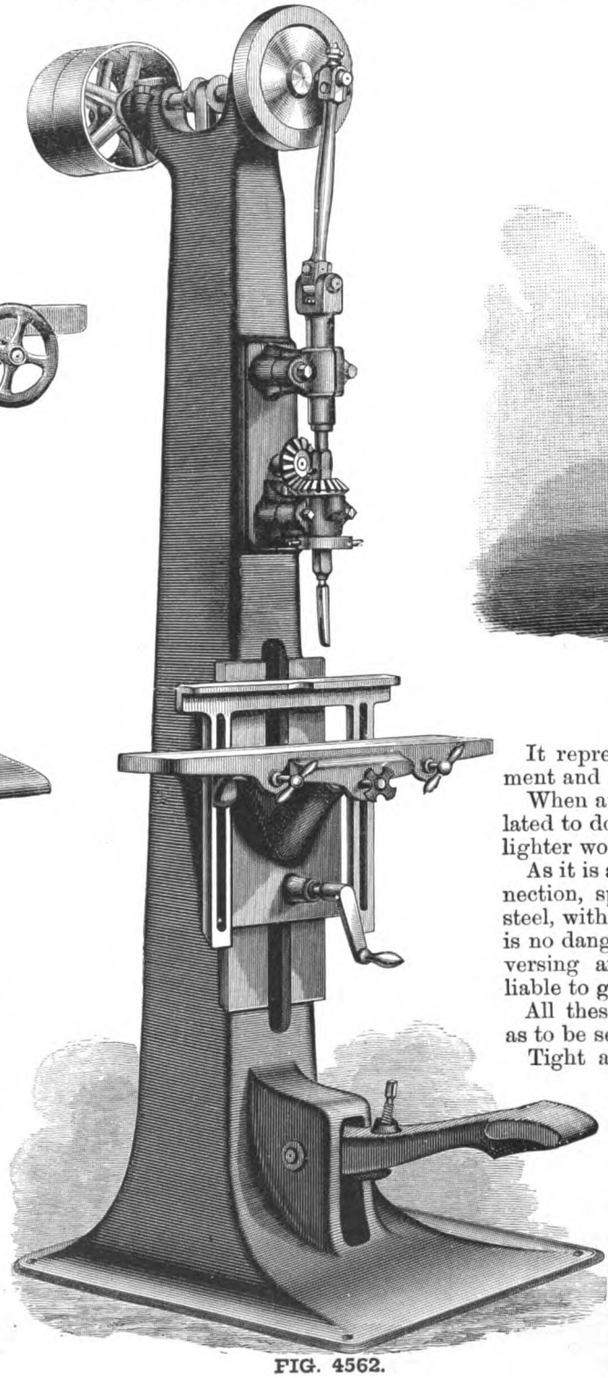


FIG. 4562.

DESCRIPTION, FIG. 4562.

It represents a plain mortiser with plain swinging table. The spindle and connection are made of steel, and the reversing motion is quick and positive. The table can be set at any angle.

The countershaft has tight and loose pulleys, 12 inches in diameter and 3 inch face, and should make 500 revolutions per minute.

WEIGHT, 1,200 LBS.

PRICE, $200.00.

NO. 2.

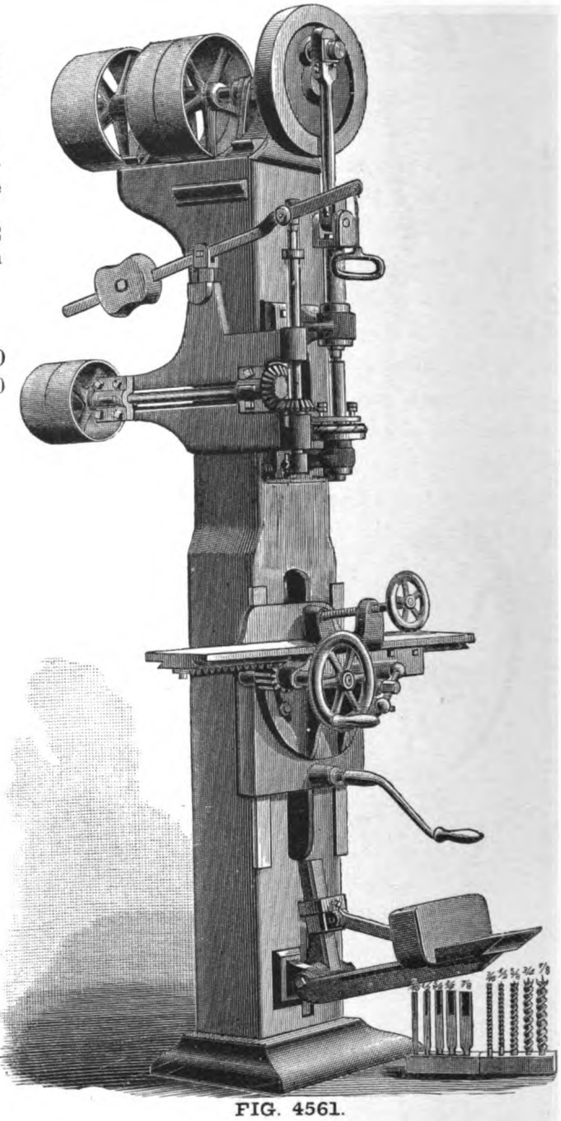


FIG. 4561.

DESCRIPTION, FIG. 4561.

It represents a mortiser with a boring attachment and a clamp, pinion feed and swinging table.

When arranged in this way this machine is calculated to do heavy hard wood mortising, as well as lighter work.

As it is a well-built, substantial machine, the connection, spindle, straps and reverse are made of steel, with extra heavy stops on the reverse, so there is no danger of the same breaking off. The reversing arrangement is simple, positive and not liable to get out of order.

All these machines are built with tilting table, so as to be set on an angle.

Tight and loose pulleys are 12x3, and should make 550 revolutions per minute. Five chisels go with this machine, ⅜, 7/16, ½, ⅝ and ¾.

WEIGHT, 1,200 LBS.

PRICES.

Clamp table and boring attachment.....$210.00
Plain table and boring attachment..... 200.00
Clamp table..... 200.00
Plain table..... 190.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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MORTISER AND BORER.

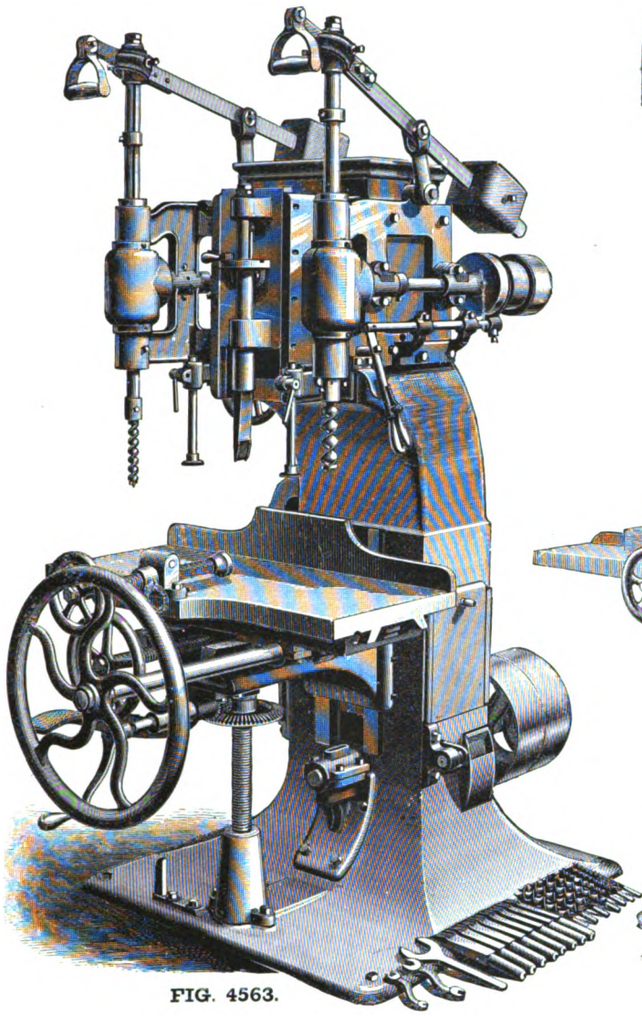


FIG. 4563.

DESCRIPTION, FIG. 4563.

It will cut mortises up to 2½ inches. The chisel bar has a perfectly graduated stroke, commencing at a still part and working into the mortise without jar to the foot, under perfect control of the operator. The bed will receive timber 17 inches square, and the chisel will beat a mortise to the center of 14 inches and 6 inches deep. The bed is supported on a center screw passing through the base, which insures a solid foundation for the blow of the chisel. It has two boring attachments, one on the line of the chisel to bore for the mortise, which will bore to 14 inches from the column. It also has a movable boring attachment which moves out and in to any point the operator wishes to use it. With the machine, eight augers and chisels are furnished, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1½. Tight and loose pulleys are 14 x 6, and should make 250 revolutions. Floor space, 5 x 4 feet.

WEIGHT, 3,000 LBS. PRICE, COMPLETE, $750.00.

MORTISER AND BORER.

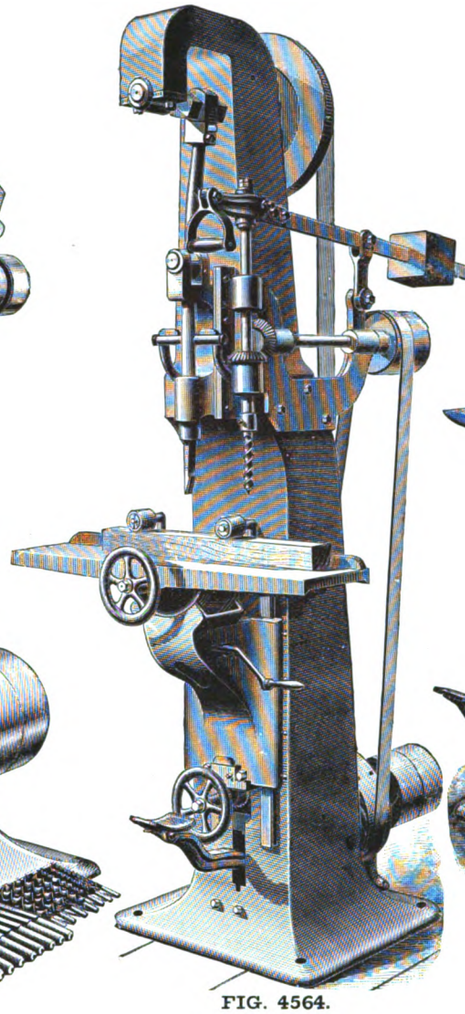


FIG. 4564.

DESCRIPTION, FIG. 4564.

By observing the cut it will be seen that the usual way of having the boxes for the driving shaft to run through with the boxes uppermost, is changed to having the outer box underneath and the other solid, through the main column, to the driving pulley. A special feature is the new weighted reversing attachment. The countershaft is at the bottom and back side of the machine; on this shaft is also a pulley to drive the shaft to run the augers. The table is compound, and is moved back and forth under the chisel by a rack and pinion, the work being clamped on by a hand wheel. The table is 3 feet long and 8 inches wide, the back having a height of 5 inches, and can be tipped to an angle of 25 degrees. With the boring attachment go 1, ⅞, ¾, ⅝, ½ and ⅜ inch augers, with chisels to suit. Tight and loose pulleys are 10 x 4. Speed, 400 revolutions.

WEIGHT, 1,200 LBS. PRICE, $295.00.

MORTISER.

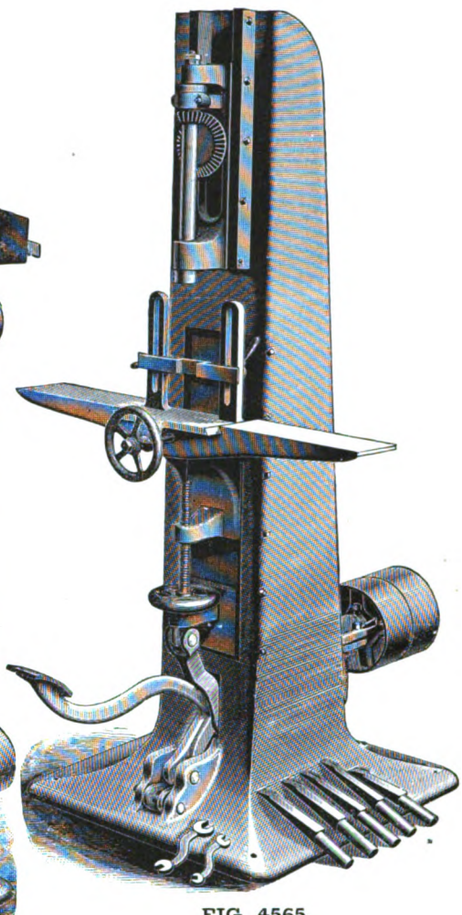


FIG. 4565.

DESCRIPTION, FIG. 4565.

In height it is only five and a half feet. The driving wheel and countershaft are at the base of the column and balanced perfectly. It has a new and improved automatic reverse, which is reliable and accurate. The table is adjustable up and down and in and out. The chisel will mortise four inches deep. Five chisels go with this machine, ¼, ⅜, ½, ⅝, ¾ inches.

WEIGHT, 600 LBS. PRICE, $165.00.

CHISELS.



FIG. 4566.

Can furnish shanks of any size or taper to suit any make of mortisers. In ordering chisels, give name of the manufacturer or send old shank.

PRICES.

Up to 1 inch.....each, $1.00
Over 1 inch ..... per ¼ inch, .25

CHISELS FOR CAR MORTISERS DOUBLE ABOVE PRICES.

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FOOT MORTISERS.

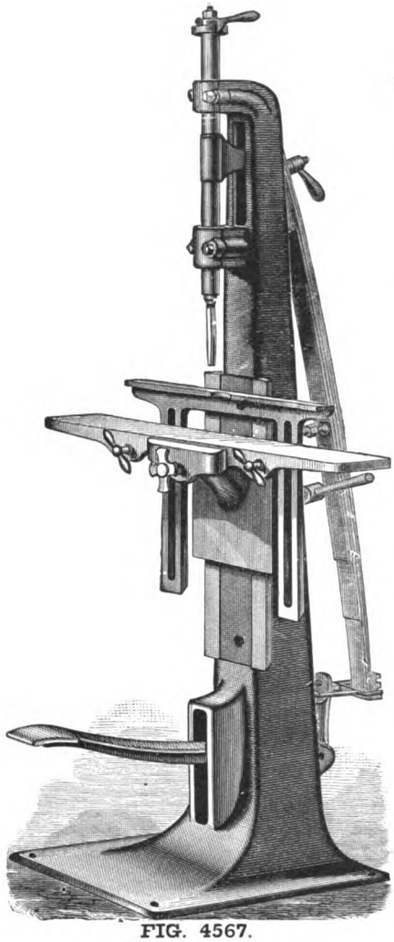


FIG. 4567.

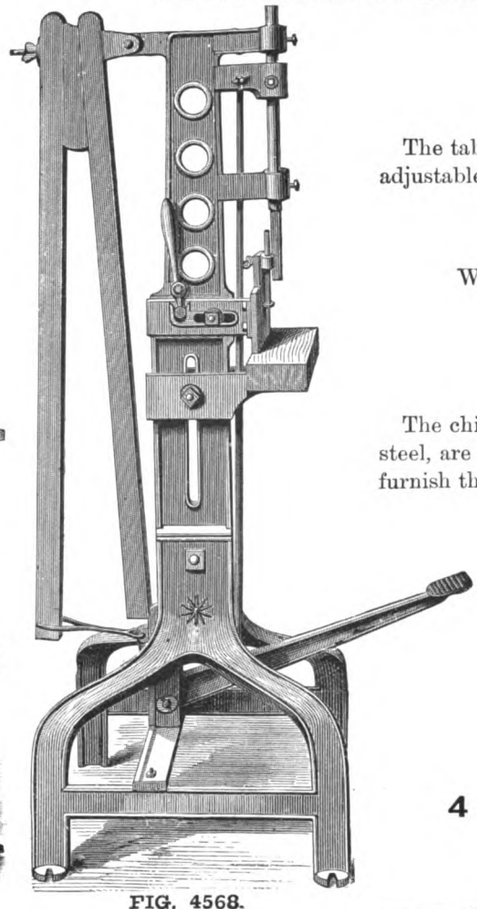


FIG. 4568.

DESCRIPTION, FIG. 4567.

The table has a vertical adjustment of 14 inches; it is also adjustable out and in. The reverse is quick and accurate.

WEIGHT, 225 LBS.

PRICE.

With 5 chisels, one each ¼, ⅜, ½, ⅝, ¾ inch.

$60.00.

DESCRIPTION, FIG. 4568.

The chisels used in our machines are forged from the best steel, are center turned and milled, carefully tempered. We furnish three chisels with each machine, ⅜, ½, ⅝ inch.

PRICE, $26.00.

FOOT MORTISER.

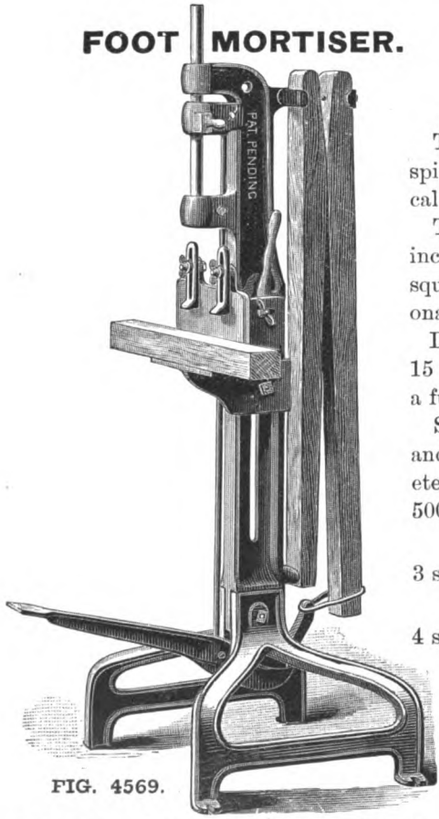


FIG. 4569.

One each ⅜, ½ and ⅝ inch chisel furnished with each machine. Other sizes may be substituted if specified.

PRICE, $22.00.

Extra chisels, up to ¾ inch, $1.00 each.

4 OR 3 SPINDLE BORER.

DESCRIPTION, FIG. 4570.

The traverse movement of the spindles is 16 inches, and the vertical movement or stroke 18 inches.

Table.—The table traverses 24 inches, receives timber to 14 inches square, and is pivoted so that diagonal holes can be bored.

Details furnished.—Four augers, 15 inches twist, countershaft and a full set of wrenches.

Speed.—Countershaft has tight and loose pulleys, 12 inches diameter, 4 inches face, and should make 500 revolutions per minute.

PRICES.

3 spindle $400.00

WEIGHT, 2,150 LBS.

4 spindle .....$_____

WEIGHT, 2,150 LBS.

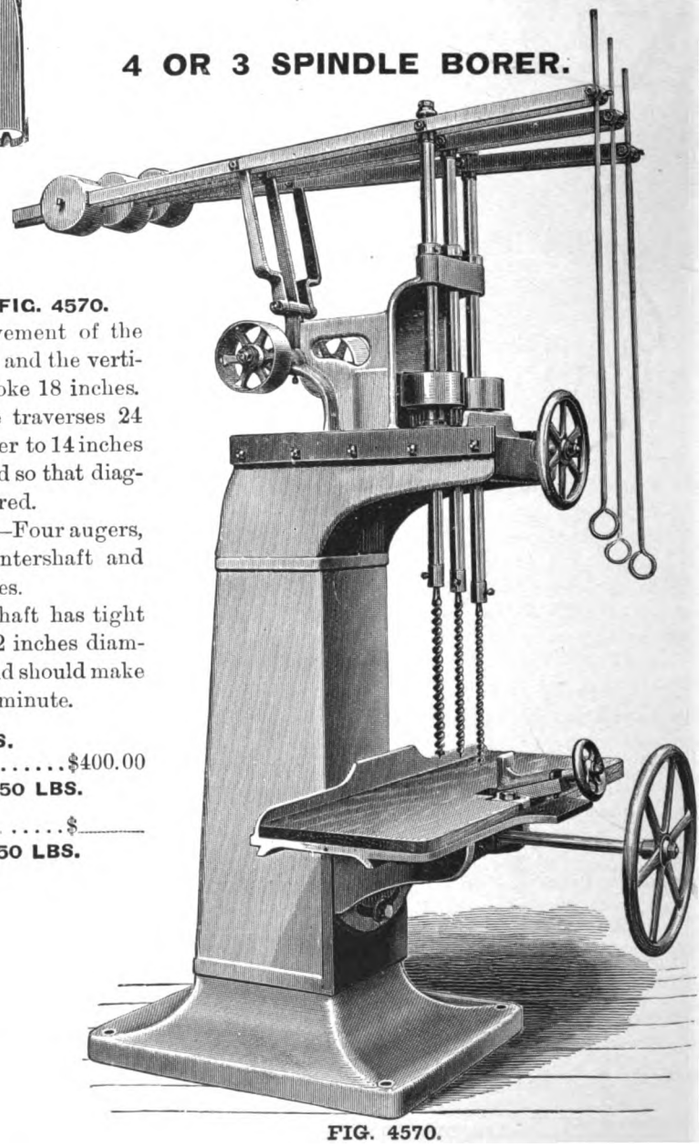


FIG. 4570.

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3 SPINDLE VERTICAL CAR BORER.

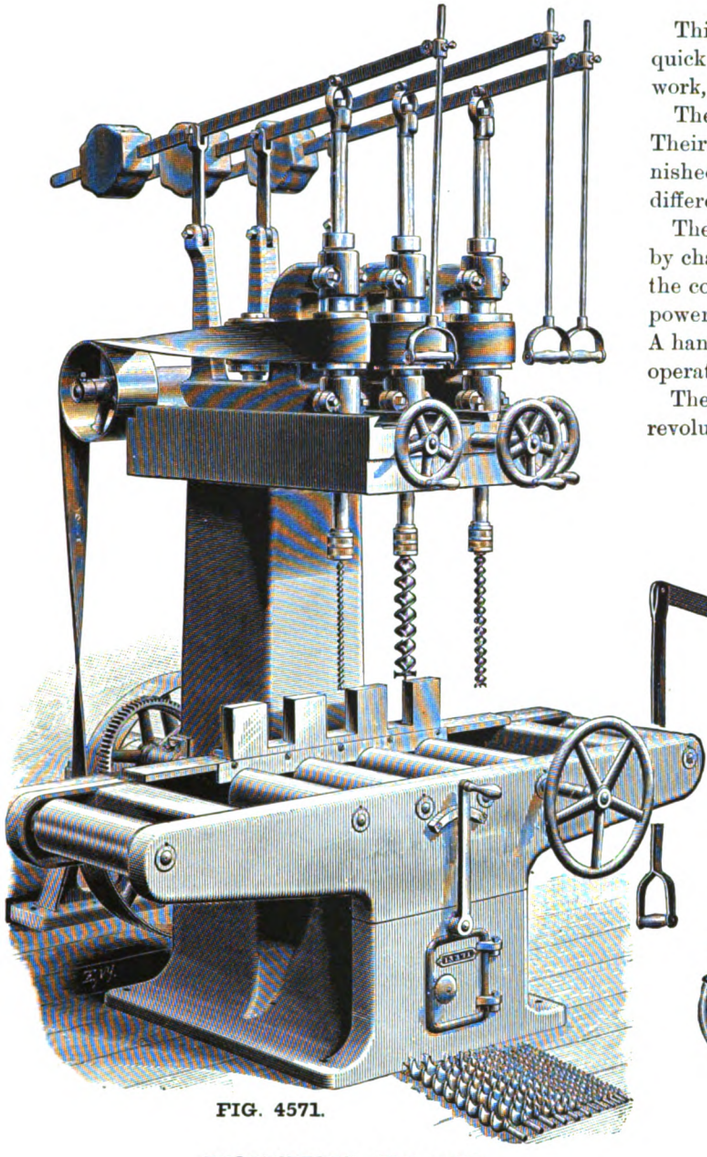


FIG. 4571.

This is a very heavy machine, with power-driven rolls in table, and quick return spindles, designed for railway, car, or heavy agricultural work, and will bore holes up to 3 in. in diameter.

The transverse movement of the spindles is 12 in. from center to center. Their vertical motion is to bore through 14 in. of timber. They are furnished with stop collars for gauging the depth of the bore, and have different sized pulleys to vary the speed of the augers.

The table has a series of large rollers, the two outside ones being driven by chains and the internal rolls being connected and driven by gearing on the countershaft, that operates in either direction, moving the timber by power to the right or left by the movement of a lever in front of the table. A hand wheel and screw is connected to the rolls, in easy access to the operator, for moving the timbers laterally by hand.

The tight and loose pulleys are 12 in. x 5 in., and should make 350 revolutions.

DESCRIPTION, FIG. 4572.

This machine has three spindles, operated by the handles connected with the weighted levers at the top, and driven by one belt from a countershaft at the back of the machine. By a heavy weight, in connection with adjusting friction pulleys, the belt remains at the same tension, whatever the position of the bits. The middle spindle has a larger pulley than the other two, for slower speed to work the larger bits. Seventeen bits are furnished, varying from ⅜ to 2 inches, all above 1⅜ to work in the middle spindle. The bits have a horizontal adjustment of 15 inches, and vertical throw of 16 inches.

The bed upon which the timber rests is furnished with four rollers, which can be operated by the hand-wheel, or by the lever which operates the friction power feed attachment from the countershaft. The counter is attached to the base of the column, and is furnished with tight and loose pulleys, 10 inch diameter and 5 inch face, which should be speeded to 275 revolutions per minute.

PRICE, $500.00.

3 SPINDLE VERTICAL CAR BORER.

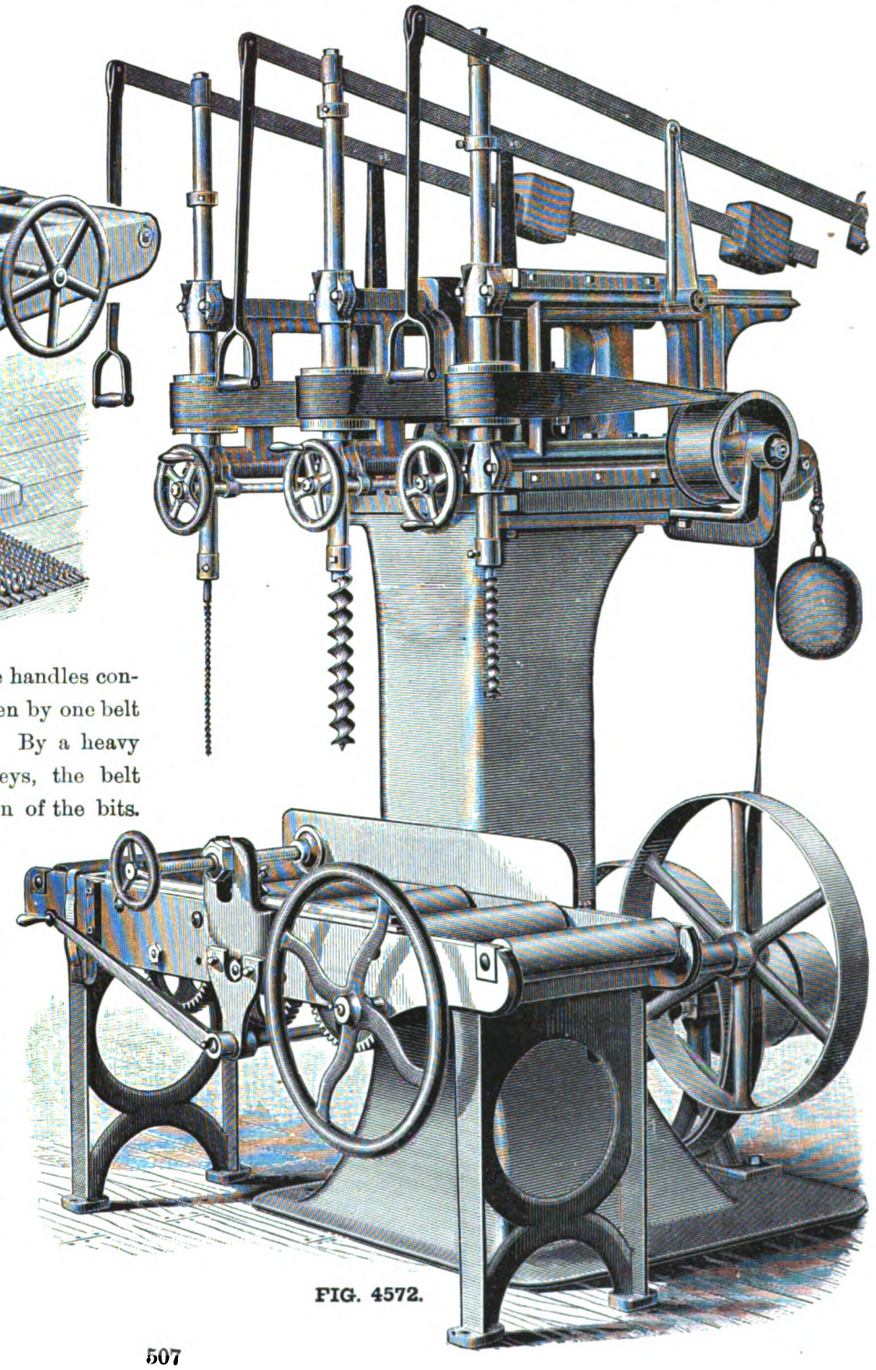


FIG. 4572.

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SINGLE SPINDLE VERTICAL BORERS.

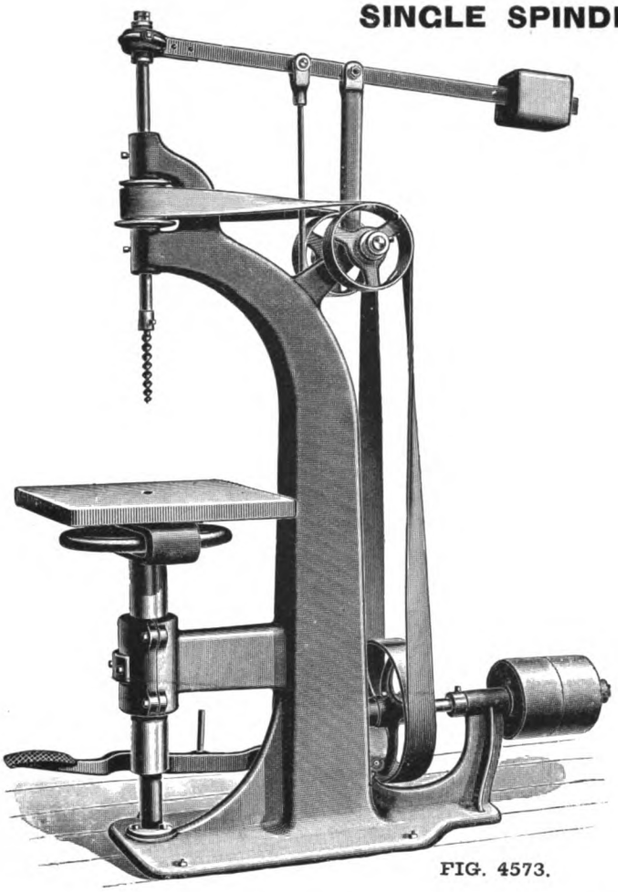


FIG. 4573.

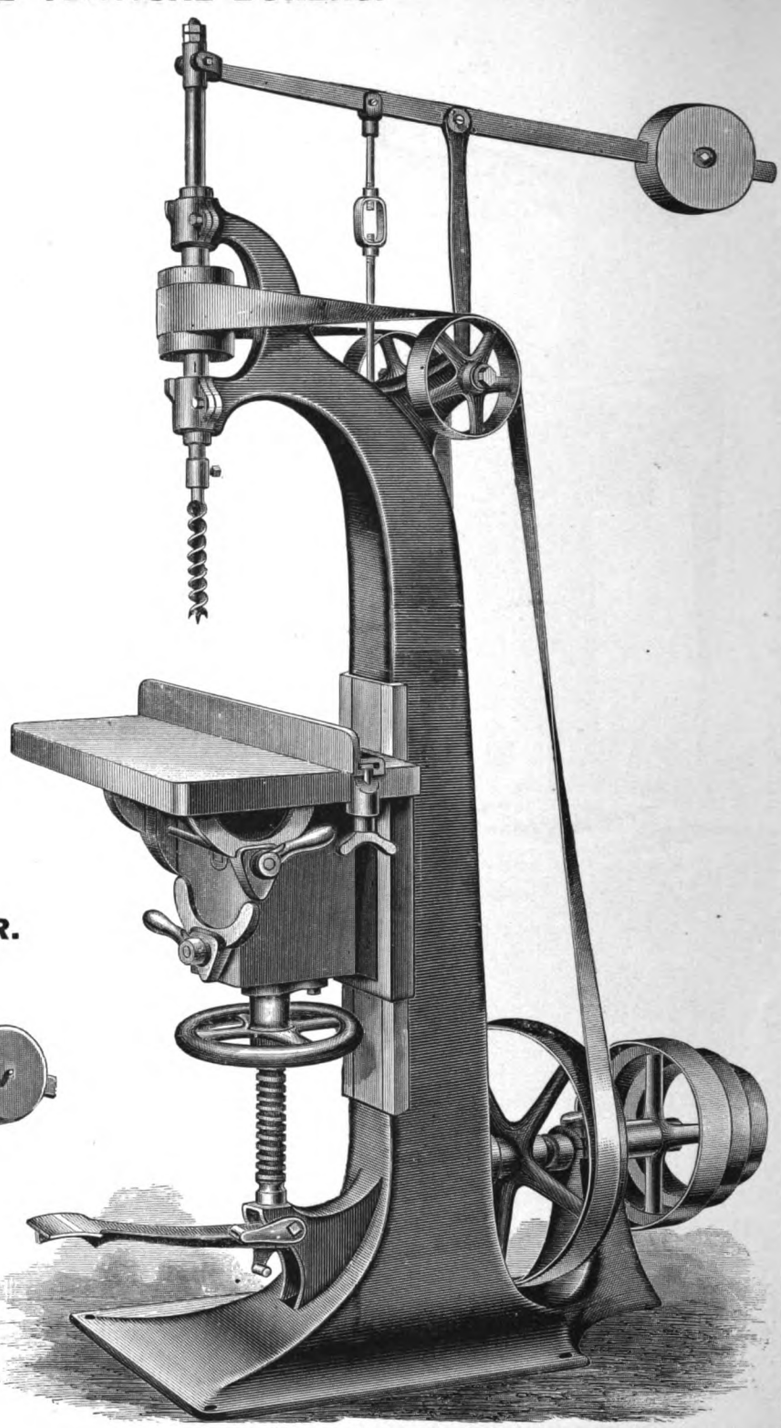


FIG. 4574. **NO. 1 SIZE.**

SINGLE SPINDLE BORER.

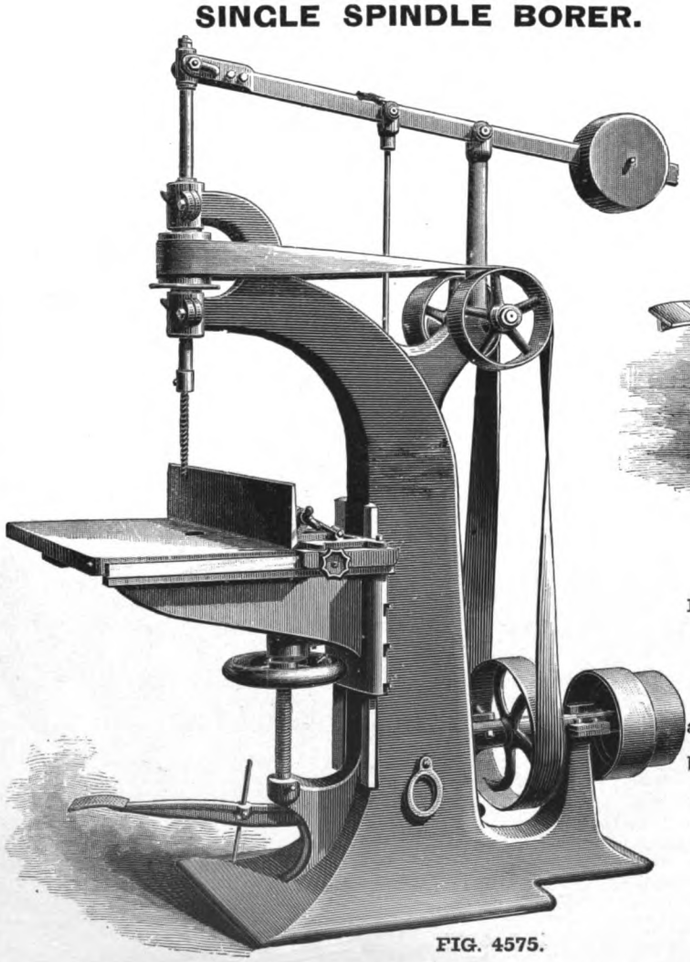


FIG. 4575.

DESCRIPTION, FIG. 4573.

Bores to center 26 inches, has 9 inch stroke; table movement up and down, 11 inches. Tight and loose pulleys, 8 x 4. Speed, 400 revs.

WEIGHT, 800 LBS. PRICE, $115.00.

Bits extra.

DESCRIPTION, FIG. 4574.

Bores to center of 24 inch; table has movement up and down of 12 inches and has adjustable fence or guide; table can be set at any angle.

Will run an auger 2 inch diameter and bore 12 inches deep, has stops for boring varying depths, will bore to center of 24 inches.

Tight and loose pulleys, 10 inch diameter, 5 inch face. Speed, 800 revs.

WEIGHT, 1,200 LBS.

PRICE, with bits, ¼, ⅜, ⅝, ¾, ⅞ and 1 inch.....**$175.00.**

DESCRIPTION, FIG. 4575.

Bores to center of 36 inch diameter, has 13½ inch stroke.

Two pulleys for driving 10 inch diameter, 4 inch face. Speed, 350 revs.

WEIGHT, 1,500 LBS.

PRICE, with bits, ½, ⅝, ¾, ⅞, 1, 1⅛ and 1¼ inch .....**$200.00.**

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VERTICAL BORERS.

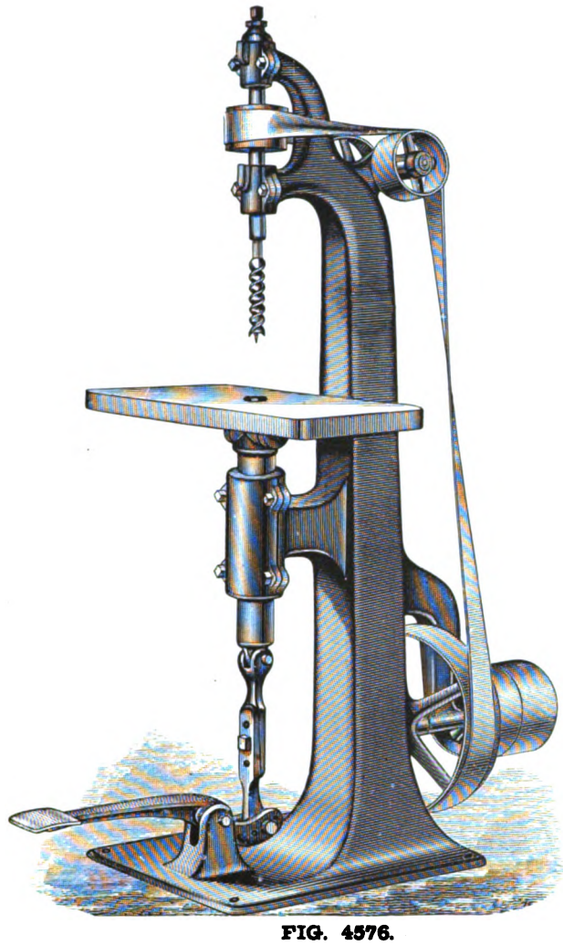


FIG. 4576.

Will bore to center of 20 inches diameter. The spindle is stationary, and table raises or falls 6 inches. Table can be set at any angle.

Tight and loose pulleys on base of machine are 9 inches diameter by 5 inch face. Speed, 850 revolutions.

WEIGHT, 450 LBS.

PRICE.

With counter and bits, ¼, ⅜, ½, ⅝, ⅞ and 1 inch.....$100.00.

DESCRIPTION, FIG. 4577.

Bores to center of 36 inches; has adjustable stop for depth of boring. Table will tilt for bevel work, and is raised and lowered by hand wheel in front.

We furnish with the machine six bits of the following sizes, ⅜, ½, ⅝, ¾, ⅞ and 1 inch.

Tight and loose pulleys on the countershaft, which is attached to the machine, are 10 inches diameter, 4 inch face, and should make 500 revolutions per minute.

WEIGHT, 1,100 LBS.

PRICE, $160.00.

DESCRIPTION, FIG. 4578.

Bores to center of 13 inches diameter; has stroke of 9 inches for vertical spindle and traverse of 8 inches on horizontal spindle.

Tight and loose pulleys, 8 x 4 inches. Speed, 500 revolutions.

WEIGHT, 950 LBS.

PRICE.

With bits, ⅜, ½, ⅝, ¾, ⅞ and 1 inch.....$140.00.

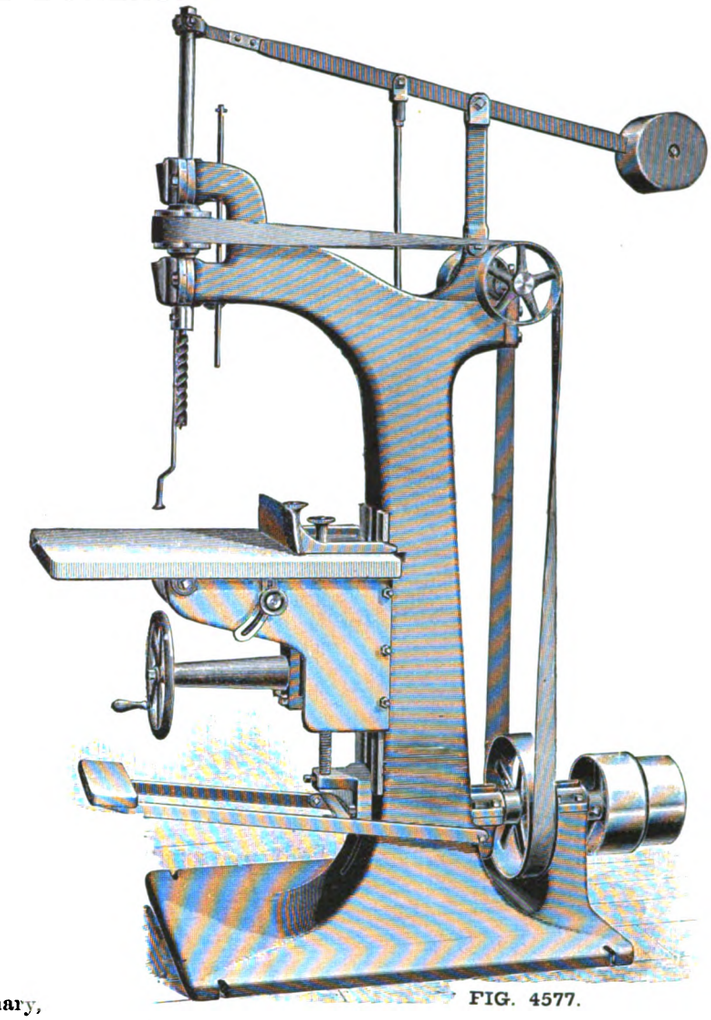


FIG. 4577.

HORIZONTAL AND VERTICAL BORER.

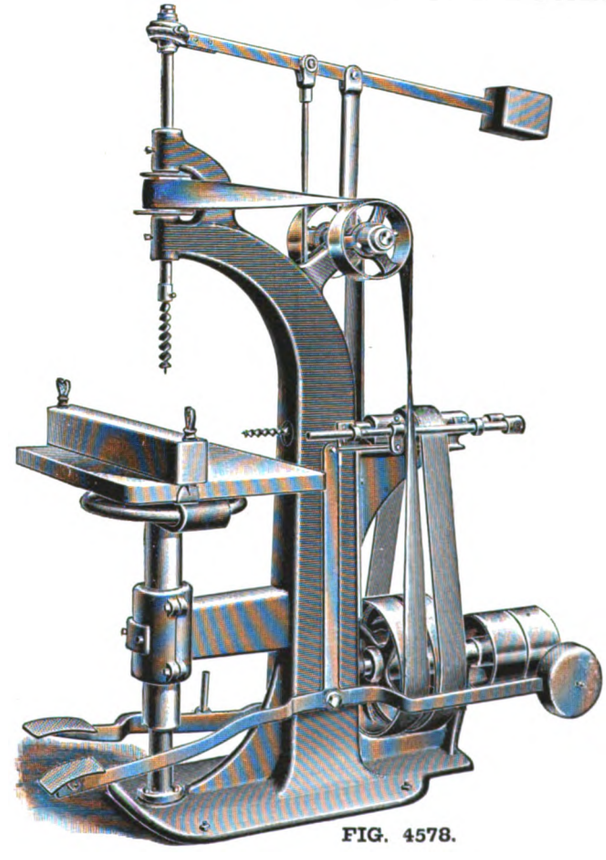
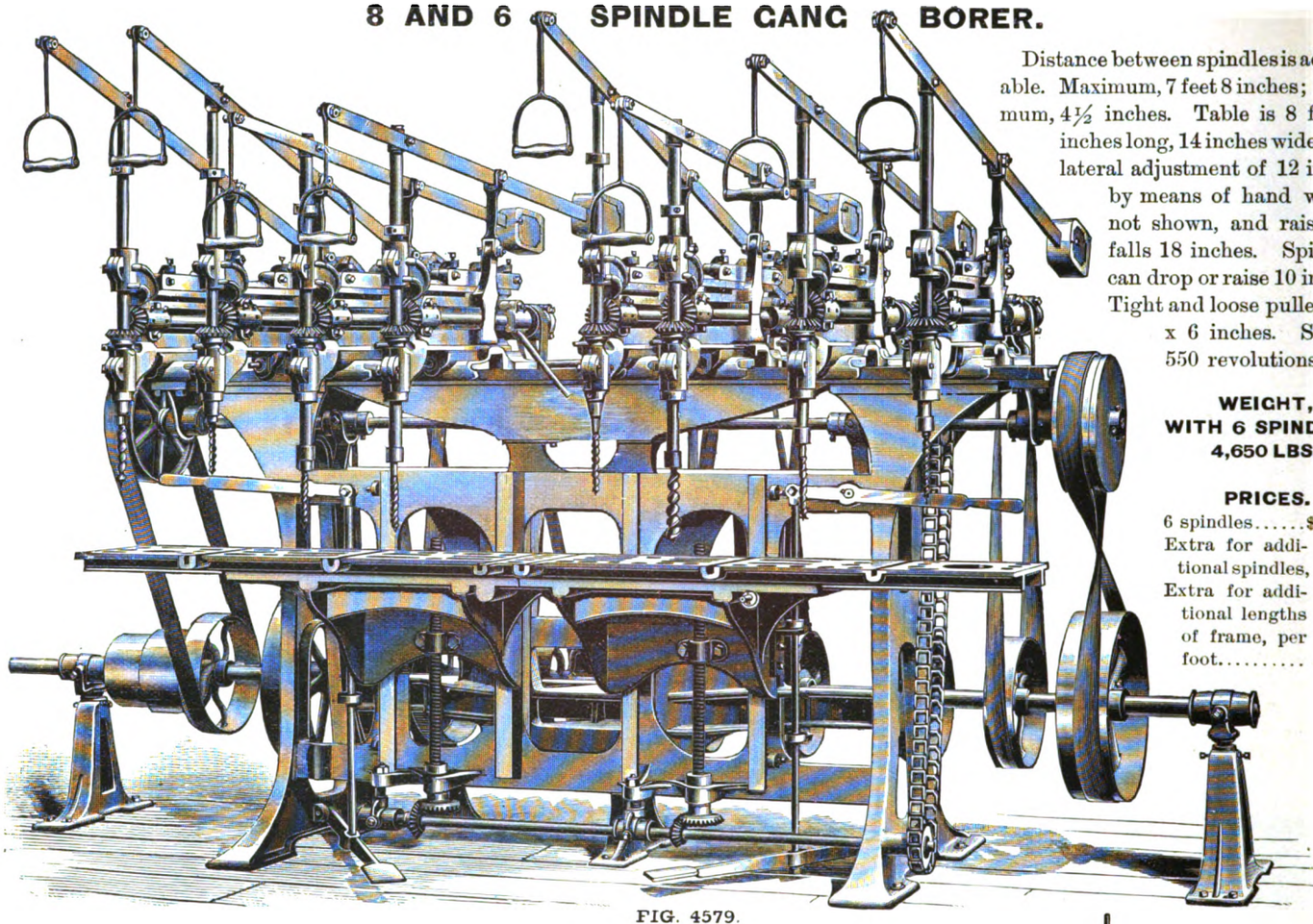


FIG. 4578.

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8 AND 6 SPINDLE GANG BORER.



Distance between spindles is adjustable. Maximum, 7 feet 8 inches; minimum, 4½ inches. Table is 8 feet 4 inches long, 14 inches wide, with lateral adjustment of 12 inches by means of hand wheel, not shown, and raises or falls 18 inches. Spindles can drop or raise 10 inches. Tight and loose pulleys, 20 x 6 inches. Speed, 550 revolutions.

WEIGHT, WITH 6 SPINDLES, 4,650 LBS.

PRICES.

6 spindles.....$840.00
Extra for additional spindles, ...
Extra for additional lengths of frame, per foot.....

FIG. 4579.

UNIVERSAL VERTICAL BORER.

The three boring spindles have each a movement of 24 inches across the table and a vertical one of 18 inches, and can be set at an angle of 45 degrees or less. Each spindle, any combination of two, or all three, can be moved at once across the table by means of the hand wheel. The table is made of glued-up strips of wood. It is fitted on the edge with a number of stops for duplicating work. The whole is mounted on a system of rolls, 12 inches diameter, placed about 6 feet apart, on which it is readily moved, either by hand or power, through the feed stand and shifting bar.

WEIGHT, WITH 14 FOOT TABLE, 5,000 LBS.

Each machine is fitted with a countershaft, sixteen auger bits of assorted sizes, and a full set of forged steel wrenches.

PRICES.

14 foot table.....$
40 foot table.....
70 foot table.....

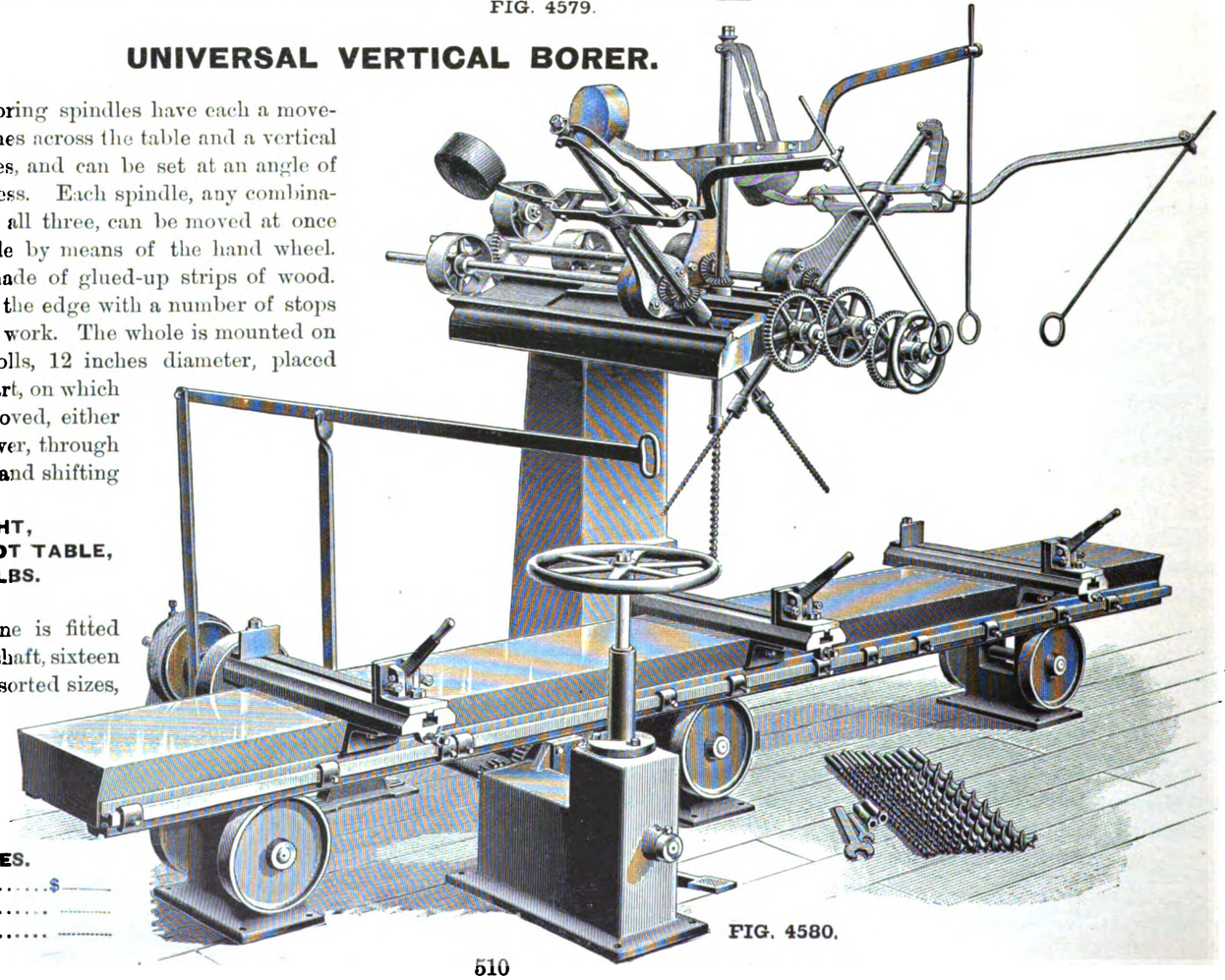


FIG. 4580.

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HORIZONTAL CAR BORER, WITH BIT STEADYING DEVICE.

Owing to its spiral form, a boring bit, when revolving, is unbalanced. At ordinary rates of speed the point of a long bit describes a circle, making it hard to strike a mark, and the tendency is to bore a hole out of line. With the steadying device bits can be run 40% faster than without. No chips resting on top of timber, operator can see where to strike a mark.

The weight of the spindles is counterbalanced; they are easily and quickly thrown to position by the hand levers and locked on the graduated arc by merely releasing pressure on the small handle.

The holes can be located by the graduations or laid out as to height by the stops on the arc or by the usual method.

On the machine is a belt-tightener, adjustment for the feed roller and adjustable gibs for the spindle frames.

Vertical adjustment, 11 inches. Will bore through 14 inch timber. Tight and loose pulleys, 12 x 8½. Speed, 325 revolutions.

4 SPINDLE, WEIGHT, 2,700 LBS., PRICE, with tools and countershaft, $.....

3 " " 2,200 " " " " " " .....

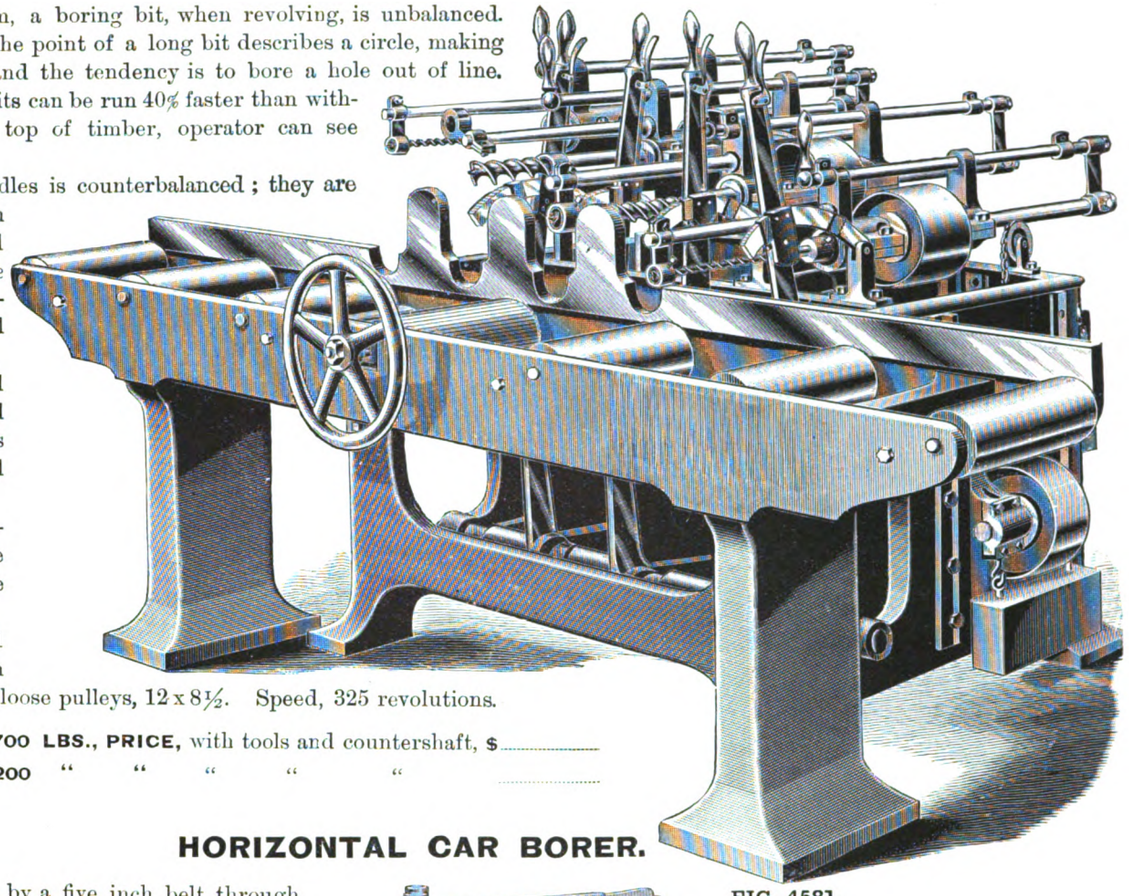


FIG. 4581.

HORIZONTAL CAR BORER.

Each spindle is driven by a five inch belt through a pulley eight inches in diameter, and the bearing next to the bit travels in a planed slide with the spindle, so that the overhanging of the bit is reduced to the minimum.

Each bit has a traverse movement of sixteen inches and a vertical one of fifteen inches by power, so arranged that all four, any combination of three or two, can be raised or lowered at once, or each one separately.

The table is eight feet in length, eighteen inches wide, carrying seven wrought iron friction rolls to support the timber. The center one is four inches in diameter, fluted and fitted with a hand wheel for moving it readily to any desired point.

We furnish with each machine sixteen auger bits of assorted sizes, countershaft, and a set of forged steel wrenches.

WEIGHT, ABOUT 5,000 LBS.

Tight and loose pulleys are 16 in. diameter, 5 in. face, and should make 300 revolutions per minute.

PRICES.

4 spindle.....$750.00
3 " 650.00

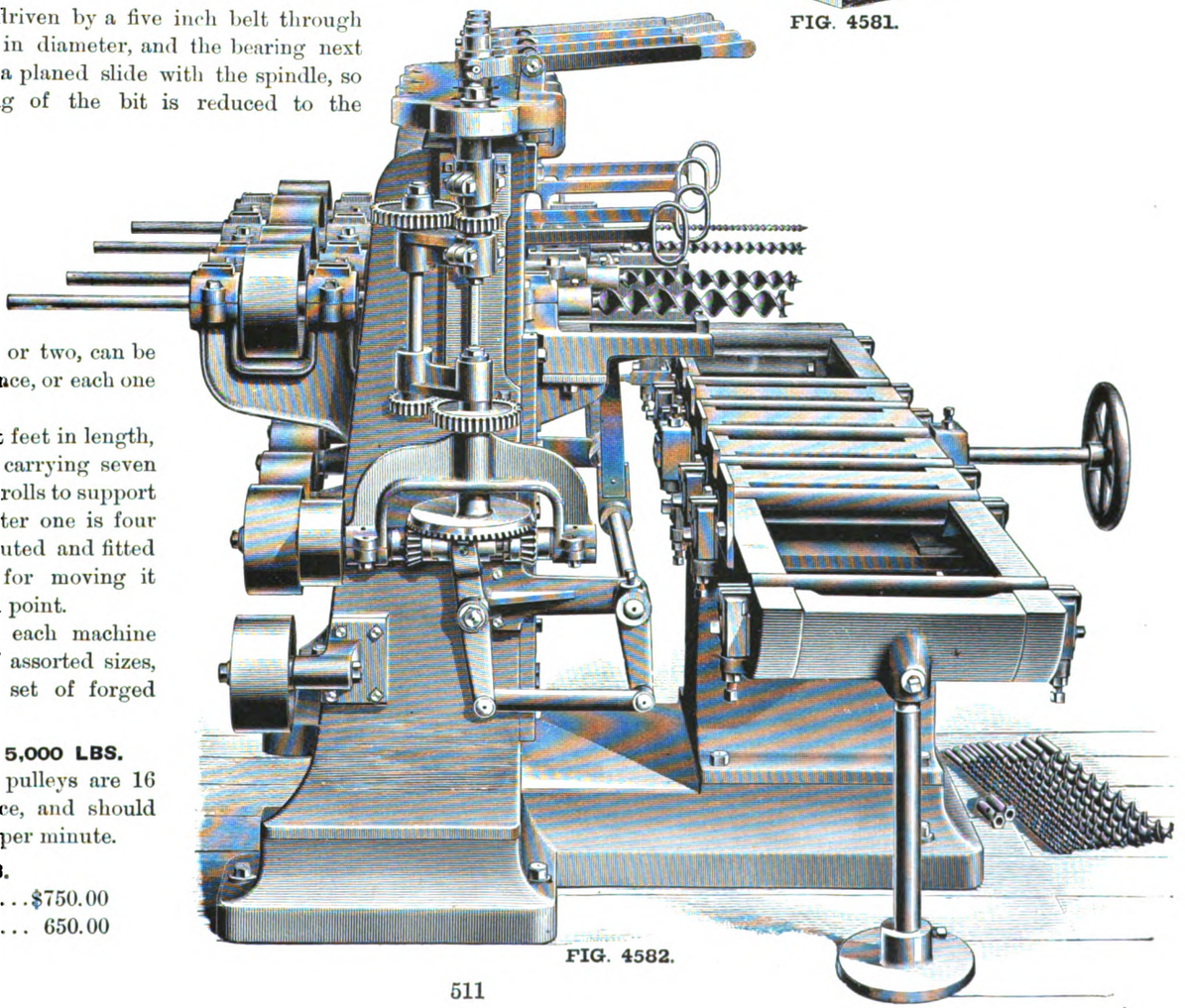


FIG. 4582.

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4 OR 3 SPINDLE CAR BORER.

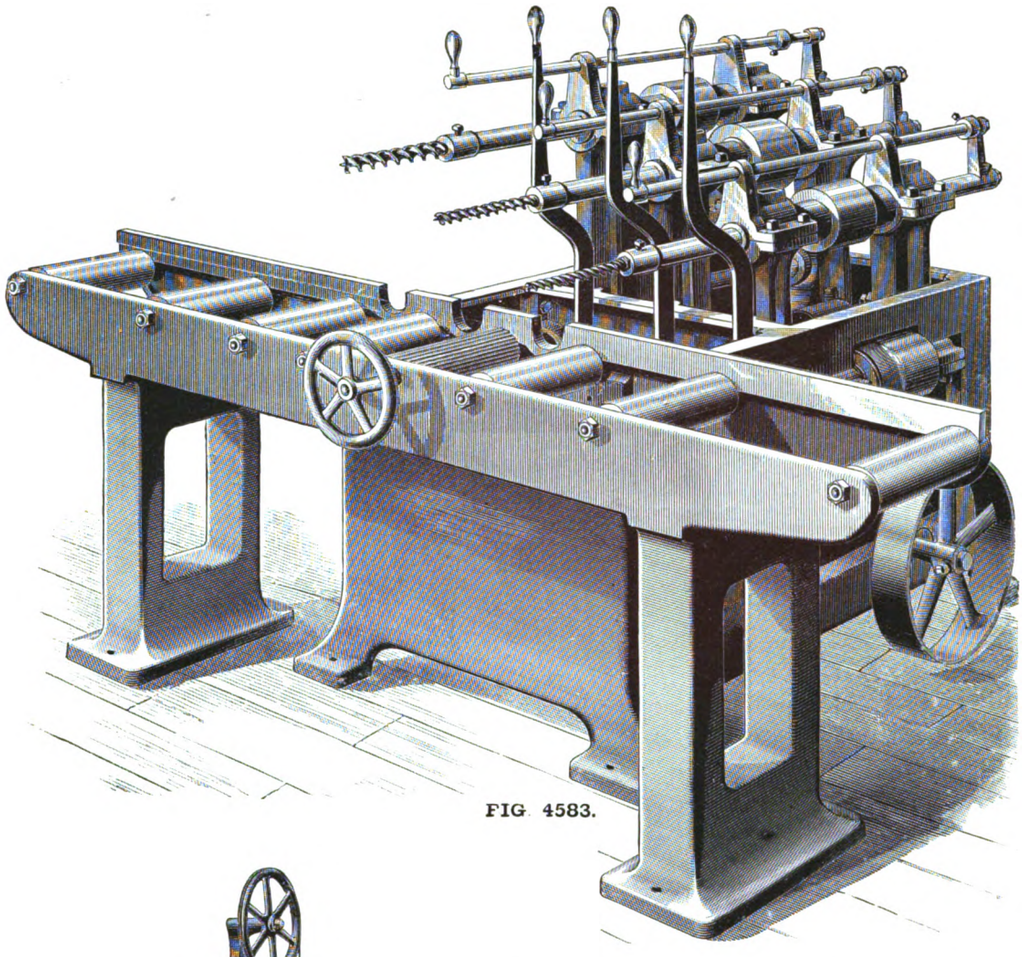


FIG. 4583.

The boring spindles have a traverse movement of 16 inches, and will bore through 14 inch timber, also a vertical movement of 10 inches, with stop collars for determining the length of the boring. The boring spindle frames move up and down in planed ways by means of square thread screws, actuated by friction gearing.

The table is long and heavy, with rollers for the timber to rest upon, also a fluted roller and hand wheel for moving it quickly to a determinate point. The countershaft is placed above the machine, but one belt being required to convey the power to all of the boring spindles.

The tight and loose pulleys are 12 inches by 5½ inches, and should make 350 revolutions.

PRICES ON APPLICATION.

UNIVERSAL HORIZONTAL BORER.

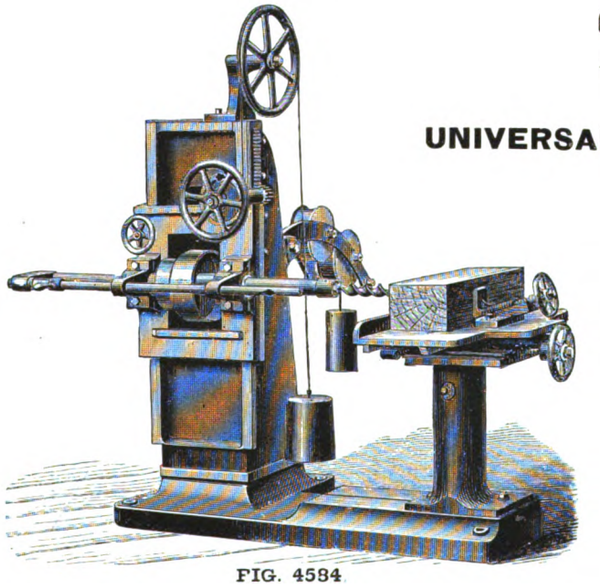


FIG. 4584.

Spindle.—Is made from cast steel 2¼ inches diameter, has a horizontal movement of 24 inches and a vertical movement of 14 inches, is bored to receive bits with shanks ¾ inch diameter, and fitted with a reducer to receive ½ inch, and driven by a cone pulley through a swinging arm which always maintains an equal tension of the belt; both the saddle and spindle are counterbalanced by a weight and quickly adjusted to the work by rack and pinion through the hand wheel shown.

Table.—Receives timber 14 inches square, and is mounted on the same substantial base as the column; has a movement to and from it, a compound and also a radial movement, so that when set at any desired angle, as shown by Figs. 1, 2 and 3, the holes can be bored in any part of the side or end of the timber presented to the bit.



FIG. 4585.

Shows table arranged to bore at any angle.

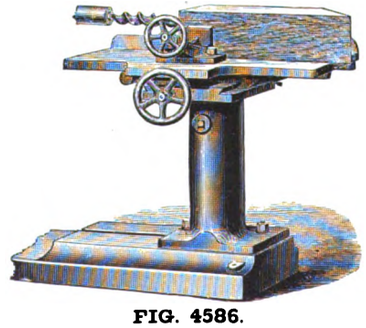


FIG. 4586.

Shows table arranged to bore in the end of timber.

Remarks.—In operating this machine, the operator stands with the spindle at his side and the work in front of him, thereby being enabled to do the boring with greater ease, accuracy and dispatch.

Details furnished.—One each $\frac{9}{16}$, $\frac{11}{16}$, $\frac{13}{16}$, $1\frac{1}{16}$ inch auger bits, 15 inches twist, countershaft, and a full set of wrenches.

Speed.—Countershaft has tight and loose pulleys, 14 inches diameter, 4 inches face, and should make 400 revolutions.

WEIGHT, 2,200 LBS. **PRICE, $425.00.**

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HORIZONTAL BORING MACHINE.

The table has a vertical adjustment of 14½ inches, operated by hand, and it can be tilted. Fence is adjustable in all directions.

Will drive augers up to 2 inches diameter, and bore 14½ deep.

Tight and loose pulleys, 10 inches diameter by 5 inch face. Speed, 600 revolutions.

WEIGHT, 1,200 LBS.

PRICES.

With countershaft and bits, ¼, ⅜, ½, ⅝, ¾ and 1 inch.....$150.00

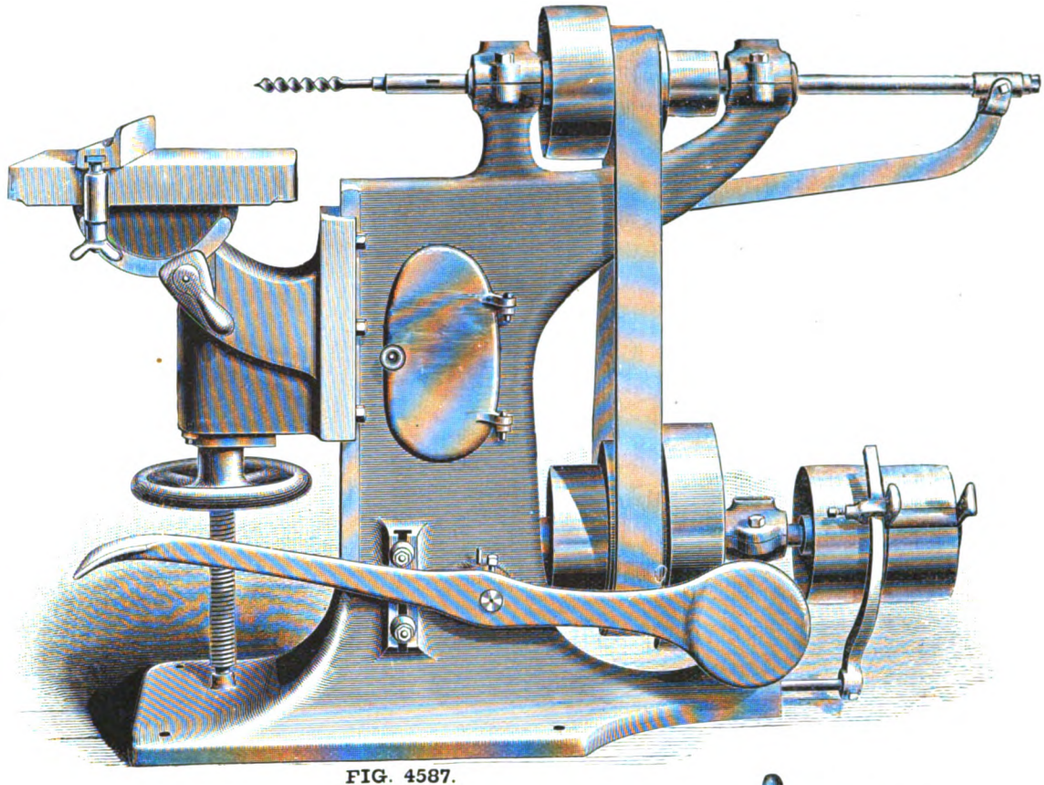


FIG. 4587.

UNIVERSAL HORIZONTAL BORER.

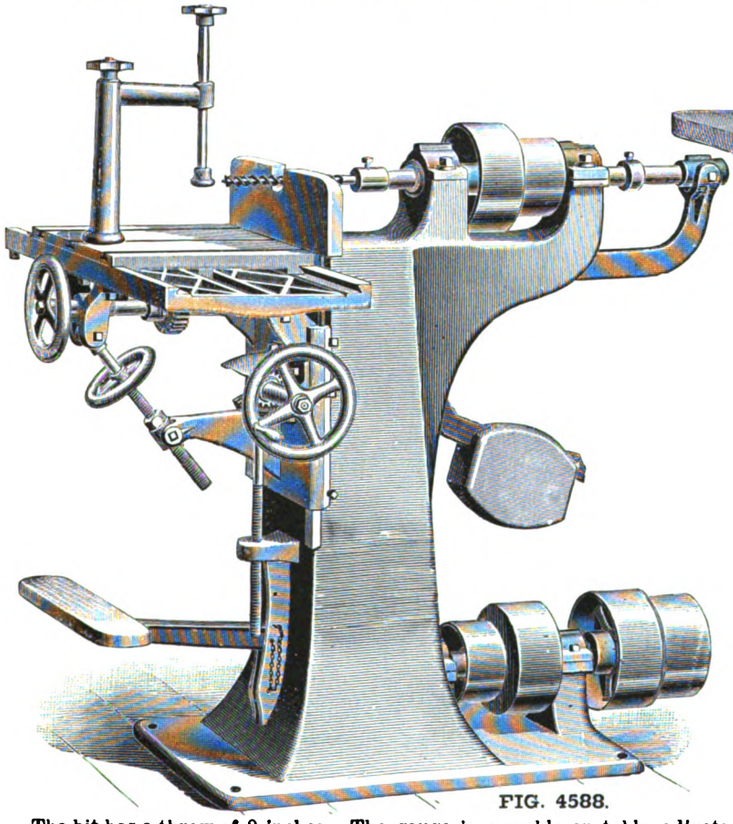


FIG. 4588.

The bit has a throw of 8 inches. The gauge is movable on table, adjusts to any angle, and for end boring, as shown in cut. It has special table for cabinet work.

Bits sent with the machine are ¼, ⅜, ½, ⅝, ¾, ⅞ and 1 inch. Countershaft, with cone pulleys for two changes of speed, is attached to the machine. The tight and loose pulleys are 8½ inches diameter, 3½ inch face, and should make 1,200 revolutions per minute. Weight, complete, 700 lbs.

PRICE, $165.00. Without cabinet table, **$150.00.**

HORIZONTAL BORER.

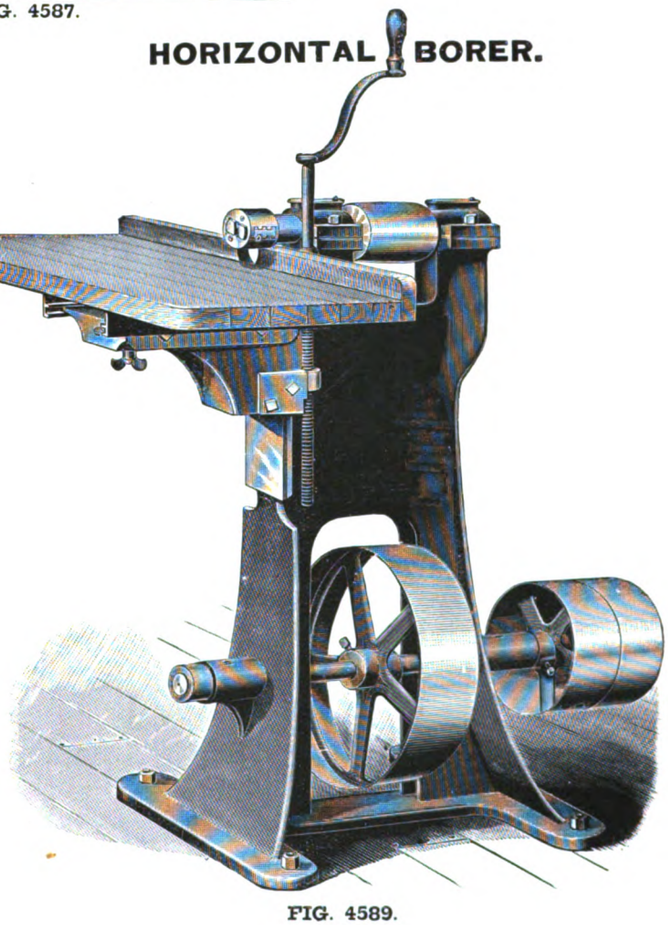


FIG. 4589.

This machine is intended for light boring; has sliding table and pin stop to regulate the depth to be bored. Each machine is fitted with a Little Giant chuck, necessary wrenches, etc. Bits extra.

Tight and loose pulleys are 8 inches in diameter and 3¼ inch face, and should make 600 revolutions per minute.

WEIGHT, 310 LBS.

PRICE, $150.00.

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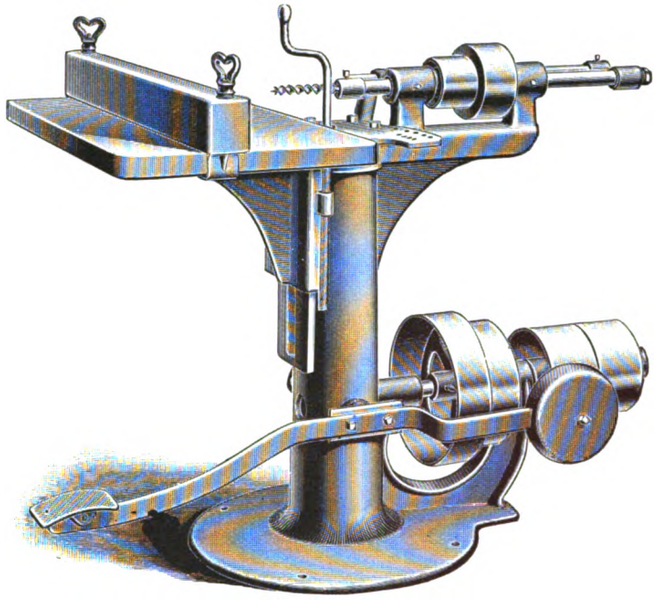


FIG. 4590.

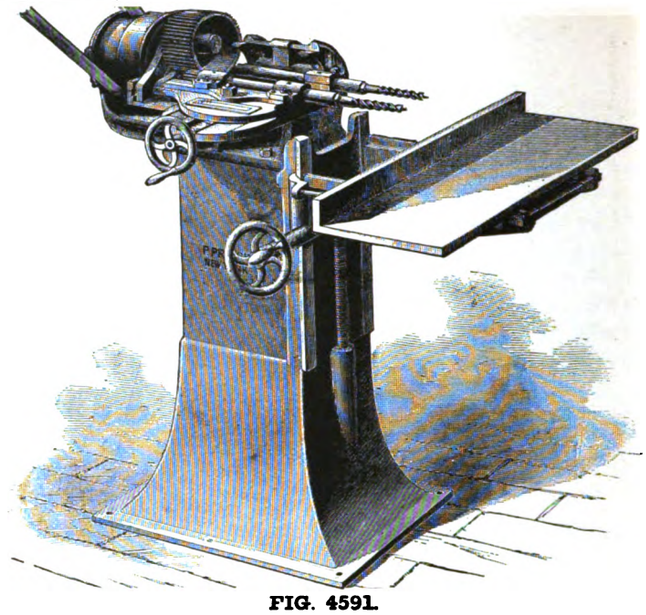


FIG. 4591.

POST BORER.

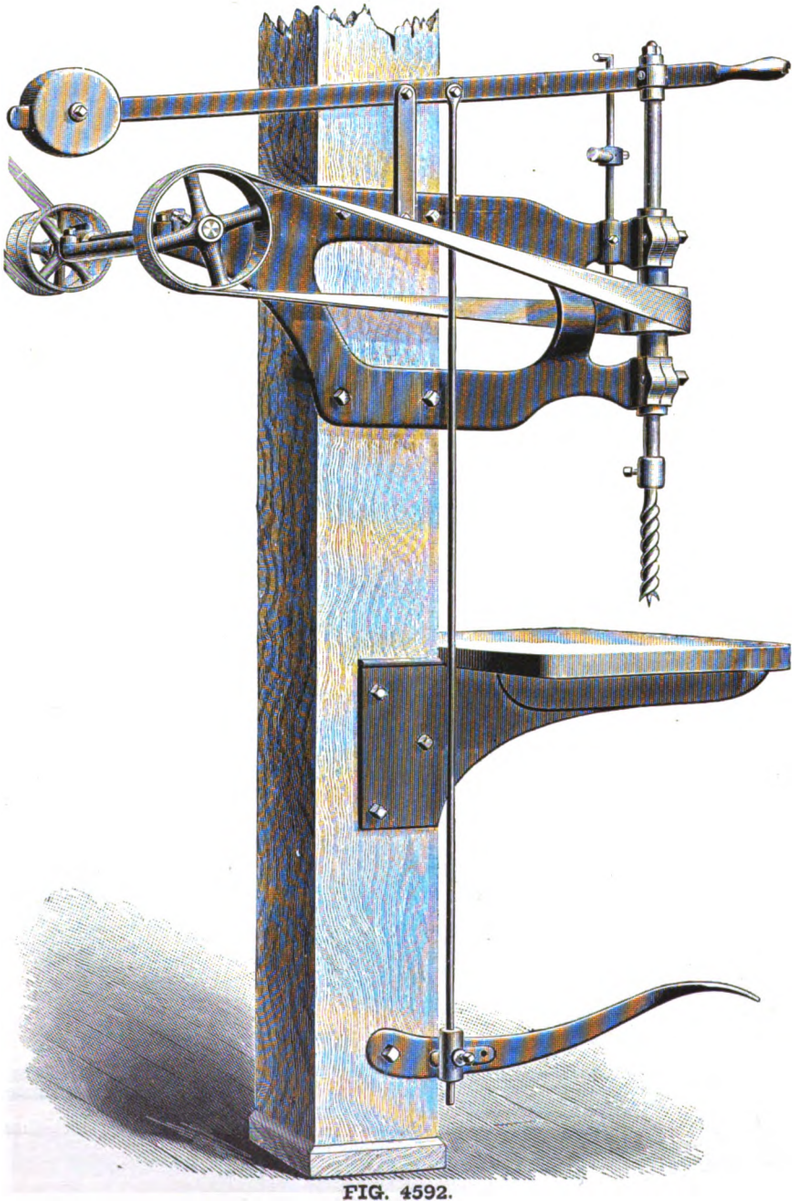


FIG. 4592.

DESCRIPTION, FIG. 4590.

It has a horizontal movement of spindle, controlled by the lever. Spindle moves 7 inches. Tight and loose pulleys, 8 x 4 inches. Speed, 400 revolutions. Weight, 600 lbs.

PRICE.

With bits, 3/8, 1/2, 5/8, 3/4, 7/8 and 1 inch.....$80.00

DESCRIPTION, FIG. 4591.

This machine will bore two holes at once, and at any angle, from the horizontal, as shown by the cut, to the vertical, where one would be over the other.

The table can be set 10 inches below the centers of spindles. It slides forward and back against an adjustable stop, and, when ordered for mortising, sideways also. Mortising is done with a revolving tool, cutting on end and side, making a mortise with half-round ends.

When only one spindle is to be used, it can be disconnected from the gearing by loosening a single nut. This should always be done for mortising, as the spindle then runs at a much higher speed than for boring.

The spindles and their pinions are of steel, and their bearings are adjustable for wear.

16 inch machine. To bore holes from 1 to 16 inches between centers. Weight, about 600 lbs.

5 inch machine. To bore holes from 1 to 5 inches between centers. Weight, about 510 lbs.

In ordering, state whether the machine is to be used for mortising.

The tight and loose pulleys on the countershaft are self-oiling, and are 7 inches diameter, 2½ inches face. They should make from 950 to 1,000 turns per minute.

PRICE, 16 INCH, $160.00. PRICE, 5 INCH, $135.00.

DESCRIPTION, FIG. 4592.

To be fastened to a post, and will bore up to 2 inch. Spindle has stroke of 10 inches and may be worked by hand or foot. Tight and loose pulleys, 6 x 3½ inches. Speed, 850 revolutions. Weight, 250 lbs.

PRICES.

With table and bits, 1/4, 3/8, 1/2.....$50.00
No table, with bits.....40.00

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POST BORERS.

CEARED BORER.

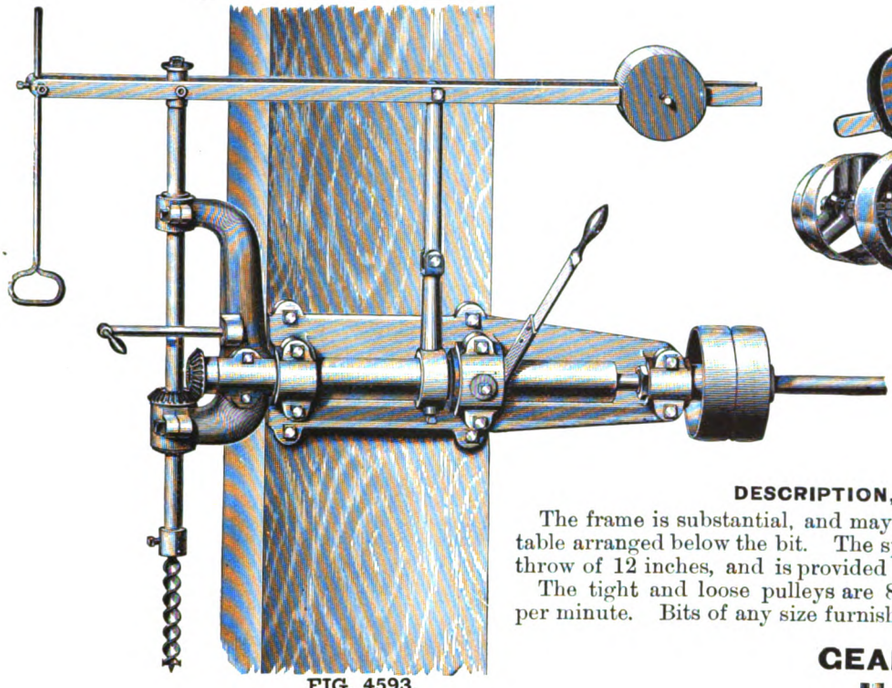


FIG. 4593.

The boring spindle has a vertical movement of 12 inches, a transverse adjustment across the timber of 8 inches, and may be set to bore either square or angular holes.

The machine is provided with tight and loose pulleys, 8 inches diameter, 2 inches face, and should make 1,000 revolutions per minute.

WEIGHT, 300 LBS.

PRICE, WITHOUT BITS, $75.00.

BELT BORER.

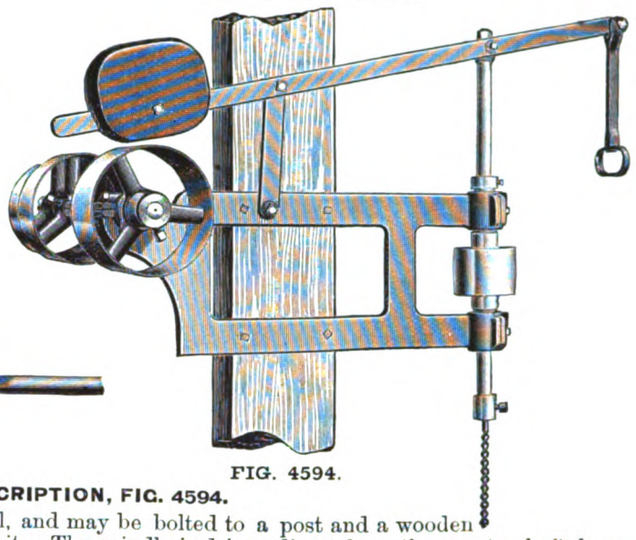


FIG. 4594.

DESCRIPTION, FIG. 4594.

The frame is substantial, and may be bolted to a post and a wooden table arranged below the bit. The spindle is driven direct from the countershaft, has a throw of 12 inches, and is provided with a collar to regulate depth of bore.

The tight and loose pulleys are 8½ x 3½ inches, and should make 600 revolutions per minute. Bits of any size furnished as extras. Price, $30.00.

CEARED BORER.

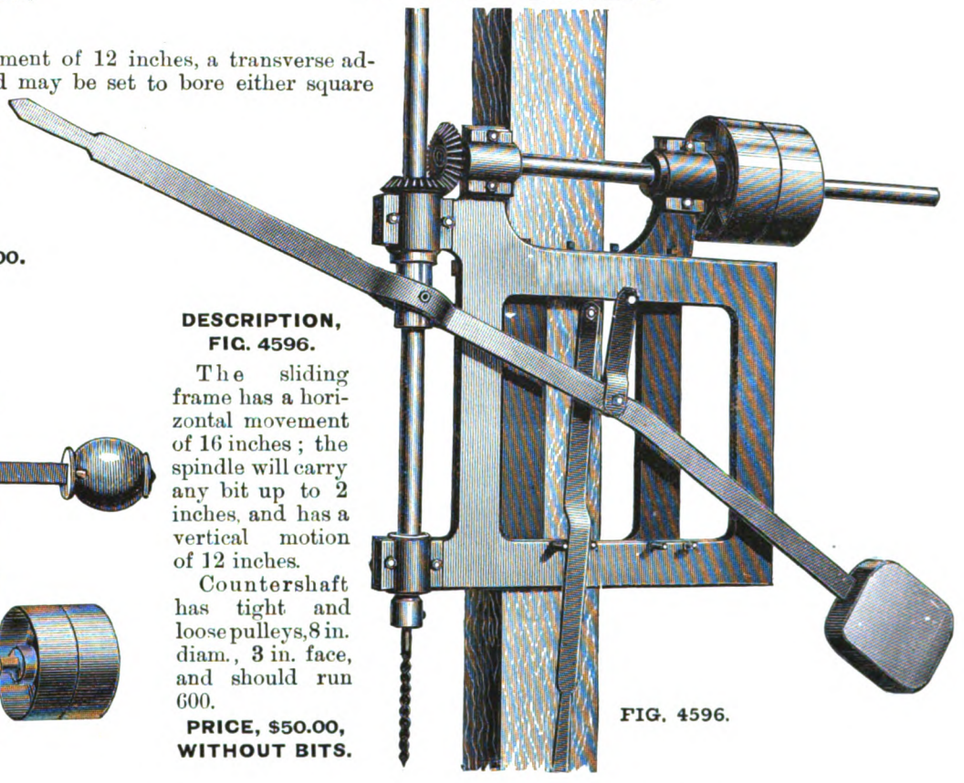


FIG. 4596.

DESCRIPTION, FIG. 4596.

The sliding frame has a horizontal movement of 16 inches; the spindle will carry any bit up to 2 inches, and has a vertical motion of 12 inches.

Countershaft has tight and loose pulleys, 8 in. diam., 3 in. face, and should run 600.

PRICE, $50.00, WITHOUT BITS.

CEARED BORER.

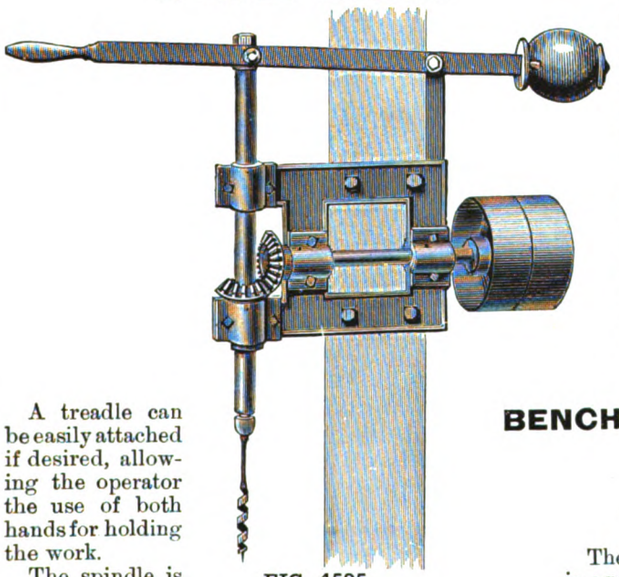


FIG. 4595.

A treadle can be easily attached if desired, allowing the operator the use of both hands for holding the work.

The spindle is strong enough to carry any bit up to 1½ inches, and has a vertical motion of 9½ inches.

Tight and loose pulleys, 8 in. diameter, 3 in. face. Speed, 600 revolutions.

PRICE, WITHOUT BITS OR POST, $30.00.

BENCH BORER, WITH FOOT TREADLE AND LEVER.

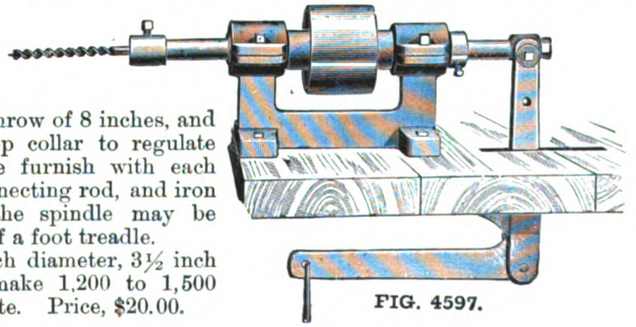


FIG. 4597.

The spindle has a throw of 8 inches, and is provided with stop collar to regulate depth of hole. We furnish with each machine a lever, connecting rod, and iron brackets, so that the spindle may be operated by means of a foot treadle.

The pulley is 5 inch diameter, 3½ inch face, and should make 1,200 to 1,500 revolutions per minute. Price, $20.00.

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ARM BORER.

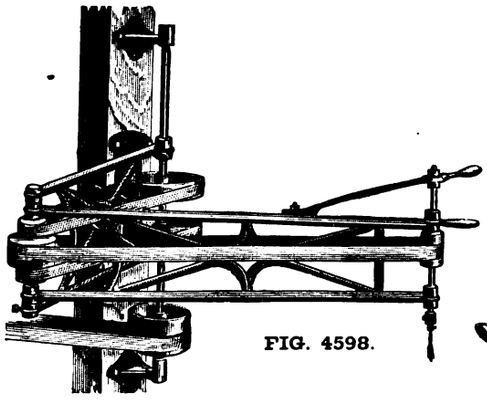


FIG. 4598.

DESCRIPTION, FIG. 4598.

It is operated by simply pressing the hand on a spring, and on removing pressure the bit is immediately withdrawn.

Tight and loose pulleys, 7 by 3, and should make 300 revolutions per minute.

No. 2, 8 ft. long, for doors and blinds; No. 1, 4 ft. long, for sash.

PRICES.

No. 1, $50.00. No. 2, $60.00.

At an extra, can be added an arrangement for sandpapering by using a disc where bit is shown in Fig. 4665.

PIN HOLE ARM BORER.

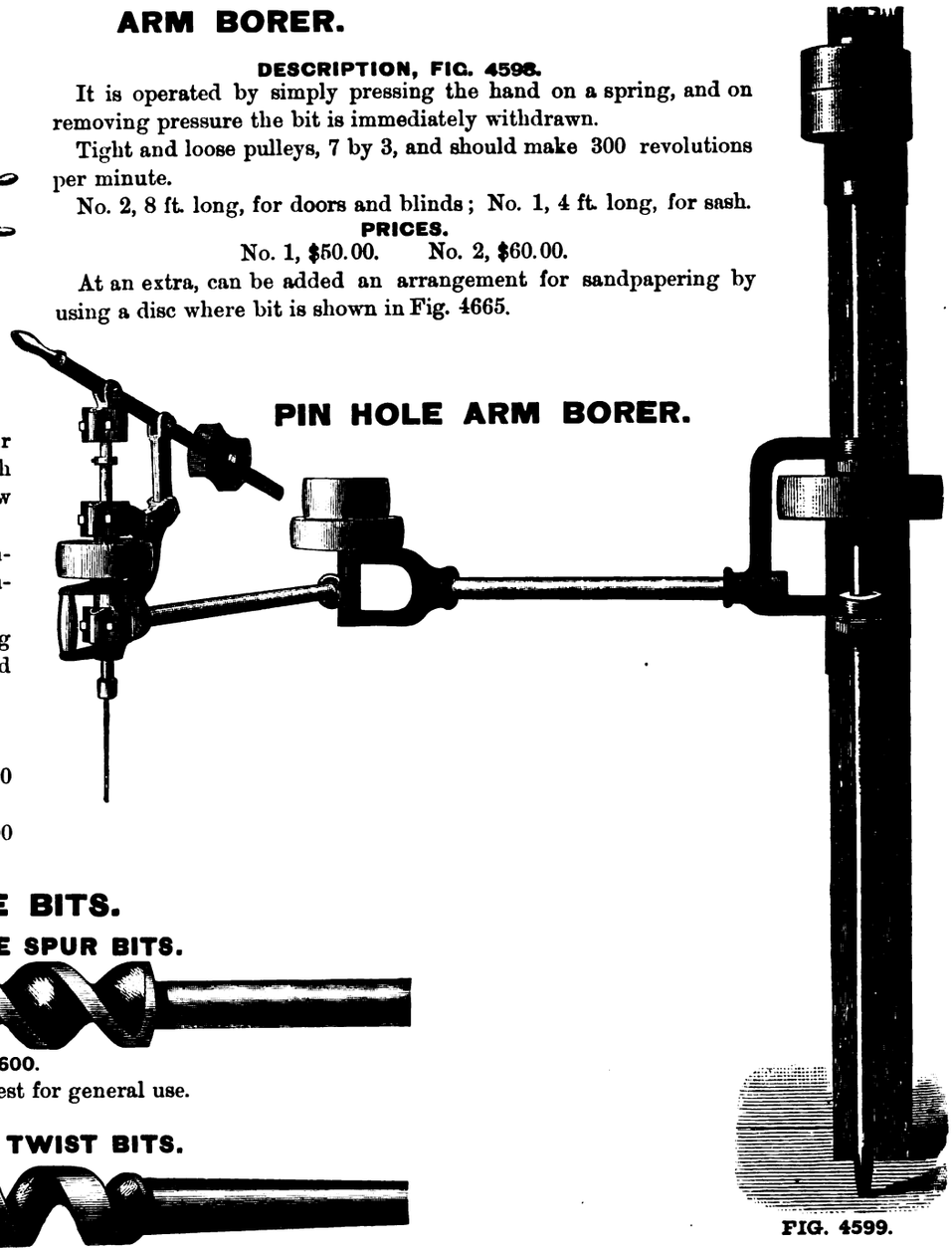


FIG. 4599.

DESCRIPTION, FIG. 4599.

The spindle is movable to the depth of four inches by means of a weighted lever, which also serves as a counterbalance to withdraw the bit.

Tight and loose pulleys, 8 inches in diameter, 3 inch face, and should run 900 revolutions.

We also fit same frame as a sandpapering machine alone and as a sandpapering and boring machine combined.

WEIGHT, 150 LBS.

PRICES.

Sandpapering or boring machine alone, $40.00
Sandpapering and boring machine combined. 50.00

MACHINE BITS.

EXTRA DOUBLE SPUR BITS.



FIG. 4600.

We think these are best for general use.

LEWIS SINGLE TWIST BITS.



FIG. 4601.

These are the best for hard wood, or with the grain of the wood.

JENNINGS DOUBLE TWIST BITS.



FIG. 4602.

We make these styles of machine bits, and sell them by the list, up to 6 inch twist, with regular turned shanks, not exceeding 2½ x ½ inch—straight or taper. For every additional three inches of twist, or fractional part of same, add 20 per cent. to list.

Special charges for extra long shanks.

Half sizes furnished at same price as next regular size larger.

In ordering, always state style of bit, length of twist, length and diameter of shank.

PRICES, FIGS. 4600, 4601 AND 4602.

	3	4	5	6	7	8	9-16 in.
List doz.,	$5.10	4.50	5.10	5.70	6.60	7.20	7.80
Price, each,	.43	.38	.43	.48	.55	.60	.65
	10	11	12	13	14	15	16-16 in.
List doz.,	$8.40	9.15	9.90	10.80	11.70	12.60	13.50
Price, each,	.70	.77	.83	.90	.98	1.05	1.13
	17	18	19	20	21	22	23-16 in.
List doz.,	$14.40	15.30	16.20	17.10	18.00	18.90	19.80
Price, each,	1.20	1.28	1.35	1.43	1.50	1.58	1.65
	24	26	28	30	32-16 in.		
List doz.,	$20.70	22.50	24.30	26.10	27.90		
Price, each,	1.73	1.88	2.03	2.18	2.33		

MACHINE DOWEL BITS.

Size, $\frac{5}{16}$. List price, $3.40 per doz.

Machine dowels are about 1¼ inch twist and 1 inch shank; 2¼ inches over all. The shanks are polished, not turned, and $\frac{5}{16}$ in. in diameter.

We recommend the Lewis patent as the best dowel machine bit for hard wood, but furnish either of the three styles at the same price.

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PATTERN MAKERS' CAP LATHE.

Made in sizes 50–25 inch, and 37½–21 inches swing.

Feed table is operated by diagonal worm which imparts a smooth and easy motion to the carriage, causing it to move rapidly with each revolution of balance handle.

Carriage is gibbed to bed, has double cross slides and swivel for working outside and inside bevels, tapers, etc.

Bed slider is operated by rack and pinion, which, when open, give fifty inches swing through gap, and three feet additional distance between centers.

Furnished with countershaft, two worm face plates, two spur centers, two pointed centers, three T rests, screw tool poppet, wrenches; also an extension arm with screw, which receives the slide rest with swivel base and allows bevels, etc., to be turned and work faced up at the full capacity of the lathe, without change of tool.

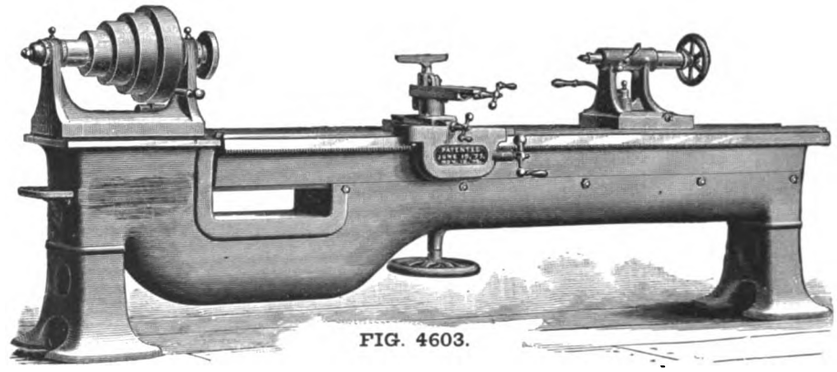


FIG. 4603.

PRICES, 50–25 INCHES.

Length of bed. Feet.	Swing over carriage. Inches.	Swing through gap. Gap 20 in. long Inches.	Distance between centers, closed slide.	Distance between centers, slide open. Feet.	Weight. Lbs.	Prices.
8	20	50	4 ft., 4 in.	7	2,700	$.....
10	20	50	6 " 4 "	10	3,000	.....
12	20	50	8 " 4 "	13	3,300	.....
14	20	50	10 " 4 "	16	3,600	.....

Tight and loose pulleys on countershaft, 10 in. diameter, 4½ in. face.

Countershaft should make 550 revolutions per minute.

Lathe constructed with overhanging outside, face plate and standard rest, $.....extra.

Lathe constructed with automatic and hand feed to carriage, $.....extra.

PRICES, 37 1-2–21 INCHES.

Length of bed. Feet.	Swing over carriage. Inches.	Swing through gap. Inches.	Distance between centers, closed slide.	Distance between centers, slide open. Feet.	Weight. Lbs.	Prices.
6	16	37½	2 ft., 10 in.	5	1,800	$.....
7	16	37½	3 " 10 "	6	1,900	.....
8	16	37½	4 " 10 "	7	2,000	.....
9	16	37½	5 " 10 "	8	2,200	.....
10	16	37½	6 " 10 "	9	2,400	.....
11	16	37½	7 " 10 "	10	2,600	.....
12	16	37½	8 " 10 "	11	2,800	.....

Tight and loose pulleys on countershaft, 8 inches in diameter, 4 inch face.

Countershaft should make 550 revolutions per minute.

Lathe constructed with overhanging, outside, face plate and standard rest, $.....extra.

25 INCH PATTERN MAKERS' LATHE.

Cone pulleys made of seasoned cherry, and take a 3 inch belt. The spindles extend through back end of the head and have thread cut for attaching face plate on back end. Furnished complete, with overhead countershaft, floor rest or stand, face plates for front and back ends of spindle, socket rest and two T-sockets, two spur centers, two common centers, one female center, and two chucks with taper screws.

Bed, 10 feet long, 7 feet between centers, 25 inch swing. Fitted with carriage and tool stock, worked by rack and pinion.

Weight, about 2,200 lbs.

PRICE, $300.00.

For additional length of bed, per foot..... $10.00
Without rack and pinion and movable carriage... 250.00
Heads and rest, etc., for fitting to wood shears.... 175.00

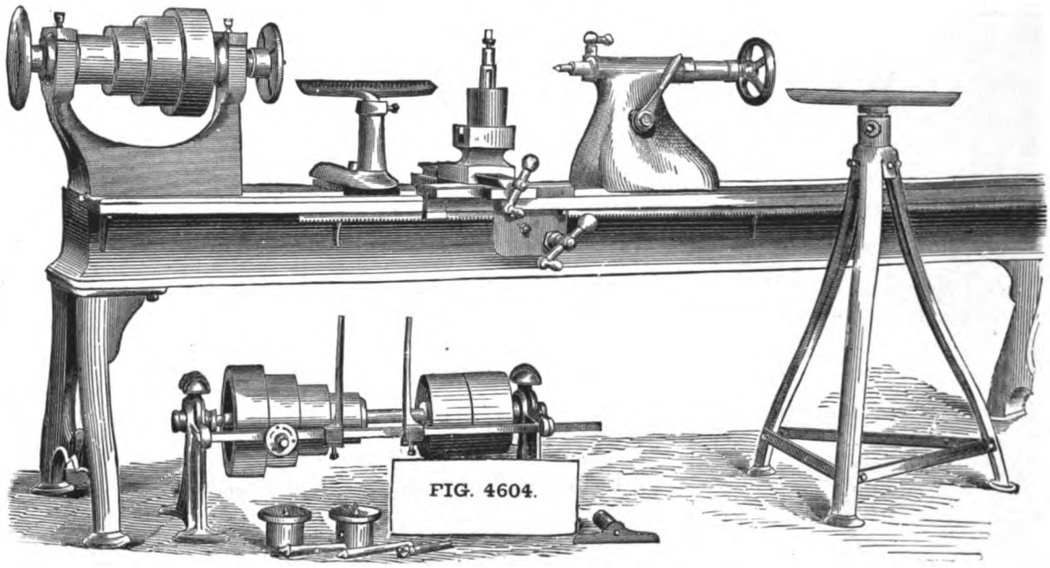


FIG. 4604.

24 AND 20 INCH PATTERN MAKERS' LATHE.

There is a floor stand for the back face plate, and the countershaft is provided with an extra pair of tight and loose pulleys to change the direction of motion for the back face plate.

The engraving shows a slide rest worked by hand, which is very convenient for long, straight or taper work; it is also used as a socket or a hand rest.

PRICES.

24 in. swing, 10 ft. bed, weight 2,000 lbs...$325.00
20 inch swing, 10 ft. bed, weight 1,400 lbs...300.00
Extra per foot for longer bed..... ..... 5.00

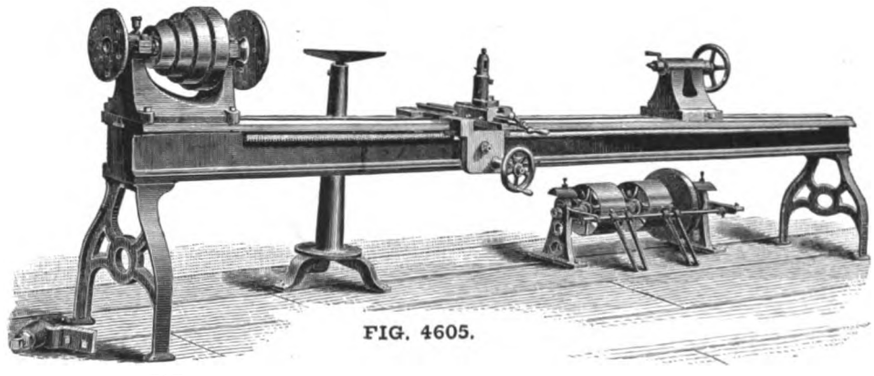


FIG. 4605.

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PATTERN MAKERS' AND WOOD TURNING LATHE.

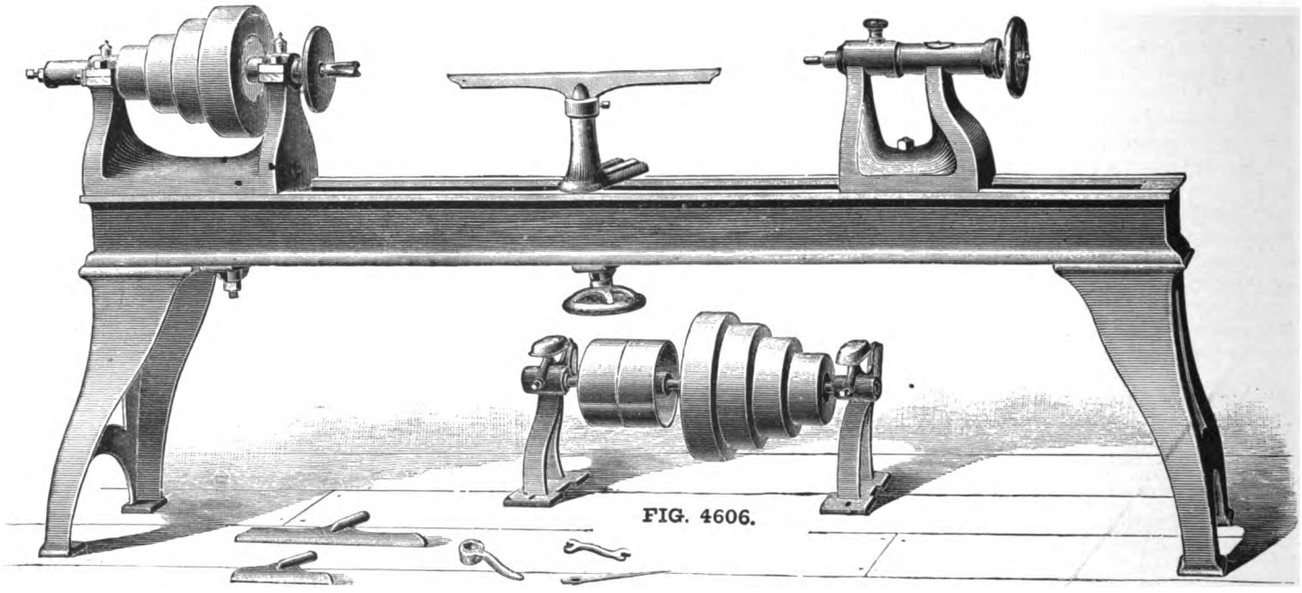


FIG. 4606.

These lathes are made with best steel arbors, and cones with four speeds. They are well balanced, so as to run easily and freely.

We furnish with each lathe the head and tail blocks, one pair of centers, two rest-sockets, one double and two single rests. Also, the screw face plate, with a screw in the center for turning knobs, etc.; countershaft complete, with hangers, tight and loose pulleys and cone pulley.

We can also furnish extra, if desired, large back face plates, for the back end of head-blocks, for pattern makers' use, with a floor-rest or standard, to stand on the floor, and the small chuck for driving the pieces into to be turned. We can make the frame or shears for them when wanted, and any length desired, at prices noted below.

The 12 inch has tight and loose pulleys, 6½ inch diameter, 2½ inch face, and should make 680 revolutions per minute. Weight, boxed, 250 lbs. Cone belt, 1¾ inch.

The 16 inch has tight and loose pulleys, 8½ inch diameter, 3½ inch face, and should make 750 revolutions. Weight, boxed, 350 lbs. Cone belt, 2¼ inch.

WOOD TURNING LATHE.

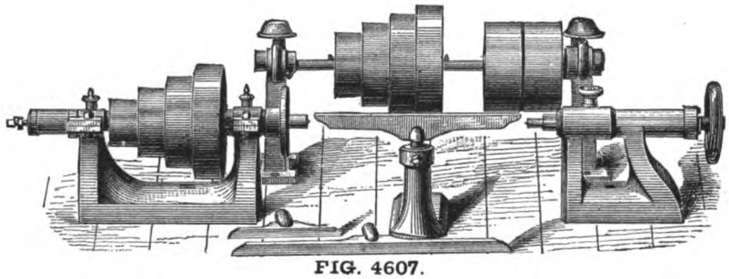


FIG. 4607.

The 20 inch has tight and loose pulleys, 8½ inch diameter, 3½ inch face, and should make 775 revolutions. Weight, boxed, 450 lbs. Cone belt, 2¾ inch.

The 24 inch has tight and loose pulleys, 10 inch diameter, 4¼ inch face, and should make 650 revolutions. Weight, boxed, 550 lbs. Cone belt, 3¼ inch.

Power required to drive lathe, 1 to 2 horse power.

The driving belt to run counter should be, for 12 inch, 2¼ inch; for 16 inch, 3 inch; for 20 inch, 3¼ inch; for 24 inch, 4 inch.

FLOOR REST.

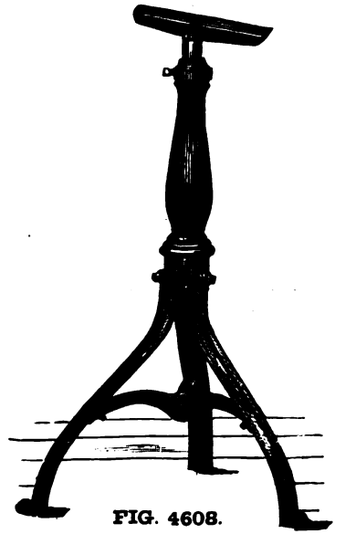


FIG. 4608.

PRICES, WITH IRON SHEARS.

Pattern lathe, Fig. 4606, with back face plate,	12	in. swing,	10	ft. bed,	$111.00.	Extra, per ft.,	$4.00
" " " " "	16	"	10	"	137.00.	" "	5.00
" " " " "	20	"	10	"	160.00.	" "	6.00
" " " " "	24	"	10	"	190.00.	" "	7.00

PRICES, WITH WOODEN SHEARS.

Pattern lathe, Fig. 4606, with back face plate,	12	in. swing,	10	ft. bed,	$106.00.	Extra, per ft.,	$3.50
" " " " "	16	"	10	"	127.00.	" "	4.00
" " " " "	20	"	10	"	145.00.	" "	4.50
" " " " "	24	"	10	"	170.00.	" "	5.00

PRICES, FIG. 4606.

Either wood or iron shears, without back face plate, 12 in., less $6.00; 16 in., less $7.00; 20 in. and 24 in., less $10.00.

PRICES, WITH BACK FACE PLATE.

Fig. 4607,	12	inch swing.	$71.00
"	16	"	87.00
"	20	"	100.00
"	24	"	120.00

PRICES, PLAIN.

Fig. 4607,	12	inch swing.	$65.00
"	16	"	80.00
"	20	"	90.00
"	24	"	110.00

PRICE, FIG. 4608, $15.00.

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PATTERN MAKERS' TURNING LATHE.

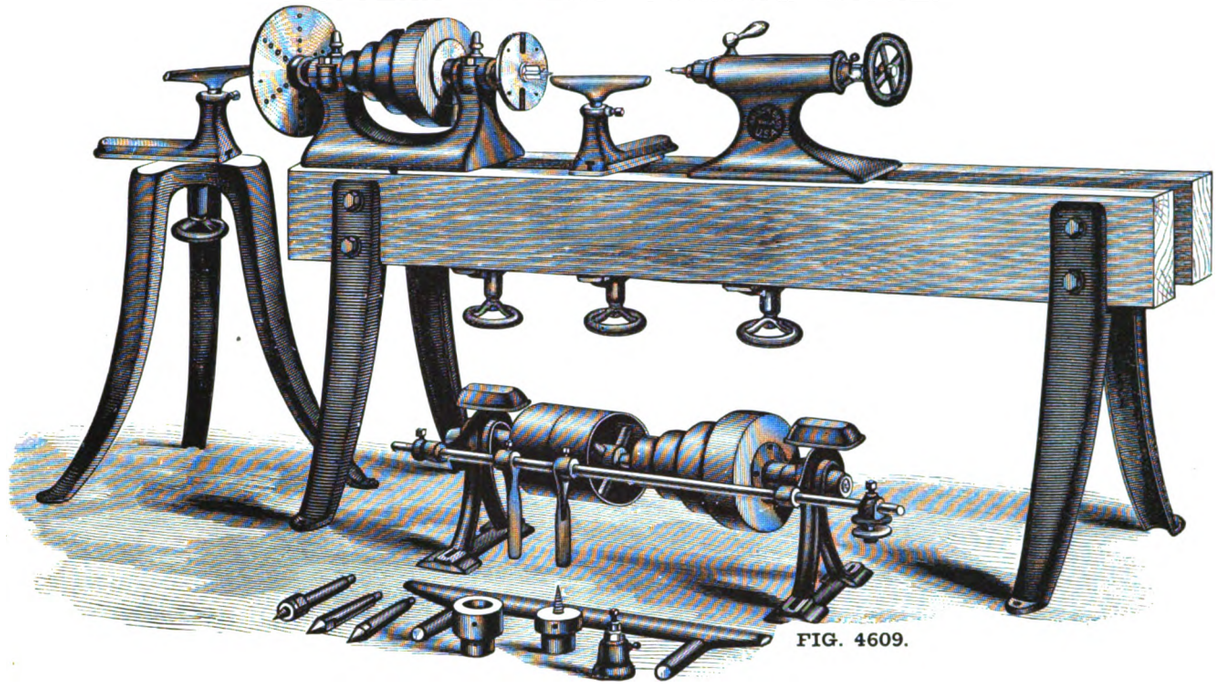


FIG. 4609.

PRICES, WITHOUT FLOOR REST OR BACK FACE PLATE.

16 inch lathe shears,	12 feet long,	tight and loose pulleys,					8 x 4½	inches,	speed	700	$150.00
20	"	"	12	"	"	"	10 x 4½	"	"	600	160.00
24	"	"	12	"	"	"	10 x 4½	"	"	550	180.00

EXTRAS.

Floor rest.....$15.00. Rear face plate.....$5.00.

SHOWING PARTS OF LATHE.

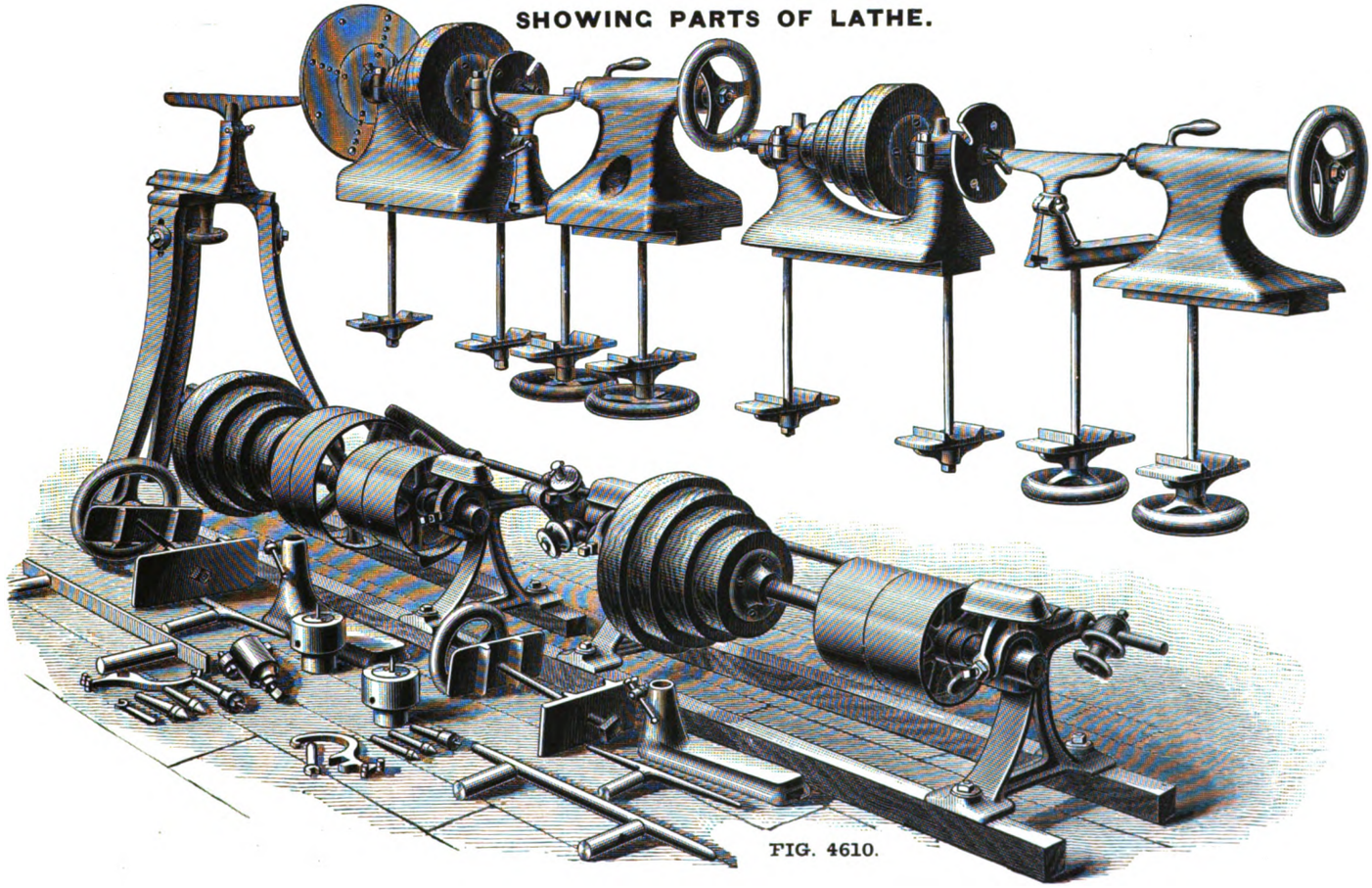


FIG. 4610.

PRICES OF HEAD AND TAIL STOCKS, WITH COUNTERSHAFT AND ALL PARTS SHOWN; NO SHEARS, FLOOR REST, OR BACK FACE PLATE.

12 inch swing.....$65.00. 16 inch swing.....$80.00. 20 inch swing.....$90.00. 24 inch swing.....$110.00.

EXTRAS.

Floor rest.....$15.00. Rear face plate.....$5.00. Shears as per Fig. 4609.

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WOOD TURNING LATHES.

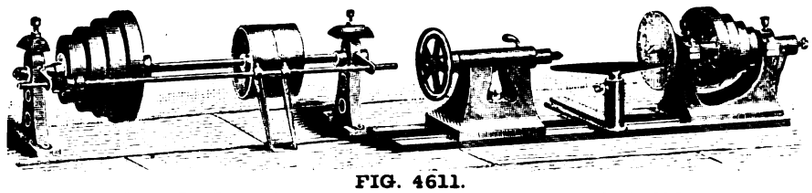


FIG. 4611.

PRICES.

12 inch lathe, weight 400 lbs. $65.00
16 " " " 600 " 75.00
20 " " " 700 " 95.00
24 " " " 800 " 125.00

With each lathe are furnished 2 face plates, 2 rests, 2 sockets and countershaft.

PATTERN MAKERS' LATHES.

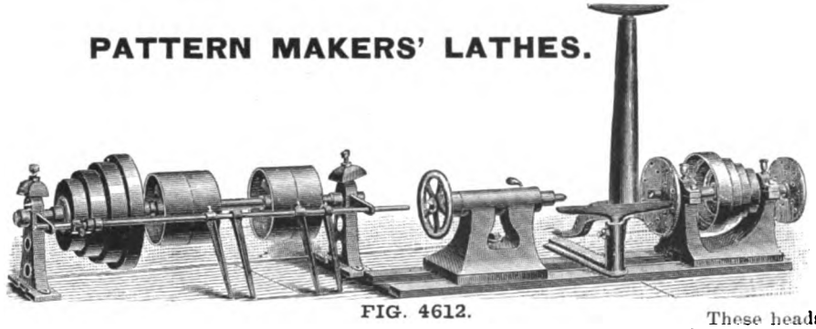


FIG. 4612.

PRICES.

20 inch lathe, weight 760 lbs. $135.00
24 " " " 965 " 145.00

The countershaft is furnished with two pairs of tight and loose pulleys, to reverse the motion of cone head.

Each lathe is furnished with 2 face plates, floor rest, 2 sockets, 2 rests and countershaft.

WOOD TURNING LATHES.

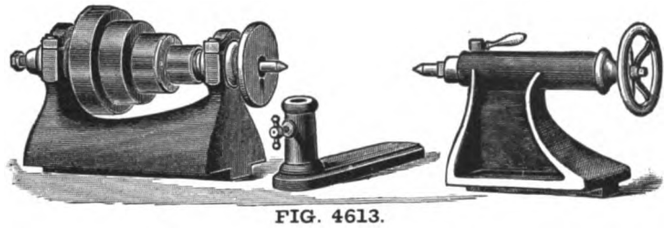


FIG. 4613.

The 10 and 12 inch lathes have only 3 steps on cones; all the other sizes have 4 step cones.

PRICES.

10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	24 in.
$50.00	$60.00	$70.00	$80.00	$95.00	$110.00	$120.00

PATTERN MAKERS' LATHES.

Made same as above, but with back face plate and floor stand.

PRICES.

16 in.	18 in.	20 in.	24 in.
$110.00	$125.00	$135.00	$150.00

Prices for wood or iron beds, see table below, Fig. 4613.

CHEAP LATHE HEADS.

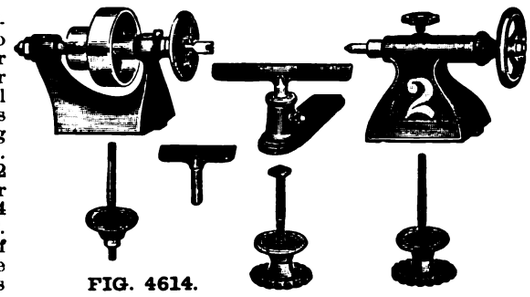


FIG. 4614.

These heads are offered to the trade to meet the demand for a machine of a lower price. They are well made and the bottoms are planed to bring the centers in line. The No. 1 and No. 2 have cone pulley for 2, the No. 3 and No. 4 for 3 changes of speed. The spindles are of steel well fitted. Price of heads includes head and tail rest socket, with 2-Ts, face plate, flat center, tail center, with bolts and hand wheels for fastening to the bed.

PRICES OF HEADS.			PRICES OF TURNED BALANCE WHEELS, including shaft boxes and crank for operating lathe by foot power.				PRICES OF COUNTERSHAFTS.		
No.	Swing.	Prices.	No.	Dia.	Weight.	Prices.	No.	Size of T. & L. pulleys.	Prices.
1	6 in.	$10.00	1	20 in.	30 lbs.	$8.00	1	3 x 1	$7.00
2	8 "	15.00	2	22 "	40 "	10.00	2	4 x 1½	8.00
3	11 "	20.00	3	22 "	60 "	13.00	3	5 x 2	10.00
4	13 "	30.00					4	6 x 3	12.00

DETAILS FURNISHED WITH FIG. 4613, AT PRICES ABOVE, SEE FIG. 4615.

WITH 10 AND 12 INCH LATHES.—Countershaft, with tight and loose pulleys, 6 x 3 in. 1 common face plate. 1 chuck face plate—Fig 6. 1 3-inch screw chuck—Fig. 10. 2 round centers. 1 ¾-inch female center—Fig. 8. 1 1-inch spur center—Fig. 9. 1 rest socket—Fig. 12. 2 T rests, 5 x 10 in.—Fig. 2. Together with bolts, wheels and flanges for holding head, tail and rests—Figs. 3 and 5.

WITH 14 AND 16 INCH LATHES.—Countershafts, with tight and loose pulleys, 8 x 3 in. 1 common face plate. 1 chuck face plate—Fig. 6. 1 3-inch screw chuck—Fig. 10. 1 rosette chuck with adjustable screw center—Fig. 7. 2 round centers. 1 ¾-inch female center—Fig. 8. 1 1-inch spur center—Fig. 9. 1 rest socket—Fig. 12. 3 T rests, 5, 9 and 12 inch—Fig. 2. Together with the bolts, wheels and flanges for holding the head, tail and rests—Figs. 3 and 5.

WITH 18, 20 AND 24 INCH LATHES.—Countershafts, with tight and loose pulleys, 12 x 4 in. 1 common face plate. 1 chuck face plate—Fig. 6. 1 4-inch screw chuck—Fig. 10. 1 2-inch rosette chuck with adjustable screw centers—Fig. 7. 2 round centers. 1 1-inch female center—Fig. 8. 1 1¼-inch spur center—Fig. 9. 1 rest socket—Fig. 12. 3 T rests, 6, 12 and 18 inch—Fig. 2. With the bolts, wheels and flanges for holding the head, tail and rest—Figs. 3 and 5. Pattern makers' lathes have in addition to the above 1 back face plate and 1 floor rest.

EXTRA PARTS FOR FIG. 4613.

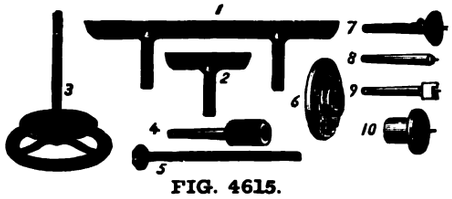


FIG. 4615.

PRICES, EXTRA PARTS FOR FIG. 4613.

Swing of lathe.	IRON LEGS, drilled.	WOODEN SHEARS, including iron legs.				SCREW CHUCKS. Fig. 10.			FACE PLATES. Fig. 6.			ROSETTE CHUCKS. Fig. 7.	HOLLOW CHUCKS. Fig. 4.			SPUR CENTERS. Fig. 9.				FEMALE CENTERS. Fig. 8.			DOUBLE T RESTS. Fig. 1. Price includes extra socket. Bolt and wheel, Figs. 3 and 12.							BACK REST.
		6 feet long.	8 feet long.	10 feet long.	Each added ft.	3 inch.	4 inch.	6 inch.	8 inch.	10 inch.	12 inch.		1 inch hole.	1¼ inch hole.	2 inch hole.	1 inch.	1¼ inch.	1½ inch.	1¾ inch.	½ inch.	¾ inch	1 inch.	18 inch.	24 inch.	30 inch.	36 inch.	42 inch.	48 inch.	60 inch.	
10	4.00	14.00			1.00	2.00	2.50		3.00			2.00	1.00	1.25	1.50	1.50	1.75			1.50	1.50		3.00	3.25	3.50	3.75	4.00	4.50		4.00
12	4.00	15.00			1.00	2.00	2.50		3.00			2.00	1.00	1.25	1.50	1.50	1.75			1.50	1.50		3.00	3.25	3.50	3.75	4.00	4.50		4.00
14	5.00		18.00		1.50	2.00	2.50		3.00	3.50		2.50	1.25	1.50	1.75	1.75	2.00	2.25		1.75	1.75		3.50	3.75	4.00	4.25	4.50	5.00		5.00
16	5.00		19.00		1.50	2.50	3.00	3.50	3.00	3.50		2.50	1.25	1.50	1.75	1.75	2.00	2.25		1.75	1.75		3.50	3.75	4.00	4.25	4.50	5.00		5.00
18	6.00			24.00	2.00	2.50	3.00	3.50	3.50	4.00	5.00	3.00	1.50	1.75	2.00	2.00	2.25	2.50	2.75	1.75	1.75	2.00		4.00	4.50	5.00	5.50	6.00	6.50	6.00
20	6.00			30.00	2.50	3.00	3.50	4.00	3.50	4.00	5.00	3.00	1.50	1.75	2.00	2.00	2.25	2.50	2.75	2.00	2.00	2.00		4.00	4.50	5.00	5.50	6.00	6.50	6.00
24	6.00			34.00	2.50	3.00	3.50	4.00	3.50	4.00	5.00	3.00	1.50	1.75	2.00	2.00	2.25	2.50	2.75	2.00	2.00	2.00		4.00	4.50	5.00	5.50	6.00	6.50	6.00

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PATTERN MAKERS' FACE LATHES.

The spindle is made of steel, large in diameter, and carries a cone having four steps, made of cherry.

The countershaft we send with this lathe carries a four step cone to match the cone on the machine, and has two pairs of tight and loose pulleys securing eight changes of speed, to suit all sizes of work.

With each lathe we furnish three face plates, 18 in., 10 in., 6 in. diameter, floor stand, rests, sockets, centers, countershaft hangers and pulleys.

The tight and loose pulleys are 10 in. x 7 in.; one pair should make 120 revolutions, and the other pair should make 475 revolutions per minute.

PRICES ON APPLICATION.

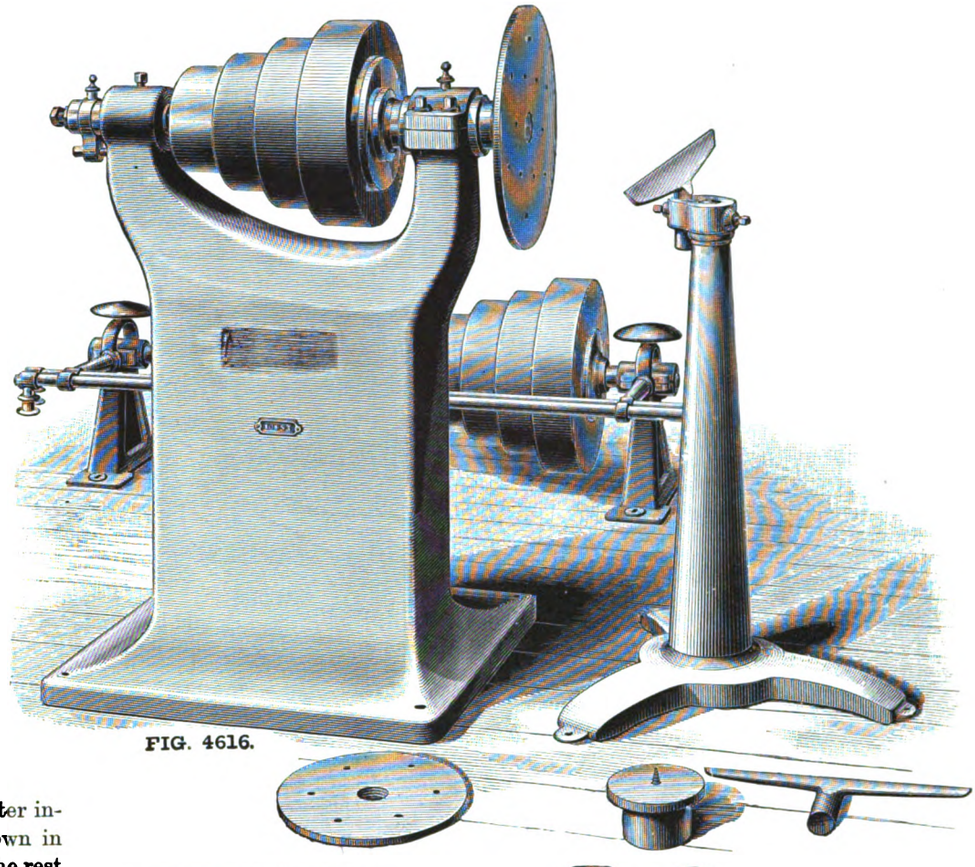


FIG. 4616.

FACE LATHES.

DESCRIPTION, FIG. 4617.

Swing.—The lathes swing to 6 ft. diameter inside the rest when it is in the position shown in the cut, or to any larger diameter when the rest is swung back.

The rest is pivoted, so as to be instantly moved out of the way in mounting or removing pieces from the lathe.

The spindle is 3½ in. diameter, the bearings of best babbitt metal.

The cone pulleys are preferably made of wood, to avoid weight, but iron pulleys are furnished instead when preferred.

Each lathe is provided with one face plate and two rests, countershaft, and a full set of wrenches.

Speed.—Countershaft has tight and loose pulleys, 16 in. diameter, 3½ inches face, and should make 400 revolutions per minute.

WEIGHT, 1,700 LBS. PRICE, $400.00.

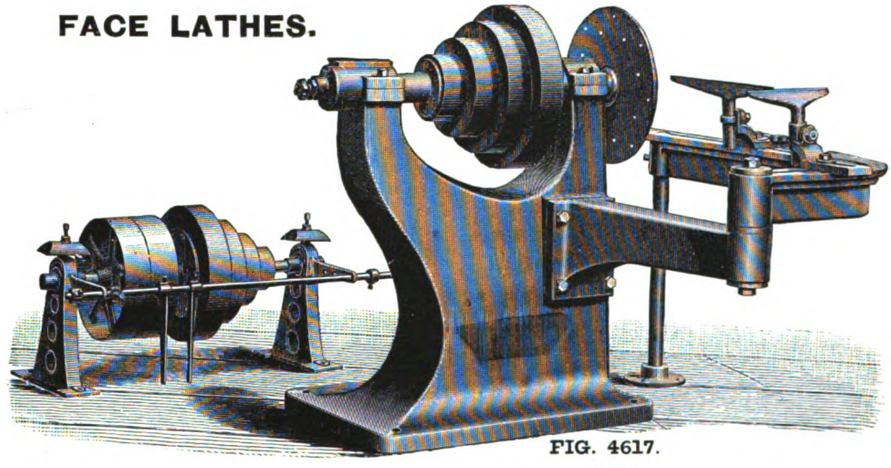


FIG. 4617.

FACE LATHE.

DESCRIPTION, FIG. 4618.

This very complete and useful machine takes the place of a double-head lathe for a large share of the turning required in a pattern shop; it is much less expensive, occupies but little room, and is much more convenient and efficient for every kind of face work of 16 in. or less in diameter. In operating the lathe, a workman stands in front instead of at the side of the work, which, for face turning, especially inside work, is a matter of great convenience. These lathes are strongly recommended in any case where there is considerable pattern turning to do; even if a double-head lathe would perform all, there is much gained in time and convenience by having both, because a single lathe is generally in use when there are odd pieces to be turned.

Each lathe is provided with an overhead shaft, rests, stands, and other details, as shown.

WEIGHT, 700 LBS. PRICE, $125.00.

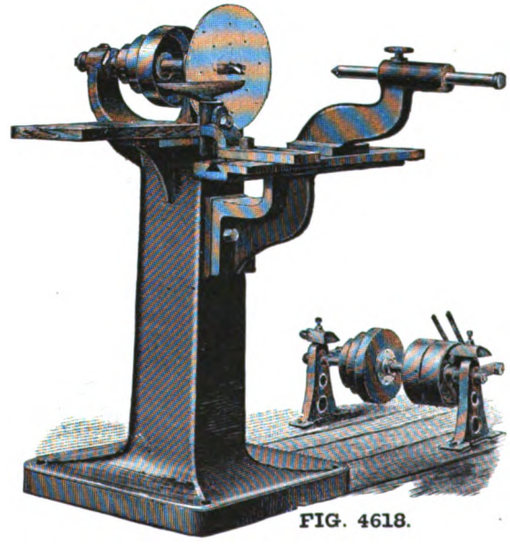


FIG. 4618.

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CAUCE LATHES.

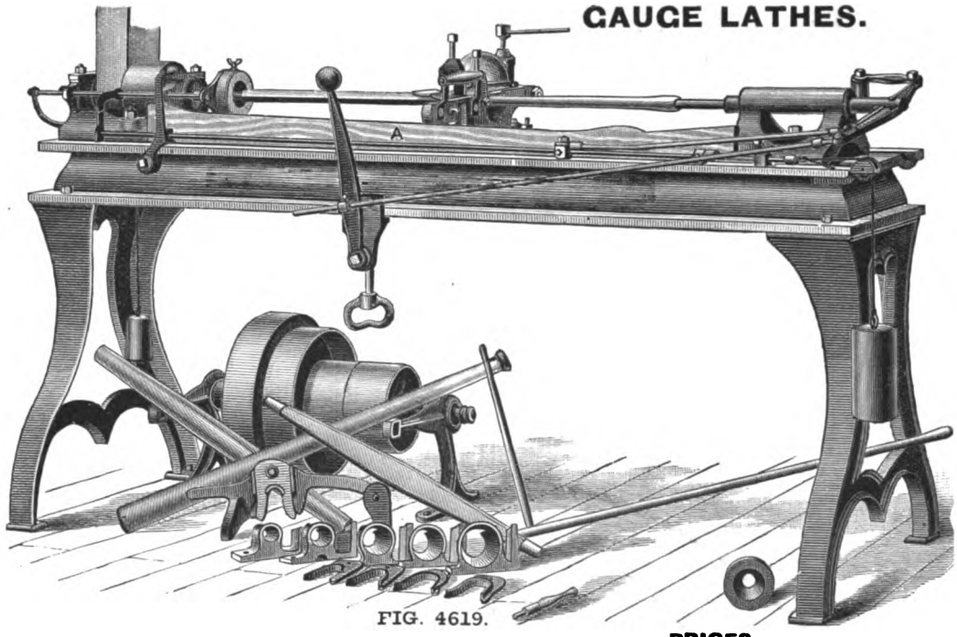


FIG. 4619.

The knives are to be ground on the bevel or hollow side, and should be without any bevel whatever on the under side. The dies are right when we ship them, and should never be filed. If the knives do not cut properly the fault lies in the grinding or the setting of the knives.

The lathes will turn 2,000 to 3,000 broom handles per day of ten hours; 1,000 to 1,200 hoe handles, 3,800 chair legs, and other turned articles with corresponding rapidity. A countershaft with hangers accompanies each lathe. It has tight and loose pulleys, 8 in. diameter by 4 in. face, to receive the driving belt, and a cone of two speeds for belting to the lathe. Speed of the countershaft, 525 revolutions per minute.

We also make a special lathe for turning and threading insulator pins and brackets for telegraph and telephone use.

PRICES.

7 ft. 10 in. lathe, with countershaft	$170.00,	weight,	1,090 lbs.
4 ft. 10 in. " " "	150.00,	"	950 "
3 ft. 10 in. " " "	120.00,	"	750 "
Broom handle lathe, with countershaft	$100.00,	weight,	710 lbs.
Special lathe, with short bed, for pins and brackets, with countershaft	150.00	"	..... lbs.
Special lathe for insulator pins alone	125.00	"	..... lbs.

SPIRAL BACK KNIFE CAUCE LATHE.

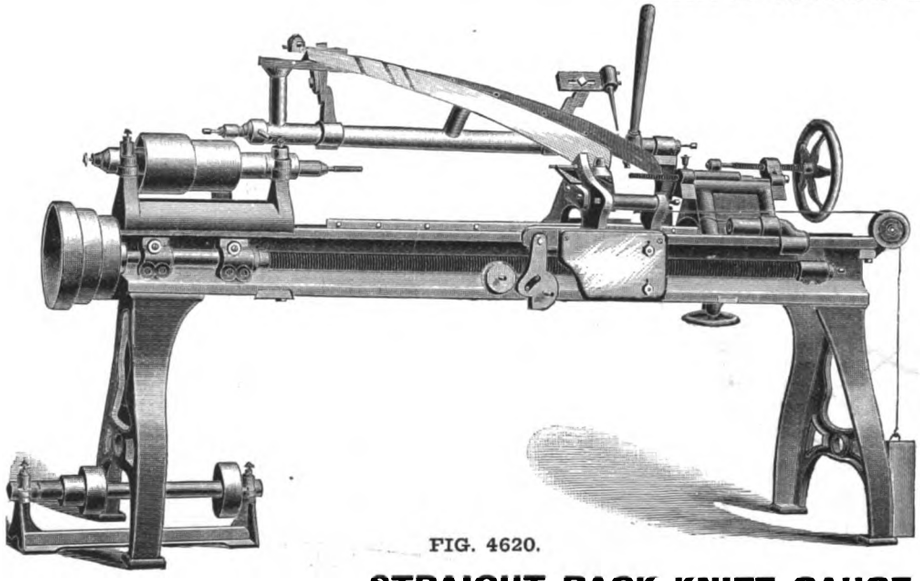


FIG. 4620.

Lathes furnished with straight or spiral knives.

It is automatic in its construction, and is operated by a feed screw which moves the carriage where the rougher knife is firmly held, sizing the stock and allowing it to pass through the ring; at the same time the finishing knife, which is of a corrugated surface, to correspond with the form to be turned, is allowed to cut a little at a time, leaving a smooth polished, or dead surface, as may be desired.

The knives are easily sharpened and adjusted to take up wear.

WEIGHT, 1,600 LBS.

PRICES.

With 8 foot bed, turns 48 inches, no knife	$265.00
Spiral knife, extra per inch	1.50

STRAIGHT BACK KNIFE CAUCE LATHE.

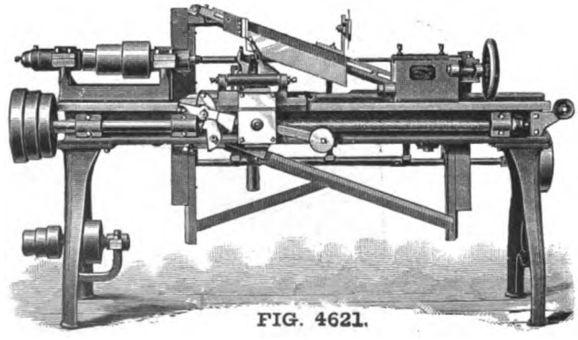


FIG. 4621.

Below is a description of above lathe for turning all kinds of beaded chair stock, and other like work. The spindle is large, with extra long bearings, and has a cone pulley with two shifts for different speeds.

The tail spindle is conical in shape, and runs in a long babbitt lined box, with a step to take the end pressure, and made adjustable to take up the wear.

The knife bar is made adjustable for different sizes, and planed in such shape that when the knife is once right it is always right.

The knife frame has racks cast on each end and gears working in them, so the sash works up and down square without binding on the ways. It has a centering device that centers both ends of the stock, adjustable to any length or size.

The gouge holder in front of the die is made so as to adjust with screws without stopping the lathe. The feed screw has three bearings, so that when the feed belt is tight it will not throw the screw out of line. The feed nut is made to open and shut square, so that it gives an equal bearing on all the threads. One set of turning tools, six dies, two spur centers, and two cup centers for tail spindle are furnished with each lathe.

PRICES.

To turn 13 inches	weight,	..... lbs.	$275.00
" " 30 "	"	..... lbs.	300.00
" " 36 "	"	1,700 lbs.	335.00
" " 48 "	"	1,900 lbs.	375.00
Extra for countershaft			25.00

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IMPROVED GAUGE LATHE.

These gauge lathes have screw feed, are in general use for turning furniture and chair stock, bedstead rolls, balusters, hoe, fork and broom handles, and all kinds of beaded and plain turning, using a V cutter and gouge.

PRICES.

To turn 6½ feet long; weight, ... lbs	$275.00
" " 4½ " " " 1,500 lbs	225.00
" " 3 " " " ..... lbs	200.00
Countershaft, extra	20.00

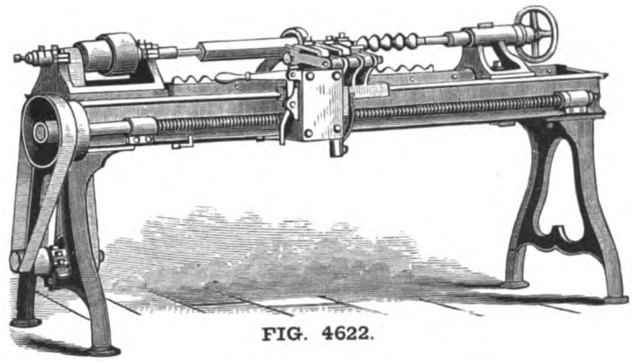


FIG. 4622.

VARIETY WOOD TURNING LATHE.

ADJUSTABLE HEADS.

This lathe has three heads—one a rough cutter, next a center guide, and the third the sizing cutter, operated by the knee on a padded drop under the lathe. On the tailstock is a cut-off attachment, and end borer can also be applied.

PRICES.

No. 1, 5 foot bed, works stock up to 2 inches; weight, 700 lbs	$150.00
No. 2, 5 foot 9 inch bed, works stock up to 2¼ inches; weight, 800 lbs	160.00
No. 3, 6 foot bed, works stock up to 3 inches; weight, 925 lbs	175.00
No. 4, 7 foot bed, works stock up to 3½ inches; weight, ... lbs	185.00
No. 5, 7 foot bed, works stock up to 4 inches; weight, ... lbs	200.00

Prices include counter and four chucks, one ring and one set knives.

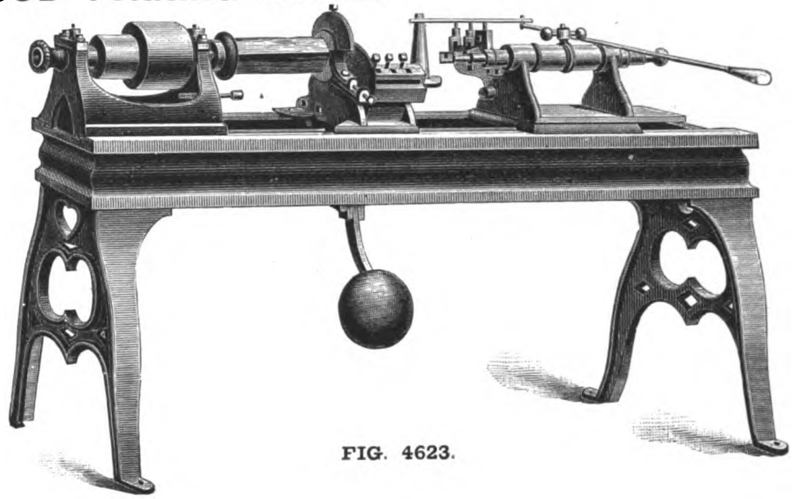


FIG. 4623.

ROD, PIN AND DOWELL MACHINE.

NO. 3.

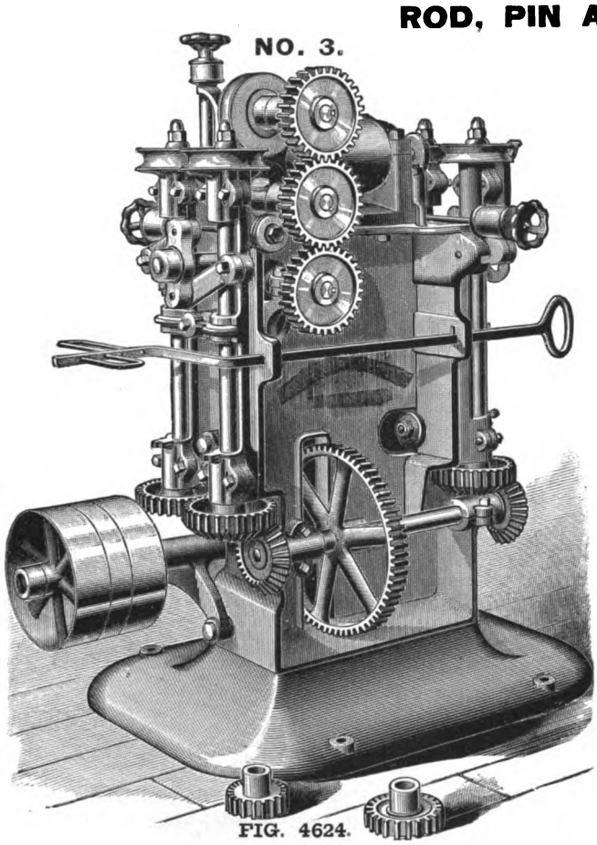


FIG. 4624.

It has three speeds of feed and a reverse feed, when ordered, which are put in motion or stopped by the hand shipper rod shown in cut.

A feed speed, varying from 1,000 to 3,500 lineal feet per hour, is given to the machine, according to the work to be performed.

With each machine is furnished a countershaft, which drives the hollow arbor and the feed; two brass cutter-heads and two sets of feed rolls.

We manufacture three sizes of machines:

No. 1, Speed of cutter-head—pulley, 4½ diameter x 4½—5,000; speed of countershaft—tight and loose pulleys, 10 diameter x 4—900.

No. 2, Speed of cutter-head—pulley, 5 diameter x 4½—4,500; speed of countershaft—tight and loose pulleys, 10 diameter x 5—940.

No. 3, Speed of cutter-head—pulley, 6 diameter x 5—3,600; speed of countershaft—tight and loose pulleys, 10 diameter x 6—900.

NO. 1.

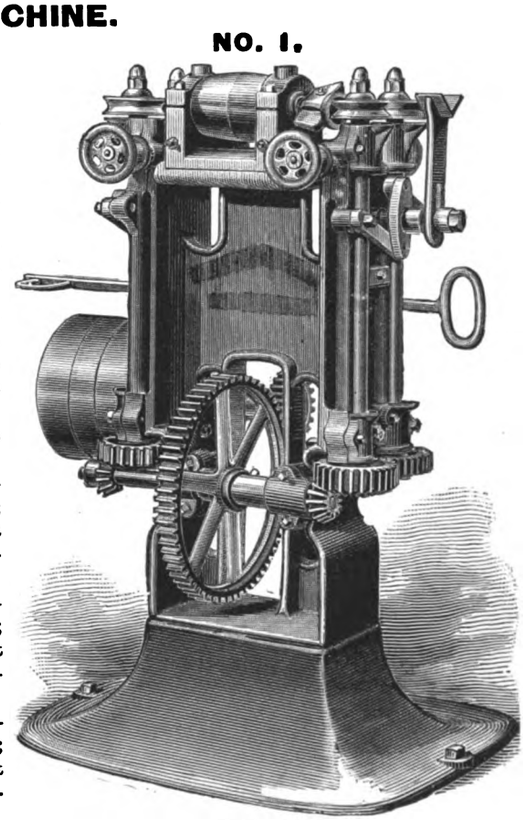


FIG. 4625.

PRICES.

No. 1, To turn from ¼ to 1¼ inches	$130.00
No. 2, To turn from ½ to 1 5/16 inches	150.00
No. 3, Extra large and heavy, to turn from ¾ to 2 inches	250.00

Reverse feed, $10.00 extra. Extra heads, $5.00. Extra rolls, per set of four, $4.00.

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POWER FEED ROD PIN AND DOWEL MACHINE.

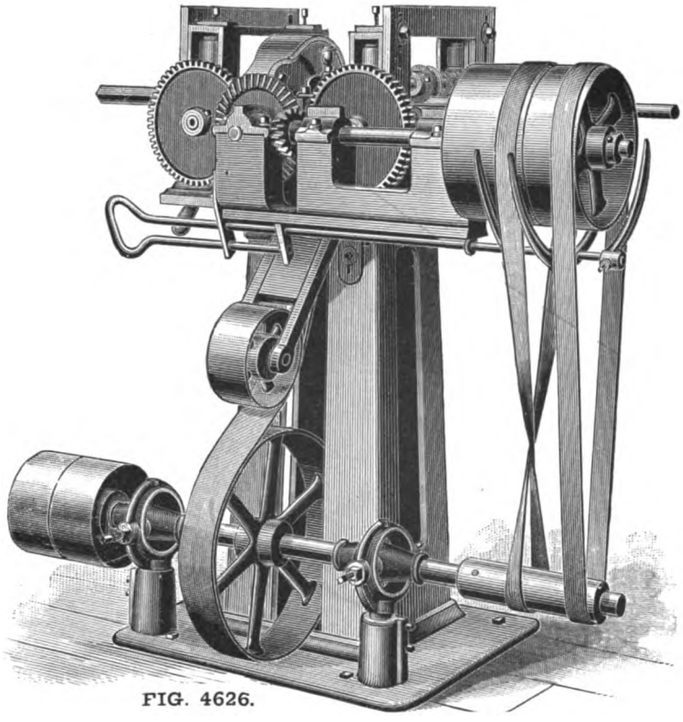


FIG. 4626.

Will make dowels from $\frac{5}{16}$ up to and including 1⅜ inch, furnished with two heads, $150.00.

NO. 3 UNIVERSAL MITER MACHINE.

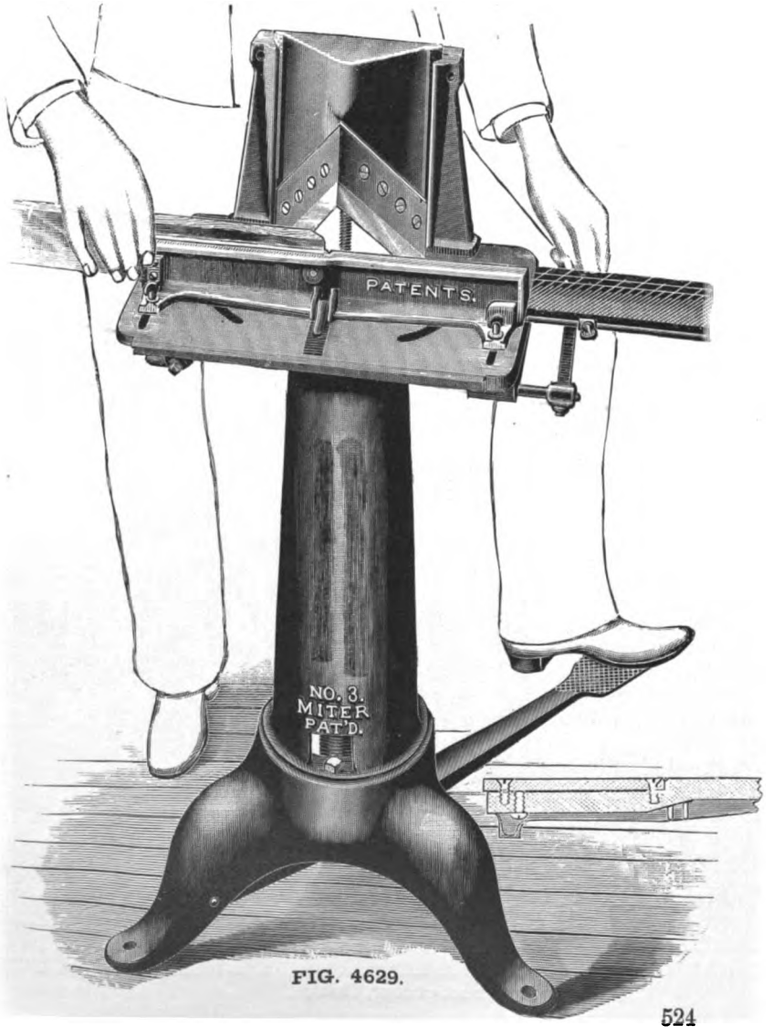


FIG. 4629.

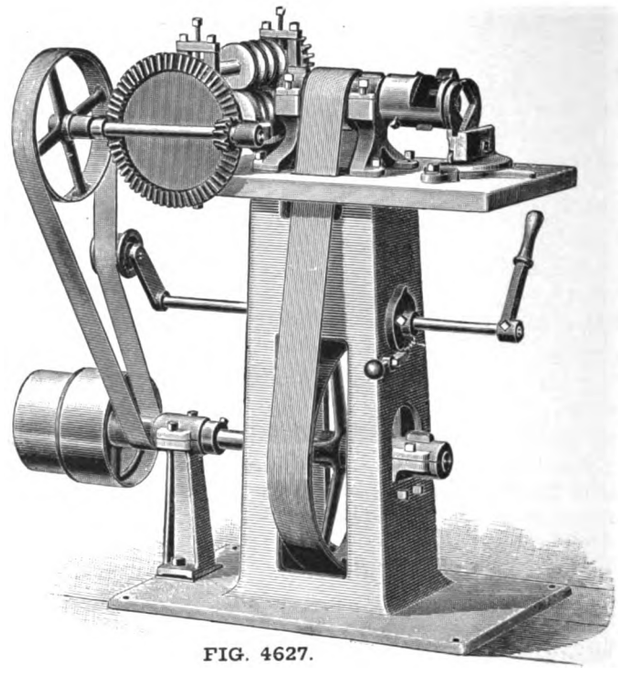


FIG. 4627.

Built in three sizes—the No. 6, to work 3 inches and under; the No. 5, to work 2 inches and under; and the No. 3, to work 1⅜ inches and under.

We furnish with each machine three heads with cutters, and one set of rolls with three sizes of grooves to match the heads. Parties ordering extra heads will need to order rolls with grooves to match; and, in ordering, please state the number of the machine, so that they may be sure to fit.

The countershaft for Nos. 3 and 5 has tight and loose pulleys, 8½ inch diameter, 3½ inch face, and should make 600 revolutions per minute for No. 3, and 500 revolutions for No. 5.

No. 6 has 8½ x 5 pulleys, and should make 675 revolutions. Weight, 450 lbs.

PRICES.

NO. 3, $100.00. NO. 5, $105.00. NO. 6, $135.00.

HAND FEED ROD AND PIN MACHINE.

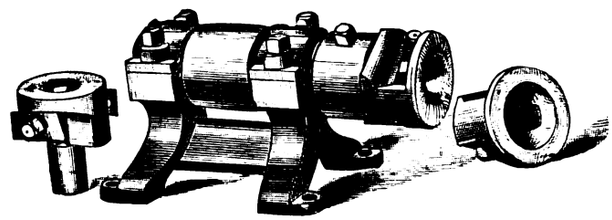


FIG. 4628.

PRICES.

	Size.	Diam. pulley.	Face.	Speed	Prices.
No. 1, rod machine	⅜, ½, ⅝ in.	2½ in.	2¼ in.	3,500	$28.00
No. 3, " "	1⅛, 1¼, 1⅜ "	3½ "	3½ "	3,000	33.00
No. 5, " "	1¾, 1⅞, 2 "	4 "	4¼ "	2,500	40.00
No. 6, " "	any 3 sizes under 3 in.	5 "	5½ "	2,000	45.00

DESCRIPTION, FIGS. 4629 AND 4630.

Fig. 4629 shows front view of the machine with universal column, which may be revolved, and adjustable miter gauge detached on floor below the treadle.

Fig. 4630 shows back view and adjustable stop on treadle rod. The detached cut to left shows top of bed with squaring gauge in position; they are quickly attached and enable one to cut any angle from square to miter.

Hand machines are similar in appearance to trimmers, Figs. 4637 and 4638.

FOR PRICES SEE NEXT PAGE.

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NO. 3 PLAIN MITER MACHINE.

This machine shows the miter gauge ruled, and bed plates.

We also make this machine to do the work of the copes on the tenon, and on furniture work it makes a better joint than can be made by copes, and enables you to run any kind of moulding, and no extra expense to put the work together.

We have a special gauge which we attach to this machine so that moulding can be cut on a miter or octagon without disturbing the gauge.

PRICES, FIGS. 4629 AND 4630.

Number.	Bed.	Stroke.	Miter mouldings.	Prices.	Extra knives per set.
2 hand power	6 x 9	3¼	2 in. wide, plain	$27.50	$5.00
3 foot power	9 x 12	4½	3 " " " with rule	41.25	7.50
4 hand power	12 x 20	6½	4 " " " " "	55.00	10.00
5 foot power	15 x 29	8	5 " " " " "	68.75	12.50

Extra for bed plates or squaring gauge No. 2.....$5.00
" " " " " No. 3..... 7.50
" " " " " No. 4.....10.00
" " " " " No. 5.....12.50

No. 2 miters moulding to 2 inches wide.....weight, 25 lbs.
No. 3 " " " 3 " " ..... " 140 lbs.
No. 4 " " " 4 " " ..... " 150 lbs.
No. 5 " " " 5 " " ..... " 250 lbs.

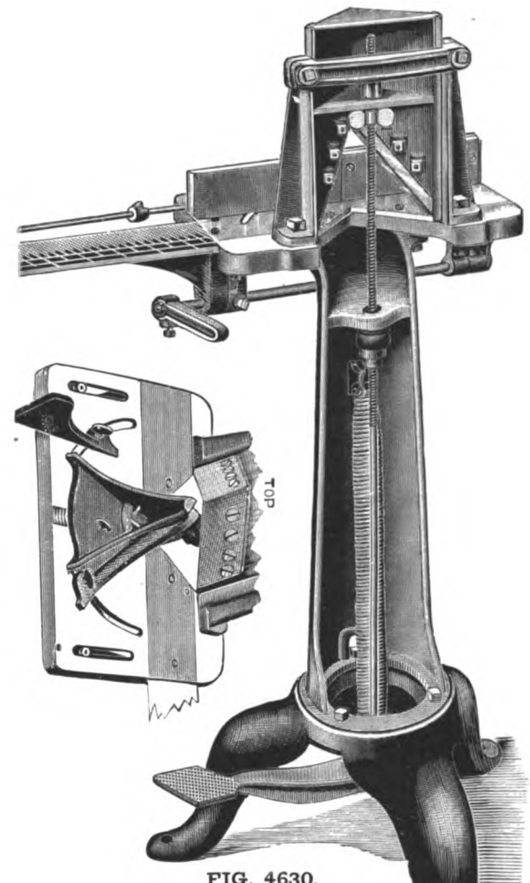


FIG. 4630.

PRICES, FIG. 4631.

Machine to cut up to 2¼ inches.....$40.00
" " " 3 " 50.00
" " " 4 " 60.00

This tool is supplied with rabbet supports.

FOOT MITER.

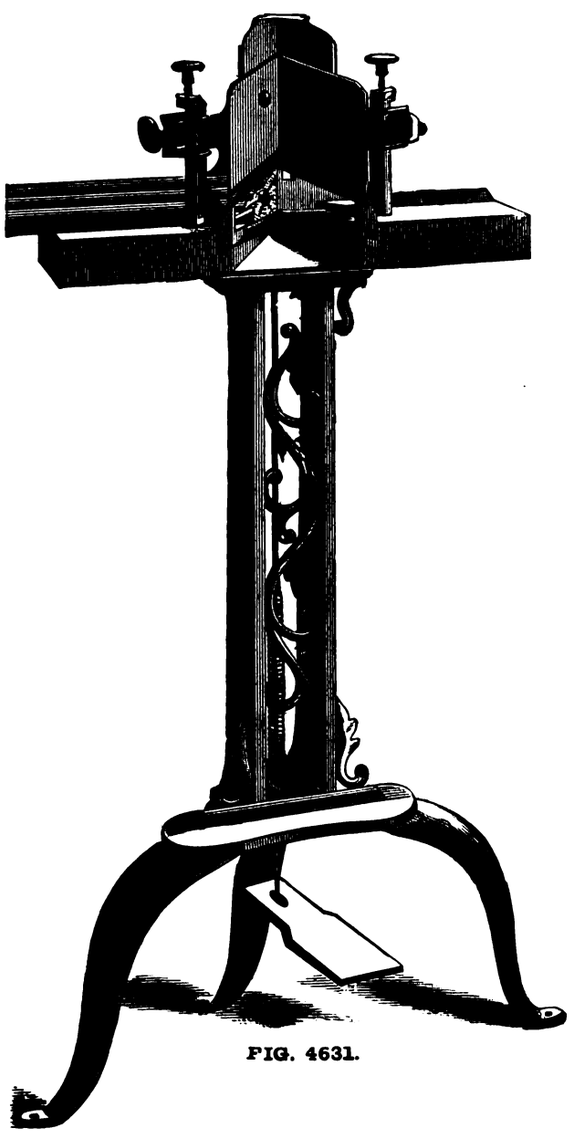


FIG. 4631.

FOOT MITER.

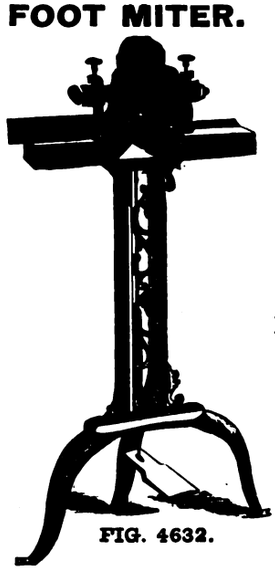


FIG. 4632.

HAND MITER.



FIG. 4633.

PRICES.

Hand miters, to cut up to 2¼ inches..$20.00
" " " " 3 " ..30.00

PRICES.

Foot miters, to cut up to 2¼ inches.....$30.00
" " " " 3 " 38.00
" " " " 4 " 48.00
Back support, extra..... 5.00

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EASTMAN'S FOOT MITER.

DOOR MOULDING. PICTURE FRAME.

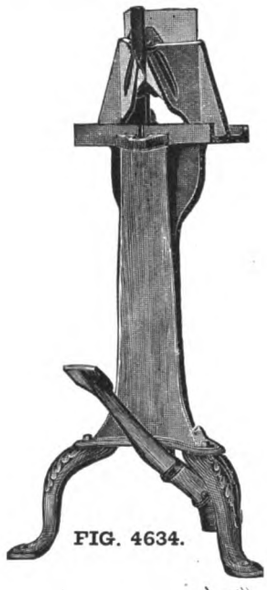


FIG. 4634.



FIG. 4635.

The knives have an oscillating motion, severing the moulding with a shearing cut, doing the work with much less labor and more perfectly. They do not chip or break whitened mouldings in the least, without any support under the rabbet, thus dispensing with the rabbet rest, which saves much time and trouble in changing from one kind of work to another. They have a boring attachment which is operated by the treadle, and makes a brad hole while the moulding is being severed, which is a great saving of labor on all lining and small mouldings. They have adjusting screws for regulating the amount of spring required on picture frame work. They are provided with an improved rule and stop, which gives sight and rabbet measures without calculation.

PRICES.

Picture frame machine, with measure and borer.....$38.00
" " " without borer..... 35.00
Door moulding machine..... 35.00

WEIGHT, 150 LBS.

UNIVERSAL TRIMMERS.

NO. 6 D, 4 D AND 4 C D TRIMMERS.

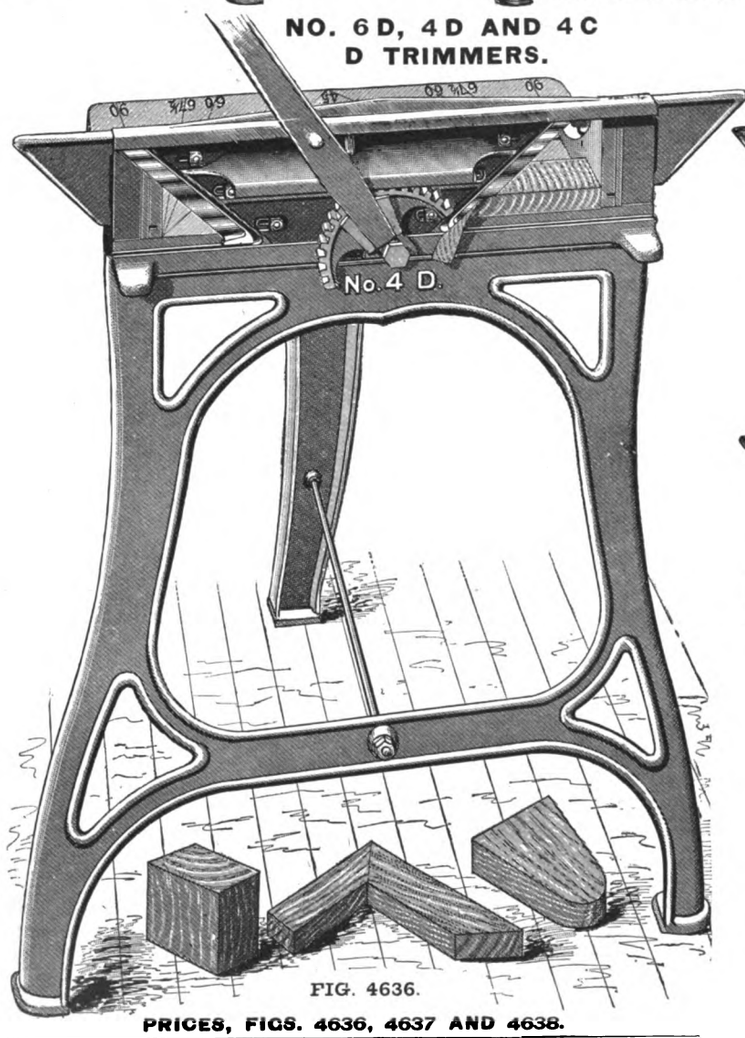


FIG. 4636.

A AND B TRIMMERS FOR BENCH.

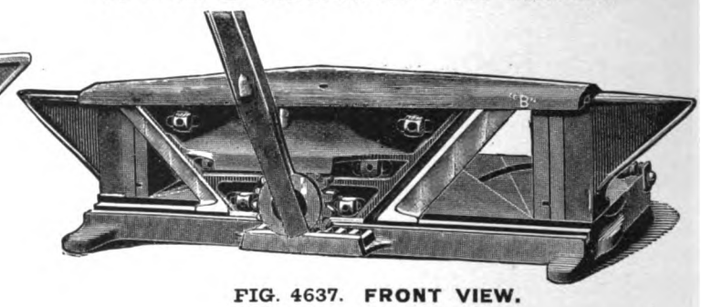


FIG. 4637. FRONT VIEW.

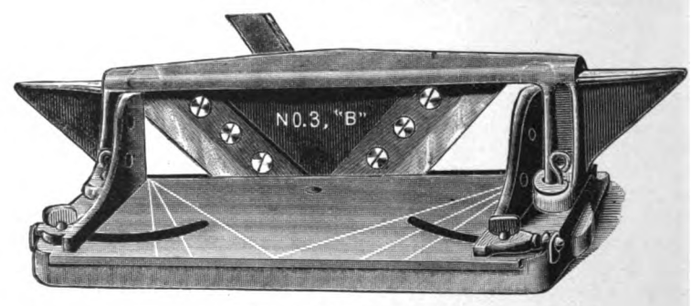


FIG. 4638. REAR VIEW.

Fig. 4636 is operated by segment on one rack ; Figs. 4637 and 4638 are operated by pinion and 2 racks. All sizes have stops at each end of bed, which stops gears from coming out of racks.

The gauge makes a shear cut with the knife full height, the shearing edge being guided by the circle at the top. Firm bearing, full height of gauge, cannot be sprung or broken. The spring is not essential to the working of the gauge. Its use merely brings the gauge to the square position when the thumb screw is released.

1 inch travel of pinion gives 2 inches motion of the carriage.

The shields completely protect the operator and the point of the knife. They are made detachable for the convenience of shipping.

We get the draw cut by inclining the knife at an angle of 45 degrees. This gives 1½ inches of cutting edge on the knife for each one inch in height it has to cut, the line of motion being parallel to the bed. A shear cut by having gauge work close to the knife.

PRICES, FIGS. 4636, 4637 AND 4638.

No. of machine.	Length of stroke.	Rise.	Size of bed.	Weight.	Prices.	Extra knives per set.
3 B.	6 inch.	3 inch.	6 x 15	25 lbs.	$25.00	$6.25
4 A.	8 "	4 "	8 x 17	30 "	28.00	7.50
4 B.	8 "	4 "	8 x 20	45 "	31.25	7.50
4 C.	8 "	4 "	8 x 20	45 "	31.25	7.50
4 D.	8 "	4 "	12 x 20	110 "	37.50	7.50
6 A.	12 "	6 "	13 x 27	135 "	56.25	11.25
6 D.	12 "	6 "	18 x 30	300 "	75.00	11.25

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BENCH TRIMMERS.

Main gauge can be set at any angle without shifting position with knife.

Auxiliary gauges or adjustable links for irregular surfaces and special work.

Handle to carry machine by. Leverage ample to make the cutting easy, while movement of arm is not excessive.

Operating handle detachable and adjustable to suit workman's convenience.

REAR VIEW.

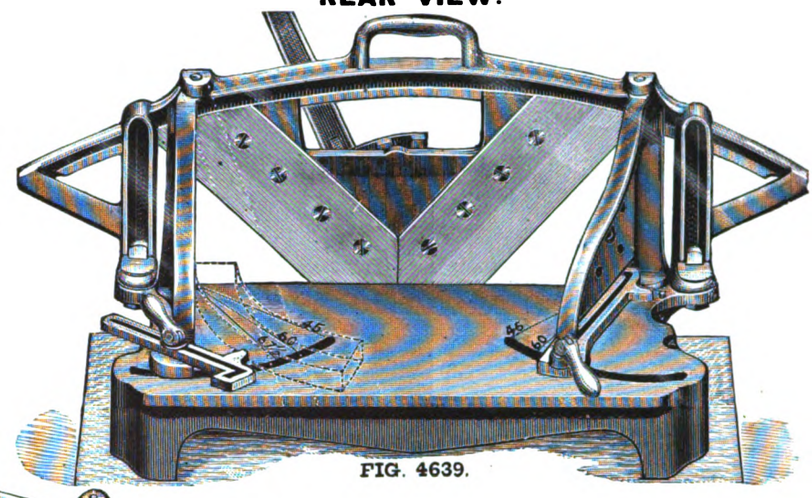


FIG. 4639.

FRONT VIEW.

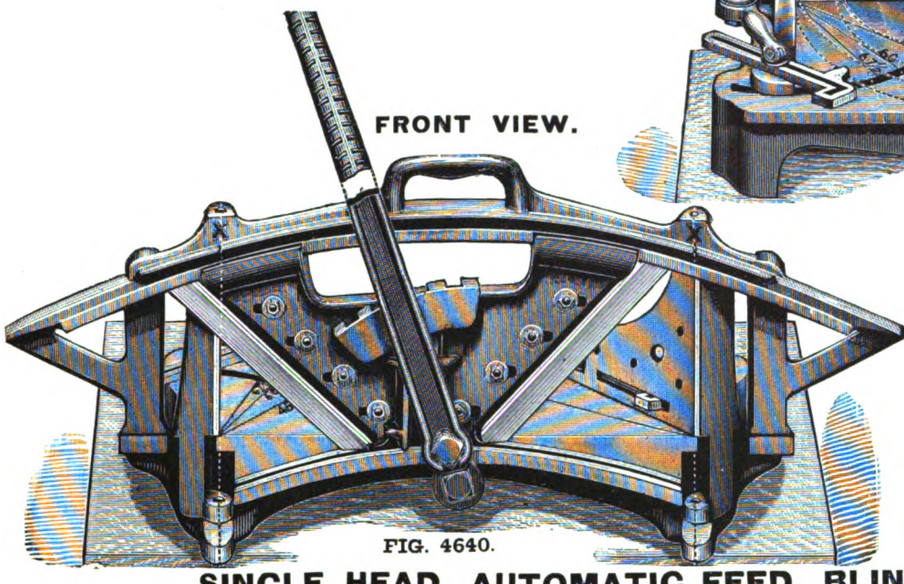


FIG. 4640.

PRICES.

Small machine has $\frac{5}{8}$ inch draw of knife. Weight, 50 lbs. Trims a piece $7\frac{1}{2}$ x 1 or 4 x 4 inch stock..... $25.00

Large machine has $1\frac{1}{4}$ inch draw of knife. Weight, 160 lbs. Trims a piece 11 x 1 or 7 x 3 inch stock..... 50.00

SINGLE HEAD, AUTOMATIC FEED, BLIND SLAT PLANER.

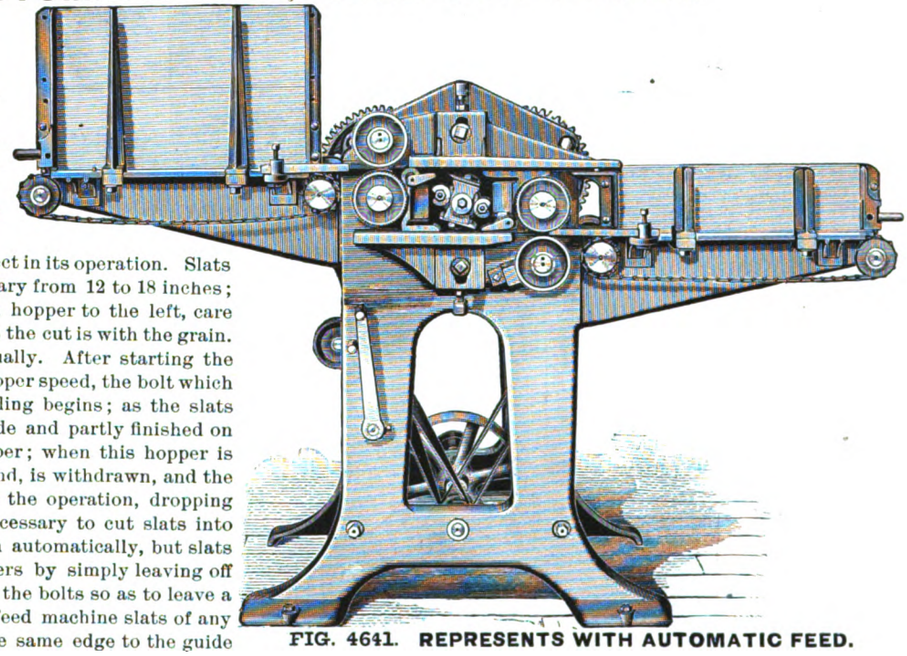


FIG. 4641. REPRESENTS WITH AUTOMATIC FEED.

Herewith we illustrate the new single head, automatic feed, blind slat planer manufactured by us. These machines are made either with or without automatic feed, and are the simplest and most satisfactory machine ever invented for the purpose.

When hand feed is used tables take the place of the hoppers.

The automatic feed is exceedingly simple and perfect in its operation. Slats to be planed are first cut into lengths, which may vary from 12 to 18 inches; these slats are placed in the entering hopper, the high hopper to the left, care being taken that each slat is grained, *i. e.*, laid so that the cut is with the grain. This hopper is filled and should be kept full continually. After starting the cutter and feed rolls, allowing them to attain their proper speed, the bolt which is at the end of the hopper is withdrawn and the feeding begins; as the slats pass over the head they are finished on the under side and partly finished on each edge, and are dropped into the delivering hopper; when this hopper is about three-fourths full, the bolt, which is at the end, is withdrawn, and the slats are then fed under the head which completes the operation, dropping them out of the machine, finished complete. It is necessary to cut slats into lengths not to exceed 18 inches, in order to feed them automatically, but slats of any length may be fed by hand through the hoppers by simply leaving off the belts which drive the automatic feed and lifting the bolts so as to leave a clear passage through the hoppers. In the hand feed machine slats of any length may be fed, but each slat must be fed with the same edge to the guide in each passage.

The head and knives are constructed especially for the purpose and consist of the head proper, two facing knives, and four edging knives. The facing knives contain the shape of the slat, and it is only necessary in sharpening to grind or file them to proper bevel.

The edging bits are made to cut the edge of the slat either round or flat, as may be desired. Both the facing and edging knives are easily kept in order as they both contain the shape of the slat, and sharpening requires no great skill or time. A gauge is furnished to set the knives on the head.

The automatic feed is such that slats are fed continuously, there being no space between the ends. Slats should be sawed to within a fraction of their finished thickness.

The machine can be belted from above or from below, or from either end, and, complete, comprises countershaft, one head with knives for any size or shape of slat desired, gauge for setting knives on head, two endless belts for driving the automatic feed, and the necessary wrenches. There are three feeds, 15, 20 and 30 feet per minute.

The tight and loose pulleys on countershaft are 6 inches diameter by 4 inch face, and should run 1,000 revolutions per minute. WEIGHT, 750 LBS.

PRICES.

With automatic feed..... $250.00 With hand feed..... $215.00

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BLIND STILE BORER AND MORTISER.

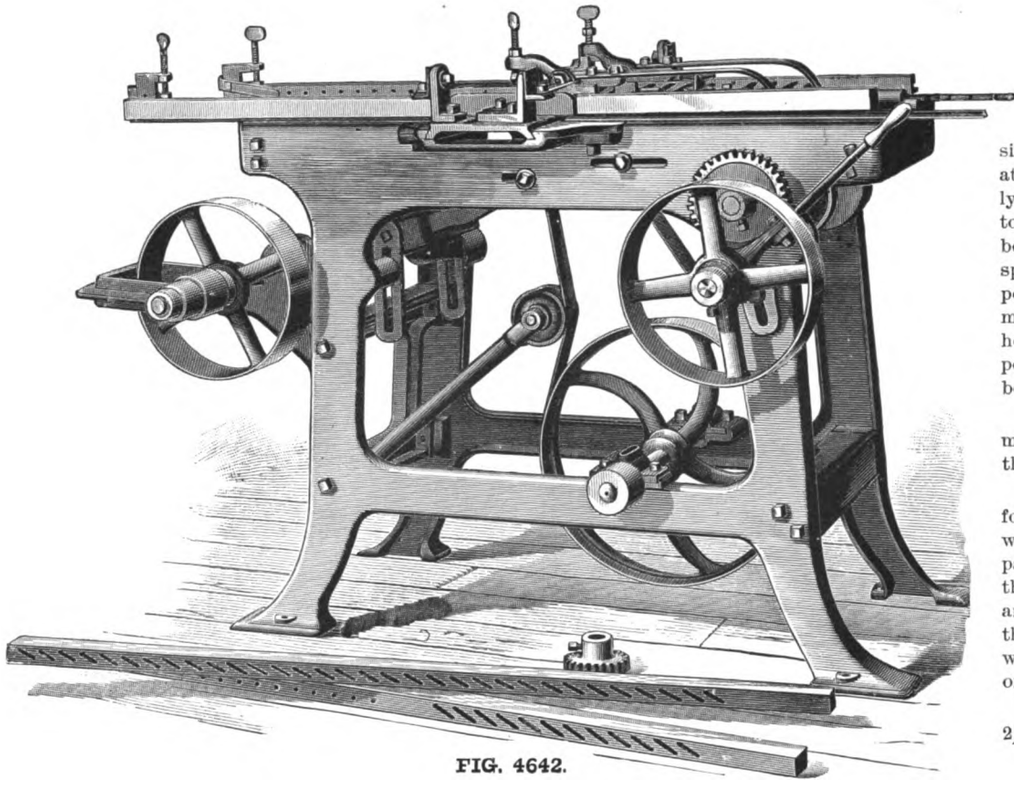


FIG. 4642.

The above cut represents our improved machine of entirely new design, for boring stiles for rolling blinds, and mortising stiles for stationary blinds.

It is a very heavy, solid frame, and all the parts are constructed as strong and simple as it is possible to make them and attain good results. The stile is bored while lying on its side, which allows the operator to see how the work is being done; it not only bores and mortises true and smooth, but spaces accurately every time, and cannot possibly vary the length of spaces. It will make any length of mortise, from a round hole up to 2½ inches, and leave the mortiser perfectly free from chips. The mortises may be placed any distance apart up to 2 inches.

The machine is so constructed that it runs much faster when boring for rolling blinds than when mortising.

We build a machine from these patterns for railroad shops, especially adapted to their work, viz.: Mortising hard wood blinds for passenger cars; there is no other machine in the market that does this work as smooth and accurate, every mortise being absolutely the same depth, which is important in car work, as every slat must rest in the bottom of the mortise.

Tight and loose pulleys, 7 in. diameter by 2½ in. face, and should run 600 revolutions.

PRICE, $160.00.

BLIND STILE BORER AND MORTISER.

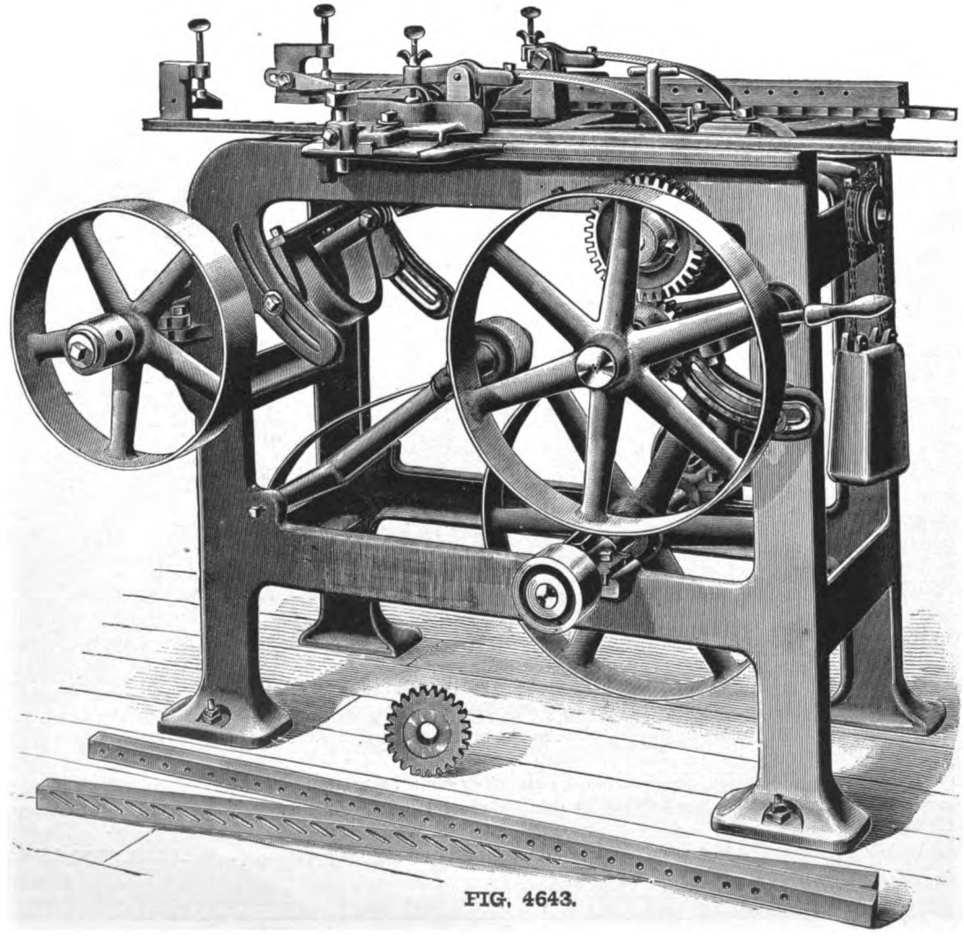


FIG. 4643.

This machine is intended for boring stiles for rolling slats and mortising for stationary ones. The frame is cast in one solid piece. By the use of an open cam operated by a steel roller and weight, as shown in the cut, all lost motion, caused by the wearing of the cam in other machines, is entirely avoided, and every hole is therefore bored to exactly the same depth. The tightener pulley is fitted with a spring which keeps the belt perfectly tight when mortising for stationary slats. By simply loosening a nut the large clutch pulley can be dropped out of the way of the feed gear, which can then be taken off and replaced with the small gear shown in the cut which will increase the speed one-third, thus adding largely to the capacity of the machine, when boring for pivot slats.

Every movement of this machine is positively accurate, as regards spacing, boring and mortising, and covers every range of work that can possibly be done on any other machine of the kind, at the same time doing it much faster and better. We claim that it will mortise far more slats in a given time than any other machine on the market, and it is so arranged that it will bore much faster than it will mortise.

Tight and loose pulleys, 8 in. diameter by 3 in. face, and should run 800 revolutions per minute.

PRICE, $160.00.

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BUCK'S BLIND SLAT BORER AND MORTISER.

This machine will make mortises of any length, from a round hole up to 2½ inches, and of any width, depth and angle desired in a window blind, leaving the mortise free from chips, ready for the slat, and is self-operating in all its parts. All the workman has to do is to put in the stiles and set the machine in motion, when it does its work, and, having done it, stops It does the work on both sides at once, at the rate of 60 mortises a minute. This bit, or burr, that does the work, is a very simple and cheap affair, not liable to be broken, and costs but 30 cents. **PRICE, $125.00.**

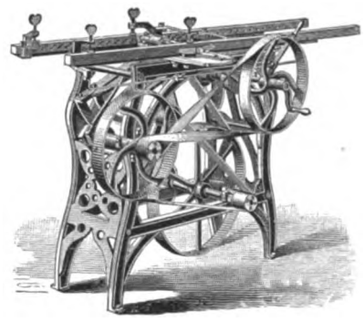


FIG. 4644.

BLIND SLAT CRIMPER.

The mechanical arrangement of this machine is such that by simply loosening three set screws in the cams, the cam shaft becomes liberated from them, and as they are threaded to one another by right and left hand screws, by turning the shaft, by means of a hand wheel, to the right or left, the whole apparatus, consisting of cams, dies, clearers and hopper ends, that do the work on each end of the slats, are moved all at once to or from a central point on the machine for the work on different length slats, a thing which is not done on any other machine, on most of which a separate motion is required for each of the above parts. This machine is automatic in its operations, requiring the services only of a boy to put the slats into the hopper, when the dies that compress the ends come up and do their work and recede, and another cam pushes the slat out of the machine onto the floor. At the same time another slat drops into place and is operated upon in the same way. **PRICE, $50.00.**

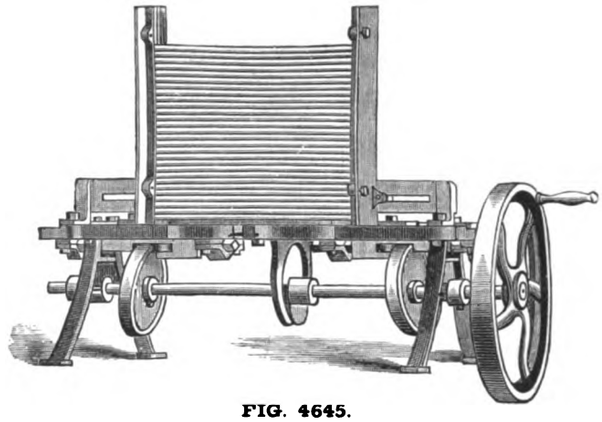


FIG. 4645.

BLIND STILE SPACING AND BORING MACHINE.

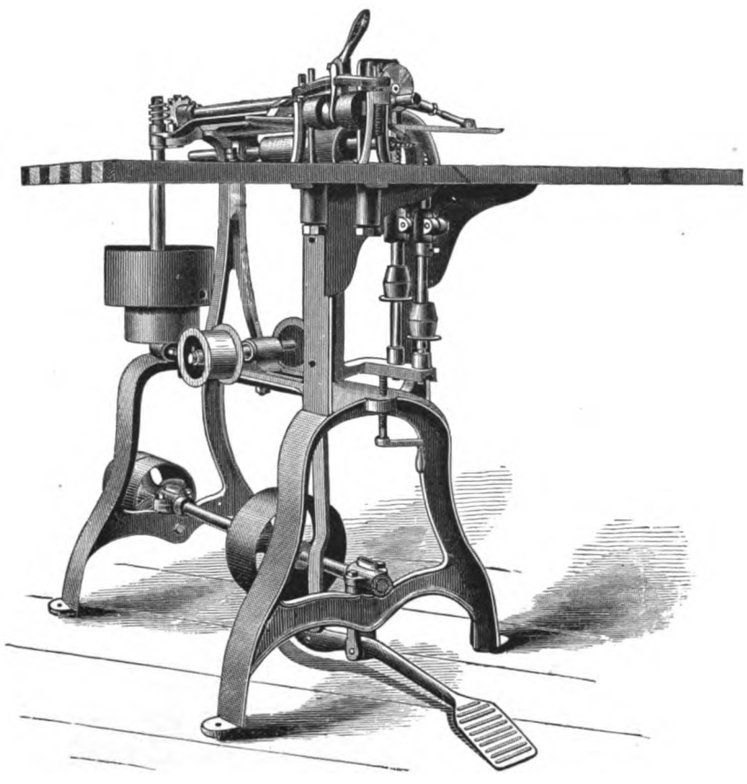


FIG. 4646.

The stiles, after being jointed, are placed upon the table with a ratchet between them, the lower end of the stiles resting against two blocks, which are securely fastened to the end of the ratchet, and are moved over the bits by means of the pawl working in the notches of the ratchet. It spaces its own work with perfect accuracy, at any distance apart from 1 to 1⅞ inches, and bores two stiles their entire length without stopping to skip the lock-rail mortise, the whole operation being done automatically. The ratchets should be of hard wood and about 1⅞ inches wide, otherwise the machine will not space as short as 1 inch. Space the ratchets their entire length, regardless of mortises, and, after boring, drop out one or two holes for lock-rail mortise. Should this be objectionable on account of changing the customary width of rail, then lay off lock-rail mortise in the center of ratchet and make the holding blocks adjustable so they may be moved up to any length of stiles. Always commence boring at the top end of stile and bore before mortising. The holes can be placed either in the center or at one side by changing the thickness of ratchet. The vertical bits are for blinds only, and bore from the under side of the stiles, thereby leaving the holes of a uniform depth. Tight and loose pulleys 6 inches in diameter, and should run about 800 revolutions per minute. **WEIGHT, 275 LBS.**

PRICES, complete, **$100.00;** without horizontal bit, **$75.00.**

DESCRIPTION, FIG. 4647.

The large saw, of course, rips the tenon, while the small saw, which cuts out the relish, is brought down to the work by pressing the foot on the treadle, the rail is then placed on the opposite table under the routing tool, and by pressing the foot on the opposite treadle the recess is quickly and neatly cut.

This machine is very simple in its construction, but it will readily be seen that it combines three useful machines in one.

Tight and loose pulleys 6 inches in diameter, and should make 600 revolutions per minute.

WEIGHT, 325 LBS. PRICE, $100.00.

COMBINED RELISHER, ROUTER AND BORER.

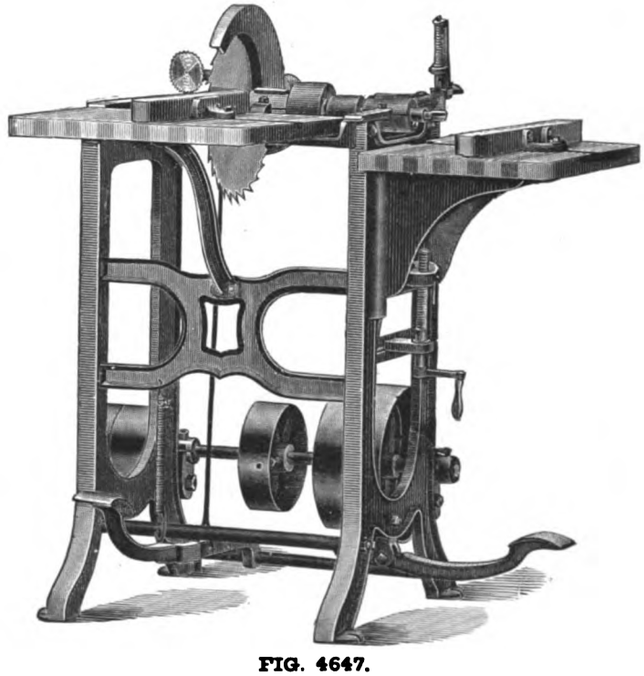


FIG. 4647.

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SASH, DOOR AND BLIND RELISHER AND MORTISER.

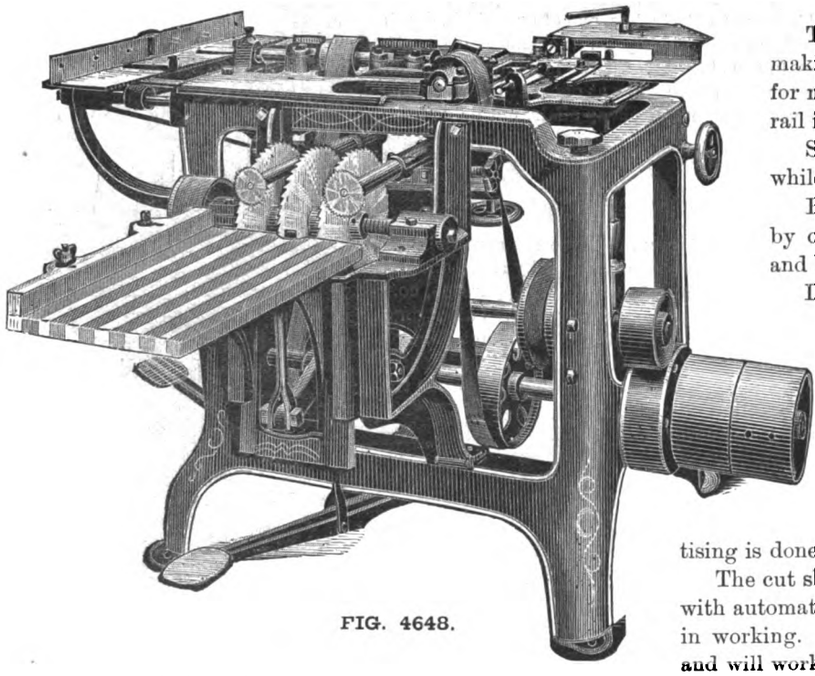


FIG. 4648.

This machine is designed for relishing sash, doors and blinds, making the recess in the rail for the end of the rod in blinds, and for making the mortise for the bars in the bottom and meeting rail in sash. All work is done to stops, saving the "laying out."

Sash are relished by one operation and by one handling, while it requires three separate operations the old way.

Blinds are relished and the recess made for the end of rod by one operation; the old way requires five. The meeting and bottom rail are also mortised by one operation.

Door relishing is done with five saws, as shown in the cut, by one handling. Door wedges are made in one operation with two saws, not shown in cut.

The sash and blind relishing can be done without stopping the mortising of the meeting and bottom rails, or the relishing of doors. The mortising of sash can be done without interfering with the other parts. It can all be run together without interference, doing each as readily as when running single. The mortising is done with an oblong hollow chisel, inside of which runs a bit.

The cut shows the mortiser with foot power feed. We can furnish with automatic power feed, which is easier for the operator and faster in working. The mortising part can be used as a blind stile borer, and will work as fast as any machine using only one bit.

Styles.—We furnish the machine with any parts desired. For instance, the mortiser, simply; or the mortiser and sash relisher, without the blind routing attachment; or machine complete with door relisher, without the wedge cutting attachment, as shown in the cut.

The complete machine is furnished with one set of tools, which includes one chisel and one bit, one size routing cutter, one set of saws for relishing doors and cutting wedges, one gauge with adjustable stops for mortiser.

The countershaft has tight and loose pulleys, 8 inches diameter, 4½ inch face, and should run 1,000 revolutions per minute.

PRICES.

With wedge cutting attachment.....$.....
As sash and blind relisher and mortiser.....
Extra for power feed on mortiser.....

RAPID FEED SLAT TENONER.

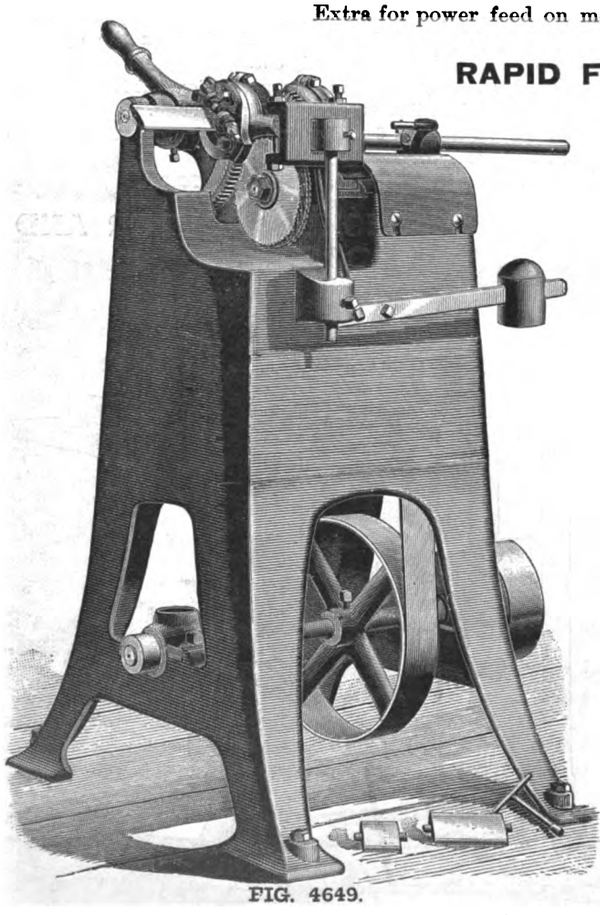


FIG. 4649.

Tight and loose pulleys, 6 x 2½; speed, 900 revolutions.

PRICE, $110.00.

It will tenon slats from ⅞ inch to $2\frac{1}{16}$ inches in width, and from ¾ inch to 24 inches in length.

The device for holding the slat is self-centering, thus always making the tenon in the center of the width of the slat, but is so arranged that the tenon may be placed nearer one edge if so desired. The slat is firmly held while it is being cut, and is not released until the tenon has been completed and the slat cut off. The slat is moved to the saws and two tenons cut by one motion of the lever, thus performing the operation quickly, and at the same time allowing the operator to vary the feed to suit the nature of stock to be worked, whether hard or soft wood. By this arrangement perfect work may be done in the shortest possible time.

The stop which determines the length of slats is simple and positive, and admits of no variation in the length of slats. The saws are perfectly accessible, thus causing no trouble or delay in removing them when they become dull.

ELLIS BLIND SLAT TENONER.

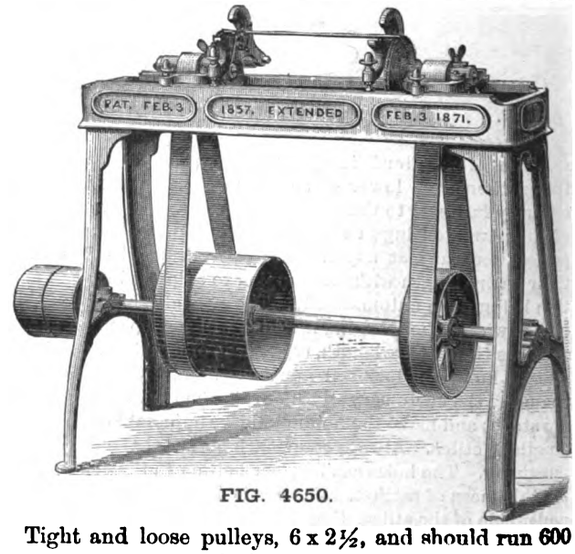


FIG. 4650.

Tight and loose pulleys, 6 x 2½, and should run 600 revolutions per minute.

PRICE, $75.00.

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SELF-FEED BLIND SLAT TENONER.

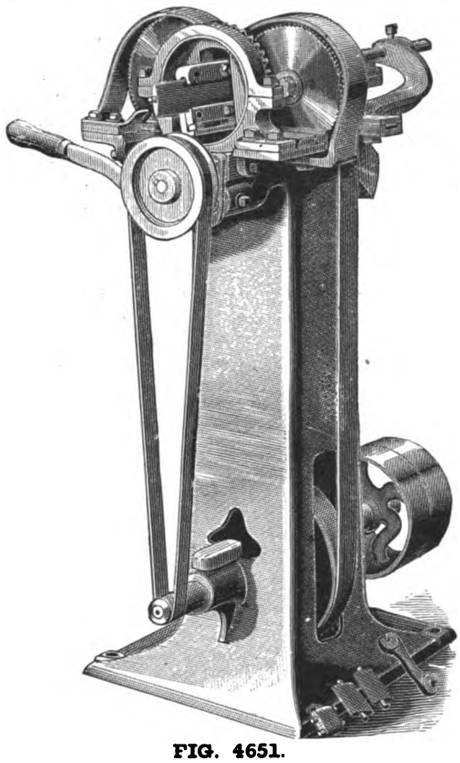


FIG. 4651.

DESCRIPTION, FIG. 4651.

The lever which operates the feed works is convenient to the operator, and raising it brings the head holding the slat against the saws which make the tenon. At this point it is released from the stop, and the head is allowed to revolve, making one revolution, and again coming in contact with the stop, when it is ready to make another tenon. The adjustments for changing from wide to narrow slats are very simple and handy.

The tight and loose pulleys are 8 inches diameter by 2½ inch face, and should make 900 revolutions per minute. We furnish the belts as shown in cut.

WEIGHT, 300 LBS.

PRICE, $115.00.

BLIND RABBETER AND JOINTER.

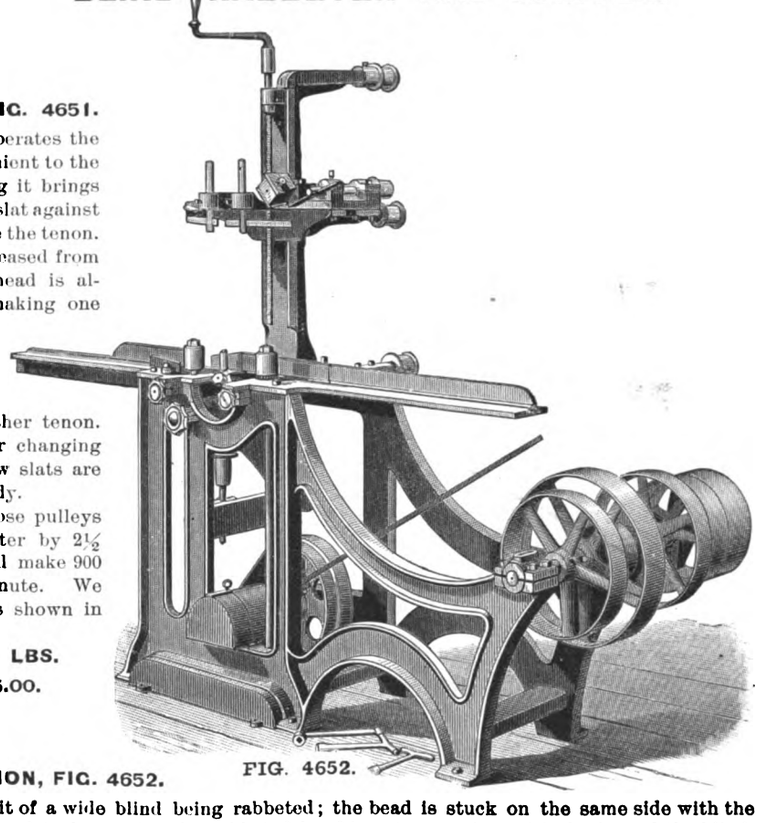


FIG. 4652.

DESCRIPTION, FIG. 4652.

The blind is fed on its edge, doing away with a wide table, to admit of a wide blind being rabbeted; the bead is stuck on the same side with the guide, avoiding the unevenness usually found in beads on blinds; the headstock carrying the rabbeted head is set on a miter with the face of the blind, which makes a free cut on both sides of the rabbet; the headstock is adjustable vertically and horizontally while in motion, by means of screws.

The table on this machine is long, and the after part is adjustable in line with the cutters, which insures straight work. The blind is held firmly by means of springs, and is fed through by two rubber rolls, one before and the other after the cutters. The first roll is fitted with a spur or fluted roll on the lower end, which operates on the part to be cut out, making a strong feed. The blind is jointed on both edges at the same time it is rabbeted and beaded.

Tight and loose pulleys, 10 x 3 inches, and should run 550 revolutions.

WEIGHT, 600 LBS. PRICE, $165.00; WITHOUT JOINTING ATTACHMENT, $125.00.

SASH AND BLIND RABBETER, JOINTER AND BEADER.

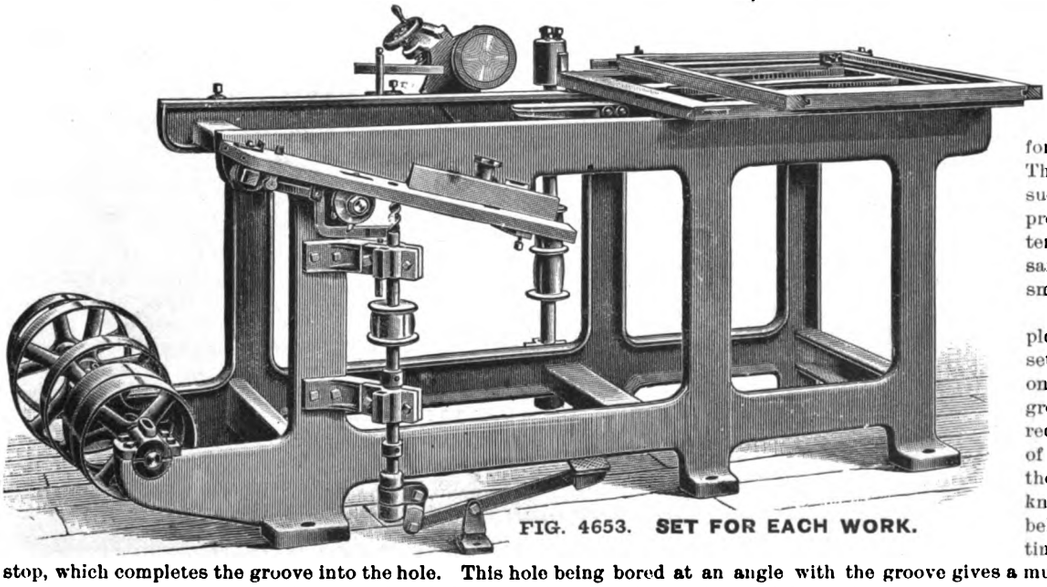


FIG. 4653. SET FOR EACH WORK.

For sash work the frame is fitted with the usual movable table, which, in this machine, is provided with stops for holding the sash in such a position as to insure a perfect uniformity of thickness in the meeting rails. The cutters in the jointing head are set in such a way as to give a shear cut, which prevents all chipping of the ends of the tenons, and the work then passes to the sand disc, which gives it a perfectly smooth finish.

A special feature of the machine is the plowing and boring attachment, which is set on an incline. The sash, being placed on the table, is moved forward over the grooving head to a stop adjusted to the required distance of the hole from the end of the sash; then, by placing the foot on the treadle, the hole is bored to receive the knot in the cord, and the first stop drops below the table, giving the operator ample time to move the sash over it to the second stop, which completes the groove into the hole. This hole being bored at an angle with the groove gives a much firmer fastening for the cord. For finishing blinds, the sash table is removed and the work done on the stationary table. By simply removing the sand disc and substituting a small beading head, the arbor can be dropped down below the line of the table, and with a slight lateral adjustment the machine is ready for rabbeting, jointing and beading at one operation, the work being held in such a way as to insure a perfectly square and straight joint.

The method of belting this machine is another feature which deserves and will command special attention, as it is far superior to any other. The jointing head is driven by a long belt direct from the countershaft. From this mandrel a long open belt is carried to the boring attachment, thus avoiding entirely the crowding together of pulleys and short, troublesome belts found in other machines. The grooving and beading heads are driven direct from the countershaft.

Countershaft has tight and loose pulleys, 10 inches diameter, 4 inch face, and should run 900 revolutions per minute.

WEIGHT, 1,000 LBS. PRICE, $175.00.

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UPRIGHT SASH DOVETAILER.

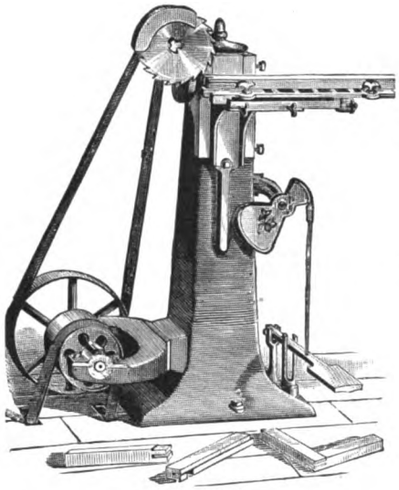


FIG. 4654.

PRICES, FIG. 4654.

PLAIN DOVETAILER.

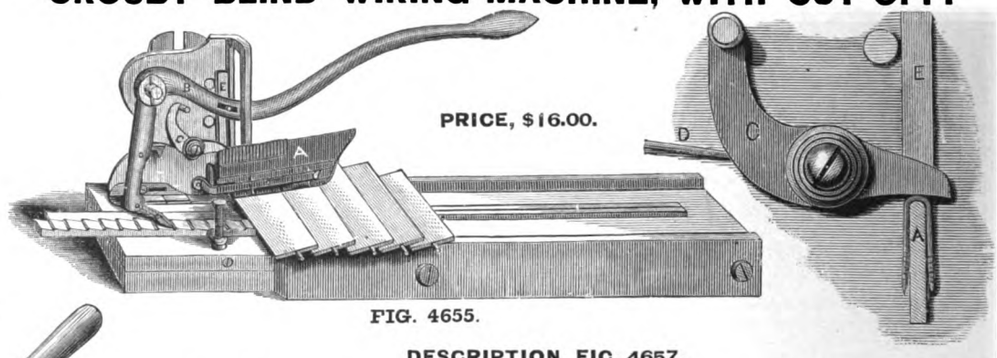
Weight of machine, 300 lbs. Countershaft has tight and loose pulleys, 6 in. diameter, 3 in. face, and should make 1,000 revolutions per minute.

Price $125.00
" of grooving attachment, extra 10.00
" " plain boring " " 10.00
" " self-spacing and boring attachment for blind stiles, extra 20.00

DOVETAILER, COMPLETE.

With all attachments, for dovetailing, grooving, plain boring, and self-spacing and boring blind stiles. PRICE $150.00

CROSBY BLIND WIRING MACHINE, WITH CUT-OFF.



PRICE, $16.00.

FIG. 4655.

DOUBLE AND SINGLE BLIND WIRER.

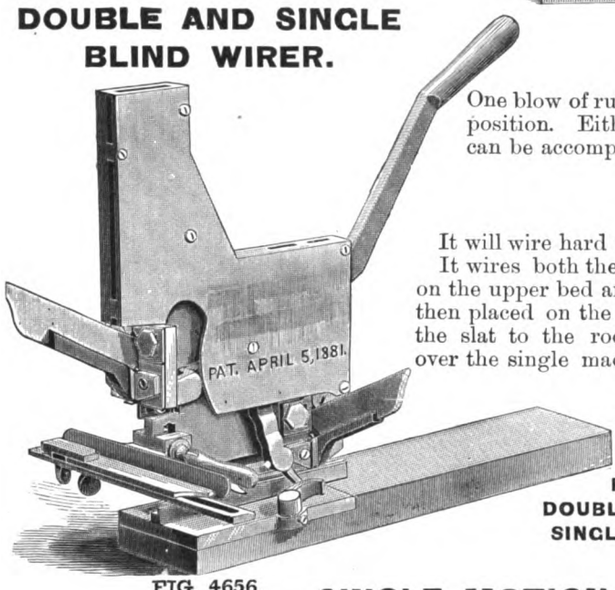


FIG. 4656.

DESCRIPTION, FIG. 4657.

One blow of rubber hammer drives and sets the brad, and automatically places another in position. Either wire nails or finishing nails may be used. More than three times the work can be accomplished with this machine than by hand.

PRICE, $25.00.

BRAD DRIVER.

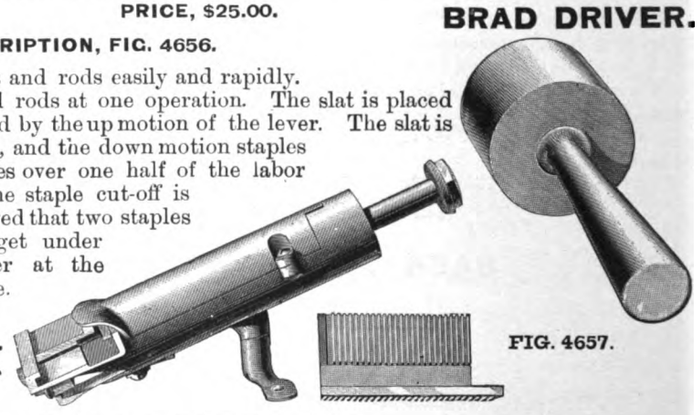


FIG. 4657.

DESCRIPTION, FIG. 4656.

It will wire hard wood slats and rods easily and rapidly.

It wires both the slats and rods at one operation. The slat is placed on the upper bed and is wired by the up motion of the lever. The slat is then placed on the lower bed, and the down motion staples the slat to the rod. It saves over one half of the labor over the single machine. The staple cut-off is so arranged that two staples cannot get under the driver at the same time.

PRICES.
DOUBLE, $40.00.
SINGLE, $20.00.

SINGLE MOTION DOOR AND BLIND CLAMP.

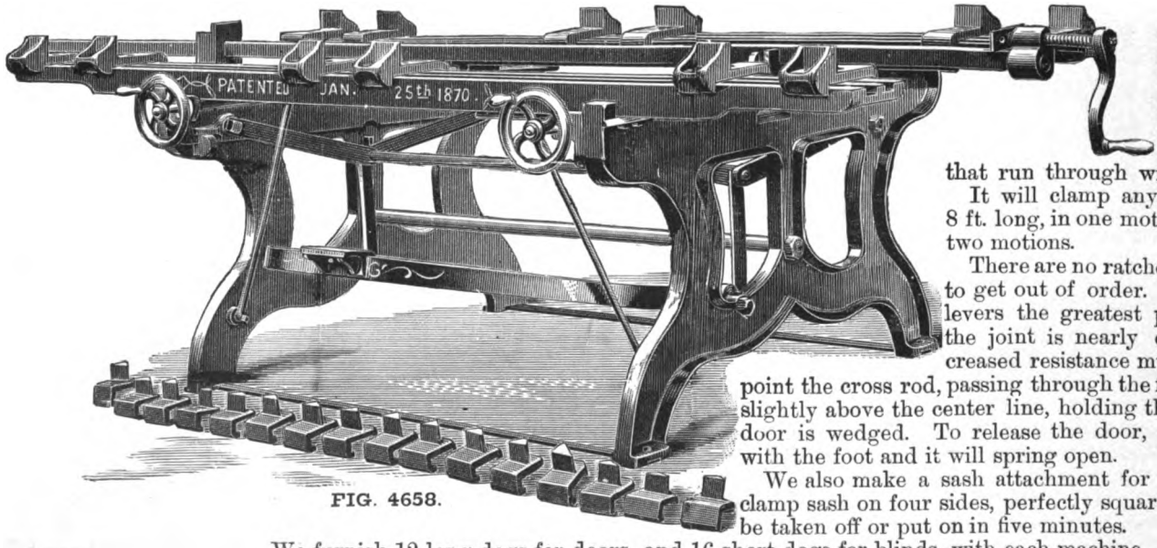


FIG. 4658.

The change from one size to another can be made in less than one minute, by moving the back plate forward or backward with hand wheels fastened to screws that run through width of machine.

It will clamp any size up to 4 ft. wide by 8 ft. long, in one motion, or twice its length in two motions.

There are no ratchets to break and no pawls to get out of order. By our arrangement of levers the greatest pressure is applied when the joint is nearly closed, or where the increased resistance must be overcome. At this point the cross rod, passing through the four horizontal bars, rises slightly above the center line, holding the clamp closed until the door is wedged. To release the door, raise the treadle slightly with the foot and it will spring open.

We also make a sash attachment for this machine, which will clamp sash on four sides, perfectly square, in one motion. It can be taken off or put on in five minutes.

We furnish 12 long dogs for doors, and 16 short dogs for blinds, with each machine.

PRICE of door and blind clamp, 4 ft. wide, 8 ft. long, with end bar $125.00
" " blind clamp, 3 ft. wide, 8 ft. long, without end bar 110.00
" " sash attachment, extra 25.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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COMBINED SASH JOINTER AND SANDPAPERER.

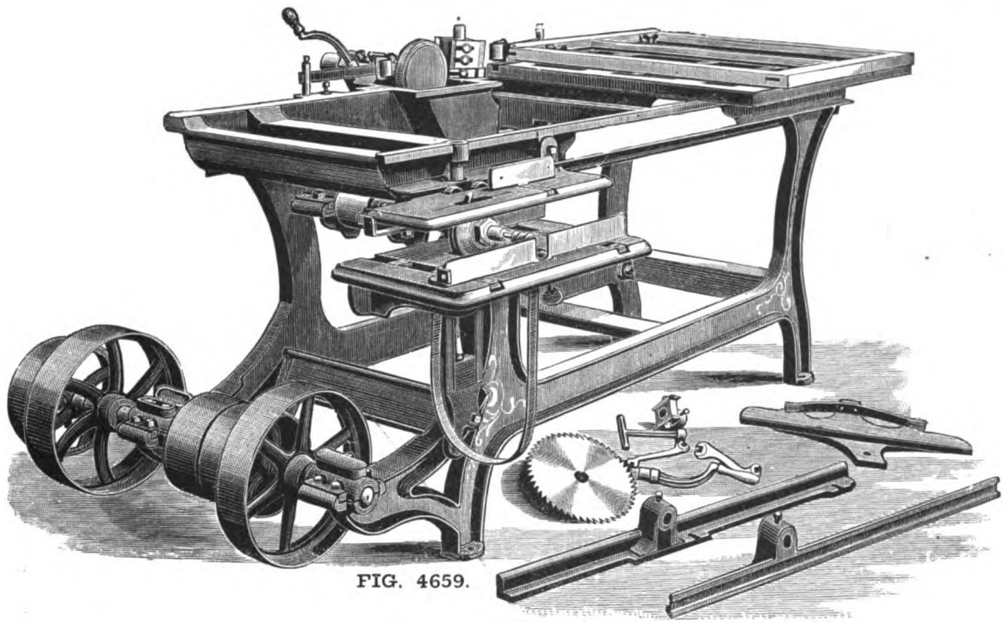


FIG. 4659.

The cut shows a sash on the machine.

This machine will joint and sandpaper the meeting rail of sash. It joints the meeting rail square and straight, in one motion. The sash is placed on movable carriage, and meeting rail rests against adjustable stops, by which means a heavy or light cut can be obtained. Springs hold the sash in position while passing through, thus leaving meeting rails all one thickness.

The ploughing and boring attachment is also simple and easily operated. The sash is placed against a gauge on lower table at an angle of about thirty degrees, and the stile is bored for cord with one bit. The sash is then placed against the gauge on upper table and grooved or ploughed to the bore; thus the cord can be heavily knotted and slipped into the bore, and the weight of the sash will draw the knot to the bottom. This method is far superior to the old system of boring two holes and connecting them together by means of a smaller hole, and avoids the annoyance of slipping a cord through and knotting after the sash is hung. By boring a single hole on an angle the sash is held firm, and can be taken out easily.

We have added a sash relishing attachment, which relishes the rail perfectly in one handling, without laying down the stuff, and is ten times faster than the old method of slitting tenon on a saw, cutting out with mortiser and trimming with knife.

Size, tight and loose pulleys, 8 x 4 inches, and should run 800 revolutions per minute.

PRICES.

		Sash relisher, extra.
Sash jointing and sandpapering machine, without ploughing and boring attachment	$125.00	$25.00
Same, with ploughing and boring attachment	150.00	15.00
Complete machine, including blind jointer, rabbeting and beading attachment	175.00	15.00

DOUBLE DISC DOOR AND BLIND SANDER.

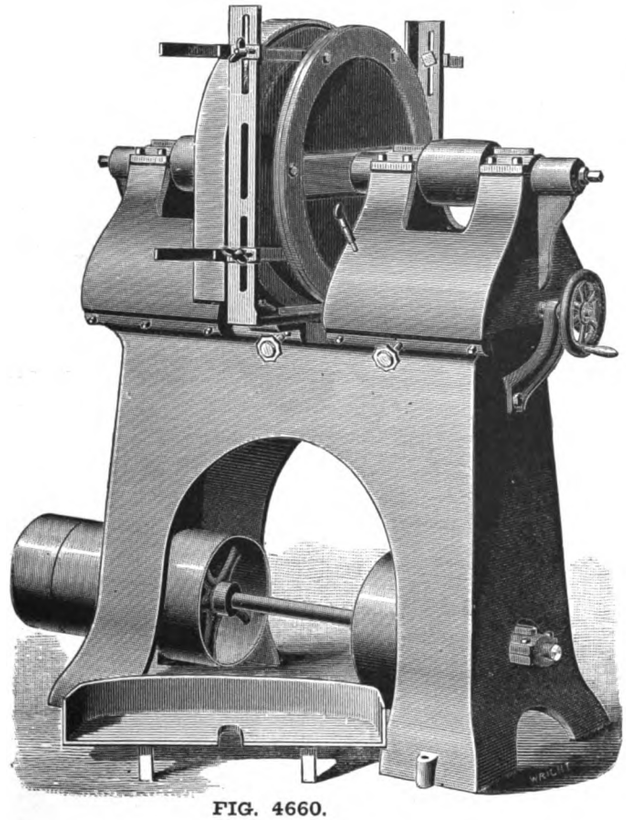


FIG. 4660.

DESCRIPTION, FIG. 4660.

Discs, 20 inches diameter. It will sandpaper on both sides of doors, sash, blinds, mantles, etc.

Tight and loose pulleys, 10 x 5 inches. Speed, 600 revolutions.

WEIGHT, 900 LBS. PRICE, $150.00.

DESCRIPTION, FIG. 4661.

The bed raises and lowers in dovetail ways, which are gibbed, and all wear can be instantly taken up. Top and bottom rolls are all geared, and make a very strong feed.

The drum or cylinder is 12 inches diameter, made up of glued strips, bolted to iron flanges, turned perfectly round, and balanced and covered with suitable cushion, and sandpaper is properly stretched.

These machines take paper 24, 30, 36 and 42 inches wide. The accompanying cut shows the 24 inch machine.

We put on each machine a movable cover over the cylinder or drum. This can be taken off to admit of using the drum for curved or circle work by hand, or may be made to accommodate a blower or exhauster when wanted.

The machine has an oscillating attachment for vibrating the drum.

PRICES.

24 inch machine	$230.00	36 inch machine	$300.00
30 " "	255.00	42 " "	

POWER SANDER.

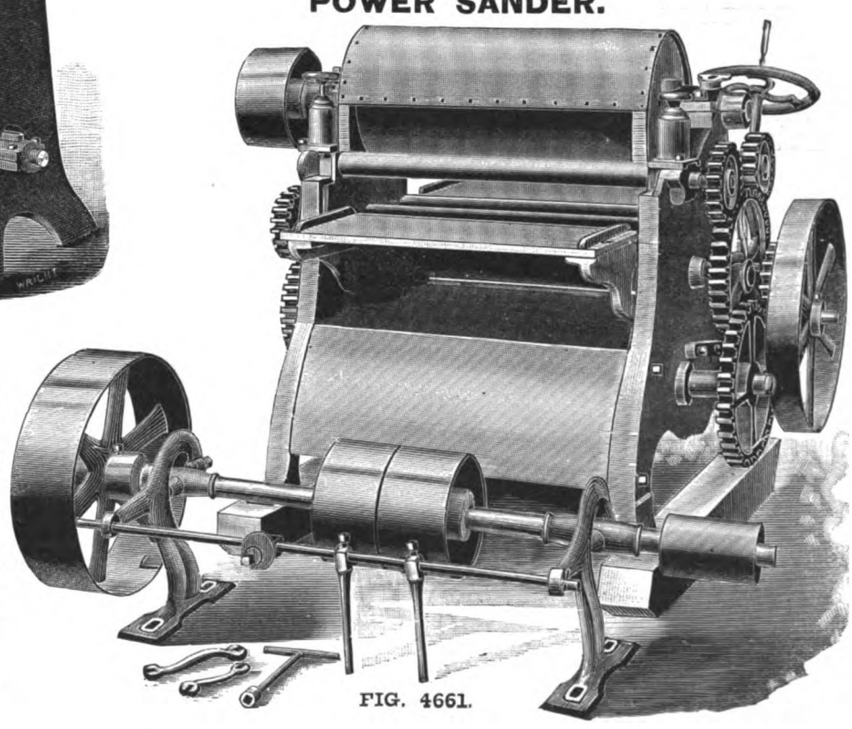


FIG. 4661.

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TRIPLE DRUM, EICHT ROLL, POWER FEED SANDER.

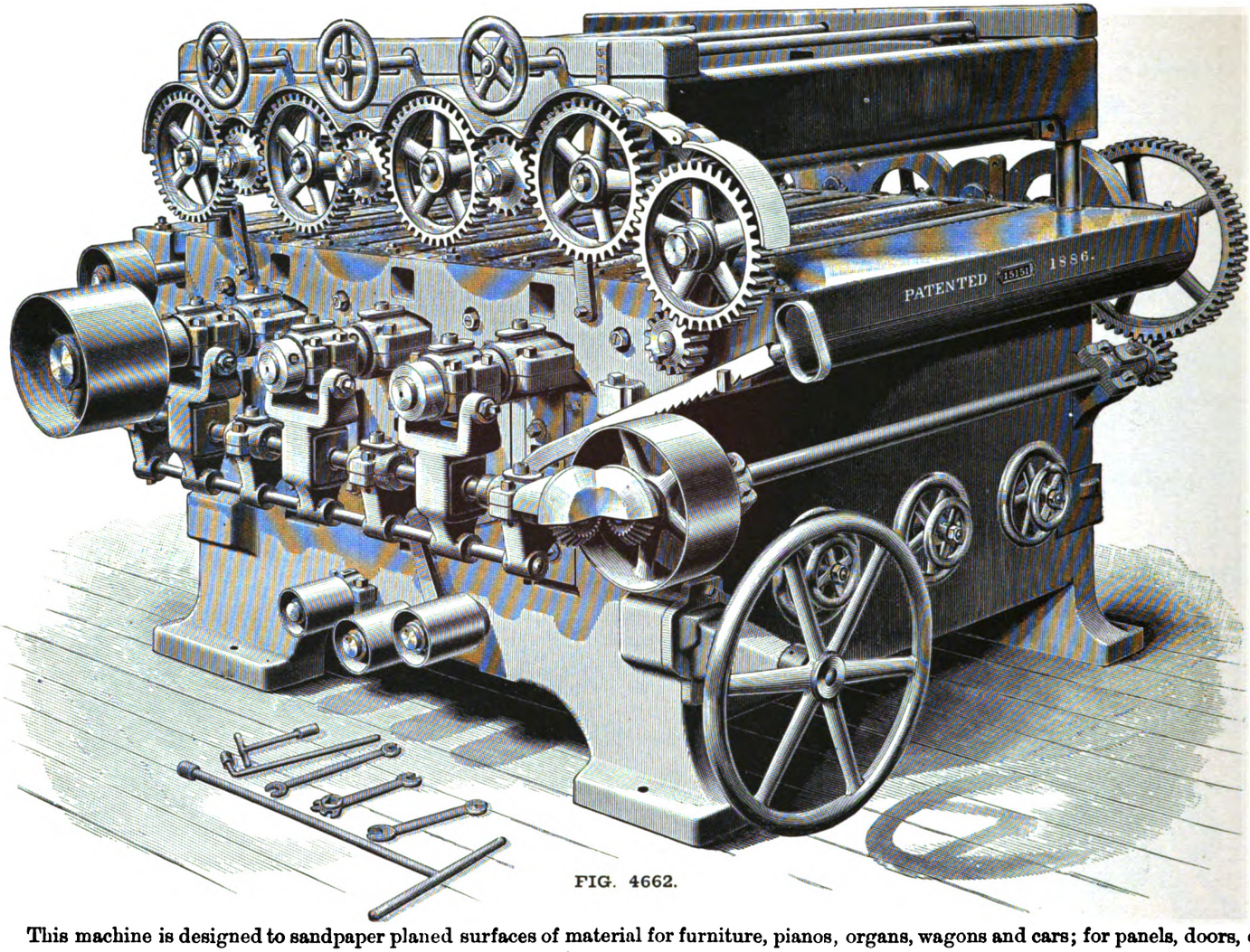


FIG. 4662.

This machine is designed to sandpaper planed surfaces of material for furniture, pianos, organs, wagons and cars; for panels, doors, or any class of work requiring a perfect surface either for varnishing or painting. We make it to work 30, 36, 42, 48 and 60 inches wide.

The drums are three in number, made of steel, upon which the sandpaper is placed and graded according to the work to be done. The first drum carries a coarse grade of paper, the second drum a fine grade for smoothing, and the third drum a finer grade for giving the material the polished surface. Each drum has an oscillating or vibratory motion laterally across the material to prevent the formation of lines which would result if the revolving motion was direct. They are equipped with a device for placing the sandpaper about them and giving it the proper tension in the shortest possible time.

The drum shafts are steel. The drums can be easily removed by raising the entire roller and bed frame, which opens a space directly over them sufficiently to lift them out and over their bearings. This raising device is operated by the large hand wheel by which the screws at the four corners of the machine are turned, the screws resting on friction rollers, giving very easy motion in raising to any height. The adjustment of the drums for the difference in heavier or lighter cutting is done by the movement of the three hand wheels at the end of the machine.

The feeding rolls are eight in number, four above and four below the platen. They are placed so the material will pass between the upper and lower sets and open to receive material 8 in. thick. Each bed plate can be set to gauge the amount of cut to each drum, or all the bed plates can be set in line and the drums set to the cut desired above this line.

The upper rolls are mounted in a frame over the corresponding lower rolls. The pressure rolls are three in number, one over each drum to hold the material firmly to them, and are separately adjustable by the hand wheels shown in front, which operate worms and worm gears. The feed is governed by a double belt tightener operated by a hand lever, by which it is instantly started or stopped.

A brush attachment is provided for cleaning the material as it passes finished from the machine. The countershaft can be placed either on the floor or under the floor as may be desirable, and when so placed the feed belt is driven from a pulley on the countershaft. If it is desired to drive the machine from the countershaft placed overhead, the feed belt is driven from a pulley on the first drum shaft.

Countershaft has tight and loose pulleys, 14 x 8 inches. Speed, 600 revolutions.

PRICES ON APPLICATION.

ARM SANDER.

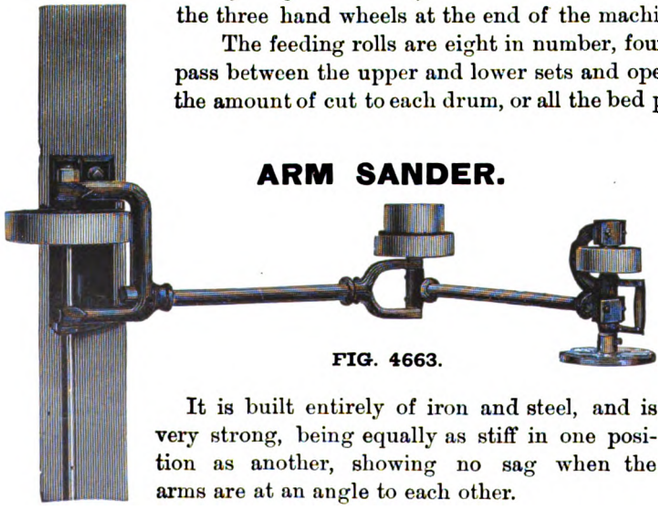


FIG. 4663.

It is built entirely of iron and steel, and is very strong, being equally as stiff in one position as another, showing no sag when the arms are at an angle to each other.

WEIGHT, 150 LBS. PRICE, $40.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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BOARDMAN CYLINDER SANDER.

NO WAVES.
NO SCRATCHES.
NO ROUNDED ENDS.
NO COUCES.

We use a screw and a worm gear, no cam, for cylinder alignment, also to vary cut, and can belt machine from above or in any direction desired, and still a rigid alignment is always maintained.

Our cylinders are made of iron, with no flat side where paper fastens. The periphery is perfectly true, with only one-quarter of an inch opening where paper fastens.

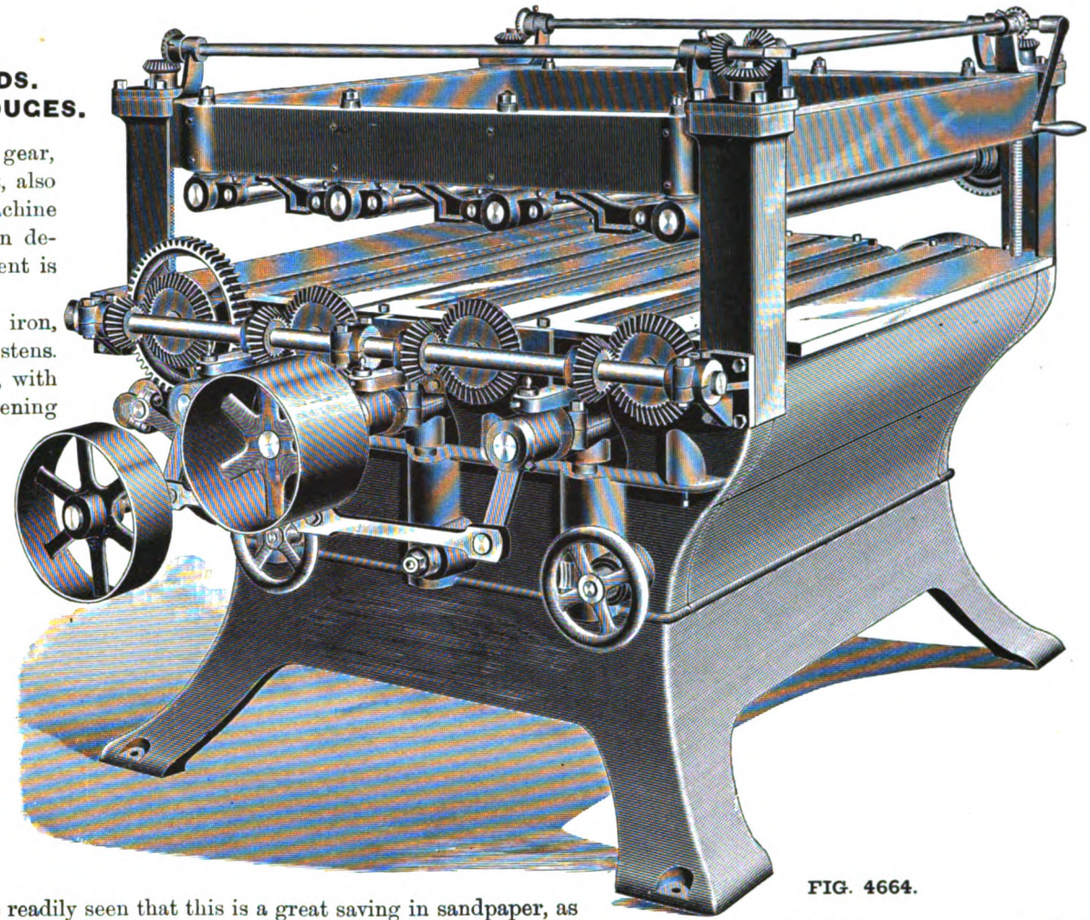


FIG. 4664.

It will be readily seen that this is a great saving in sandpaper, as only one and one-half inches is used in making the fastening, there being no flat side in the periphery of cylinder; all the sandpaper covering comes in contact with surfaces to be polished, with no particular waste.

The sandpaper is placed around cylinder, and both ends are firmly held by a wedge key; then, by internal mechanism, sections of the cylinder are expanded and rigidly held in place; by this means the paper is made uniformly snug to cylinder. The mode of changing the sandpaper is simple and easily done.

Instead of pressure rolls we use broad bars over cylinders, and they may be swung out of the way and give operator free access to renew sandpaper on cylinder.

PRICES, FIG. 4664.

		Weight.	Prices.
24 inches.	Three cylinder power feed	4,200 lbs.	$600.00
30 "	" " " "	4 800 "	675.00
36 "	" " " "	5,400 "	750.00
42 "	" " " "	6,000 "	850.00
48 "	" " " "		1,000.00
60 "	" " " "		1,500.00
24 "	Two cylinder power feed		500.00
30 "	" " " "		575.00
36 "	" " " "		650.00
42 "	" " " "		750.00
48 "	" " " "		850.00

ARM SANDER.

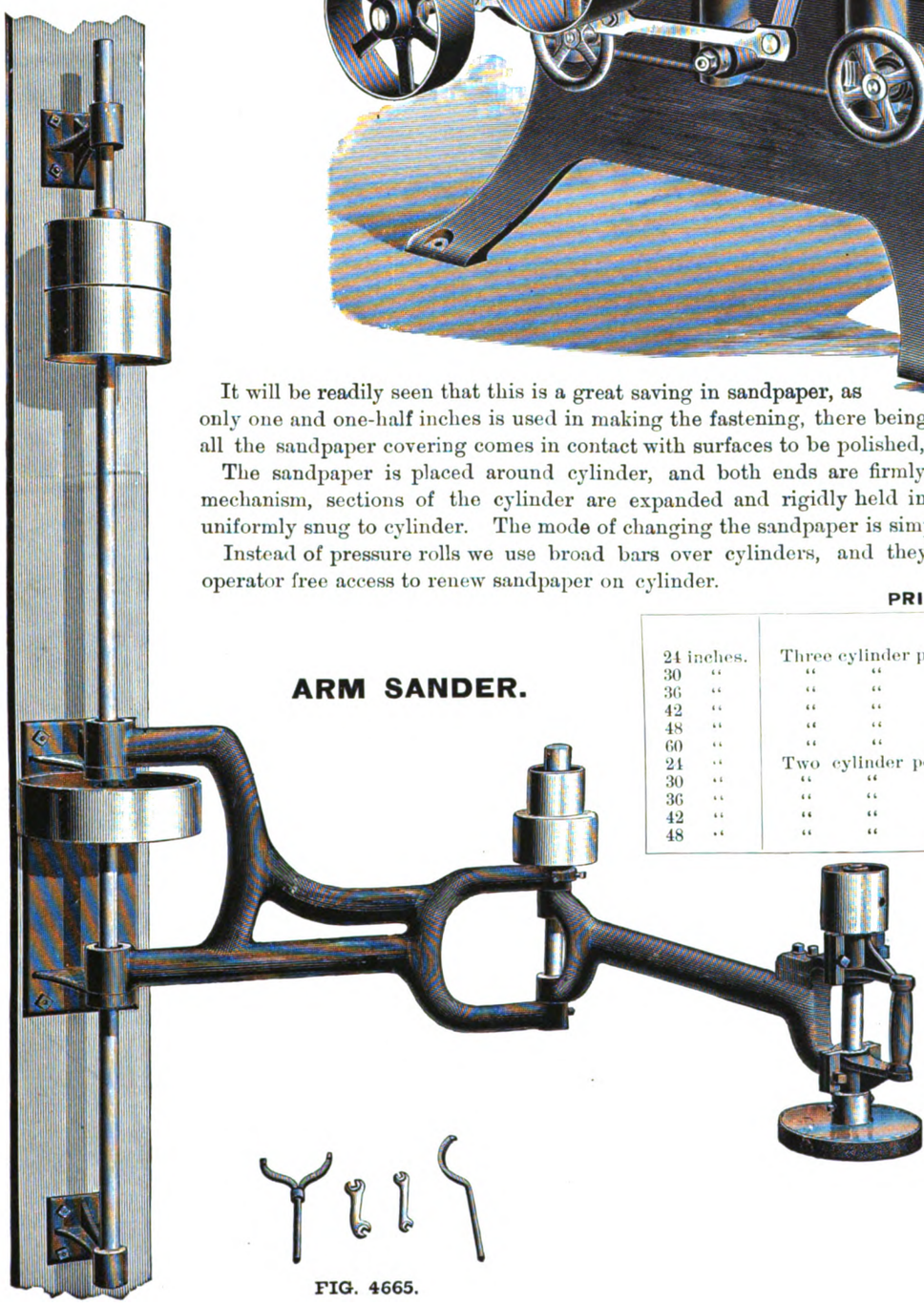


FIG. 4665.

DESCRIPTION, FIG. 4665.

This machine is intended for sandpapering doors, sash, blinds, furniture and all plain surfaces. It has no suction fan or table, but is made to meet the want of those who cannot afford a more expensive machine.

Tight and loose pulleys, 8 by 4, and should run 650 revolutions per minute.

PRICE, $50.00.

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STEAM GLUE POT HEATERS.

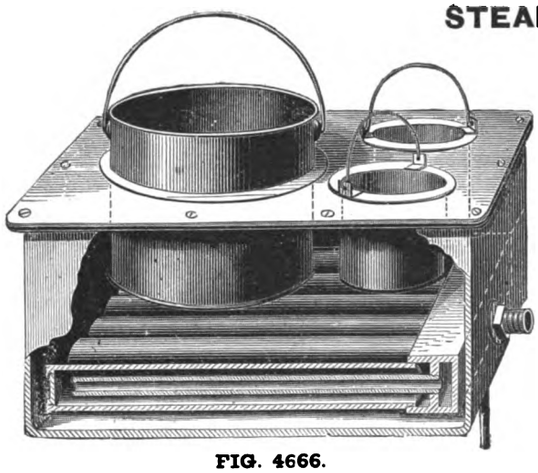


FIG. 4666.

PRICES, FIG. 4666.

Numbers	1	2	3
Sizes of covers, inches	11 x 15½	16 x 22½	16 x 28¾
Depth, inches	7	9	9
Sizes and numbers of pots fitted up for each size	Two 5 in. only, or one 8 in. only, or one 9 in.	Six 5 in. only, or one 10 in. and two 5 in.	Two 12 in. only, or one 12 in. and four 5 in., or eight 5 in.
Price, without pots	$8.00	$16.00	$20.00

COPPER POTS FOR GLUE HEATERS.

Diameter, inches	5	8	9	10	12
Depth, inches	5	7½	7½	8	8
Prices	$2.00	$3.50	$4.00	$4.50	$5.50

Galvanized cast-iron pots, 5 inch, 75 cents each.

SIZE D HEATER.

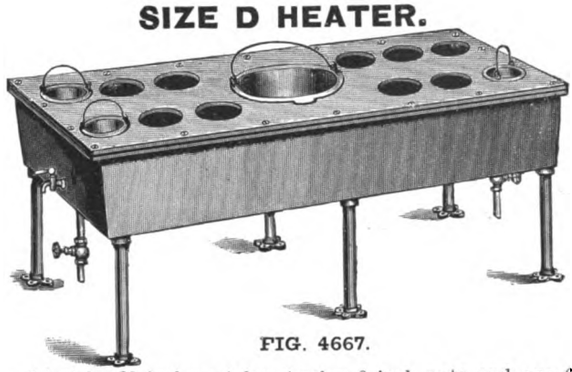


FIG. 4667.

5 feet by 28 inches; takes twelve 6 inch pots and one 6 gallon central pot.

PRICES.

Without pots $42.00
Six gallon pots to suit this heater, each 2.50

STEAM GLUE HEATER.

DESCRIPTION, FIG. 4668.

Steam and waste pipes, with screw valves, are fitted on each side, as shown, and on the front is a faucet for drawing off hot water.

The pots are of iron, zinc-plated, and are turned at the flanges, so as to make a tight joint and prevent the loss of heat.

The central pot, used for melting, holds one gallon, and those at the ends one-third gallon each. A zinc water-bucket, to hold one gallon, is also included.

Each heater is tested with steam, at a pressure of 60 lbs. to an inch, to detect leaks.

WEIGHT, 300 LBS.

PRICE, $50.00.

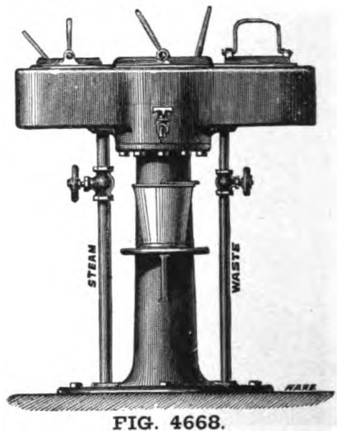


FIG. 4668.

SIZES A, B, C.



FIG. 4669.

PRICES, FIG. 4669.

Size A, 14 inches x 14 inches x 13 inches deep. No. 1 takes two 5 inch pots; No. 2 takes one 5 inch and one 6 inch pot; No. 3 takes one 8 inch pot; No. 4 takes one 10 inch pot. Price, $10.00.

Size B, 20 inches x 14 inches x 12 inches deep. No. 1 takes three 5 inch pots; No. 2 takes one 8 inch and one 6 inch pot; No. 3 takes three 6 inch pots; No. 4 takes one 8 inch and one 5 inch pot; No. 5 takes two 6 inch pots. Price, $15.00.

Size C, 24 inches x 20 inches x 12 inches deep. No. 1 takes six 5 inch pots; No. 2 takes six 6 inch pots; No. 3 takes one 10 inch and three 6 inch pots; No. 4 takes one 10 inch and three 5 inch pots; No. 5 takes one 10 inch and one 8 inch pot; No. 6 takes one 8 inch and four 5 inch pots. Price, $20.00.

Note.—When ordering heaters, please be careful to state whether or not pots are wanted to accompany them.

PRICES OF POTS.

	5 inch.	6 inch.	8 inch.	10 inch.
Copper ..... each	$1.00	$1.50	$2.25	$3.00
Plain iron ..... "	.60	.80	1.30	1.75
Enameled ..... "	.80	1.20	1.75	2.75

20 GALLON HEATER.



FIG. 4670.

Diameter outside, 34 inches. Height, 30 inches.

PRICE.

Complete, with 20 gallon pot.....$55.00

SINGLE GLUE POTS.

SIZES 00, 0.



FIG. 4671.



FIG. 4672.

WITH STAND.

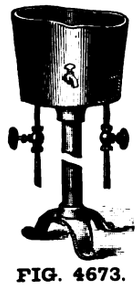


FIG. 4673.

PRICES, TINNED, FIG. 4671.

Nos.	000	00	0	1	2	3	4	5	6
Capacity, in pints	½	¾	1	1¼	2	2½	4	4½	5
Per dozen	$5.00	5.50	6.00	6.75	8.40	10.26	12.42	14.58	16.94

PRICES, ENAMELED.

Nos.	000	00	0	1	2	3	4	5	6
Capacity, in pints	½	¾	1	1¼	2	2½	4	4½	5
Per dozen	$5.00	5.50	6.00	6.75	8.40	10.26	12.42	14.58	16.94

DESCRIPTION, FIG. 4672.

The single heaters, sizes 00, 0, are intended for use on bench where each man has his private supply of glue, or they can be arranged with stand, as shown in Fig. 4673, when desired. They can be connected either through opposite sides for feed and waste pipes, or both pipes may enter from below by removing the plugs from bottom outlets, and closing outlets in sides.

PRICES, WITHOUT POTS.

Valves shown in cuts are not included in prices, but are illustrated to show method of connecting heaters.

All sizes with stand or feet are made of the same height, viz.: 30 inches.

Size 00 takes single pot, either 5 inch or 6 inch. Price, $5.50
Extra for stand, Fig. 4673 ..... .40
Size 0 takes single pot, either 8 inch or 10 inch. Price, $8.50
Extra for stand, Fig. 4673 ..... .60

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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BACKUS WATER MOTOR.

PRICES.

7 inch motor complete.								$15.00
11	"	"	"					22.50
12	"	"	"	with stand				40.00
17	"	"	"	"	pulley and oilers,	$65.00;	with governor,	85.00
17	"	"	"	double	" "	100.00;	" "	120.00
22	"	"	"	single	" "	85.00;	" "	110.00
22	"	"	"	double	" "	125.00;	" "	150.00
30	"	"	"	single	" "	140.00;	" "	165.00
30	"	"	"	double	" "	200.00;	" "	235.00
45	"	"	"	"	" "	300.00;	" "	325.00
11	"	"	with Fleetwood scroll saw attached					35.00
Hand rope attachment for elevator								85.00
Fly wheel for 45 inch motor								20.00
"	"	pulley for circular saw						10.00

Send us the nature of work you require done, or the kind of machinery you wish to drive, also the water pressure, and we will give full particulars as to the size motor and pipes necessary.

H. P. DEVELOPED AT VARIOUS PRESSURES.

	20 to 75 lbs.	75 to 100 lbs.
12 inch motor	⅛ to ½ H. P.	½ to 1¼ H. P.
17 " "	½ to 1¼ "	1¼ to 2 "
17 " double motor	1 to 1½ "	2 to 3 "
22 " motor	1½ to 2½ "	3 to 4½ "
22 " double motor	2½ to 3½ "	4½ to 6 "
30 " single motor	3½ to 4 "	6 to 8 "
30 " double motor	4 to 6 "	8 to 12 "
45 " " "	6 to 10 "	12 to 15 "

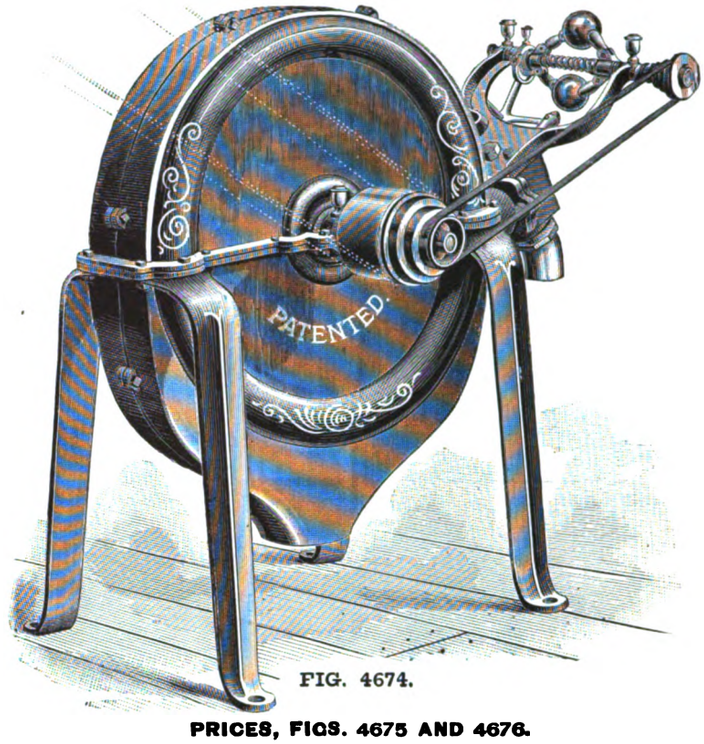


FIG. 4674.

PRICES, FIGS. 4675 AND 4676.

Price, complete, with pulley, packed and shipped:

No.	8,	9,	10,	10½,	11,	12,	13,
	$18.00	$30.00	$50.00	$75.00	$100.00	$175.00	$285.00

Extra for governor, Fig. 4675, Nos. 11 and 12, $25.00; No. 13, $35.00.
Elevator attachments, from $50.00 to $100.00, extra.

Supply pipes should be large enough to avoid loss by friction. If about 100 feet in length, should be

No.	9,	10,	10½,	11,	12,	13,
	1 inch.	1¼ inch.	1½ inch.	2 inch.	2½ inch.	3 inch.
Taps in street main—						
	½ inch.	½ inch.	¾ inch.	1 inch.	1¼ inch.	1½ inch.

TUERK WATER MOTORS.

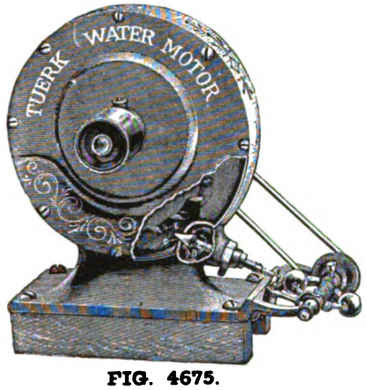


FIG. 4675.



FIG. 4676.

Pounds pressure at motor.	Horse power developed.					
	No 9.	No. 10.	No. 10½.	No. 11.	No. 12.	No. 13.
30	⅛	¼	½	1	2	3
50	¼	½	1	1½	3	5
100	½	1	2	3	6	10
150	¾	1½	3	4½	9	15
200	1	2	4	6	12	20
Diameter of wheel.	6 in.	9 in.	10½ in.	13 in.	19 in.	25 in.

FIG. 4676 REPRESENTS NOS. 9, 10 AND 10½, WITH HAND REGULATORS.

HERCULES WATER WHEELS.

PRICES, FIG. 4677.

Diameter of wheel.	Square inches vented.	Length of shaft from flume deck.	Whole length of shaft.	Diameter of shaft.	Dimensions. A	B	C	D	E	F	G	Prices.
9	24.89	23¼	27 5/16	1¾	22¼	16¼	8½	16	7¼	4 11/16		$150.00
12	42.89	35 5/16	38	2 3/10	24¾	19 7/8	11 3/8	24 7/8	10 7/8	11	24 5/8	200.00
15	69.19	41 5/8	43 3/8	2 4/10	28¼	22	11	32 11/16	8 15/16	15	32 7/16	250.00
18	96.56	44 7/8	47	2 9/10	32¼	26 3/16	12½	35 3/4	9 1/8	16 3/8	36 5/16	300.00
21	136.	50 9/16	52 3/4	3 3/10	36⅛	29 3/16	14	39 11/16	10 25/32	17 3/8	40 3/4	350.00
24	168.	55 5/16	58 3/8	3 4/10	40	33 5/8	15¼	43 1/4	12 1/16	19 1/8	45 1/16	400.00
27	224.	58 3/16	61 3/8	3 9/10	43½	37¼	17	46	12 1/8	20 3/8	48 3/4	450.00
30	265.	63 3/8	67 3/8	3 9/10	47¼	41 3/16	18	50½	13 1/8	23 1/16	54 5/8	525.00
33	335.	73 3/4	80 1/8	4 3/10	55	46 1/4	20	55¼	18 1/2	24 3/4	58 1/2	600.00
36	379.	78	81	4 9/10	58	48 3/8	22	57 7/16	20 1/2	25 1/8	62 5/8	700.00
39	466.	79 7/8	84 1/4	5 5/10	63	54 1/4	24	62 1/4	17 3/8	27 1/4	67 3/4	800.00
42	555.	82 1/4	91 1/2	5 7/8	67½	58 3/8	27½	69¼	13	28 3/4	73 1/8	900.00
45	623.	84 7/8	94 3/8	5 7/8	72½	63 3/4	27½	71 13/16	13 1/16	28 1/8	77 1/16	1,050.00
48	687.	86 3/4	97	6 3/8	74¼	65 3/16	29	73 3/8	13 5/16	30 3/8	80	1,250.00
51	776.	103½	112 1/8	7 1/2	83	72 3/8	36	77 7/8	25 5/8	31 5/8	84 5/8	1,500.00
54	897.	103 5/8	112 1/4	7 1/2	88	78 3/8	36	80 7/8	22 3/4	34 5/8	89 3/8	1,800.00
57	969.	107	118	8	94	82	38	85 7/8	21 1/8	35 1/4	95 7/8	2,150.00
60	1074.	107	118	8	100	88	38	88 3/8	18 5/8	36 1/2	98 3/8	2,550.00

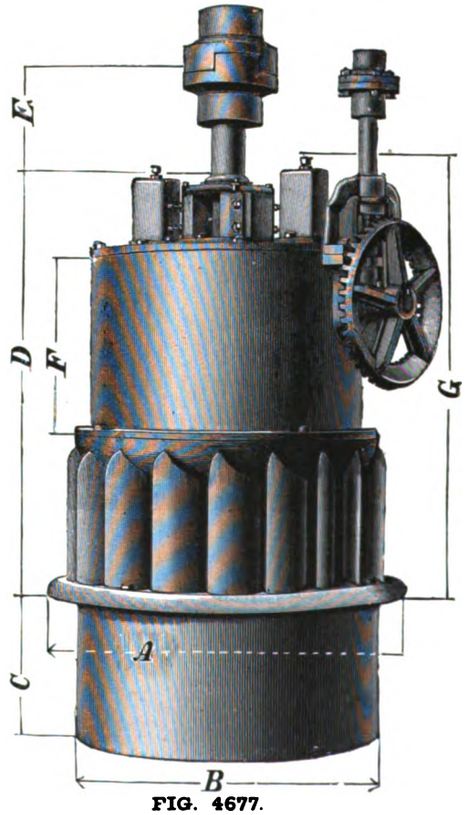


FIG. 4677.

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HORIZONTAL HERCULES WATER WHEEL.

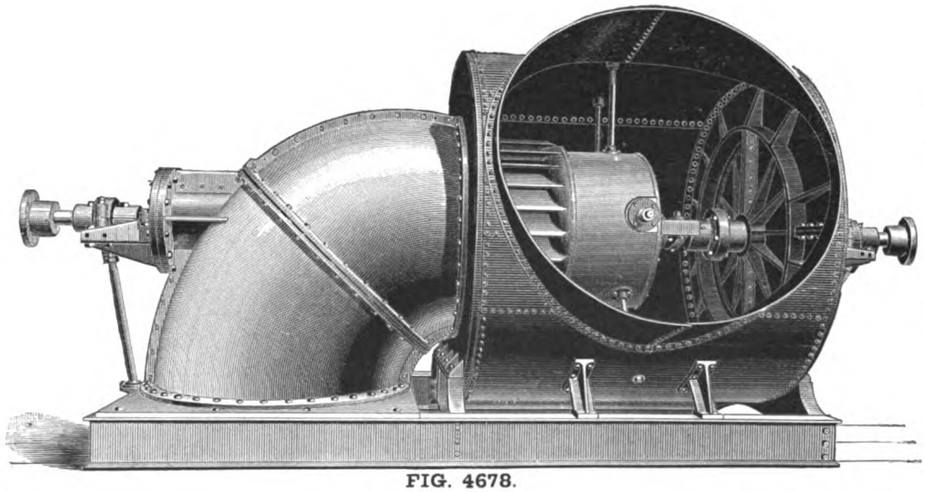


FIG. 4678.

Fig. 4678 represents the general style of mounting a single large horizontal wheel. Modifications of the design may be made as the requirements of the situation demand for singles and doubles.

Prices for wheels, see Fig. 4677.

Prices for outfits on application, stating full requirements.

LEFFEL WATER WHEELS.

OLD STANDARD.

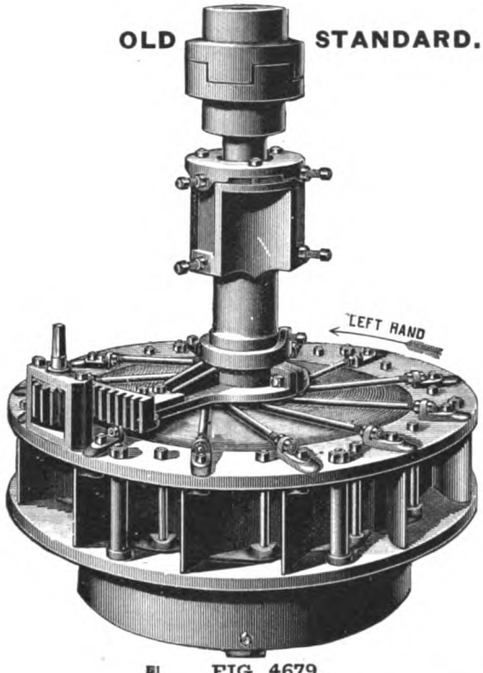


FIG. 4679.

NEW SPECIAL.

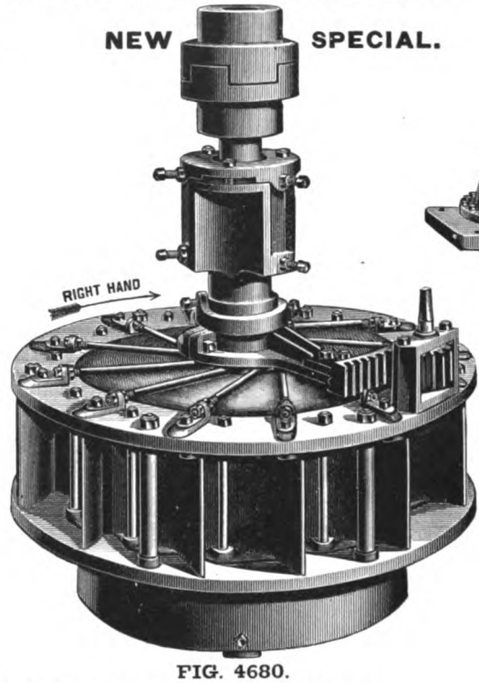


FIG. 4680.

TWIN COMBINATION SINGLE DISCHARGE WHEEL.

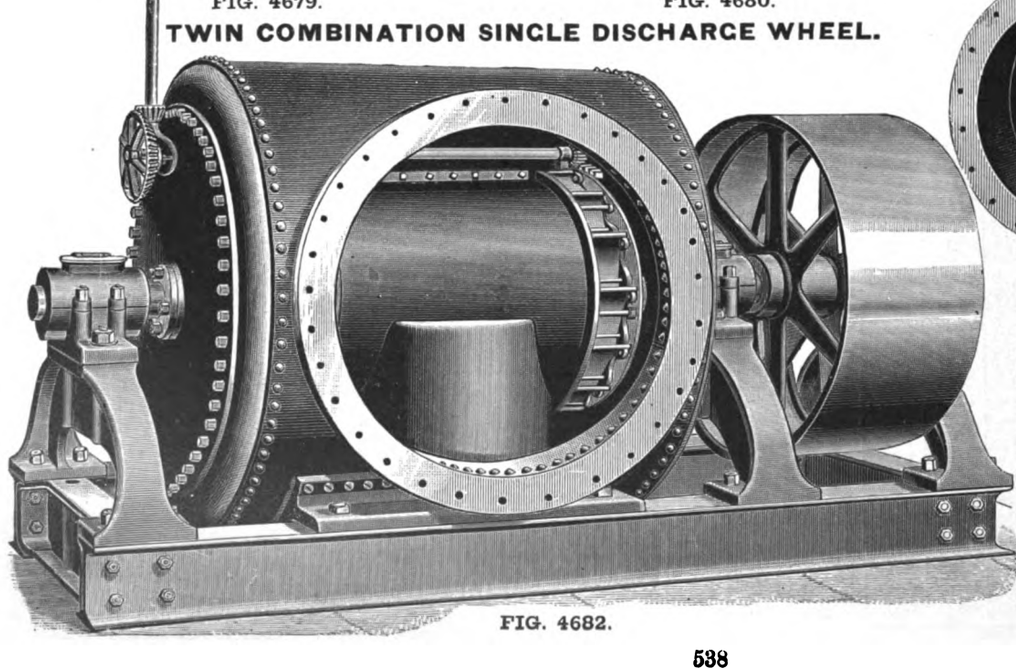


FIG. 4682.

GLOBE CASING.

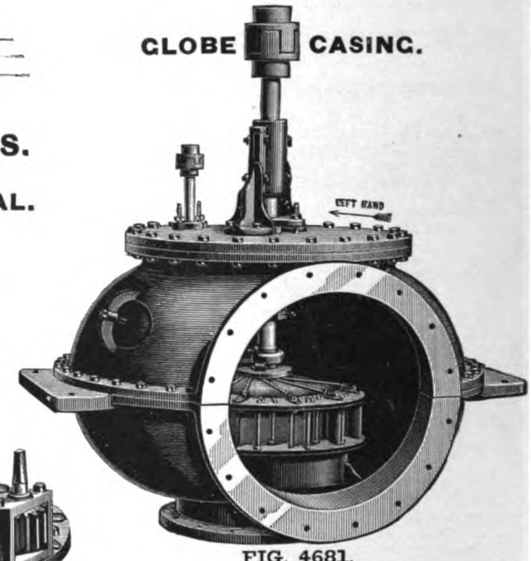


FIG. 4681.

IMPROVED CYLINDER CASING.

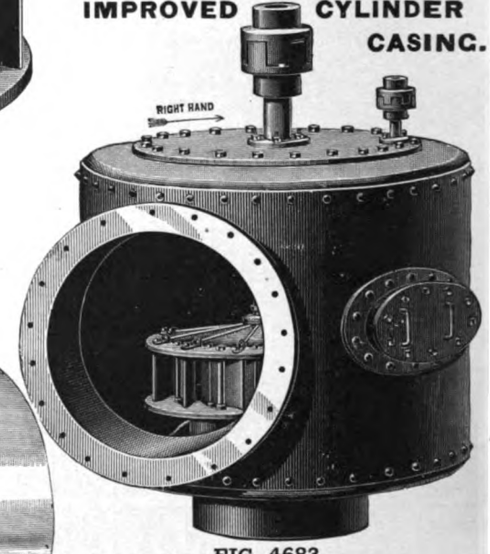


FIG. 4683.

SEE PAGE 539 FOR PRICES.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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DESCRIPTION AND PRICES, FIGS. 4679 TO 4683.

Size of wheels.	Vent of wheels. Standard.	Vent of wheels. Special.	Prices of wheels and casings. Standard. Fig. 4679.	Prices of wheels and casings. Special. Fig. 4680.	Prices of wheels and casings. Figs. 4681 and 4683.
8¾	8¾	....	$135.00	....	$80.00
10	11½	6½ 8¾	140.00	....	85.00
11½	14¾	....	145.00	....	90.00
13¼	19¾	14½	150.00	....	100.00
15¼	26¼	....	135.00	....	115.00
17½	34½	....	155.00	....	130.00
20	45	....	180.00	....	150 00
23	60	85	210.00	$235.00	175.00
26½	79	113	250.00	275.00	
30½	104	150	290.00	315.00	
35	137	200	330.00	350 00	
40	180	264	375.00	400.00	
44	217	303	415.00	450.00	
48	260	....	480.00	....	
50	....	403	....	580.00	
56	441	514	700.00	750 00	
61	518	606	800.00	850.00	
66	624	712	905.00	975.00	
74	769	920	1,180.00	1,250.00	
87	991	1,235	1.550.00	1,625.00	

These prices are intended for wheels under ordinary heads, the larger ones being adapted in weight and strength to heads ranging from 6 to 16 feet, the medium sizes to heads of 14 to 30 feet, and the small ones to head pressures of 25 to 50 feet. When lower heads are utilized, the wheels may be made of less weight and strength. If higher heads are used than those named, it is advisable to have the wheels made stronger at additional expense.

It is readily understood a wheel may be well adapted in proportion and weight to a 30 foot head, which would be unable to fill the requirements of strength and durability under 120 feet. In all instances where the conditions of power, pressure and kind of work are unusual, we should be consulted and permitted to build the wheel best suited to the situation. Smaller wheels are made of brass or bronze; except the guide casing; the gates being made of iron, steel, bronze, or gun metal, as we may deem best suited to the circumstances. The larger sizes are frequently made with steel gates, for high heads and great strength and power.

PRICES OF HORIZONTAL SHAFT WHEELS.

Prices for this type of wheel are only furnished on application, after a full understanding of the kind of work they are intended to do, the amount of power required, and the head pressure under which they would be placed—all of which control the style, strength and price.

HYDRAULIC RAMS.



FIG. 4686.

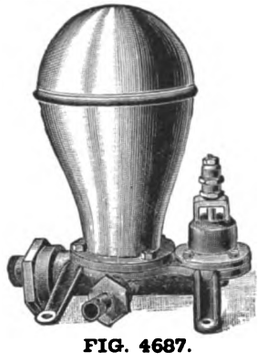


FIG. 4687.

PRICES, FIG. 4686.

Size.	Supply per minute to operate ram.	Length of drive pipe.	Diameter of pipes. Drive.	Diameter of pipes. Disch.	Prices. Leather valve.
No. 2	1 to 2 gals.	50 to 75 ft.	¾ in.	½ in.	$9.00
No. 3	2 to 4 "	50 to 75 "	1 "	½ "	11.00
No. 4	3 to 7 "	50 to 75 "	1¼ "	¾ "	14.00
No. 5	6 to 10 "	50 to 75 "	2 "	1 "	22.00

PRICES, FIG. 4687.

No. 2	1 to 2 gals.	50 to 75 ft.	¾ in.	½ in.	$9.00
No. 3	2 to 4 "	50 to 75 "	1 "	½ "	11.00
No. 4	3 to 7 "	50 to 75 "	1¼ "	¾ "	14.00

BOILER WASHING AND TESTING APPARATUS.

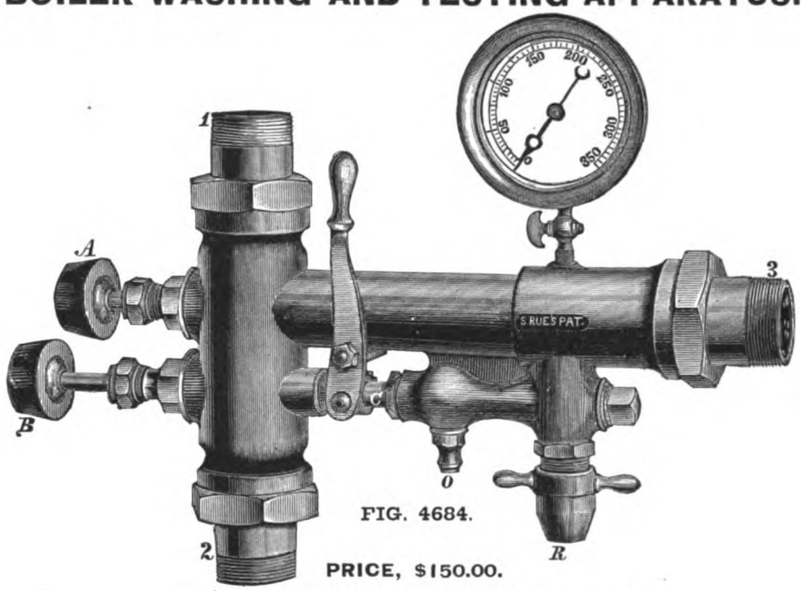


FIG. 4684.

PRICE, $150.00.

This apparatus enables one to blow out boiler, wash and fill with hot water, and have steam ready for service within one hour, without injury to the boiler.

SINGLE.

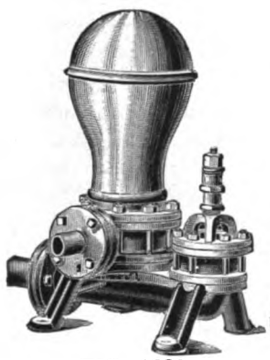


FIG. 4688.

DOUBLE.

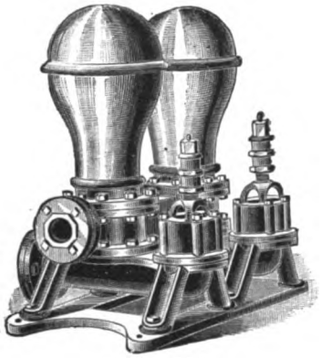


FIG. 4689.

PRICES, FIG. 4688.

Size.	Supply per minute to operate ram.	Length of drive pipe.	Diameter of pipes. Drive.	Diameter of pipes. Disch.	Prices. Brass spring valves.
No. 6	11 to 25 gals.	50 to 200 ft.	2½ in.	1¼ in.	$50.00
No. 7	20 to 40 "	50 to 200 "	3 "	1½ "	85.00
No. 8	25 to 75 "	50 to 200 "	4 "	2 "	130.00

PRICES, FIG. 4689.

No. 6	11 to 25 gals.	50 to 200 ft.	2½ in.	1¼ in.	$100.00
No. 7	20 to 40 "	50 to 200 "	3 "	2 "	170.00
No. 8	25 to 75 "	50 to 200 "	4 "	2½ "	260.00

The size of the pipes should vary in proportion to the distance the water is to be conveyed, as the greater the distance the larger the pipe in proportion to the size of the machine. This applies to the discharge pipe only. By means of an adjuster applied to each of our rams, the quantity of water drawn from the fountain may be varied at pleasure—thus readily adapting the machine to a variable supply. Fig. 4687 can be fitted for wrought iron or lead pipe, as ordered. Fig. 4686 for wrought iron pipe only.

HYDRAULIC TEST PUMP.

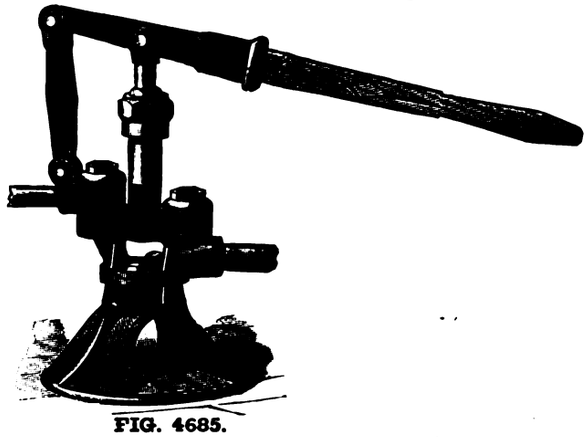


FIG. 4685.

Will work up to 800 lbs. per square inch; working parts are all of bronze.

PRICES.

No.	Size of piston.	Length of stroke.	Length of lever.	Suction for pipe.	Disch'ge for pipe.	Price, without gauge.	Price, with gauge.
1	⅞ in.	3 ins.	24 ins.	¾ in.	½ in.	$25.00	On application.

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BABCOCK & WILCOX WATER TUBE BOILERS.

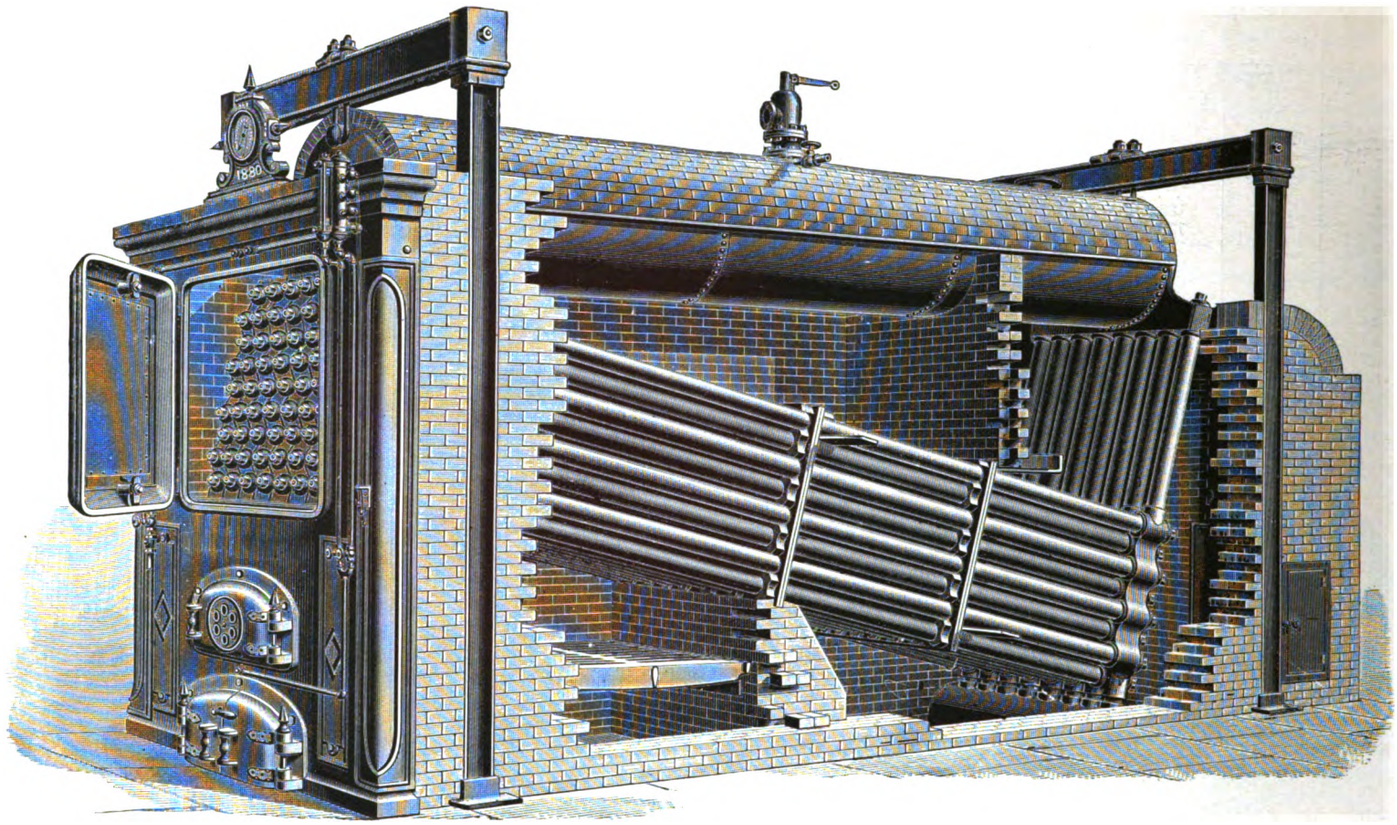


FIG. 4690. REPRESENTS 125 H. P.

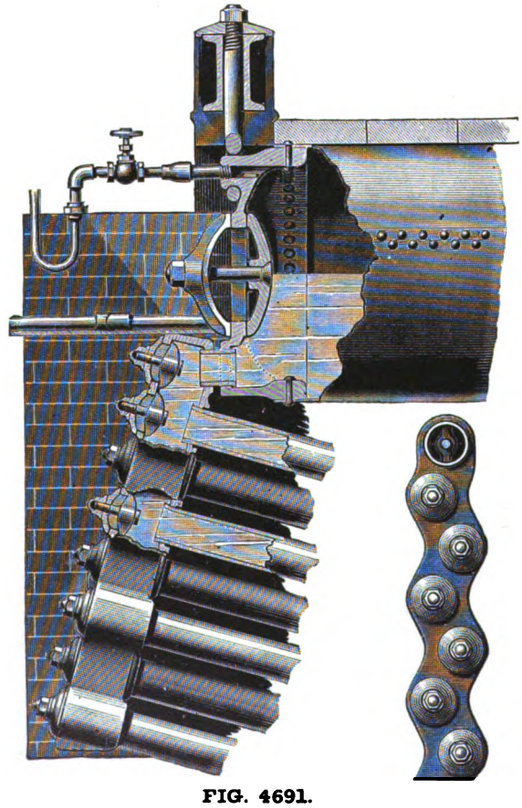


FIG. 4691.

The Babcock & Wilcox boiler consists of a plain cylinder boiler, serving as a steam and water reservoir, placed above and connected at each end with a nest of inclined heating tubes also filled with water. The rear and lower end of these tubes are connected to a mud drum at the point furthest removed from the fire. The heat is applied to one-half of the cylinder and all the tube surface.

Dry steam is made, and therefore no superheating surface is necessary.

Every square inch of the boiler, inside and out, is in sight, and accessible for mechanical cleaning through a manhole in the cylinder, handholes in the mud drum, and handholes having milled faces opposite each end of every tube for the interior, and through cleaning doors in the walls for the exterior surfaces.

All joints between the several parts are made by expanding tubes into taper seats, and increased pressure tends to increase tightness.

The boiler setting forms a furnace in which all the heating surfaces are enveloped by the hot products of combustion as they rise from the grates situated under the front and highest end of the tubes, passing at right angles across them three times and once under the whole length of the cylinder, before being discharged into the stack, at a greatly reduced temperature.

The greater portion of the heat is transferred to the water during the first passage of the gases across the tubes and while combustion is being completed in the triangular chamber under the cylinder, these being properly fire box surfaces. The remaining heat is taken up during the second and third passes across the tubes, which act as economizers.

As the water inside the tubes becomes heated, a mingled stream of steam and water is discharged into the front end of the cylinder above, where the steam gradually separates from the water, the latter flowing to the rear end of the cylinder and down again into the tubes, making a rapid and continuous circulation of all the water in the boiler, keeping all parts at a uniform temperature, and avoiding strains from unequal expansion. This rapid circulation also serves to sweep away the steam bubbles from the heating surfaces as fast as formed, supplying their place with water, thus increasing the efficiency of the surface; it also serves to carry any sediment contained in the water into the mud drum at the rear and lowest point in the boiler from whence it can be blown out. The steam is taken out at the top of the steam drum at the rear end.

PRICES QUOTED ON APPLICATION.

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HEINE BOILER, WITH TOP OUTLET.

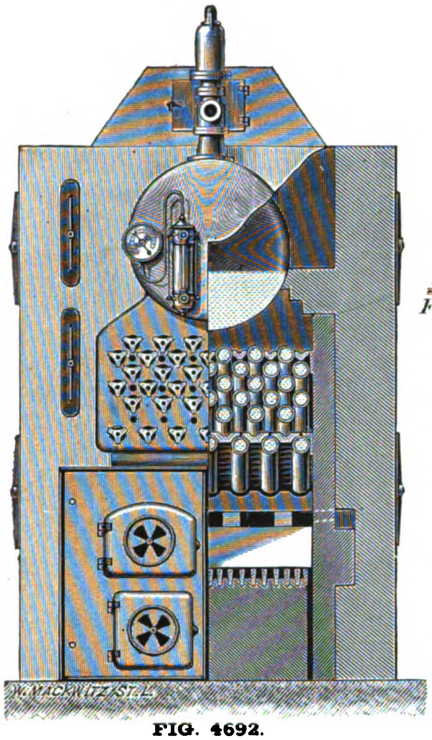


FIG. 4692.
FRONT ELEVATION SECTION, X Y.

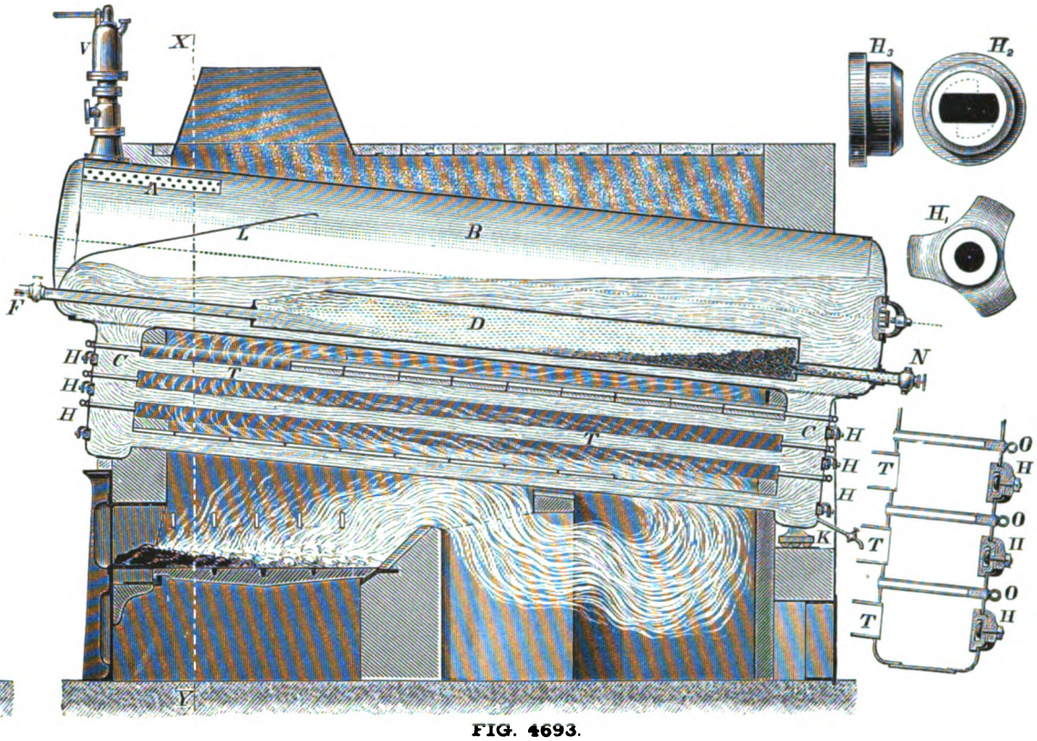


FIG. 4693.
LONGITUDINAL SECTION.

The boiler consists of an upper shell, B, two water legs, C, C, and the water tubes, T, T. The shell has dished or rounded heads and forms the steam drum. Near each end of the shell, just inside of the heads, on the lower side, it is cut away, making an opening about one-quarter of the circumference in length by 13 inches in width. In the larger sizes this opening is replaced by two or more smaller openings, and the strips between them strengthened by re-enforce plates riveted through onto the water legs. At these openings are attached the water legs, C, C, of an approximately square shape, somewhat wider than the diameter of the steam drum. The water legs are stayed by hollow staybolts of hydraulic tubing in such a manner that two such staybolts support each tube and handhole.

The tubes, T, T, are 3½ inch lapwelded tubes, extending from water leg to water leg, C, C, into the inner sheets of each of which tube sheets, they are rolled or expanded. Opposite each tube, in the outer sheet, head plate, is placed a handhole, large enough to insert or withdraw a tube in case of renewals. Each handhole is closed from the inside with a handhole plate which, by an ingenious device for locking, can be removed in a few seconds when necessary to inspect or clean the tube. The hollow staybolts permit the passage of a ⅜ in. steam nozzle to blow off any soot accumulating on the outside of the tubes.

A mud drum, D, is suspended in the steam drum, near its rear end, 3½ inches above its lower surface and entirely surrounded by boiling water. The feed water is introduced through the front head of steam drum by the pipe, F, entering the mud drum, D, thus becoming heated as it flows to the rear of mud drum, there depositing its sediment which is blown off through the blow-off pipe, N, while the clear water eddies over the sides and head of the mud drum which is cut down about one-quarter of its diameter as shown in section. A supplementary blow-off cock is provided in the base of the rear water leg.

To the front head is riveted a cast iron flange through which feed pipe enters the boiler end; on the rear head is a similar flange for main blow-off pipe.

The water column, with gauge glass and cocks, steam gauge, steam valve and safety valve, is also attached to the front end of the boiler, thus placing all appliances for safety and control at one convenient point.

In the cuts, O, O, are the hollow staybolts with stoppers. H, the handhole plate, H_1, showing outside yoke, H_2 the top, and H_3 the side view of the turned and squared inside plate which is packed with a thin gasket, and held by a T headed bolt. K is the roller, supporting rear end of boiler. V is the pop safety valve which is bolted to a special casting, which has also branch for the steam pipe and draws steam from the dry pipe, S, or dry pan, A.

Light firebrick tiles, resting on the upper and lower rows of tubes—see section—form flues around the tubes which are thus suspended in the heated gases, which sweep along their entire length making three turns to the breeching, which they reach usually with about 400 deg. F. temperature, thus showing the completeness with which the heat is utilized by the boiler.

The breeching may be placed at front or rear end of boiler as circumstances may require.

The boiler is inclined 1 ft. in 12 ft. from front to rear and stands with the base of the front water leg resting upon a cast iron fire front, while the rear water leg, which is supported by the roller, is free to expand or contract.

The tubes thus rising from the rear to the front end give natural channels for the circulation of the water, which flows from the tubes into the enlarged area of the water leg permitting the ready and free separation of the steam bubbles. Both steam and water rising through the throat at top of front water leg, C, are deflected by the deflection plate, L, the water flowing to the rear of the steam drum and dropping into the rear water leg, C, to continue its circulation. The steam passing over the deflection plate, L, to the perforated dry pipe, S, or dry pan, A, is dry and free from water spray.

The inclination from front to rear also gives a larger steam space in front and a larger water space in rear of drum, B, which is about one-half full of water at middle gauge, thus giving very large steam liberating surface.

Prices on application.

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RETURN TUBULAR BOILERS.

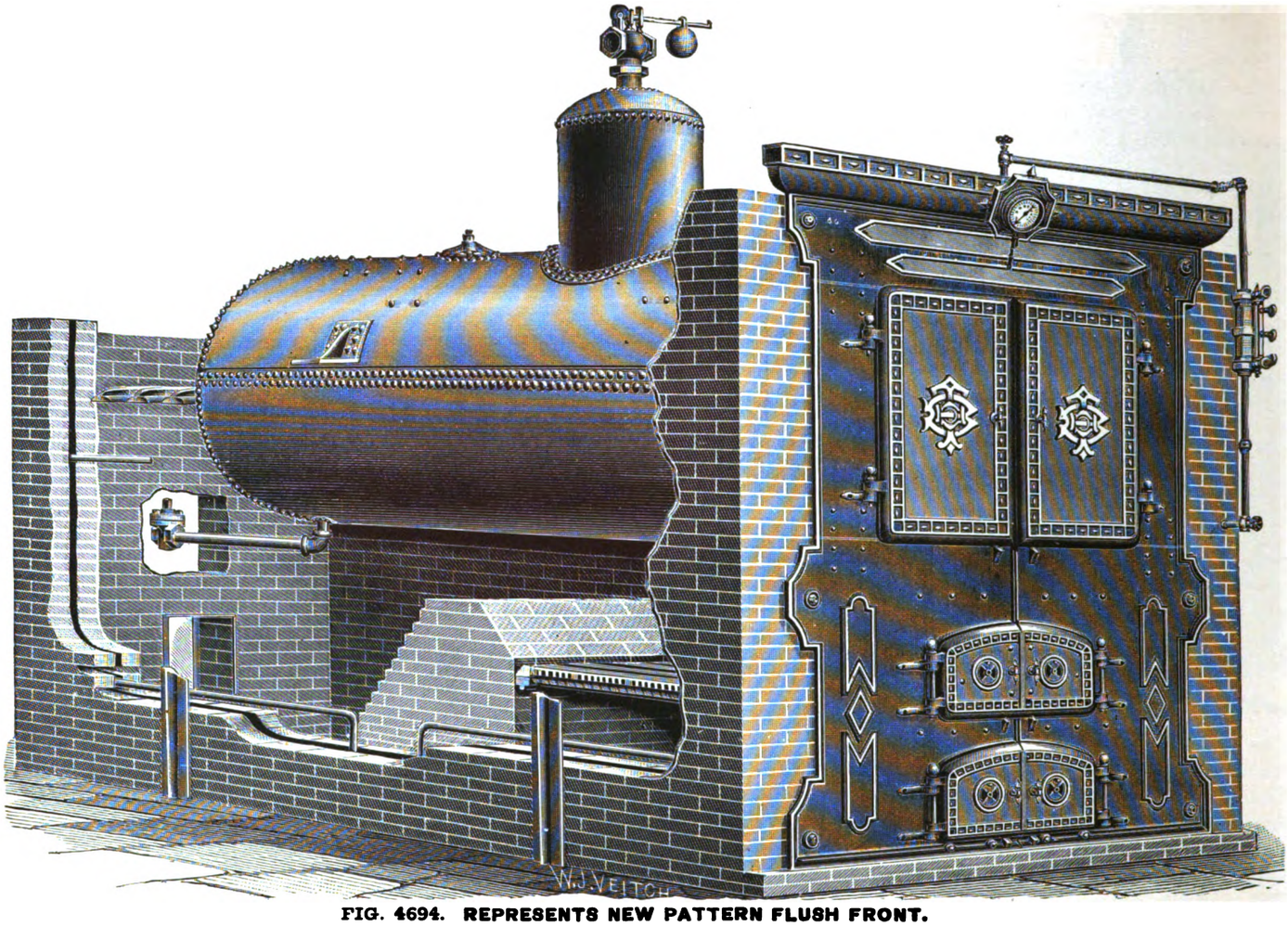


FIG. 4694. REPRESENTS NEW PATTERN FLUSH FRONT.

If boilers are wanted without domes we put two nozzles on top of shell.

We would call attention to our new pattern front as the most practical one in the market, being made in six separate pieces, besides the doors, and is bolted together on the back with angles and plate iron, room being left for expansion and contraction, so that it is an impossibility for it to crack or break after being properly set. In boilers above 40 horse power a large manhole is placed in the front head under the tubes, as well as one on top of the shell, and a handhole in the rear head. This enables one to get inside of the boiler under the tubes, as well as on top, whereby it can be more readily kept clean, as well as giving an opportunity to examine the tubes and other points inside. The three or four tubes taken out at the bottom to make room for this manhole do not in any way detract from the steaming qualities of the boiler, as these tubes are so low down the heat that would naturally pass through them would be of very little benefit, and by removing them it leaves a solid body of water directly over the fire where the most intense heat comes. In smaller sizes we have to put a handhole in each head, as is customary. Great care is taken in the bracing so that the strain on each brace will be of an equal tension, as well as equalizing the pressure on the flat surface of the head. We adopt what is called the radial bracing. All plates are nicely planed on the edges before being bent, and calked with a round nose tool of Connery's patent.

We furnish with these boilers flush fronts, with anchor bolts for same, grates and bearers, square cleaning door and frame, 3 rear T bars, binder bars and bolts, steam gauge, glass water gauge, gauge cocks, with cast iron column and pipe connections from same to boiler, safety valve, blow-off valve, feed and check valve. The blow-off pipe elbow and nipple, shown in cut, we do not furnish unless ordered especially, for which we charge extra.

All boilers tested to 150 lbs. hydrostatic pressure before leaving the works.

Smoke stacks charged extra.

SPECIFICATIONS OF NEW STYLE TWO PLATE STEEL RETURN TUBULAR BOILER.

Number of size	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Horse power	15	20	25	30	35	40	45	50	60	70	75	80	90	100	125
Diameter of boiler, in inches	36	36	42	42	44	48	50	54	54	60	60	60	66	66	72
Length of boiler, in feet and inches	8′11″	10′11″	11′	13′	13′	13′ 2″	14′ 2″	13′ 2″	16′ 2″	15′ 4″	16′ 4″	17′ 4″	16′ 5″	17′ 5″	17′ 6″
Thickness of shell	1/4	1/4	5/16	5/16	5/16	5/16	5/16	5/16	5/16	3/8	3/8	3/8	3/8	3/8	7/16
Thickness of heads	3/8	3/8	3/8	3/8	3/8	1/2	3/8	3/8	3/8	7/16	7/16	7/16	7/16	7/16	1/2
Length of tubes, in feet	8	10	10	12	12	12	13	12	15	14	15	16	15	16	16
No. of tubes, 3 inches in diameter	30	30	38	38	46	52	52	58	58	76	76	76	96	96	122
Diameter of dome, in inches	20	20	24	24	24	24	30	30	30	30	30	30	36	36	36
Height of dome, in inches	20	20	24	24	26	28	30	30	30	30	30	36	36	36	36
Length of furnace, in feet	3	3½	3½	4	4	4	4	4½	5	5	5	5	5½	5½	6
Diameter of smoke stack required, in inches	18	18	20	20	22	24	24	26	26	28	28	28	32	32	36
Weight of bare boiler, about	2,950	3,500	4,400	5,000	5,500	6,400	6,800	7,300	8,550	10,000	10,500	11,200	13,300	14,000	17,500
Weight of boiler and fixtures complete, with arch front	5,350	5,900	7,100	7,800	8,700	10,000	10,600	11,300	12,750	14,800	15,300	16,100	18,900	19,600	24,000
Weight of boiler and fixtures complete, with flush front	5,550	6,100	7,400	8,200	9,100	10,500	11,200	12,000	13,450	15,600	16,000	16,900	19,800	20,500	25,000

When desired, sizes from No. 7 to No. 15, inclusive, are made with 3½ or 4 inch tubes, at the same price. The heating surface, however, with the larger tubes is not quite as much as with the 3 inch tubes.

Number of size of boiler	7	8	9	10	11	12	13	14	15
No. of tubes, 3½ inches in diameter	40	50	50	60	60	60	72	72	96
No. of tubes, 4 inches in diameter	32	44	44	50	50	50	60	60	74

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HIGH PRESSURE RETURN TUBULAR BOILERS.

Used for compound engines and extreme high pressure.

Showing treble riveted butt strap horizontal seam.

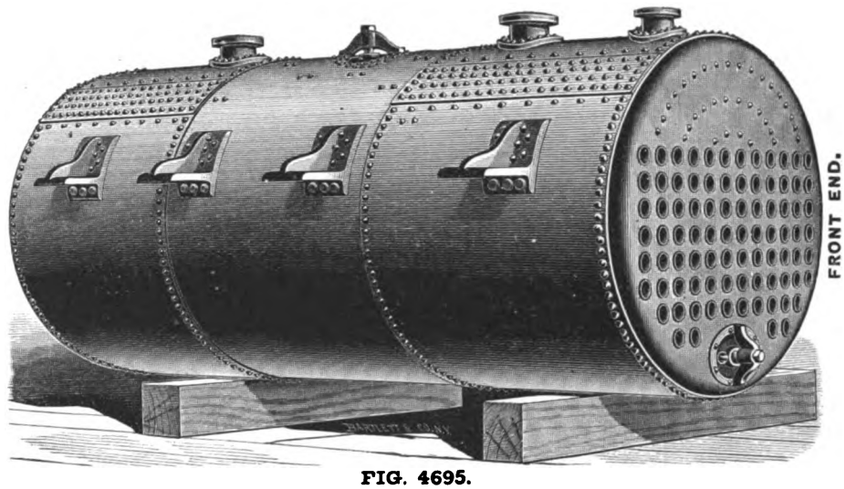


FIG. 4695.

The cut represents our high pressure return tubular boiler adapted for compound engines, where a working pressure of 150 lbs. is often required. The greatest care is taken in the construction of these boilers in each and every detail, both in regard to workmanship and material. The horizontal seams are on the upper quarter of the shell above the fire line, and are made with the treble riveted butt strap joint, which is a strap inside and out and so constructed that it gives 90 per cent. of the strength of the solid metal. The manhole rings are of charcoal iron and double riveted to shell, heads braced with solid crow-foot bracing, great care being taken as to position and location of these braces so that they may all bear an equal strain. They are made of the very best bur-den iron, and riveted solid to both shell and flat surface of head. The nozzles are extra heavy, and, in fact, everything about the boilers is made to meet the requirements of extreme high pressures.

We test all these boilers to 200 lbs. cold water pressure before they leave the works, and make them capable of carrying a working pressure of 150 lbs. if desired.

Prices and specifications furnished on application. No list is given for these boilers, as the conditions under which they are to be used vary so that it is difficult to give a standard that would meet all requirements.

When desired, these boilers can be made with a curtain sheet instead of flush end, as shown in above cut.

TWO-FLUE HORIZONTAL BOILERS, IRON OR STEEL.

All these boilers are made in a thorough manner; longitudinal seams and dome saddle double riveted.

The fixtures are exactly the same as we furnish with return tubular boilers. Arch front complete with anchors, grate bars, grate rests, cleaning door, three rear T pieces, binder bars for side and rear walls, with anchor bolts, steam gauge, glass water gauge, gauge cocks, with cast iron column and pipe connection from same to boiler, safety valve, blow-off valve, brass feed and check valves.

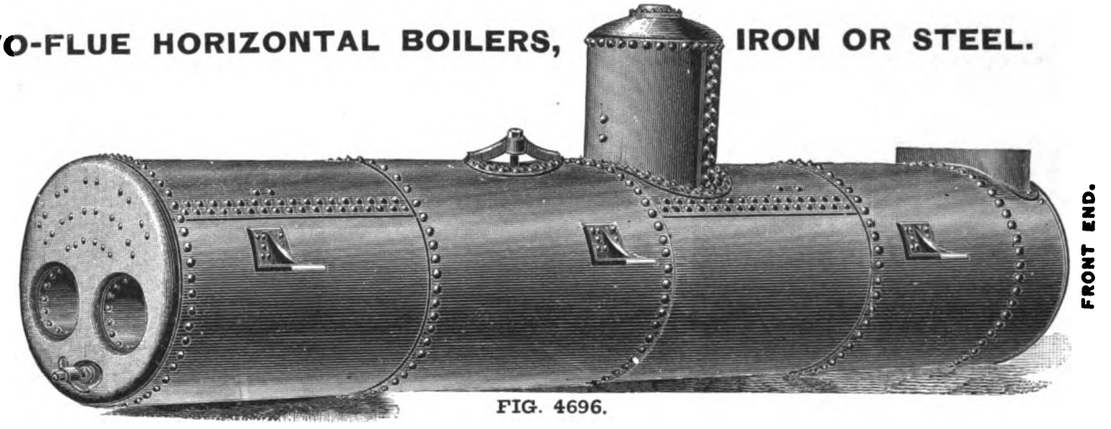


FIG. 4696.

Smoke stacks charged extra.

SPECIFICATIONS, FIG. 4696.

Number of size	1	2	3	4	5	6	7	8	9	10
Horse power	15	20	25	30	35	40	45	50	60	70
Diameter of boiler, in inches	36	36	42	42	44	48	48	50	54	60
Length of boiler, in feet	21	26	21	25	27	27	31 ft. 2 in.	33 ft. 2 in.	35 ft. 2 in.	34 ft. 4 in.
Length of flues, in feet	20	25	20	24	26	26	30	32	34	33
Diameter of flues, in inches	12	12	14	14	15	16	16	17	18	20
Thickness of shell	1/4	1/4	5/16	5/16	5/16	5/16	5/16	5/16	5/16	3/8
Thickness of flues	1/4	1/4	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of heads	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	7/16
Diameter of dome, in inches	20	20	24	24	24	24	24	30	30	30
Height of dome, in inches	20	20	24	24	24	24	24	30	30	30
Diameter of smoke stack required, in inches	18	18	20	20	22	24	24	26	28	30
Length of furnace for grates, in feet	4½	4½	5	5	5	5	5½	5½	5½	5½
Weight of boiler without fixtures	5,500	6,500	6,600	7,700	8,000	8,800	9,900	12,500	13,800	17,000
Weight of fixtures, about	2,500	2,600	2,800	2,900	3,300	3,450	3,550	3,700	4,300	4,700
Weight of boiler and fixtures, complete	8,000	9,100	9,400	10,600	11,360	12,250	13,450	16,200	18,100	21,700

PRICES ON APPLICATION.

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SHAPLEY SPARKLESS BOILERS.

SECTIONAL VIEW.

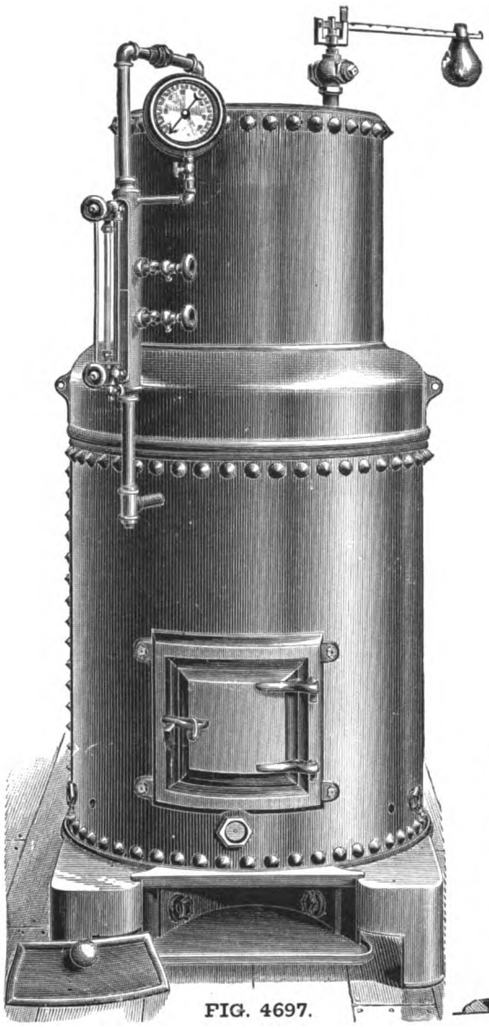


FIG. 4697.

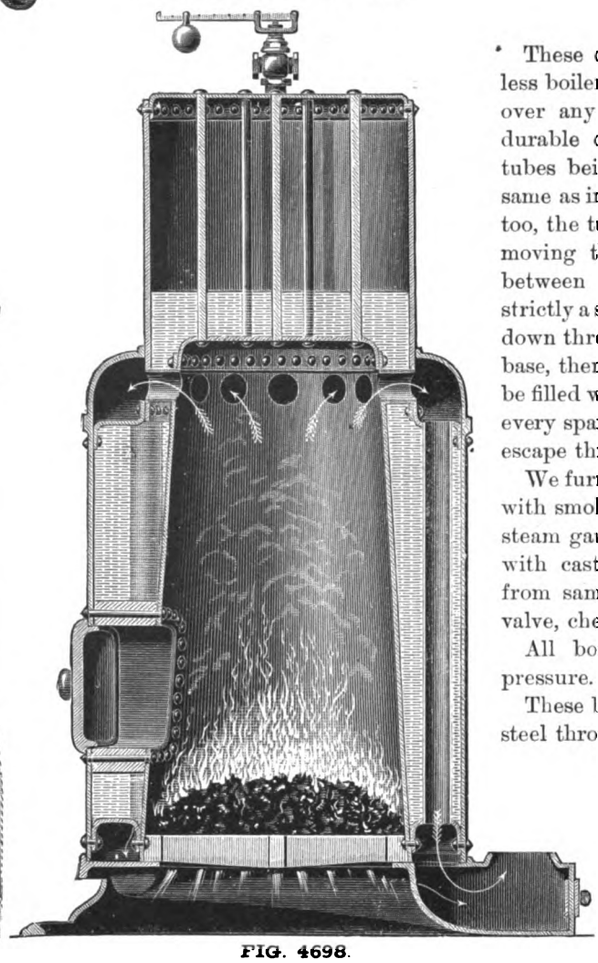


FIG. 4698.

These cuts represent our Shapley sparkless boiler, which possesses some advantages over any other upright boiler. It is very durable on account of the crown sheet and tubes being entirely covered by water, the same as in the submerged head boiler. Then, too, the tubes are very easily cleaned by removing the jacket that surrounds the boiler between upper and lower sections. It is strictly a sparkless boiler, as the draft is drawn down through the tubes on the side into the base, thence through the stack. The base can be filled with water, which necessarily receives every spark, making it impossible for one to escape through the stack.

We furnish with these boilers cast iron base, with smoke bonnet attached to same, grates, steam gauge, glass water gauge, gauge cocks, with cast iron column and pipe connections from same to boiler, safety valve, blow-off valve, check and feed valve.

All boilers tested to 150 lbs. hydraulic pressure.

These boilers are made of best open hearth steel throughout.

SUBMERCED HEAD BOILERS.

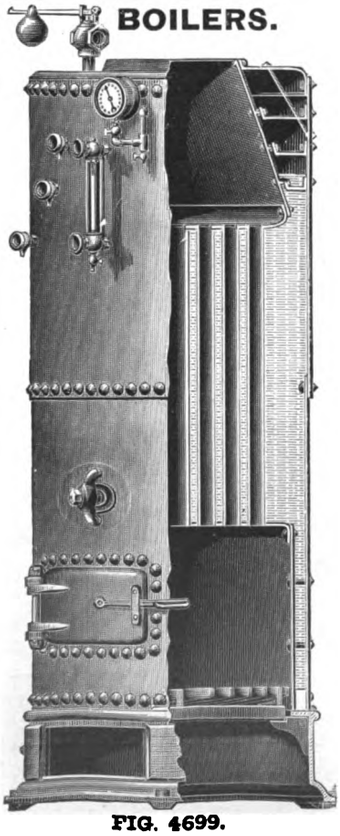


FIG. 4699.

SPECIFICATIONS, FIG. 4697.

Number of size	1	2	3	4	5
Horse power	3	5	8	12	15
Diameter of lower section, inches	24	28½	32	44½	45
Height of lower section, inches	24	32	38	39	44
Diameter of upper section, inches	17	20	24	36	36
Height of upper section, inches	24	26	29	34	39½
Diameter of conical fire box at base, inches	17	20	24	36	36
Diameter of conical fire box at top, inches	12	14	17½	28	28
Height of conical fire box, inches	32	40	48	50	54
Thickness of shell	¼	¼	¼	5/16	5/16
Thickness of furnace	¼	¼	¼	5/16	5/16
Thickness of heads	5/16	5/16	5/16	3/8	3/8
Number of vertical tubes, 2 inches diameter	18	23	26	38	43
Length of vertical tubes, inches	24	30	36	38	42
Number of cross tubes	8	11	13	20	14
Diameter of cross tubes, inches	3	3	3	3	4
Weight complete, about	1,290	1,625	2,200	3,825	4,100
Diameter of stack required	8	10	11	14	14

DESCRIPTION, FIGS. 4699, 4700 AND 4701.

The upright seams on all boilers 30 inches diameter and larger are double riveted.

Sizes 1, 2, 3, 4 and 5 have 2 handholes in the water leg and 2 just above the crown sheet. All other sizes have 3 in the water leg and 2 above the crown sheet.

We include with these boilers an improved cast iron base, smoke bonnet, grates, safety valve, steam gauge, glass water gauge, 3 gauge cocks, blow-off cock, check and feed valves. Our base is the heaviest and most improved in the market, having a cast iron bottom raised from the floor so as to admit of a circulation of air, and sliding draft doors.

With the mounted boilers we include, in addition to the above, 6 feet of smoke stack, and injector, all piped off, and ash pan instead of base. Also wheels, axles, pole, evener, neck-yoke, and whiffletrees, complete.

With the submerged head boiler no smoke bonnet is required.

FOR SPECIFICATIONS, SEE PAGE 545.

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PLAIN UPRIGHT BOILERS.

SECTIONAL.

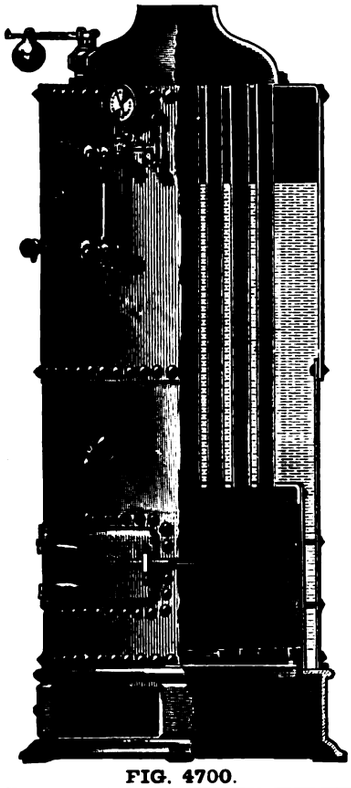


FIG. 4700.

MOUNTED BOILER, EITHER PLAIN OR SUBMERGED HEAD.

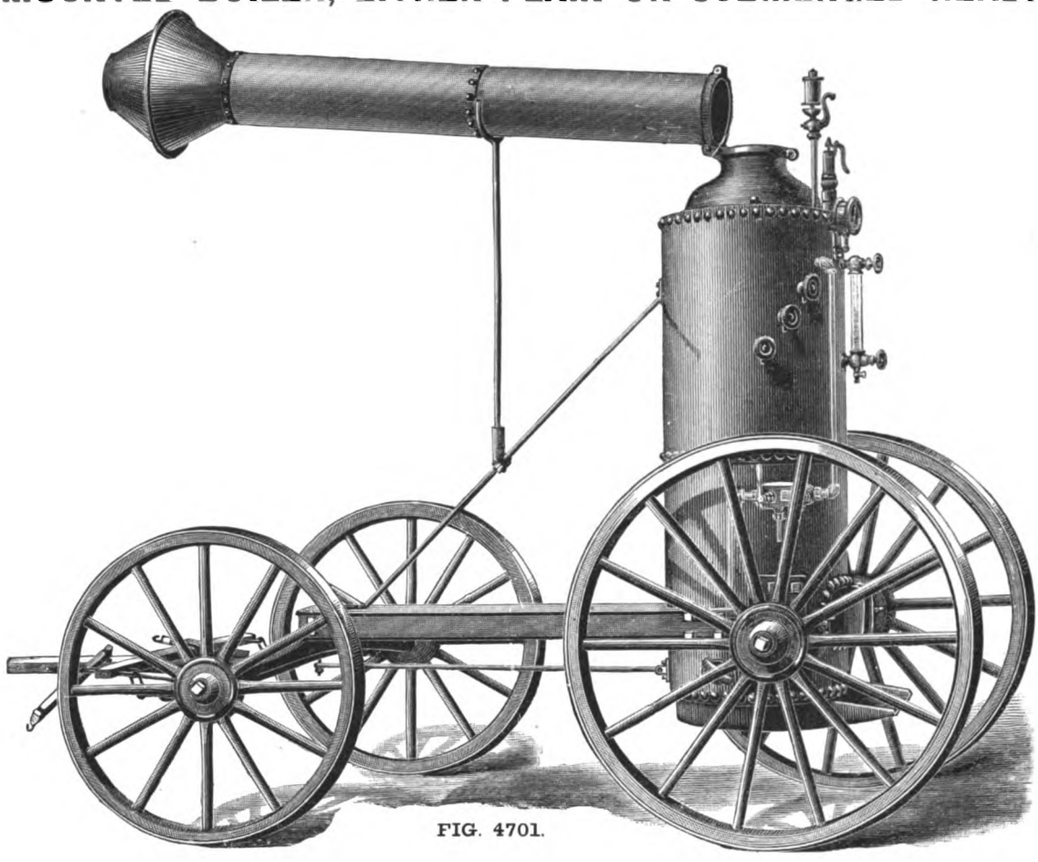


FIG. 4701.

SPECIFICATIONS, FIGS. 4700 AND 4701.

Number of size	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Horse power	3	5	6	7	8	10	12	15	18	20	25	30	35	40	50
Diameter of boiler, inches	21	24	27	30	30	32	34	36	40	40	44	48	48	48	54
Height of boiler, feet	5	5	5	5	6	6	6½	7	7½	7½	8	8	8	9	9
Diameter of furnace, inches	16	19	22	25	25	27	28½	30½	34½	34½	38½	42½	42½	42½	48½
Height of furnace, inches	24	24	24	24	24	24	24	24	30	30	30	30	30	30	36
Thickness of shell	¼	¼	¼	¼	¼	¼	¼	¼	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of furnace	¼	¼	¼	¼	¼	¼	¼	¼	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2
Thickness of heads	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Number of 2-inch tubes	20	31	39	46	46	51	56	64	74	84	95	118	138	138	178
Length of tubes, inches	36	36	36	36	48	48	54	60	60	60	66	66	66	78	72
Diam. of bottom of base, in.	27	31	35	37	37	39	41	43	47	47	50	54	54	54	60
Height of base, inches	11	11	13	13	13	13	13	13	13	13	13	13	13	13	13
Height of bonnet, inches	8	9	10	11	11	12	13	13	13	13	16	16	16	16	18
Dia. smoke stack required, in.	7	8	9	10	10	11	12	14	16	16	17	18	18	18	22
W't of boiler without fixtures	750	900	1,100	1,300	1,450	1,540	1,750	2,100	2,600	2,700	3,500	4,000	4,250	4,850	5,550
Weight of fixtures	300	400	425	500	500	600	650	700	900	900	1,000	1,050	1,050	1,050	1,200
Wt. boiler and fixtures, c'mp'te	1,050	1,300	1,525	1,800	1,950	2,140	2,400	2,800	3,500	3,600	4,500	5,050	5,300	5,900	6,750
Wt. of boiler and fixtures, complete, mounted on wheels	1,350	1,600	1,825	2,100	2,350	2,540	2,800	3,300	4,000	4,100	5,000	5,650	6,000	6,600	7,550

SPECIFICATIONS, FIGS. 4699 AND 4701.

Number of size	16	17	18	19	20	21	22	23	24	25	26
Horse power	8	10	12	15	18	20	25	30	35	40	50
Diameter of boiler, inches	30	32	34	36	40	40	44	48	48	48	54
Height of boiler, feet	7	7	7½	8	8½	8½	9½	9½	9½	10	10½
Diameter of furnace, inches	25	27	28½	30½	34½	34½	38½	42½	42½	42½	48½
Height of furnace, inches	24	24	24	24	30	30	30	30	30	30	36
Height of cone, inches	24	24	24	24	24	24	30	30	30	30	30
Thickness of shell	¼	¼	¼	¼	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of furnace and cone plates	¼	¼	¼	¼	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2
Thickness of heads	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Number of 2-inch tubes	45	51	56	64	74	84	95	118	138	138	178
Length of tubes, inches	36	36	42	48	48	48	54	54	54	60	60
Diameter of bottom of base, inches	37	39	41	43	47	47	50	54	54	54	60
Height of base, inches	12	13	13	13	13	13	13	13	13	13	13
Diameter of opening at top of cone, inches	16	16	16	18	18	18	20	20	20	20	22
Diameter of smoke stack required, about, inches	10	11	12	14	16	16	17	18	18	18	22
Weight of boiler, without fixtures	1,400	1,480	1,670	2,020	2,500	2,600	3,350	3,800	4,050	4,650	5,350
Weight of fixtures, about	450	550	580	630	800	800	825	850	850	850	1,000
Weight of boiler and fixtures, complete	1,850	2,030	2,250	2,650	3,300	3,400	4,175	4,650	4,900	5,500	6,350
Weight of boiler and fixtures, complete, mounted on wheels	2,150	2,330	2,650	3,050	3,800	3,900	4,675	5,250	5,500	6,200	7,150

Boilers tested to 150 lbs. hydrostatic pressure before leaving the works. All boilers made of open hearth steel throughout.

PLAIN.

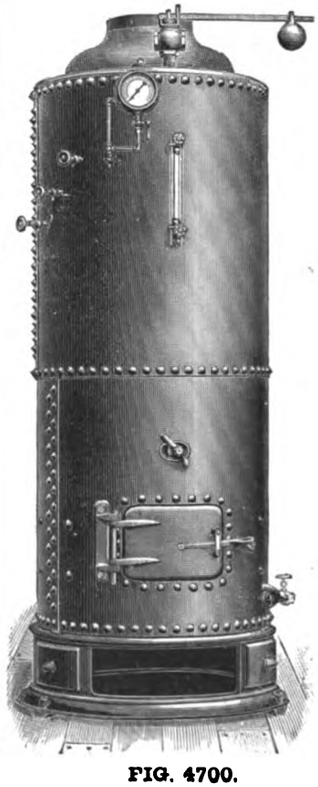


FIG. 4700.

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MANNING VERTICAL TUBULAR BOILER.

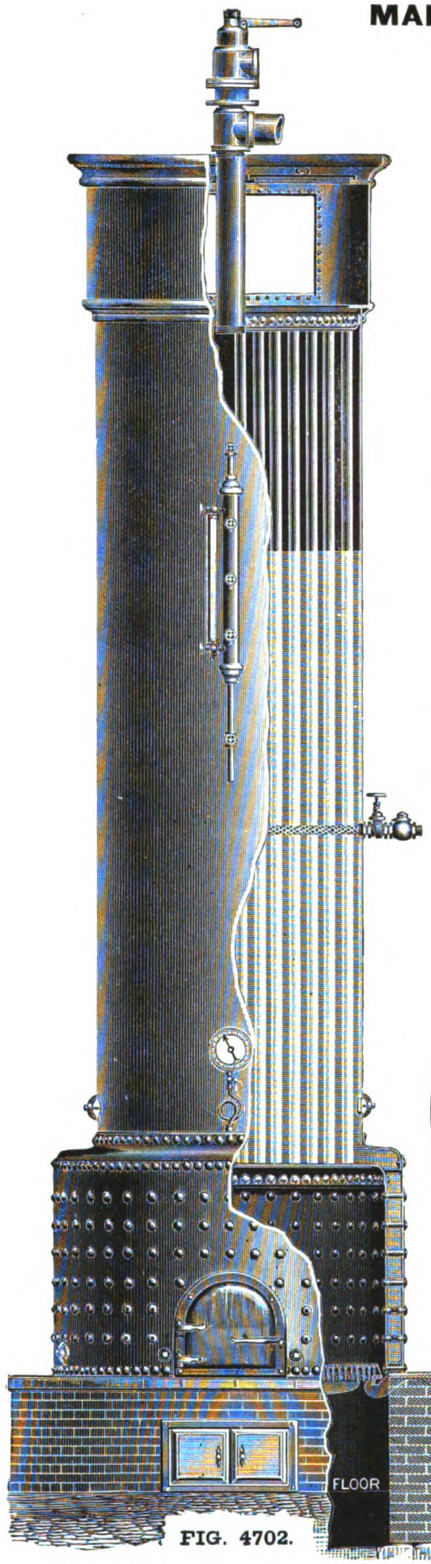


FIG. 4702.

These boilers have been particularly designed for compound and compound condensing engines, and the horse power at which they are rated, which is about 10 square feet of heating surface to the horse power, is based upon these conditions.

If these boilers are to be used for any other purpose the above must be taken into consideration.

The Manning patent vertical tubular boiler has been particularly designed to meet the increasing demand by the public for a boiler that will fulfill the following requirements:

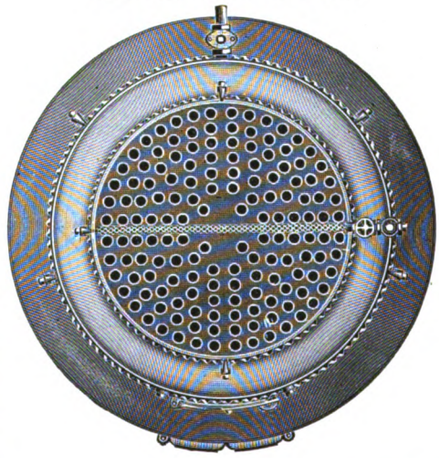
One that can safely be run at high pressure, can be erected on a small floor space, and which will give equal economy in the consumption of fuel with any of the best type of boilers on the market.

The introduction of compound condensing engines, where the extreme high pressures are demanded, necessarily calls for a boiler of the requirements mentioned. Being internally fired, the shell plates do not come in contact with the direct flame or heat, consequently are not subject to the deteriorating effects from same, and can therefore be made as thick as desired to give the required strength. The furnace can be made of stock sufficiently thin to give the best radiation of heat, and still retain sufficient strength, as it is so thoroughly staybolted to the outside shell. These boilers, for high pressure, are fully as economical, if not more so, than any boiler in the market. They must not be confounded with the usual type of upright boiler, or judged by them as to economy. The success and economy of these boilers are due to the perfect proportions of the parts. The furnaces are about 12 inches larger in diameter than the shell of the boiler, thus securing a large grate surface, and as the height of the furnaces is in no case less than 42 inches it necessarily gives a perfect combustion. The diameter and length of the tubes are so proportioned that the heat is so thoroughly absorbed by the time it reaches the smoke box that the temperature rarely exceeds the temperature due to the pressure of steam more than 40 to 50 degrees, giving the proper chimney temperature. The water line is carried from 3½ to 4 feet below the top of the boiler, thus allowing this space for the steam, which is superheated by the heat that passes through the upper end of the tubes to a temperature of about 25 degrees in excess of the temperature due to the steam pressure, thereby giving exceedingly dry steam.

These boilers are tested, when desired, to 225 lbs. hydrostatic pressure, and are capable of running at a working pressure of 150 lbs.

Floor space.—The floor space is also a great consideration with these boilers, as there is no boiler in the market that will give anywhere near the amount of power in the same given space. For instance: The largest boiler that we build of this type is 175 horse power, and the diameter of the brick work of the ash pit—or, in other words, the floor space—is but 8 feet. This, oftentimes, is a matter of great importance, especially in electric light plants constructed in large cities, where the power is generally placed near the center of the city where property is very expensive and the question of utilizing the space one of great importance.

SECTIONAL VIEW.



These boilers are made of best open hearth steel, with a tensile strength of 60,000 lbs. The shells are made in two plates, without any girth seams, and the vertical seams being double riveted gives a greater amount of strength than in the ordinary circular seam. Great care is taken in the laying out and punching of holes. In no case is a drift pin allowed to be used in the construction of these boilers. All calking done with a round nose tool of Connery's patent, and tubes expanded with a Dudgeon expander. We provide a cleaning chain at the bottom of the water leg which runs around the entire furnace, and is so arranged that the dirt and sediment may be easily loosened and removed. We feed these boilers through a perforated internal brass pipe, as shown in cut, thus securing a uniform distribution of water, avoiding the danger of damage to tubes or shell by any sudden expansion or contraction.

We furnish with these boilers cast iron base plate, patent shaking grate bars, ash pit door and frame, smoke bonnet, with cast iron top made in sections so it can be easily removed to clean the tubes; also steam gauge, gauge cocks, water gauge, cast iron column and pipe connections from same to boiler, pop safety valve, asbestos plug cock for blow-off, Jenkins' feed and check valves.

Number of size.	Horse power.	Diameter of waist, in inches.	Diameter of furnace outside, in inches.	Diameter of furnace inside, in inches.	Height of furnace, in inches.	Height of bonnet, in inches.	Number of tubes.	Length of tubes, in feet.	Diameter of tubes, in inches.	Thickness of shell.	Thickness of outside shell of furnace.	Thickness of inside shell of furnace.	Thickness of heads.	Total square feet of heating surface.	Height of ash pit below furnace, in inches.	Height of boiler from bottom of water leg to top of bonnet, in feet and inches.	Total height of boiler from floor line to top of bonnet, in feet and inches.	Diameter of mason work, in inches.	Size of steam opening, in inches.	Diameter of stack required, in inches.	Weight of boiler complete, with castings and fittings, in pounds.
1	50	38	55	48	42	24	90	11	2	5/16	5/16	5/16	3/8	569	24	17- 4½	19- 4½	64	3	24	10,000
2	75	44	61	54	42	24	86	13	2½	5/16	5/16	5/16	3/8	786	24	19- 4½	21- 4½	78	4	28	13,000
3	100	48	65	58	44	24	112	15	2½	3/8	3/8	5/16	7/16	1,138	24	21- 6½	23- 6½	82	5	30	14,500
4	125	50	67	60	44	26	124	15	2½	3/8	3/8	5/16	7/16	1,276	24	21- 8½	23- 8½	84	5	34	16,400
5	150	56	73	66	44	28	152	15	2½	3/8	3/8	5/16	7/16	1,563	24	21-10½	23-10½	90	5	38	20,000
6	175	61	79	72	45	30	184	15	2½	7/16	7/16	3/8	1/2	1,878	24	22- 1½	24- 1½	96	6	40	24,000

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LOCOMOTIVE BOILERS.

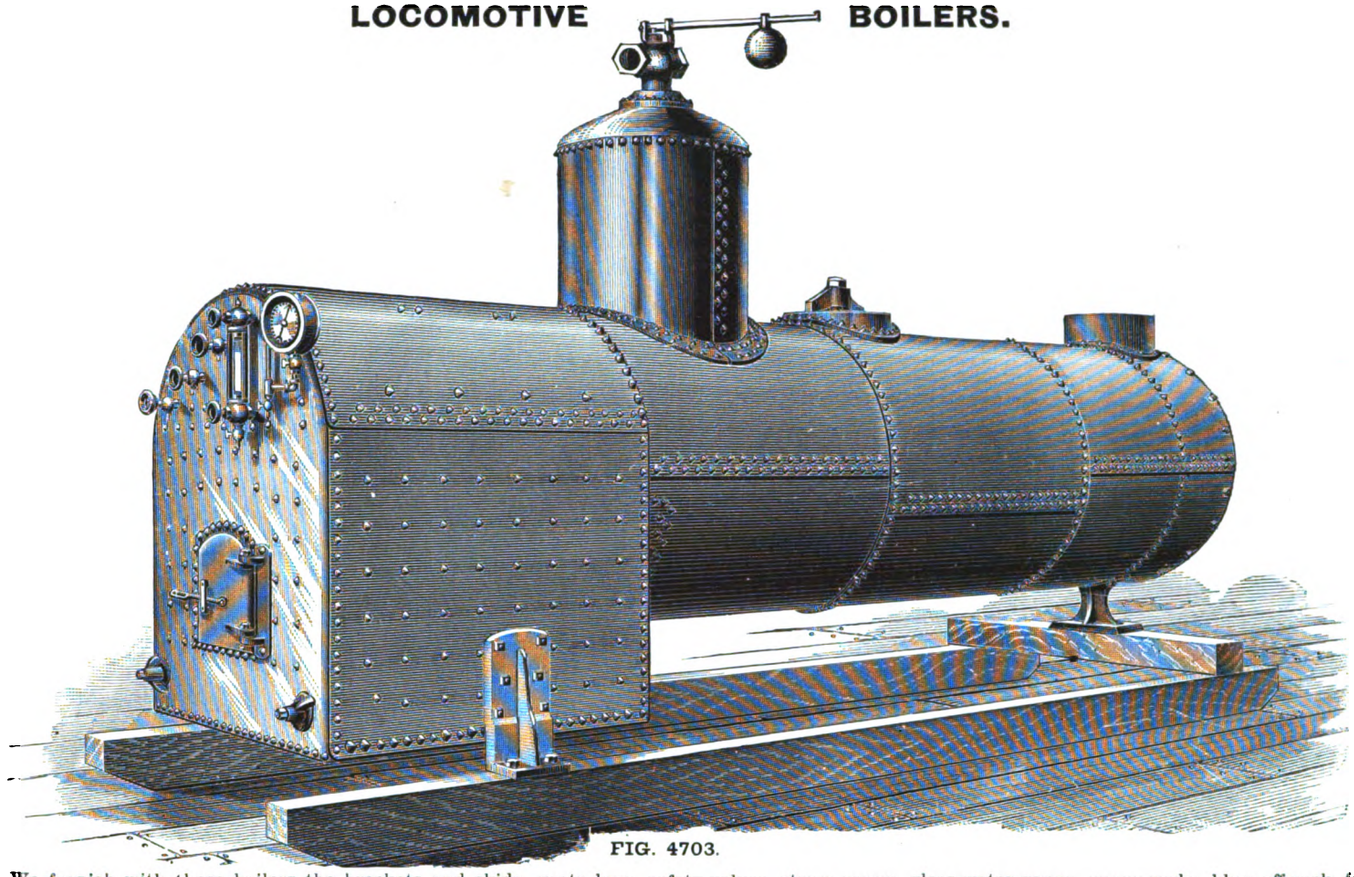


FIG. 4703.

We furnish with these boilers the brackets and skids, grate bars, safety valves, steam gauge, glass water gauge, gauge cocks, blow-off cock, feed and check valves. Smoke stack charged extra. Horizontal seams double riveted.

SPECIFICATIONS, FIG. 4703.

Number of size	7	8	9	10	11	12	13	14	15	16
Horse power	25	30	35	40	50	60	70	80	90	100
Diameter of waist, inches	40	42	44	44	48	54	56	58	60	62
Length of furnace, inches	48	50	50	50	54	60	60	60	60	60
Width of furnace, inches	34	36	38	38	42	48	50	52	54	56
Height of furnace, inches	33	34	36	36	40	44	44	48	48	50
Thickness of shell and front plate	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	3/8	3/8
Thickness of front sides and top of furnace	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of both tube sheets	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16
Number of tubes, 3 inches diameter	34	40	44	44	55	60	66	76	82	90
Length of tubes, inches	96	96	102	120	126	132	144	144	156	168
Diameter of dome, inches	24	24	24	24	24	30	30	30	30	30
Height of dome, inches	24	24	24	24	24	30	30	30	30	36
Diameter of stack required, inches	16	18	19	19	21	22	23	25	26	28
Length of boiler over all, in feet	14	14½	15	16½	17½	18½	19½	19¾	21	22¼
Height of boiler, bottom of skids to top of dome, inches	87	90	92	92	101	111	112	117	118	127
Weight of boiler without fixtures	6,600	7,200	7,800	8,350	9,300	11,200	13,000	14,000	15,500	16,500
Weight of fixtures, about	900	950	975	975	1,200	1,400	1,500	1,800	1,900	2,000
Weight of boiler and fixtures complete	7,500	8,150	8,775	9,325	10,500	12,600	14,500	15,800	17,400	18,500

LOCOMOTIVE BOILER.

FOR SPECIFICATIONS SEE BELOW.

We furnish with these boilers the brackets and skids, a cast-iron dome, ash pan, grate bars, safety valve, steam gauge, glass water gauge, gauge cocks, blow-off cock, feed and check valves. Smoke stack charged extra. Horizontal seams on Nos. 5 and 6 double riveted; all smaller sizes single riveted.

LOCOMOTIVE BOILER MOUNTED ON WHEELS.

FOR SPECIFICATIONS SEE BELOW.

We furnish with these boilers all that is mentioned above except skids, together with wheels, axles, pole, neck yoke, eveners, and whiffletrees, 10 feet of smoke stack, and injector piped off. The domes on both these boilers represented above are bolted on so they can be removed if necessary. All boilers are tested to 150 lbs. pressure. Horizontal seams on all sizes above No. 5 double riveted. All boilers tested to 150 lbs. cold water pressure. All boilers made of best open hearth steel throughout.

Number of size	1	2	3	4	5	6
Horse power	6	8	10	12	15	20
Diameter of waist, inches	27	27	30	32	34	36
Length of furnace, inches	36	36	39	39	42	48
Width of furnace, inches	22	22	24	26	28	30
Height of furnace, inches	28	28	30	33	34	37
Thickness of shell and front plate	1/4	1/4	1/4	1/4	1/4	1/4
Thickness of sides and top of furnace	1/4	1/4	1/4	1/4	1/4	1/4
Thickness of ends of furnace	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of tube head	3/8	3/8	3/8	3/8	3/8	3/8
Number of tubes, 3 inches diameter	13	13	18	23	26	30
Length of tubes, inches	60	90	84	78	90	102
Diameter of dome, inches	10	10	10	12	12	12
Height of dome, inches	28	28	28	32	32	32
Diameter of stack required, inches	12	12	13	14	15	15
Length of boiler over all, in feet	9¾	12	12	11¾	13	14⅛
Height of boiler, bottom of skids to top of dome, inches	78	78	82	89	92	95
Weight of boiler without fixtures	2,700	2,900	3,200	3,600	4,000	4,500
Weight of fixtures	350	350	450	475	500	600
Weight of boiler and fixtures complete	3,050	3,250	3 650	4,075	4,500	5,100
Weight of boiler and fixtures complete, mounted on wheels	3,350	3,550	4,050	4,475	4,900	5,600

Boilers made of open hearth steel throughout. All boilers tested to 150 lbs. hydrostatic pressure.

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STEAM BOILER DAMPER REGULATORS.

NASON'S.

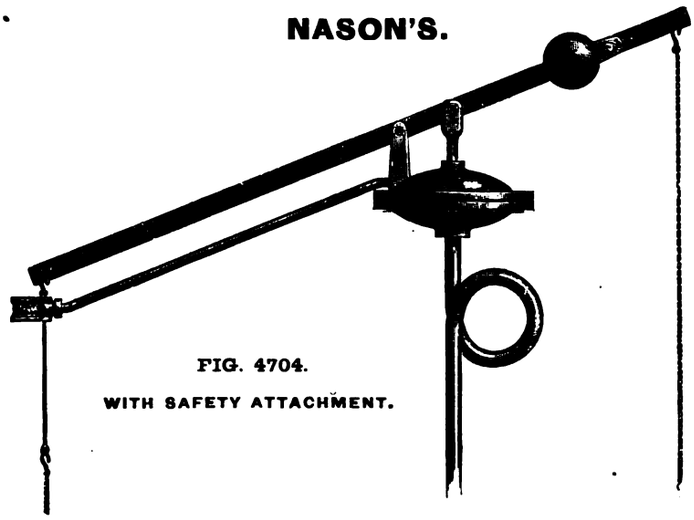


FIG. 4704.

WITH SAFETY ATTACHMENT.

DESCRIPTION, FIG. 4704.

By this device, should the diaphragm of the regulator be broken, the issuing steam will be directed upon a fusible link, connecting the draft damper with the lever; the damper will be released, and, closing, will completely check the draft.

PRICES.

Regulator, with 7 inch plates, including gooseneck..... $8.00
Regulator, with 9 inch plates, including gooseneck..... 12.00

KELLAM.

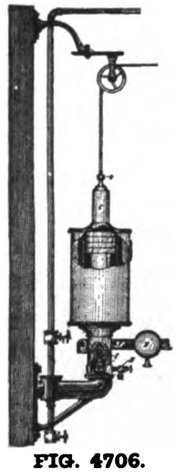


FIG. 4706.

DESCRIPTION, FIG. 4706.

No. 1, designed to control damper from four feet diameter upward.

No. 3, for dampers from twenty inches up to four feet diameter.

No. 4, all sizes up to twenty inches diameter.

All fittings except the steam pipes go with each machine.

To parties purchasing the regulator we will furnish, if desired, dampers any size at actual cost of material and labor. We will connect these machines and put in operation without cost within a reasonable distance of New York.

This damper regulator works on the safety valve principle; has neither diaphragm, packing springs nor stuffing boxes.

PRICES.

No. 1..... $150.00
No. 3..... 125.00
No. 4..... 100.00

HALLOCK'S.

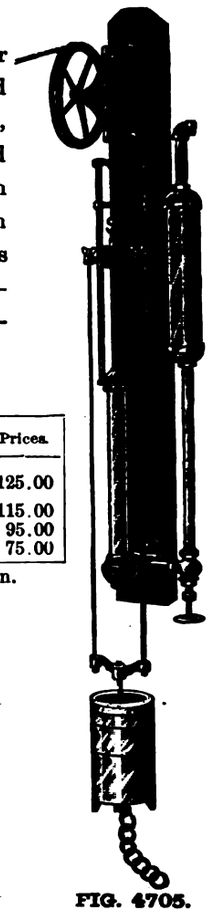


FIG. 4705.

DESCRIPTION, FIG. 4705.

The direct action of the steam upon the water piston of this regulator insures its working and obviates danger of sticking of parts by corrosion, etc. All parts of brass. Is adapted to hold damper in position to secure best results from combustion, thus saving greatest percentage in fuel. Simple in construction, contains no valves or secondary parts; can be applied by any competent engineer. In ordering, state steam pressure to be maintained, and H. P. of boilers.

PRICES.

No.	Piston.	Stroke.	Finish.	Controls H P.	Prices.
1	2 in.	22 in.	Brass piping, column, etc., full nickeled, etc.	50 to 150	$125.00
2	2 "	22 "	Nickel enameled.....	50 to 150	115.00
3	2 "	15 "	" "	25 to 50	95.00
4	1½ "	15 "	" "	10 to 25	75.00

For over 150 to 1,000 H. P. Prices on application.

CURTIS.

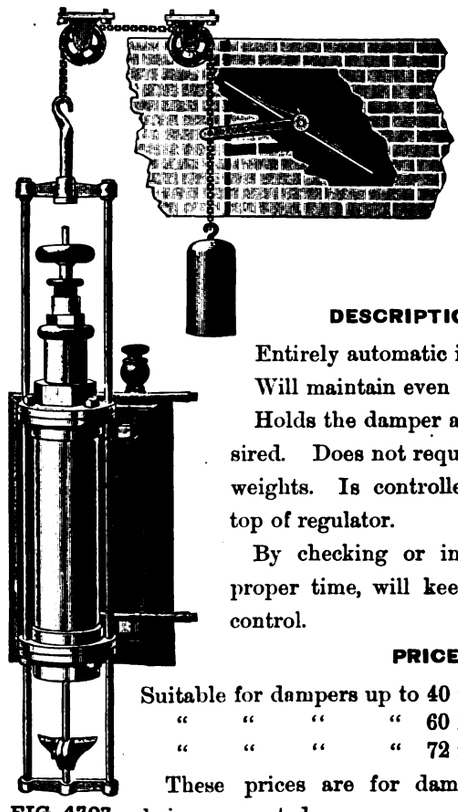


FIG. 4707.

DESCRIPTION, FIG. 4707.

Entirely automatic in its action.

Will maintain even pressure on boiler.

Holds the damper at partial opening if desired. Does not require any levers or heavy weights. Is controlled by wheel handle on top of regulator.

By checking or increasing the draft at proper time, will keep fire under complete control.

PRICES.

Suitable for dampers up to 40 in. diameter.... $80.00
" " " " 60 in. " 100.00
" " " " 72 in. " 150.00

These prices are for damper regulator without being connected.

CLARK'S HIGH PRESSURE.

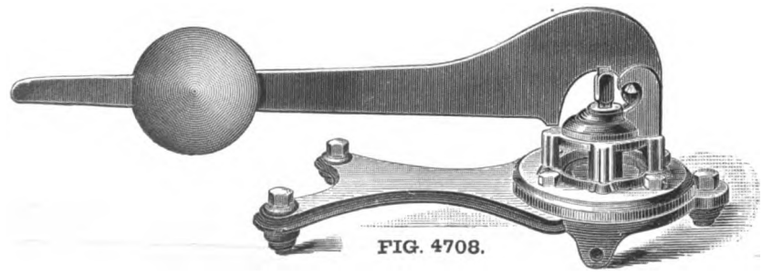


FIG. 4708.

PRICES, FIG. 4708.

Number of regulator.....	1	2	3
Size horse power boiler to apply to....	5	20	30
Prices.....	$10.00	$15.00	$25.00
Extra rubber diaphragms...	1.00	1.50	2.50

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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STEAM BOILER DAMPER REGULATORS.

KEIZERS.

DESCRIPTION, FIG. 4709.

It is simple in construction, not liable to derangement, entirely protected from the obstructive effect of dust and dirt, and practically frictionless in all its parts.

The operation of the machine is as simple as its construction. The rubber diaphragm B, Fig. 1, is protected by triangular, flat metal plates, C, hung on knife edges, which communicate motion to the lever by the same means, as shown at D and E; this makes the machine sensitive to the slightest variation of pressure, and at the same time the diaphragm is relieved of any undue strain whatever through its extremes of motion.

The lever F, with its counterpoise H, has a knife edge bearing, shown at G. Steam is admitted under the diaphragm at A.

When the machine is attached to the boiler, and the connections made with the damper rod, the weight on the lever is placed at the point that will balance the required pressure, the position of the damper being partially closed, as in Fig. 2. Any additional pressure will, of course, close the damper entirely, thereby shutting off the draft and preventing the heat from passing out the smoke stack, until the steam pressure decreasing, the weight gradually descends and opens the damper, admitting additional draft to the fire.

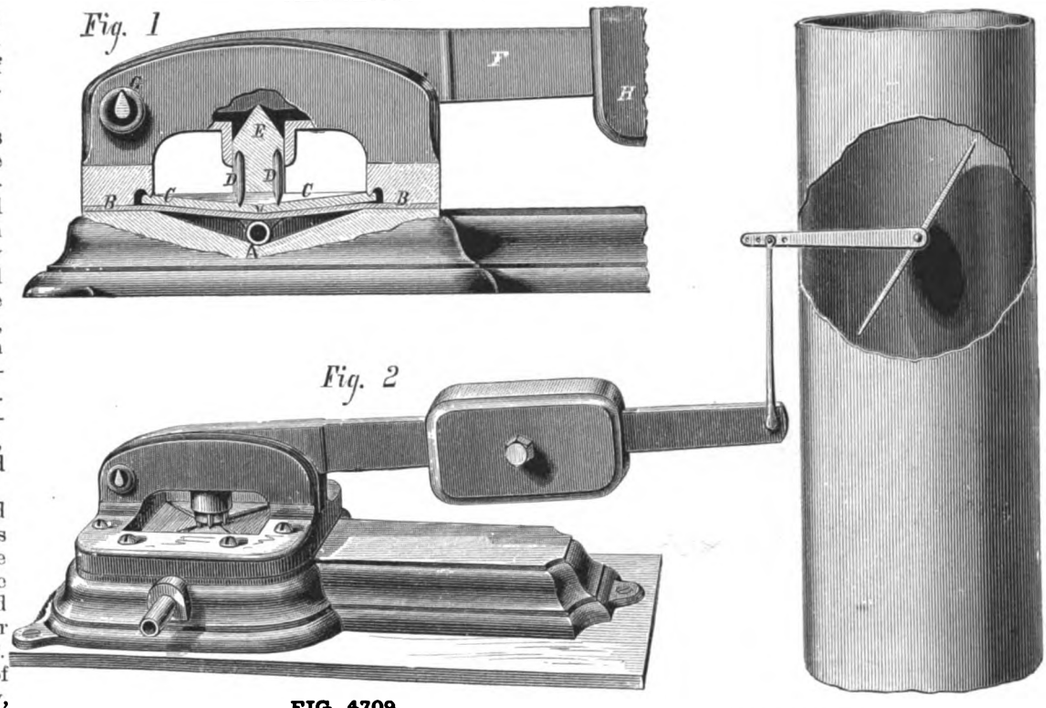


FIG. 4709.

Directions.—In attaching the regulator it is requisite that the damper in smoke stack or flue should fit tolerably close, and work freely. Very heavy dampers should run on friction rollers, such as used on grindstone frames; they can be procured at any hardware store.

The connection with the boiler should be made below the water line if practicable, to insure water contact with the diaphragm, with cock at boiler. The regulator may be placed on the floor, on a bracket shelf, overhead, or in any position that is convenient and in line, if possible, with the damper arm. Where the connecting rod from necessity makes bends or angles, bell-crank joints should be used. Lifting dampers may be balanced, and the connecting rod attached to the damper, or to the balancing arm, due regard being had to the necessary travel of lever and motion of damper. The motion of regulator levers is marked on each, and the arm on damper must be of such length as to allow the lever to be down when the damper is wide open and at its extreme height when the damper is closed. Below we give the motion of the levers; also the required length of damper arm when the damper makes a full quarter turn in the stack.

PRICES, FIG. 4709.

Sizes of regulators.	No. 2. 4 H. P. and under.	No. 3. From 4 to 20 H. P.	No. 4. From 20 to 50 H. P.	No. 5. 50 H. P. and over.
Price	$20.00	$25.00	$30.00	$35.00
Motion of levers	8 inch.	9 inch.	10 inch.	11 inch.
Arm on damper should be	5¾ "	6½ "	7¼ "	8 "

The following tables show the proper sizes of dampers to steam boilers with different heights of chimney:

Size of the damper, in inches.	Height of chimney, in feet.					
	40	60	80	100	120	150
	Square inches of damper per horse power.					
	17.4	14.2	12.4	11.0	10.0	9.0
	Horse power of the boiler.					
6 x 18	6.2	7.6	8.7	9.9	10.8	12.
7 x 21	8.5	10.	12.	13.	15.	16.
8 x 24	11.	13.	16.	18.	19.	22.
9 x 37	14.	17.	20.	22.	24.	27.
10 x 30	17.	21.	25.	28.	30.	34.
12 x 36	25.	31.	35.	40.	43.	48.
14 x 42	34.	41.	47.	53.	59.	65.
16 x 48	44.	54.	52.	70.	77.	85.

KNOWLES.

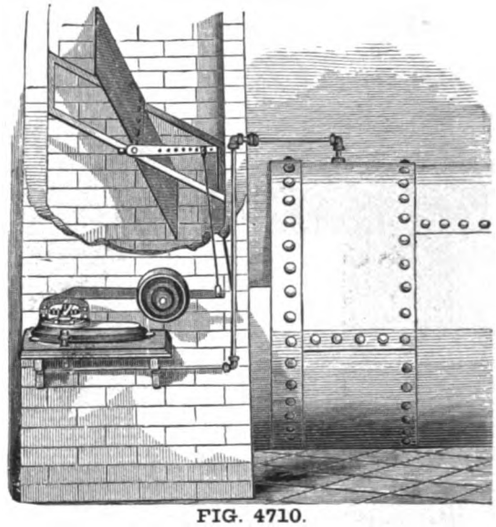


FIG. 4710.

PRICES.

No. 1—Low pressure, for heating.....$13.00
No. 2—Up to 4 H. P. 16.00
No. 3—From 4 to 20 H. P. 25.00
No. 4—From 20 to 50 H. P. 38.00
No. 5—50 H. P. and over.....

UNION.

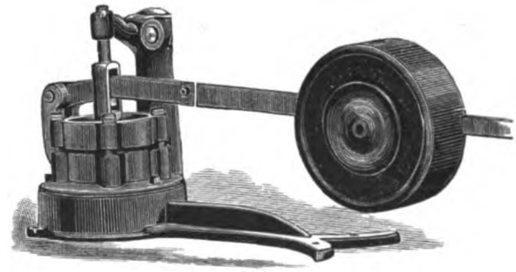


FIG. 4711.

PRICES.

No. 1 for dampers 6 x 18 to 8 x 24 inclusive, $25.00
No. 2 " " 9 x 37 to 12 x 36 " 40.00
No. 3 " " 14 x 42 to 16 x 48 " 90.00

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LOW WATER DETECTOR AND ALARM.

This style of detector has been attached to the boilers of nearly all the large manufacturing establishments in New England and throughout the country; also on the boilers of the navy yards of the United States Government, and has been approved by the United States Board of Supervising Inspectors of Steamboats, and adopted by the Secretary of the Treasury according to the requirements of an Act of Congress relating to steam vessels, approved Feb. 28, 1871.

Burnt boilers and boiler explosions are prevented by the use of the low water detector, which, on account of extreme simplicity, recommends itself to all users of steam.

The cut shows a No. 1 low water detector, fixed to a boiler through the top of the shell, which is considered the best manner to apply it to all large stationary boilers.

PRICES.

No. 1, with six discs..... $20.00 Extra discs, per dozen.....$4.80

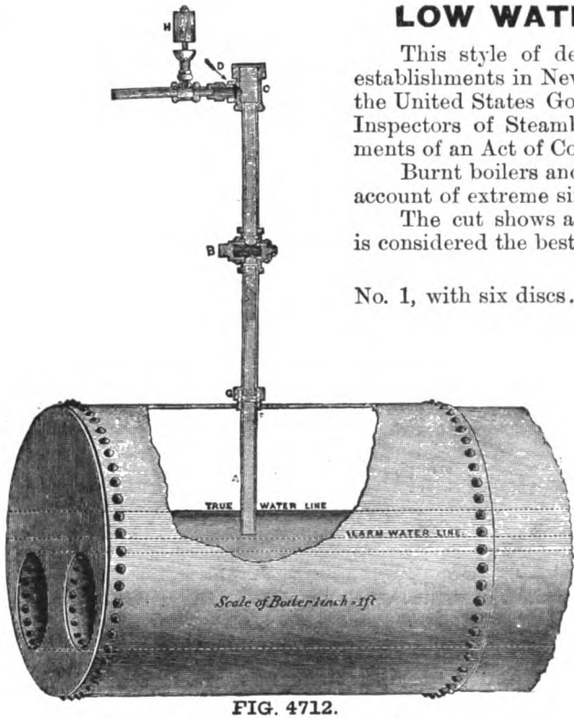


FIG. 4712.

SAFETY COLUMN ALARM.

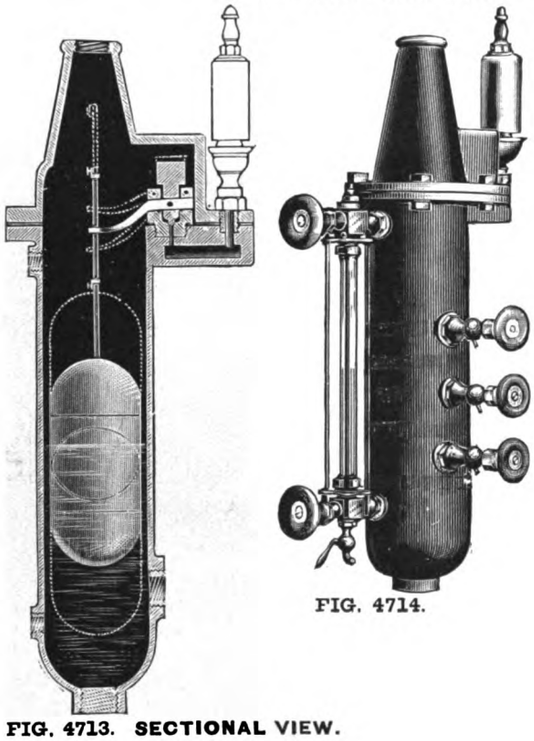


FIG. 4713. SECTIONAL VIEW.

FIG. 4714.

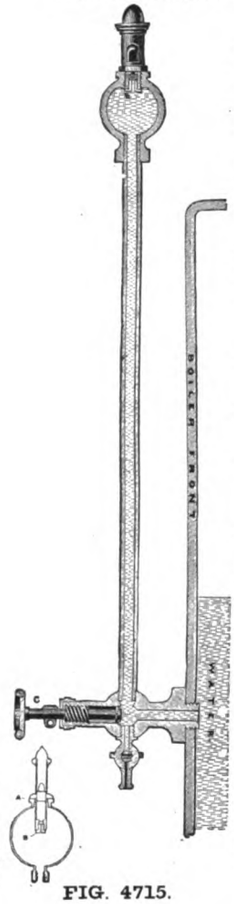
PRICES, FIG. 4714.

No.	Length over all, in inches.	Diameter of boiler and steam pressure, in lbs.		Length of glass.	Distance bet. gauge cocks.	Size of trimmings.	Variation between alarms	Without gauge cocks or water gauges.	With gauge cocks and water gauges.
	in.	Any diam.	Any press.	in.	in.	in.	in.	$	$
1	32			16	4½	½	9	30.00	40.00
2	26	Any diam.	Any press.	12	3	½	6	28.00	35.00
3	24	40 H. P.	80 lbs.	10	3	½	6	26.00	32.00

Iron columns finished and highly nickel plated, each, $10.00 extra.

	No. 1,	No. 2,	No. 3,
Finished brass columns.....	$90.00	$80.00	$70.00
Untrimmed.....	80.00	70.00	60.00

LOW WATER DETECTOR AND ALARM.



PRICES, FIG. 4715.

No. 2, all brass, with 6 discs.....	$20.00
No. 3, iron pipe and ball, brass cocks, with 6 discs.....	15.00
Extra discs.....ea.	1.20

DIRECTIONS. HOW TO FIX A PLUG IN THE DETECTOR IN A BOILER IN USE.

1st. After a plug has melted, shut the cock, *c*, to stop the whistle blowing. Then pump the water into the boiler up to the proper water-line.

2d. Unscrew the whistle at *a*; next unscrew the nut, *b*, and put a plug in place, as shown in cut; then screw the nut, *b*, hard against it; replace the whistle, open the cock, cautiously at first, to give the water time to cool before it reaches the plug, otherwise it may melt it, and the detector is again in order.

After putting in a new plug, if water drips from the mouth of the whistle, it will cause a circulation in the pipe, which would raise the temperature above 212 degrees, F., thus melting the plug. Therefore, care should be taken to screw the nut, *b*, hard against the plug to prevent leakage.

No red or white lead, or any kind of packing should be used about the plug, and as often as once in six months the plug should be blown out.

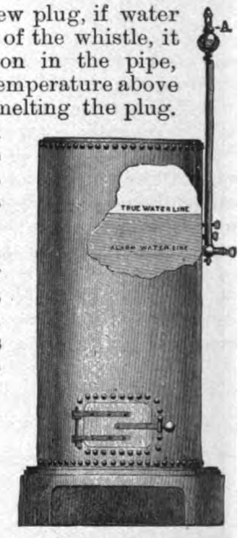


FIG. 4715.

SAFETY INDICATOR AND ALARM.

PRICES, FIG. 4716.

In ordering be particular to state diameter of boiler, if you desire to flange on the side of boiler. **PRICE, $45.00.**

We manufacture floats, all sizes, to stand heavy pressure, also for hydraulic purposes. Prices on application.

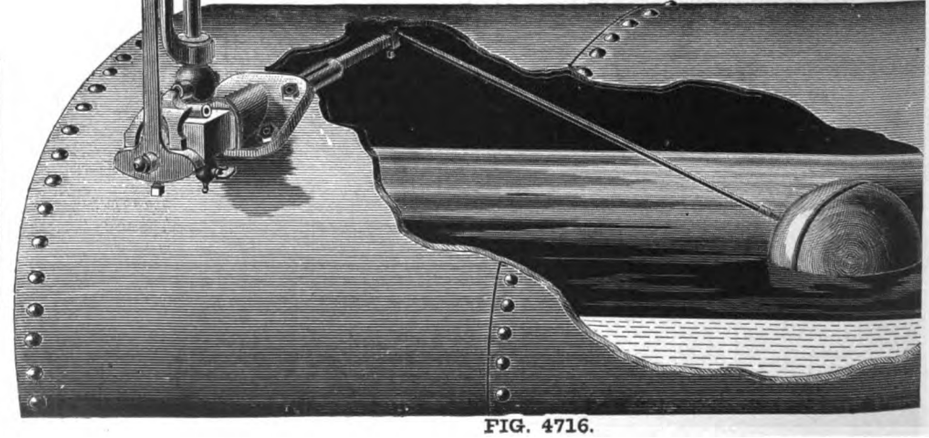
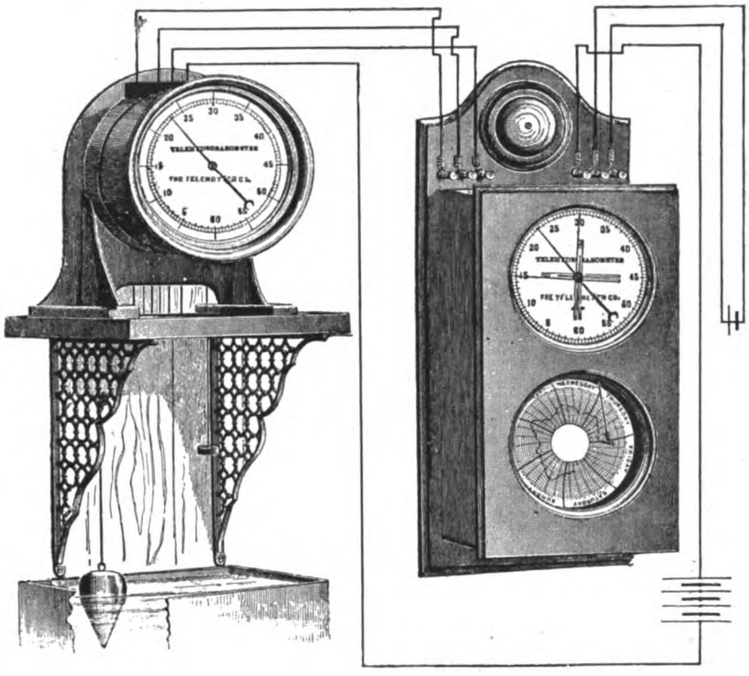


FIG. 4716.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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THE TELEHYDROBAROMETER.



TRANSMITTER. FIG. 4717. **RECEIVER.**

Indicating dial, 6 in. diam. Indicating and recording dial, 6 in. diam.

For electrically indicating and recording the height of water, oil, or of a gas-holder at a distance.

The transmitter contains a finely adjusted thermometer or steam gauge and a dial, upon which a pointer accurately indicates the temperature of the place where the transmitter is located. The whole is enclosed in a substantial case, which also contains an electrical device for transmitting an indication of the temperature to the receiver. The two instruments can be miles apart, and yet the temperature at the place where the transmitter is located will be accurately indicated on the dial of the receiver. The receiver may have a recording dial, daily or weekly, on which a continuous record of the temperature is made in red ink, and also an alarm bell, which rings whenever the temperature rises above or falls below the maximum or minimum point at which the alarm hands have been set.

On the back of the transmitter is a small drum or pulley around which is wound one end of a strong silk line, the other end of the line being connected to a float which rises and falls with the rise and fall of the liquid in which it is immersed. The revolution is electrically transmitted to the receiver, which in its turn indicates and records the height of the liquid.

The bell of a gas-holder can be substituted for the float.

THE RANGE OF THIS INSTRUMENT IS AS FOLLOWS:

Intervals.	Maximum.
$\frac{1}{10}$ feet.	12 feet.
1 inch.	10 "
2 inches.	20 "
3 "	30 "
4 "	40 "
6 "	60 "

Instruments giving special ranges can be made to order, showing intervals of less than one inch or greater than six inches.

PRICES, FIG. 4717.

Index dial.	Recording dial.	Prices.
6	6	With alarm bell..... $140.00
6	10	" " " 150.00
6	6	No " " 135.00
6	10	" " " 145.00
6	none.	With " " 130.00
6	none.	No " " 125.00

THE TELEMANOMETER.

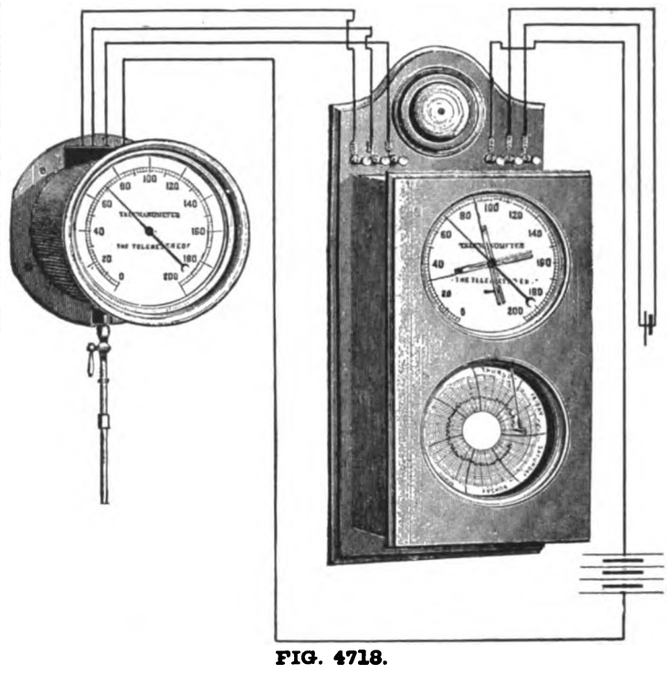


FIG. 4718.

TRANSMITTER. **RECEIVER.**

Indicating dial, 6 inches. Indicating and recording dial, 6 inches.

For electrically indicating and recording pressure at a distance.

By locating the receivers in the office, the management has at all times a complete knowledge of the conditions throughout an entire establishment.

Additional receivers, called intermediates, can be put into the main line when desired, at any point, one transmitter operating an indefinite number.

Intervals.	Maximum.
$\frac{1}{2}$ lb.	50 lbs.
1 "	100 "
2 "	200 "
3 "	300 "
5 "	500 "
10 "	1,000 "
15 "	1,500 "

Full printed instructions for installing and operating are sent with each instrument.

PRICES, FIG. 4718.

Size of index dial.	Size of recording dial.	Prices.
6	6	With alarm bell..... ...$100.00
6	10	" " " 110 00
6	6	No " " 95.00
6	10	" " " 105.00
6	none.	With " " 85.00
6	none.	No " " 80.00
Add for pressure gauges showing above 500 lbs. pressure, $15.00		

THE TELEMETER ELECTRIC TIME SYSTEM.

This is the only perfect system for transmitting time from a master clock to a system of electric dials. Estimates given for installing the system, wherever uniform and accurate time is desired. Plants for sale outright.

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BALANCED FURNACE DOORS AND WROUGHT IRON GRATE BARS.

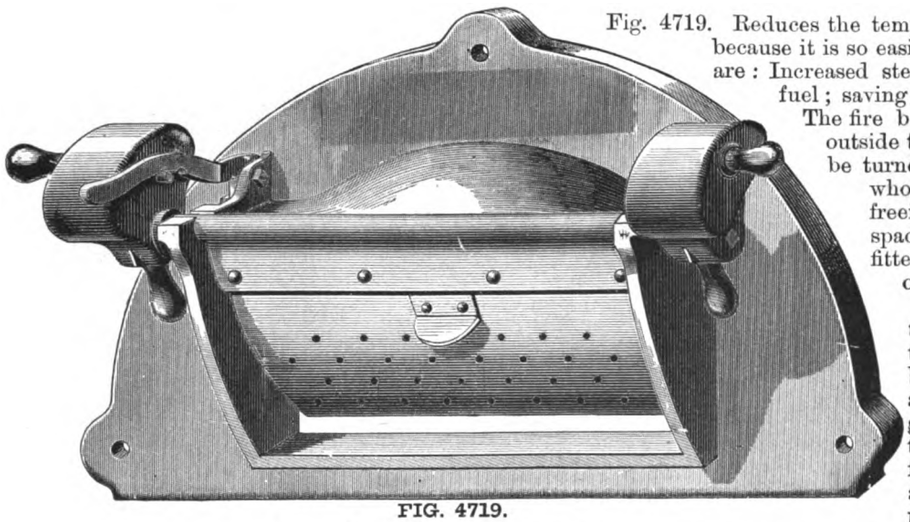


FIG. 4719.

Fig. 4719. Reduces the temperature in the fire room. The firemen like it because it is so easily handled. The natural results of this system are: Increased steam power; prevention of smoke; economy in fuel; saving of labor.

The fire bars are plain square wrought iron, and project outside the front of the furnace; each alternate one can be turned round by means of a spanner key, and the whole set can be thus turned in about one minute, freeing the furnace from dross, and clearing the spaces for the admission of air. The furnaces thus fitted will run double the time of ordinary ones without cleaning out.

This combination of the patent doors and bars to is such as to allow the freest admission of air through the fuel, insuring the maximum of combustion, and causing a constant current of fresh air in the stoke-hole. The oxygen mixes with the gases in the process of combustion, causing them to become perfectly developed before leaving the furnace, which diminishes the fouling of the tubes, and prevents the possibility of re-ignition taking place in the chimney.

The patent balanced door can be attached to any style of boiler. Parties ordering can send a rough sketch of boiler fronts, and give dimensions of opening for door, and we can furnish doors all fitted ready to attach, in place of the ordinary furnace door.

Estimates made for furnishing doors and bars and setting boilers on most improved plans.

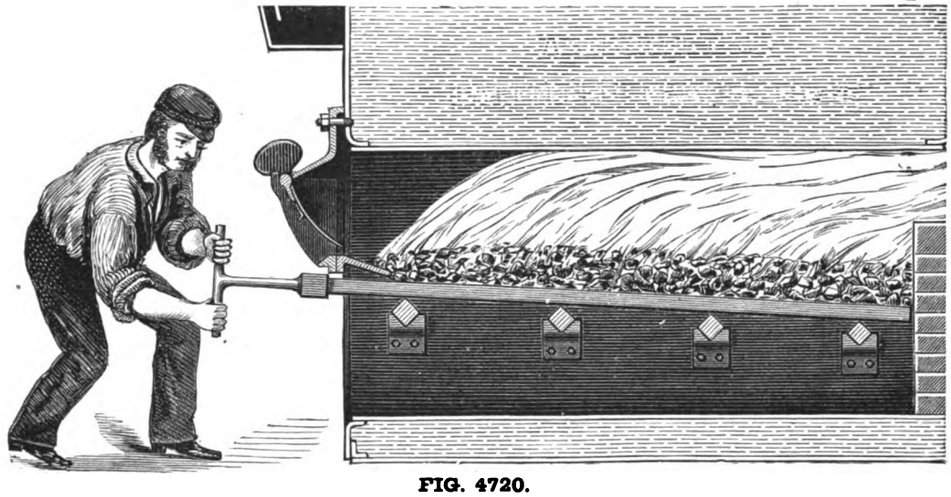


FIG. 4720.

DESCRIPTION, FIG. 4721.

It has a ventilating air space produced between the outer sides of the longitudinal supporting ribs and the circumscribing bands or ties connecting the lateral ribs or "V's," and the longitudinal supporting ribs being underneath the web and set in from its outer edges, make the whole series of supporting ribs equidistant from each other, allowing a free circulation of air between them, keeping them cool and thus prolonging the "life" of the grate. Other sectional grates have the supporting ribs on the outer edges, and a part of the web, thus bringing them so closely together as to practically exclude the air and destroy the grates.

Price per square foot..... $2.00

ROGERS SECTIONAL GRATE.

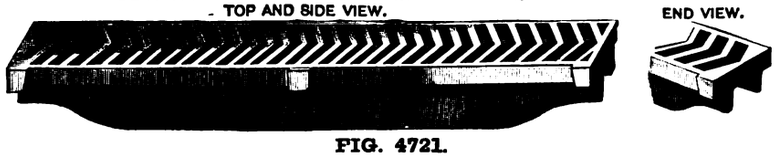


FIG. 4721.

SHAKING AND DUMPING GRATE BARS.

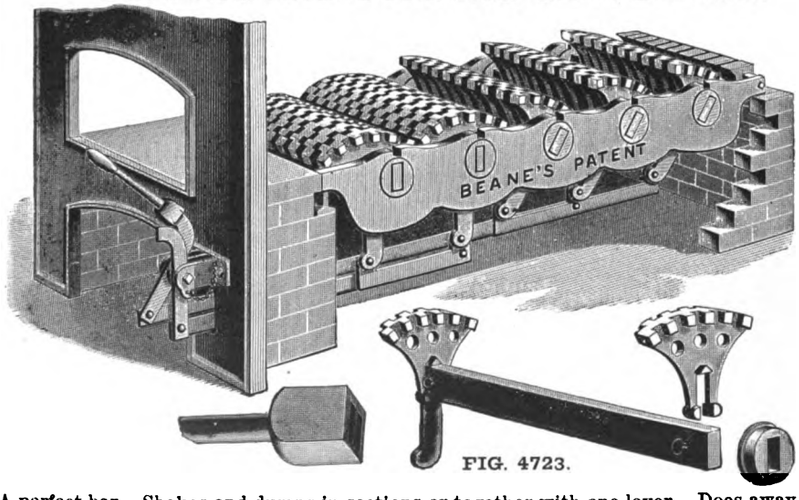


FIG. 4723.

A perfect bar. Shakes and dumps in sections or together with one lever. Does away with the use of fire tools. A few shakes of the lever give a clean, bright fire. No cold air rushing into fire box. Saves fuel. Prices on application.

ROUND AND STRAIGHT BARS.

All patterns and weights, with openings to suit any kind of coal. Prices on application.

ROUND AND STRAIGHT BARS.

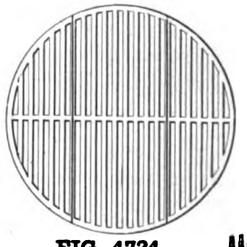
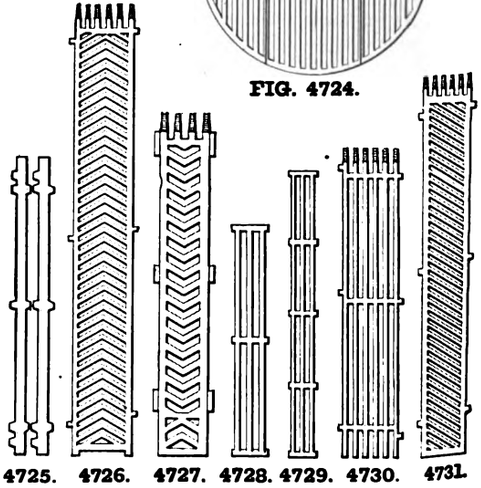


FIG. 4724.



FIGS. 4725. 4726. 4727. 4728. 4729. 4730. 4731.

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THE McCLAVE BOILER GRATES.

By its use you can burn the cheapest grades of anthracite and bituminous coal.

You can clean your fire from the bottom.

You can clean your fires without opening the fire doors.

It has a fire surface especially adapted to prevent fine unconsumed fuel from running through into the ash pit.

It has a thorough shaking movement, in which there is no increase in size of openings. This movement is well adapted to break up a soft coal fire when it cakes, or to remove the fine ashes from a hard coal fire when there is but little if any clinker formed.

THE GRATE IN ITS NATURAL POSITION.

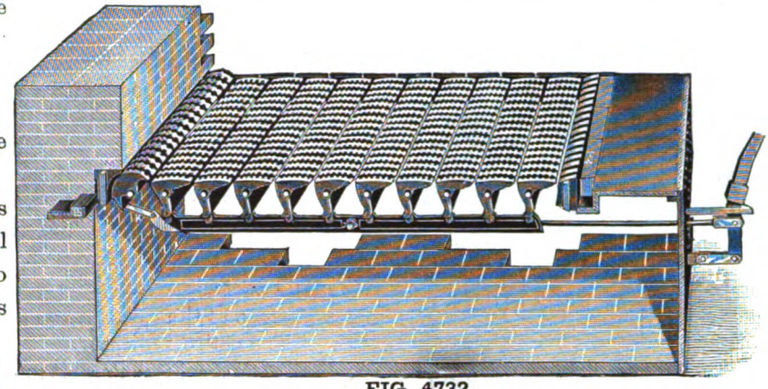


FIG. 4732.

SHAKING MOVEMENT.

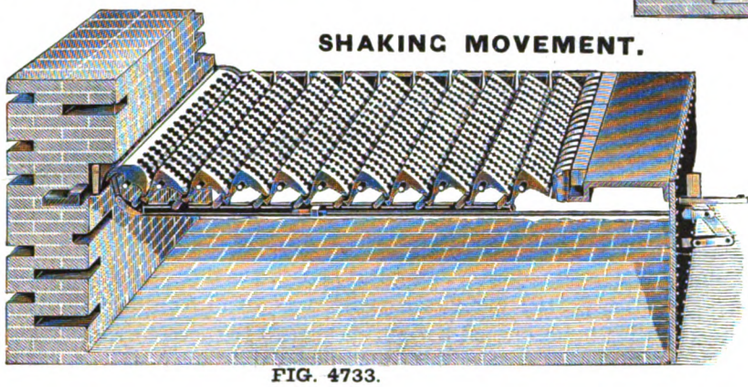


FIG. 4733.

It also has an absolute cut-off movement that will break up and remove clinkers instantly without wasting the fire.

It will clean a fire uniformly from front to rear, the grate bars at the bridge wall being crescent shaped, so that they may operate closely to the wall.

CUT-OFF MOVEMENT.

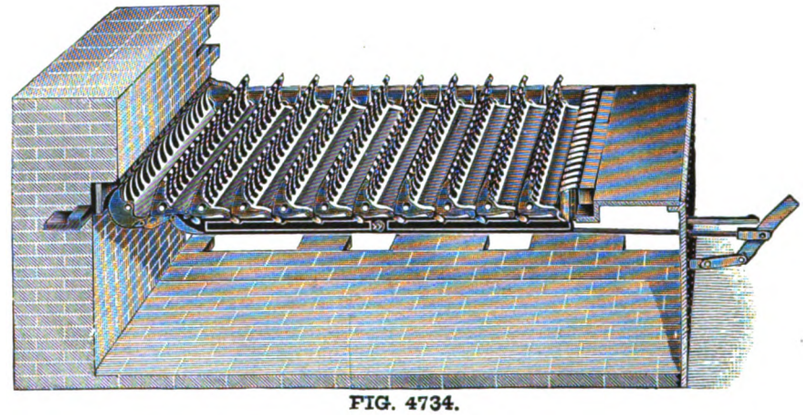


FIG. 4734.

For grates, nearly square, up to 12 square feet, the distance from the top of the grate to the bottom of the ash pit should be at least 30 inches. Where small grates are long and narrow, the ash pit should be 33 inches deep from top of grate.

For grates from 12 to 24 square feet. . . . . 33 inches deep.
For grates from 24 to 36 square feet . . . . 36 inches deep.
For grates from 36 to 72 square feet and upward . . . . . 40 inches deep.

PRICES ON APPLICATION.

FIRE TOOLS.

Hoe, pokers, slice bars, rakes.

PRICE, 20 CTS. LB.

Weights, 50 to 90 lbs. each, according to length.

THE TABOR STEAM ENGINE INDICATOR.

A special feature in the construction of the Tabor indicator lies in the means employed to communicate a straight line movement to the pencil, giving greater accuracy of its parallel movement than is found in any other indicator made. Another point, and one that is usually overlooked in indicators, although of the highest importance, is that the movement of the pencil should coincide exactly with the movement of the piston, which is perfect in the Tabor. The excellence of the manufacture of the parts of the Tabor indicator is a marked feature, and particular attention is directed to this matter, because, from an engineering point of view, excellent workmanship in an instrument of this kind is of vital importance.

This instrument is adapted to general use, as it will give accurate diagrams at either high or slow speeds.

Write for special pamphlet on the indicator.

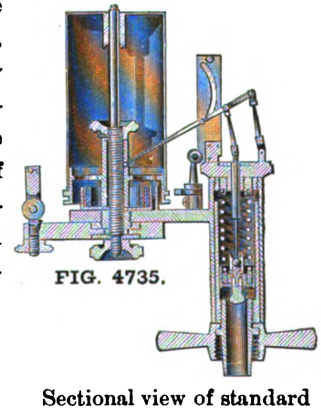


FIG. 4735.

Sectional view of standard instrument.

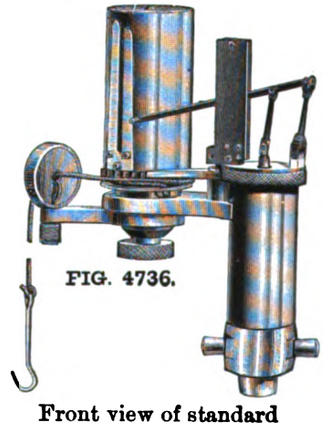


FIG. 4736.

Front view of standard instrument.

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U. S. NAVY PATTERN TABOR INDICATOR.

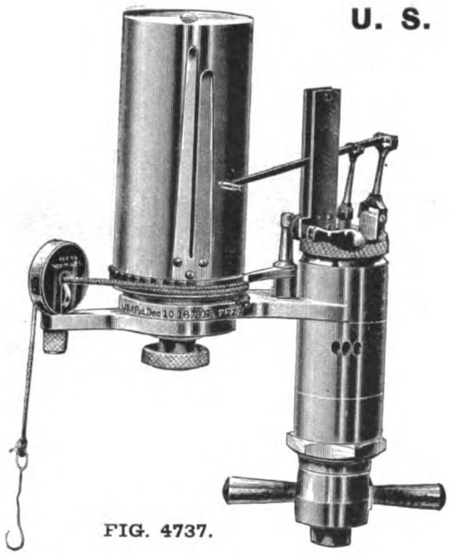


FIG. 4737.

This instrument embraces all of the desirable features of the standard indicator, and in addition has an adjustable sleeve by which the escaping steam can be discharged in any direction, thus insuring the operator protection from the annoyance of steam blowing in his face when using the indicator. This device consists of a ring fitted loosely around the body of the instrument, into which a series of holes are drilled, through which the waste steam from the cylinder is directed in its escape into the atmosphere. This ring can be swiveled around the body of the indicator at the will of the operator.

The piston cylinder of this indicator has an inside cylinder, which can be readily replaced when worn or injured, which is very desirable, for frequently in testing a new marine engine there is sand from the castings, sediment and other foreign matter that works into the indicator and injures the piston and cylinder, and in other indicators it would necessitate an entire new cylinder, whereas with the Tabor indicator the addition of a piston and the cylinder lining practically makes the indicator as good as new.

The entire indicator, excepting the moving parts, is made considerably heavier than in the standard type, and it is therefore better adapted to the extreme high boiler pressure and rougher usage than an indicator for marine purposes is frequently subjected to.

In a late report of a test of indicators made at the Brooklyn Navy Yard it was shown that the Tabor indicator had 30 per cent. less weight of moving parts and $24\frac{3}{10}$ per cent. less friction than any other indicator tested.

The Tabor indicator has been adopted by the U. S. Navy, and is in use on nearly all the ships of the new navy.

PRICES, FIGS. 4735, 4736 AND 4737.

The "Tabor" improved indicator, complete and full nickel plated, with one spring, one scale, two cocks, 100 plain cards, "Barrus" treatise on the indicator, one screw driver, one bottle oil, one extra drum spring and the necessary wrenches, all enclosed in neat black-walnut box with nickel plated trimmings, Figs. 4735, 4736 and 4737 ..... $85.00

Extra springs, Fig. 4742	5.00
Extra scales	.50
Extra steel scales	1.50
Extra straight cocks	2.75
Extra elbows	2.50
Single carrying pulley	.60
Double carrying pulley	1.20
Parallel rule	7.00
Reducing pulley, up to 4 ft. stroke	25.00
Reducing pulley, up to 6 ft. stroke	50.00
Metallic cards, by the 100	1.50
Common cards, by the 100	1.00
Special steel indicator for ammonia	125.00

COFFIN AVERAGING INSTRUMENT.

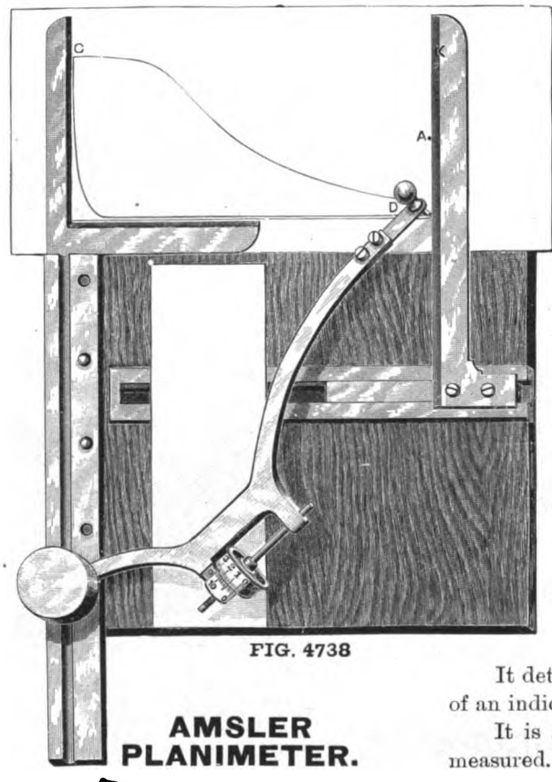


FIG. 4738

AMSLER PLANIMETER.

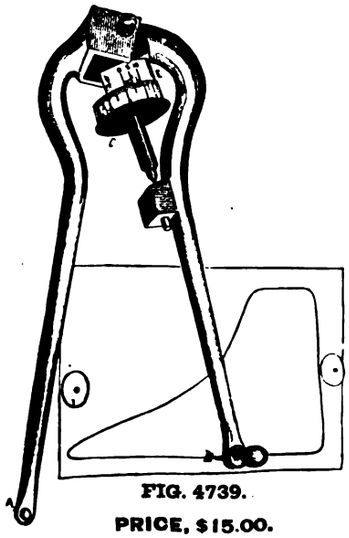


FIG. 4739.

PRICE, $15.00.

DESCRIPTION AND PRICE, FIG. 4738.

It determines the area of any irregular figure and gives mean effective pressure (M.E.P.) of an indicator diagram without computation.

It is absolute, accurate and easy to manipulate. One diagram per minute can be measured.

PRICE, IN MOROCCO CASE, $30.00.

AMSLER PLANIMETER, WITH EXTENDED ARM.

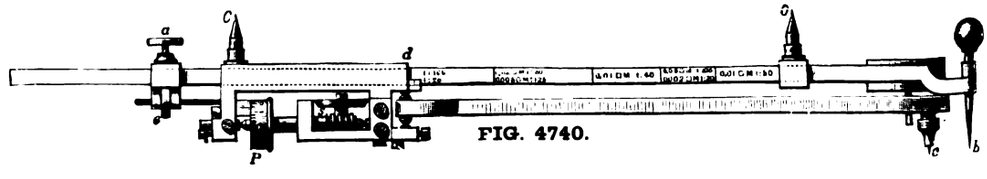


FIG. 4740.

The roller-wheel ought to play easily without touching the vernier. The pivots ought to turn very easily. The needle point ought to project but very little. The outside edge of the roller-wheel is delicate, and will not bear the least injury or spot of rust upon its rolling surface. It is very necessary that the arms and tracer should not be bent. Care should be taken to have a flat even surface for the roller-wheel to travel upon.

PRICE, $30.00.

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INDICATOR APPLIANCES.

DUPLEX SPRING.



FIG. 4741.

Scale of spring.	Maximum safe pressure to which a spring can be subjected.
8	10
10	15
12	20
16	24
20	40
24	48
30	70
32	75
40	100
48	120
50	125
60	150
64	160
80	200
100	250

STANDARD SPRINGS,

Scaling 10, 12, 20, 24, 30, 40, 50, 60, 80, 100, 120, and 150 lbs., always in stock.

Other sizes furnished if desired.

METRIC SPRINGS,

Scaling 3, 4, 5, 6, 8, 10, 15, 20 and 30 mm. per kilog. per sq. cm., always in stock.

THREE-WAY COCK.

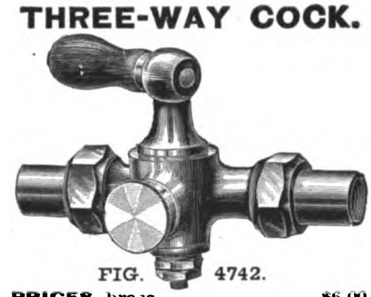


FIG. 4742.

PRICES, brass..... $6.00
" nickel-plated..... 7.00

PANTAGRAPHS.

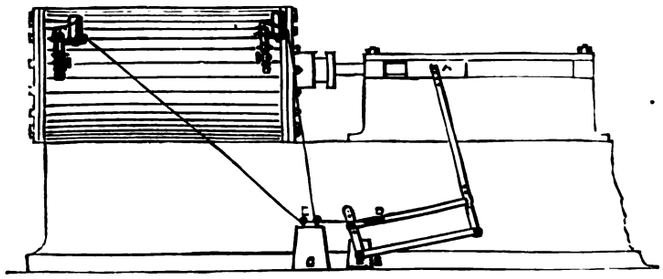


FIG. 4743.

PRICE, FIG. 4743, $10.00.

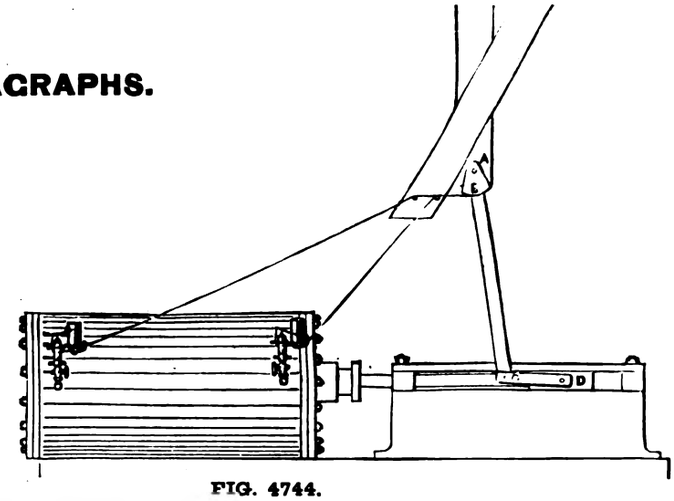


FIG. 4744.

INDICATOR DIAGRAMS.

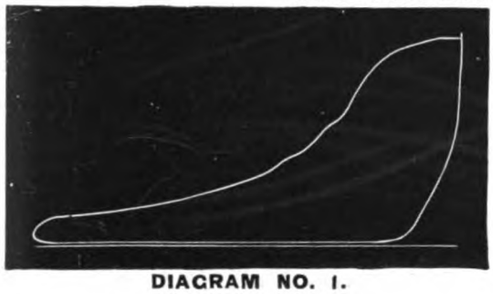


DIAGRAM NO. 1.
Correct adjustment.

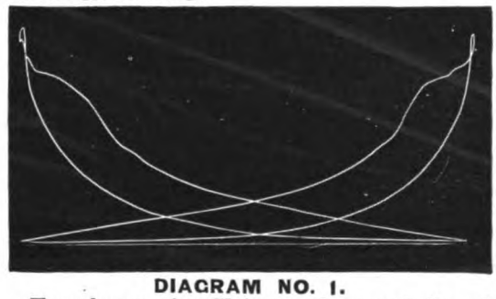


DIAGRAM NO. 1.
From locomotive. Valves set by sound. Speed, 208 rev. per min. Scale, 80. 1st notch.

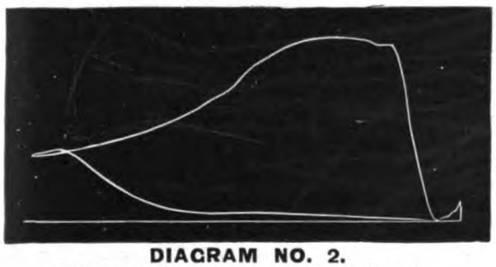


DIAGRAM NO. 2.
Faulty adjustment. Eccentric set backward 43 deg.

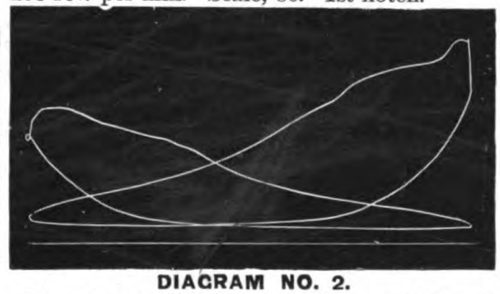


DIAGRAM NO. 2.
From locomotive. Valves set by sound. Speed, 210 rev. per min. Scale, 80. 3d notch.

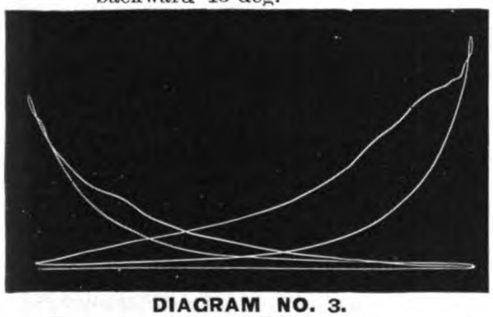


DIAGRAM NO. 3.
From locomotive. Valves set by sound. Speed, 208 rev. per min. Scale, 80. 1st notch.

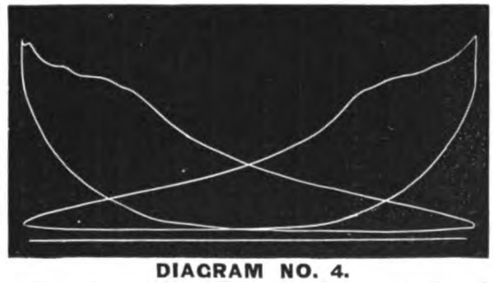


DIAGRAM NO. 4.
From locomotive. Valves set by sound. Speed, 210 rev. per min. Scale, 80. 3d notch.

LAZY TONGS.

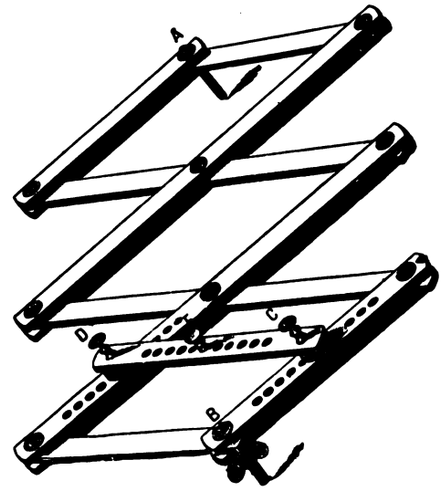


FIG. 4745.

APPLIED TO CROSS HEAD.

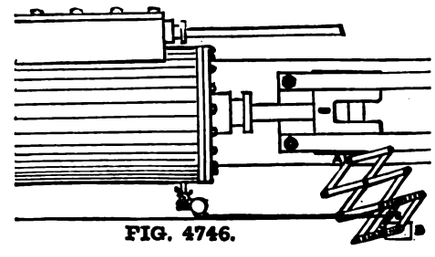


FIG. 4746.

PRICE, $10.00.

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CORLISS ENGINE.

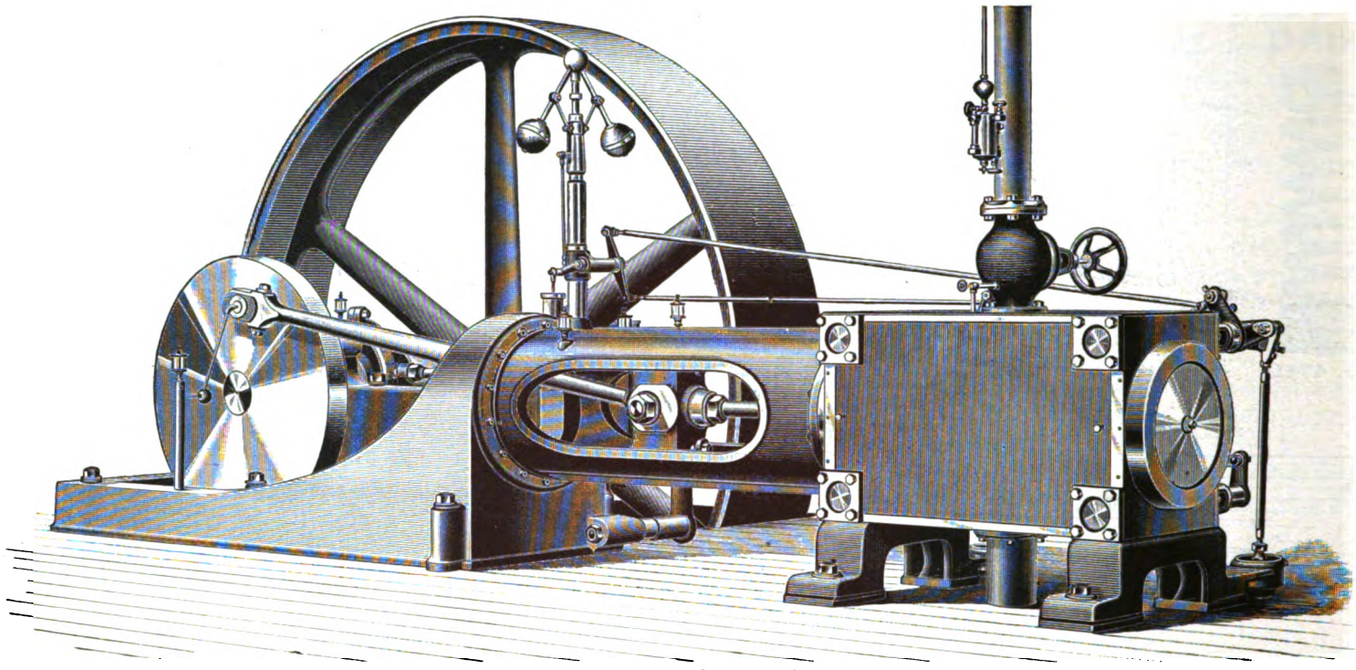


FIG. 4747. REPRESENTS FRONT.

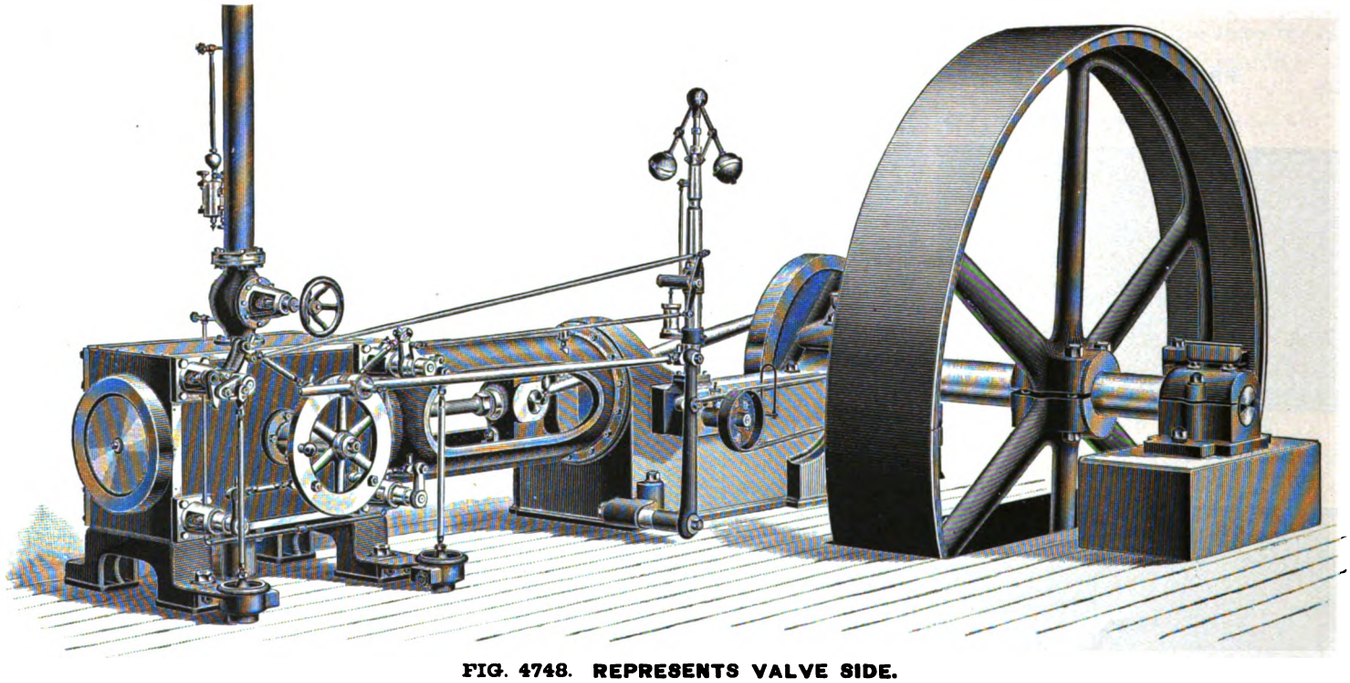


FIG. 4748. REPRESENTS VALVE SIDE.

Size.		Revolutions.	Indicated horse power.						Band fly wheel.			Distance, center of shaft to back cylinder head.	Center of shaft above foundation.
Diameter of cylinder.	Stroke.		80 pounds pressure.		90 pounds pressure.		100 pounds pressure.		Diameter.	Face.	Weight, in pounds.		
			1-5 cut off.	1-4 cut off.	1-5 cut off.	1-4 cut off.	1-5 cut off.	1-4 cut off.					
8 in.	24 in.	100	21	26	24	29	27	33	7 ft.	11 in.	2,300	11 ft., 3 in.	25 in.
10 "	30 "	90	37	45	42	51	48	58	8 "	13 "	4,300	13 " 6 "	25 "
12 "	30 "	90	54	65	62	74	69	83	9 "	15 "	5,700	14 "	25 "
12 "	36 "	85	61	73	70	84	78	94	10 "	17 "	6,300	16 " 3 "	25 "
14 "	36 "	85	83	100	95	114	107	128	10 "	19 "	8,900	16 " 3 "	25 "
14 "	42 "	82	93	112	107	128	120	144	12 "	19 "	8,900	18 " 3 "	25 "
16 "	36 "	82	105	126	120	144	135	162	12 "	21 "	10,000	16 " 6 "	27 "
16 "	42 "	78	116	139	133	159	150	179	12 "	23 "	11,800	18 " 6 "	27 "
18 "	36 "	80	129	155	148	177	166	199	12 "	25 "	13,000	16 " 9 "	30 "
18 "	42 "	78	147	176	168	202	189	227	14 "	23 "	13,300	18 " 9 "	30 "
18 "	48 "	75	162	194	185	222	208	249	15 "	25 "	15,300	21 "	30 "
20 "	42 "	75	175	210	200	240	225	270	15 "	25 "	16,600	18 " 10 "	30 "
20 "	48 "	72	192	230	219	263	246	296	16 "	27 "	18,700	21 " 1 "	30 "
20 "	60 "	65	216	260	248	297	279	334	16 "	31 "	24,400	25 " 7 "	30 "
22 "	42 "	75	211	254	242	290	271	326	16 "	29 "	18,000	19 " 1 "	32 "
22 "	48 "	72	232	278	265	318	298	358	16 "	33 "	23,100	21 " 4 "	32 "
22 "	60 "	65	262	314	299	359	336	404	18 "	35 "	26,300	25 " 10 "	32 "

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CORLISS ENGINES—CONTINUED.

Size.		Revolutions.	Indicated horse power.					
			80 pounds pressure.		90 pounds pressure.		100 pounds pressure.	
Diameter of cylinder.	Stroke.		1-5 cut off.	1-4 cut off.	1-5 cut off.	1-4 cut off.	1-5 cut off.	1-4 cut off.
24 in.	48 in.	70	268	322	307	368	345	414
24 "	60 "	65	311	374	356	427	401	481
26 "	48 "	70	315	378	360	432	405	486
26 "	60 "	65	366	439	418	502	470	564
28 "	48 "	68	355	426	406	487	457	548
28 "	60 "	65	424	509	485	582	545	654
30 "	48 "	68	407	489	466	559	524	629
30 "	60 "	62	464	557	531	637	597	717
30 "	72 "	55	494	593	565	678	635	762
32 "	48 "	65	443	532	507	608	570	684
32 "	60 "	62	529	634	604	725	680	816
32 "	72 "	55	563	675	643	772	723	868
34 "	48 "	65	500	600	572	686	644	772
34 "	60 "	62	597	716	682	818	767	920
34 "	72 "	55	635	762	726	871	817	980
36 "	60 "	62	669	803	765	918	860	1,032
36 "	72 "	55	711	853	814	977	916	1,099
40 "	60 "	62	826	991	944	1,133	1,062	1,274
40 "	72 "	55	879	1,055	1,005	1,206	1,130	1,356
42 "	60 "	62	910	1,092	1,041	1,249	1,171	1,405
42 "	72 "	55	969	1,163	1,108	1,330	1,246	1,496
44 "	60 "	62	998	1,197	1,142	1,370	1,285	1,542
44 "	72 "	55	1,063	1,275	1,216	1,459	1,368	1,642
46 "	60 "	62	1,092	1,310	1,249	1,499	1,405	1,686
46 "	72 "	55	1,163	1,396	1,329	1,595	1,495	1,794
48 "	60 "	62	1,190	1,428	1,360	1,632	1,530	1,835
48 "	72 "	55	1,266	1,520	1,447	1,737	1,628	1,954

Band fly wheel.			Distance, center of shaft to back cylinder head.	Center of shaft above foundation.
Diameter.	Face.	Weight, in pounds.		
18 ft.	35 in.	24,400	21 ft., 6 in.	32 in.
20 "	40 "	28,500	26 " 1 "	32 "
18 "	42 "	29,000	21 " 9 "	34 "
20 "	48 "	34,000	26 " 3 "	34 "
20 "	44 "	31,500	22 "	34 "
22 "	50 "	36,000	26 " 4 "	34 "
22 "	46 "	33,000	23 " 3 "	36 "
24 "	52 "	38,500	28 "	36 "
24 "	60 "	52,000	32 " 6 "	36 "
24 "	48 "	34,500	23 " 6 "	36 "
24 "	60 "	43,900	28 " 3 "	36 "
24 "	66 "	58,200	32 " 9 "	36 "

Note.—Diameter, face and weight of wheels for engines over 32 in. diameter of cylinder, made to suit circumstances. Wheels for other sizes may also be varied in dimensions if conditions render it necessary.

DOUBLE DISC, TWO FLY WHEEL, HORIZONTAL ENGINES.

The advantages of this engine may be briefly stated as follows: Extreme simplicity; the entire absence of parts requiring frequent adjustment; great regularity of speed; small cost, especially for the greater powers; small space required for engine and fly wheel; a compact form, and consequently rigidity in stationary and moving parts, unattainable in engines of long stroke; the employment of short and nearly parallel belts in place of long converging ones; the avoidance of intermediate gearing to produce the speed required; the great saving in room, building and foundations.

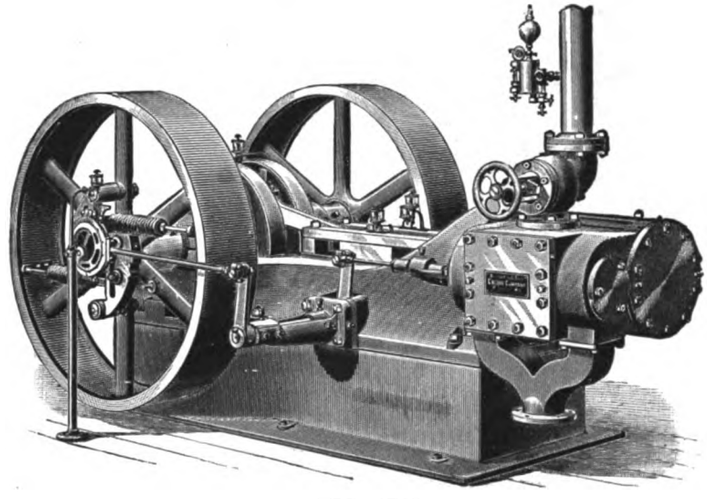


FIG. 4749.

STANDARD ENGINES, SINGLE DISC, ONE WHEEL.

The engines of this type have the well-known Porter-Allen style of bed, made very heavy, and are largely used, either singly or in pairs, for driving large manufacturing establishments.

Diameter cylinder.	Length of stroke.	Revolutions of crank per minute.	Indicated H. P. without condensation.	Fly wheel, diameter.	Fly wheel, width of face.	Diameter of steam pipe.	Diameter of exhaust pipe.	Weight with foundation box.	Weight without foundation box.
11 in.	18 in.	200	70	66 in.	13 in.	3.5 in.	4 in.	9,000	
12.5 "	20 "	180	90	72 "	15 "	4 "	5 "	12,000	
14.5 "	24 "	150	125	78 "	20 "	5 "	6 "	18,000	
16.5 "	24 "	150	150	84 "	24 "	6 "	8 "	20,000	
17.5 "	24 "	150	175	84 "	24 "	6 "	8 "	22,000	
18.5 "	30 "	120	200	108 "	30 "	7 "	9 "	32,000	
20 "	30 "	120	250	108 "	30 "	7 "	9 "	35,000	

DIMENSIONS, FIG. 4749.

5 in.	7 in.	350	10	30 in.	4.5 in.	1.5 in.	2 in.	1,800	1,500
6 "	7 "	350	14	30 "	4.5 "	2 "	2.5 "	1,950	1,550
6.5 "	8 "	350	18	34 "	5.5 "	2 "	2.5 "	2,700	2,100
7.5 "	9 "	325	25	36 "	6 "	2.5 "	3 "	3,400	2,900
8 "	9 "	325	30	36 "	6 "	2.5 "	3 "	3,500	3,000
8.5 "	10 "	300	35	40 "	8.5 "	3 "	3.5 "	4,500	3,850
9.5 "	10 "	300	42	40 "	8.5 "	3.5 "	4 "	4,800	4,100
9.5 "	12 "	275	50	47 "	10.5 "	3.5 "	4 "	7,200	5,800
10.5 "	12 "	275	60	47 "	10.5 "	3.5 "	4 "	7,500	6,100
12 "	12 "	275	75	52 "	10.5 "	4 "	5 "	9,000	7,600
13 "	12 "	275	90	52 "	11.5 "	4 "	5 "	9,300	7,700
13 "	13 "	265	95	54 "	11.5 "	4.5 "	6 "	11,800	9,700
14 "	13 "	265	110	54 "	12.5 "	4.5 "	6 "	12,000	10,000
14.5 "	15 "	260	135	60 "	12.5 "	5 "	6 "	14,800	12,500
15.5 "	15 "	260	150	60 "	13.5 "	5 "	6 "	15,000	12,700
18.5 "	18 "	220	220	86 "	16.5 "	7 "	9 "	29,000	25,000
18.5 "	18 "	200	350	86 "	21 "	7 "	9 "	40,000	35,000

SPECIAL ENGINES FOR LOW PRESSURE, DOUBLE DISCS AND TWO WHEELS.

Diameter cylinder.	Length of stroke.	Revolutions of crank per minute.	Indicated H. P. without condensation.	Fly wheel, diameter.	Fly wheel, width of face.	Diameter of steam pipe.	Diameter of exhaust pipe.
8 in.	7 in.	350	14	30 in.	4.5 in.	2.5 in.	3 in.
8.5 "	8 "	350	18	34 "	5.5 "	3 "	3.5 "
10 "	9 "	325	25	36 "	6 "	3.5 "	4 "
12.5 "	10 "	300	35	40 "	8.5 "	4 "	5 "
12 "	12 "	275	45	47 "	10.5 "	4 "	5 "
13 "	12 "	275	50	47 "	10.5 "	4 "	5 "
18.5 "	15 "	240	100	60 "	12.5 "	7 "	9 "
21 "	15 "	240	125	60 "	12.5 "	7 "	9 "

PRICES FOR ALL ABOVE ON APPLICATION.

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WESTINGHOUSE AUTOMATIC ENGINES.

COMPOUND ENGINE.

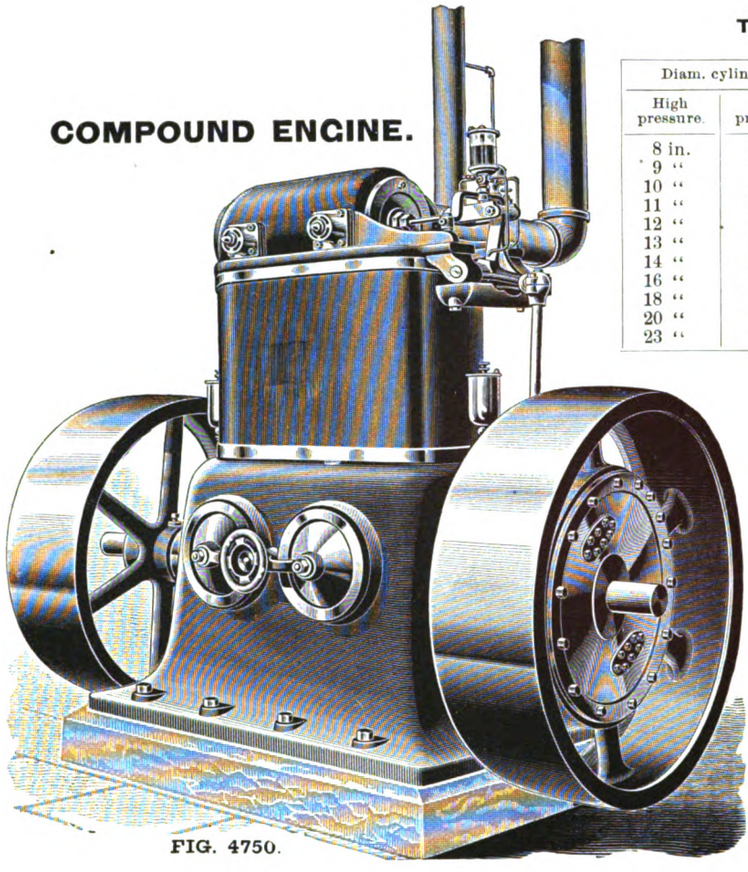


FIG. 4750.

TABLE OF SIZES OF THE COMPOUND ENGINES.

Diam. cylinder.		Stroke.	No. revs.	Piston speed, in feet.	Rated horse power.
High pressure.	Low pressure.				
8 in.	13 in.	8 in.	375	500	The size of the compound engine adapted to develop a given horse power with best results must be determined by an expert consideration of steam pressure, average and range of load, advisability of condensing, etc. An arbitrary rating is therefore impossible, and we prefer to treat each case individually.
9 "	15 "	9 "	350	525	
10 "	18 "	10 "	320	533	
11 "	19 "	11 "	300	550	
12 "	20 "	12 "	300	600	
13 "	22 "	13 "	290	628	
14 "	24 "	14 "	280	653	
16 "	27 "	16 "	250	666	
18 "	30 "	16 "	250	666	
20 "	36 "	20 "	220	733	
23 "	40 "	20 "	220	733	

JUNIOR AUTOMATIC ENGINE.

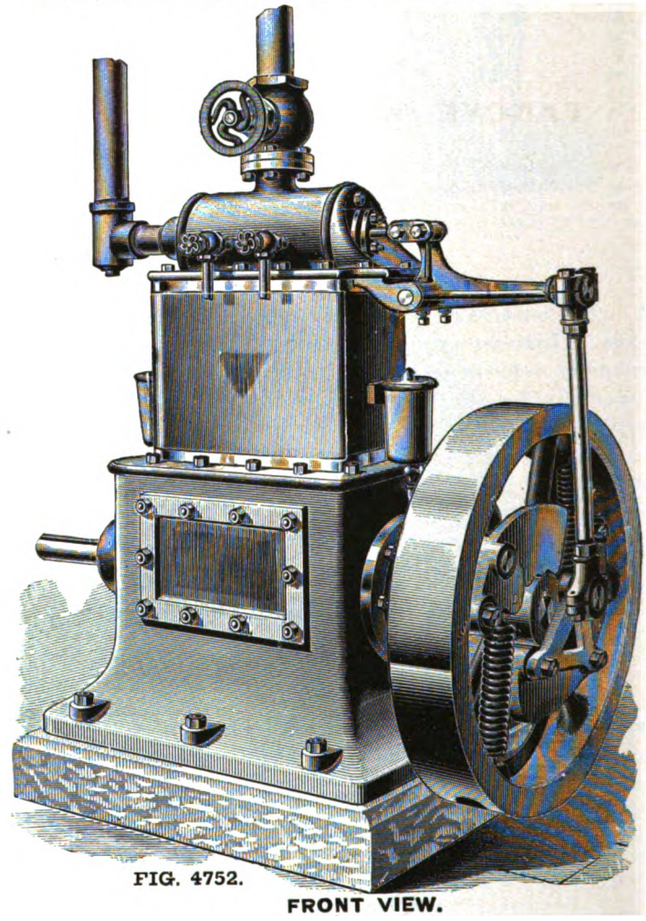


FIG. 4752.

FRONT VIEW.

STANDARD AUTOMATIC ENGINE.

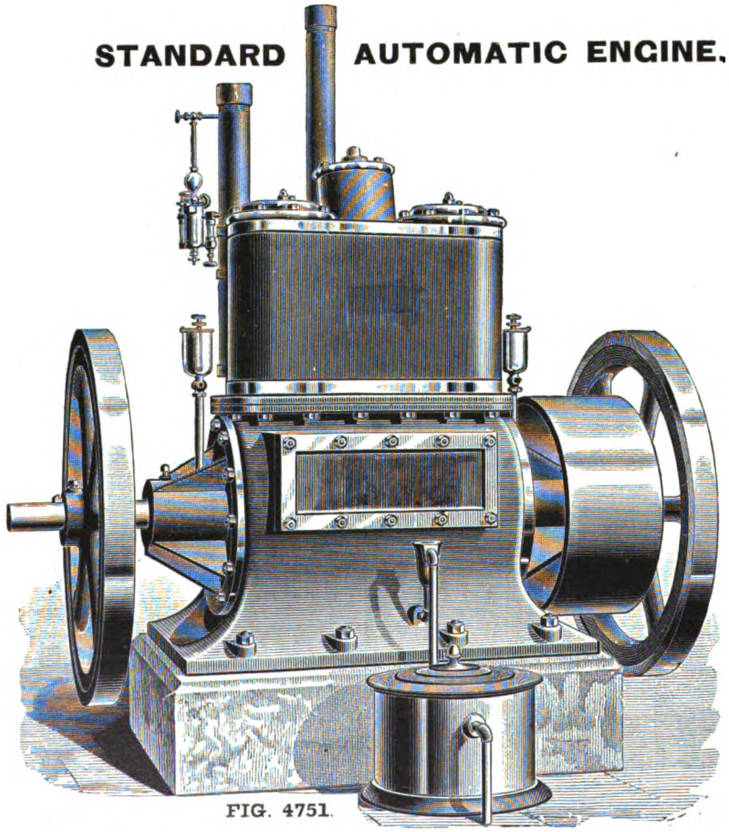


FIG. 4751.

FRONT VIEW, 15 TO 250 H. P., SHOWING BELT PULLEY.

DESCRIPTION, FIG. 4751.

The cylinders are cast in one piece with the valve chamber, and are bolted to the top of the bed or crank case.

The cylinder heads cover the upper ends of the cylinders only, the lower ends being uncovered and opening directly into the chamber of the crank case.

The pistons are of the "trunk" form, double walled at the top to prevent condensation, open at the bottom, and carrying the hardened steel wrist pins. They are each packed with three rings.

The connecting rods are now made of forged steel, without a weld, drop-forged for the sizes 5 to 25 H. P. inclusive, and hammer-forged for the sizes 35 to 250 H. P. inclusive. They are subject to compression only. The cranks, the crank pins and crank shaft are all of steel, and may be removed by taking off the crank-case head. All shafts and cranks, from 5 to 60 H. P., are forged by us in one piece from the steel billet, and the cranks cut out of the solid. From 75 H. P. upward, the cranks are in one piece, and the two ends of the shaft forced in.

SEE NEXT PAGE FOR DETAILS.

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DIMENSIONS, FIG. 4751.

Horse power.	Cylinders. Diameter.	Cylinders. Stroke.	Revolutions per minute.	Standard pulleys. Other sizes built to order. Diameter.	Face.	Width of belts.	Steam and exhaust pipes.	Weight.	Prices.
5	4½ in.	4 in.	500	18 in.	5 in.	4 in.	1½ in.	1,050	$
10	5½ "	5 "	500	21 "	6 "	5 "	2 "	1,350	
15	6½ "	6 "	400	20 "	8 "	7 "	2 "	2,050	
25	7½ "	7 "	390	22 "	9 "	8 "	2½ "	3,000	
35	8½ "	8 "	375	24 "	10 "	9 "	3 "	4,100	
45	9½ "	9 "	350	27 "	12 "	11 "	3½ "	5,200	
60	11 "	10 "	320	30 "	13 "	12 "	4 "	7,300	
75	12 "	11 "	300	34 "	15 "	14 "	5 "	9,000	
100	13½ "	12 "	300	38 "	17 "	16 "	6 "	11,400	
125	14½ "	13 "	290	40 "	21 "	20 "	6 "	14,000	
150	15½ "	14 "	280	44 "	25 "	24 "	6 "	15,000	
200	18 "	16 "	250	48 "	31 "	30 "	8 "	19,000	
250	20 "	16 "	250	60 "	38 "	36 "	8s.-10e.	20,000	

DIMENSIONS, FIG. 4752.

Horse power.	Cylinders. Diameter.	Cylinders. Stroke.	Revolutions per minute.	Piping. Steam.	Piping. Exhaust.	Weight.	Height to center of shaft.	Fly wheel. Diameter.	Fly wheel. Face.	Center of engine to end of shaft.	Shaft beyond main bearing.	Diameter of wheel fit.	Prices.
5	5 in.	4 in.	400	1½ in.	2 in.	675	10¼ in.	20 in.	5 in.	20¾ in.	7 in.	13¼ in.	$
10	6 "	5 "	390	2 "	2½ "	1,200	12 "	22 "	6 "	24½ "	8¼ "	2 "	
15	7 "	6 "	375	2½ "	2½ "	1,600	14¼ "	28 "	7 "	29 "	9½ "	2¼ "	
25	8 "	7 "	360	3 "	3 "	2,290	15 "	32 "	8 "	31 "	10 "	2⅞ "	
35	9 "	8 "	350	3 "	3 "	2,780	16 "	36 "	9 "	35 "	12 "	3⅛ "	
50	10 "	9 "	350	3½ "	4 "	3,980	16½ "	42 "	10 "	43 "	15⅜ "	3⅜ "	
75	12 "	10 "	330	4 "	4 "	4,650	18½ "	48 "	12 "	49 "	18 "	3¾ "	

PRICES QUOTED ON APPLICATION.

TANGYE BED STATIONARY ENGINES, WITH BALANCED SLIDE VALVES.

The cylinders are fitted with balanced valves, and the ports equal in length to the diameter of the cylinder, and so located as to insure perfect drainage.

The unusually large governor and steam pipe insure a full supply of steam; the main journal boxes are long, and are fitted with patent quarter boxes; the crank pin, piston and valve rods are steel, and all the wearing surfaces are extra large.

In ordering, state whether right or left hand engine is wanted. Fig. 4753 shows a right hand engine.

With an engine ordered "complete, as per list," the following fixtures are furnished:

Balance wheel pulley, per specification, turned and balanced; automatic stop governor; throttle valve; sight feed lubricator; oil cups and cylinder bibbs.

Steam and water pipe connections between engine and boiler; exhaust pipe; foundation bolts and governor belt for the engine are subject to order and charged extra.

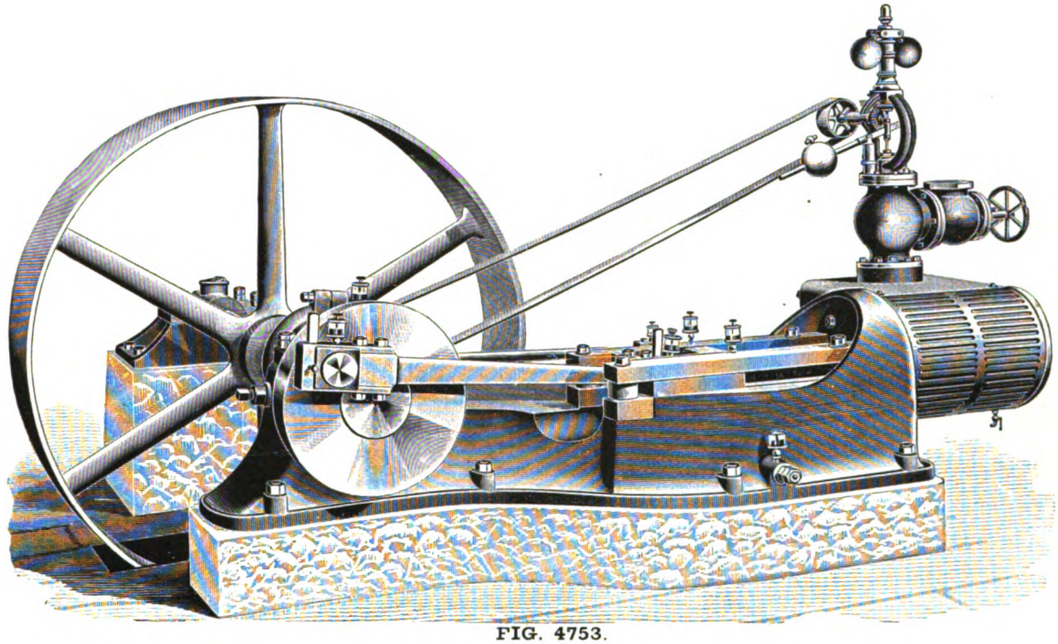


FIG. 4753.

Number of size	1	2	3	4	5	6	7	8	9
Horse power, as usually rated	35	40	50	60	80	100	150	200	250
Usual number of revolutions	150	150	150	150	150	150	135	130	120
Diameter of cylinder by length of stroke.....In inches	10 x 15	11 x 15	12 x 16	13 x 16	14 x 18	16 x 18	18 x 22	20 x 24	22 x 28
Diameter of steam pipe and governor..... "	2½	3	3½	3½	4	5	6	6	7
Diameter of exhaust pipe..... "	3½	4	4½	4½	5	6	7	7	8
Diameter of balance wheel pulley..... "	72	72	78	78	84	84	96	108	120
Face of balance wheel pulley..... "	12½	15	15	17	17	19	24	29	32
Weight of balance wheel pulley, in the rough.....In lbs.	1,100	1,200	1,650	1,800	2,200	3,000	4,500	5,500	7,000
Diameter of shaft.....In inches	4⅝	4⅞	5⅛	5⅜	6	6½	7½	9	10
Diameter of crank pin..... "	2½	2¾	3	3¼	3½	4	4½	5	5½
Length of shaft from center of engine.....In feet	6	6	7	7	7½	8	8	8½	9
Length of engine bed, about..... "	7¼	7¼	8	8	8¾	9	10½	12	13½
Width of engine bed.....In inches	29¾	29¾	35½	35½	38	40½	55	56	58
Length of journals..... "	11	11	13	13	14	15½	18	20	22
Shipping weight, about.....In lbs.	3,800	4,200	5,800	6,000	7,700	10,500	17,000	26,000	30,000
PRICES	$	$	$	$	$	$	$	$	$

FLY WHEELS AND PULLEYS FOR ABOVE ENGINES.

SUBSTITUTED FOR THE REGULAR BALANCE WHEEL PULLEY, WHEN SO ORDERED, AT THE ADDITIONAL PRICE.

Diameter of fly wheel.....In inches	84	84	86	86	96	96	108	120	120
Weight of fly wheel, in the rough.....In lbs.	1,200	1,500	2,000	2,500	3,000	3,500	4,000	6,000	8,000
Diameter of pulley.....In inches	42	42	48	48	60	60	60	72	78
Face of pulley..... "	12½	15	15	15	17	19	21	24	26
Weight of pulley, in the rough.....In lbs.	600	700	800	800	1,300	1,450	1,600	2,200	2,500
PRICES	$	$	$	$	$	$	$	$	$

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PLAIN SLIDE VALVE ENGINES.

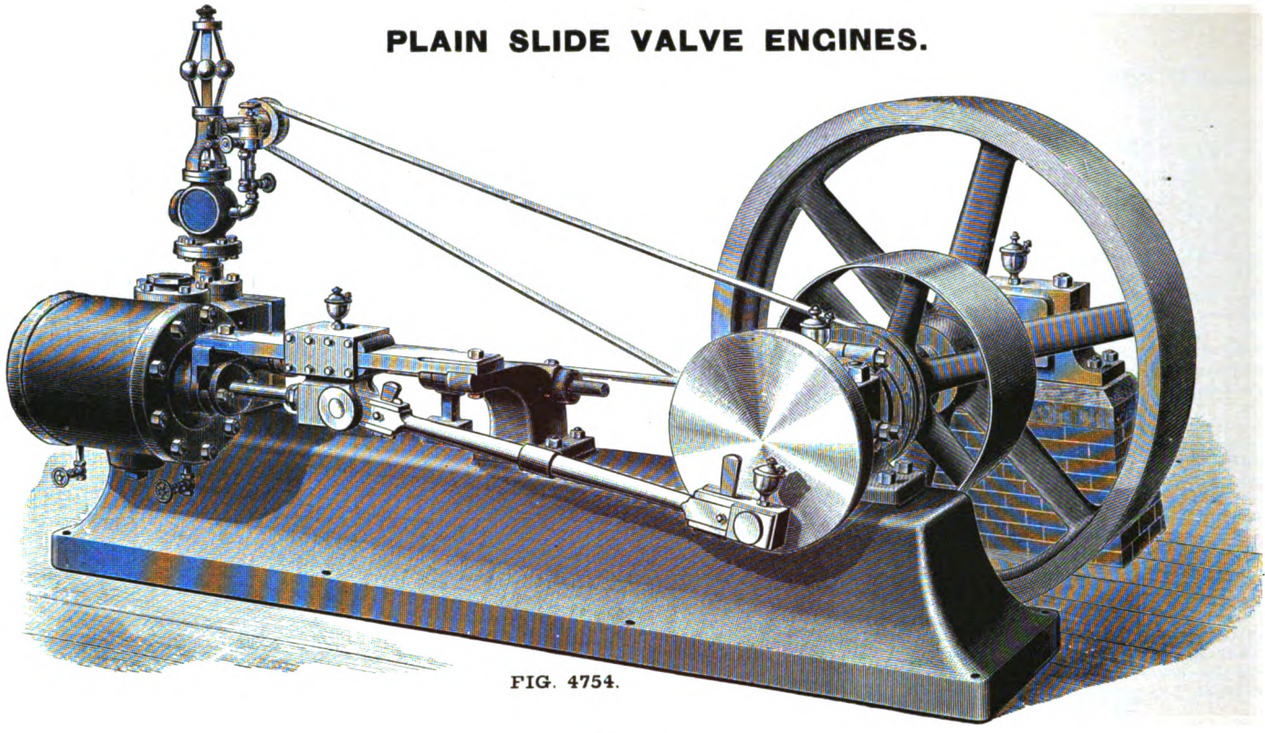


FIG. 4754.

PRICES.

Horse power.	Size of cylinders.		Steam pressure, lbs.	Size of steam and exhaust pipes.		Number of revolutions per minute.	Size of pulleys.				Shipping weight, lbs.	Prices, complete.
							Small.		Large.			
	Diameter, inches.	Stroke, inches.		Steam.	Exhaust.		Diameter, inches.	Face, inches	Diameter, inches.	Face, inches.		
25	10	12	60	2	3	150	30	10	48	10	6,000	$700.00
30	10	15	60	2½	3	140	36	12	60	12	7,500	800.00
40	12¼	15	60	3	3	130	36	14	72	14	8,500	900.00

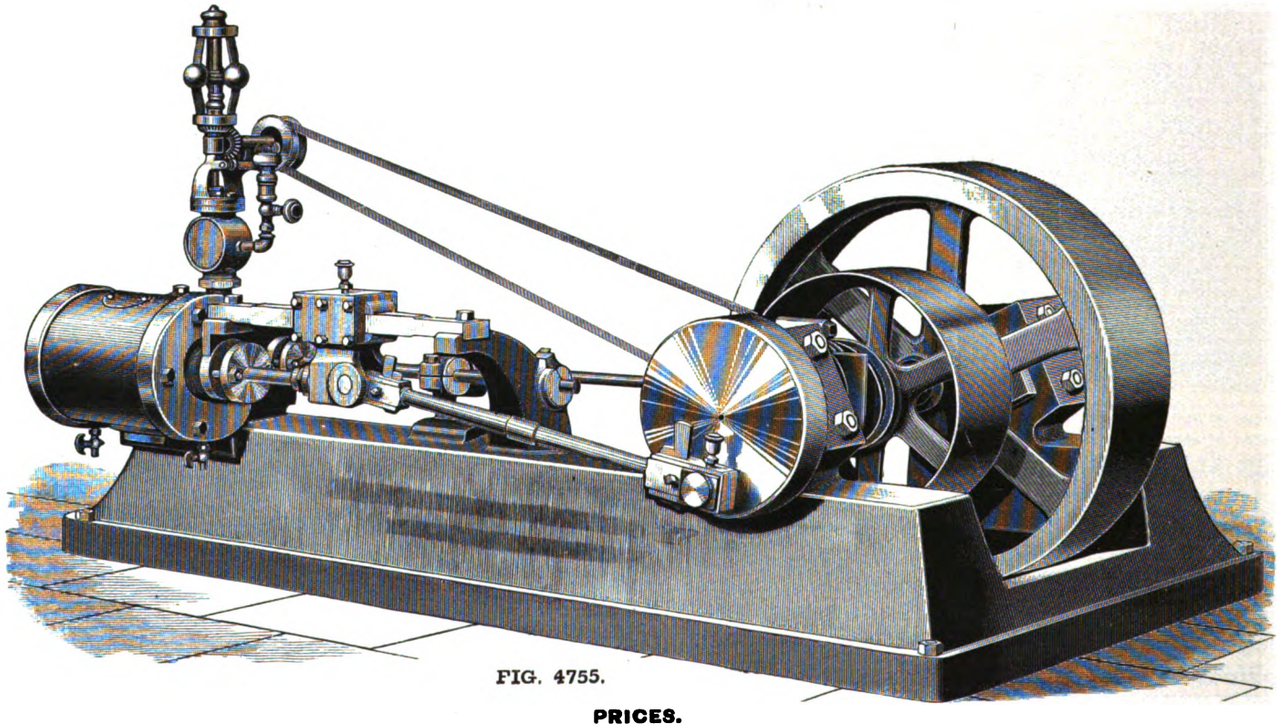


FIG. 4755.

PRICES.

Horse power.	Size of cylinders.		Steam pressure, lbs.	Size of steam and exhaust pipes.		Number revolutions per minute.	Size of pulley.				Size of bed at base.		Shipping weight, lbs.	Prices, complete.
							Small.		Large.					
	Diameter, inches.	Stroke, inches.		Steam.	Exhaust.		Diameter, inches.	Face, inches.	Diameter, inches.	Face, inches.	Length, inches.	Width, pulley end, inches.		
5	5	6	60	1	1¼	300	12	5	22	5	59	37	1,000	$225.00
8	6¼	8	60	1¼	1½	225	16	6½	29	6½	74	42	1,650	300.00
15	8¼	10	60	2	2½	180	24	8½	36	8½	92	54	3,000	450.00

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PLAIN SLIDE VALVE ENGINE.

Price of engine, complete, includes automatic stop governor, throttle valve, two pulleys, as per list, turned and balanced, sight feed lubricator, all necessary oil cups and pet cocks, also a cross head pump and heater attached to engine bed. We advise, however, the use of an independent pump or an injector in place of the cross head pump, especially on the larger sizes.

Steam and water pipe connections between engine and boiler, exhaust pipe, foundation bolts and governor belt are subject to order and are charged extra.

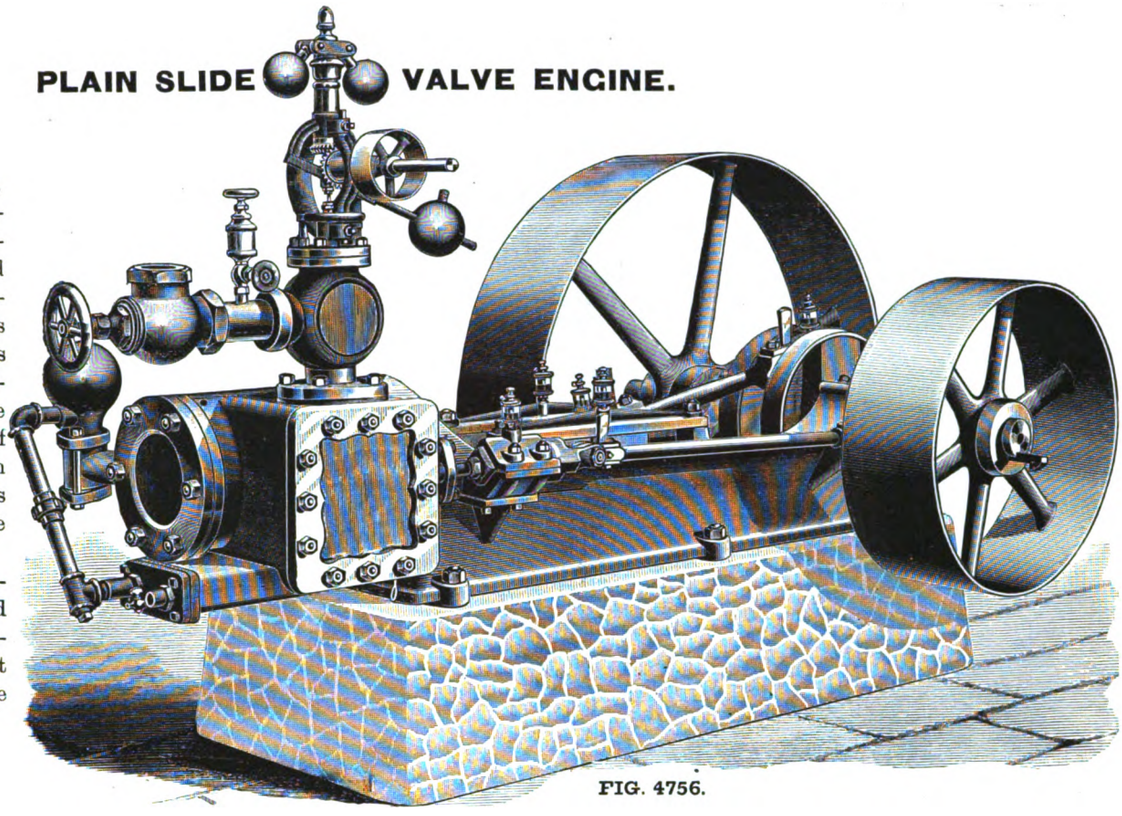


FIG. 4756.

Horse power, as usually rated		6	8	10	12	15	20	25	30	35
Usual number of revolutions		250	220	175	175	150	150	150	150	150
Diameter cylinder by length of stroke	in inches	5 x 6	6 x 8	7 x 10	8 x 10	8 x 12	9 x 12	10 x 12	11 x 12	12 x 12
Diameter of steam pipe	"	1¼	1½	1½	2	2	2½	2½	2½	3
Diameter of exhaust pipe	"	2	2	2½	3	3	3	3	4	4
Size of large pulley, diameter by face	"	36 x 9½	36 x 9½	44 x 10½	44 x 12½	48 x 12½	54 x 12½	54 x 12½	60 x 14½	60 x 14½
Size of small pulley, diameter by face	"	16 x 10½	16 x 10½	20 x 10½	20 x 10½	28 x 10½	30 x 10½	32 x 10½	36 x 10½	36 x 10½
Diameter of crank shaft	"	2¼	2½	3	3	3¼	3½	3½	4	4
Whole length of crank shaft	"	36	40	46	46	53	53	53	61	61
Weight of engine, complete		1,200	1,400	1,800	2,000	2,700	3,200	3,600	4,200	4,800
Size of governor	in inches	1¼	1½	1½	2	2	2½	2½	2½	3
Engine	PRICES	$126.00	$134.00	$150.00	$159.00	$191.00	$209.00	$239.00	$294.00	$327.00
Large pulley	"	12.00	12.00	17.00	17.00	22.00	29.00	29.00	32.00	32.00
Small pulley	"	8.00	8.00	8.00	8.00	11.00	12.00	12.00	14.00	14.00
Force pump	"	7.00	7.00	10.00	10.00	10.00	12.00	12.00	12.00	12.00
Heater	"	8.00	8.00	9.00	9.00	9.00	10.00	10.00	10.00	10.00
Automatic stop governor	"	22.00	23.00	23.00	28.00	28.00	37.00	37.00	37.00	46.00
Throttle valve	"	2.00	3.00	3.00	4.00	4.00	6.00	6.00	6.00	9.00
Engine, complete	PRICES	$185.00	$195.00	$220.00	$235.00	$275.00	$315.00	$345.00	$405.00	$450.00

PLAIN SLIDE VALVE ENGINE.

PRICES, FIG. 4757.

Horse power as usually rated.	Engine. Revolutions.	Cylinder. Diameter, inches.	Cylinder. Stroke, inches.	Band wheels. Diameter, inches.	Band wheels. Diameter, inches.	Band wheels. Width face, inches.	Weight complete for portable.	PRICES.
6	300	5	6	24	12	6	3,550	$
8	256	6	7	28	14	8	4,300	
10	220	7	8	36	18	8	4,950	
15	200	8	9	40	20	8	6,230	

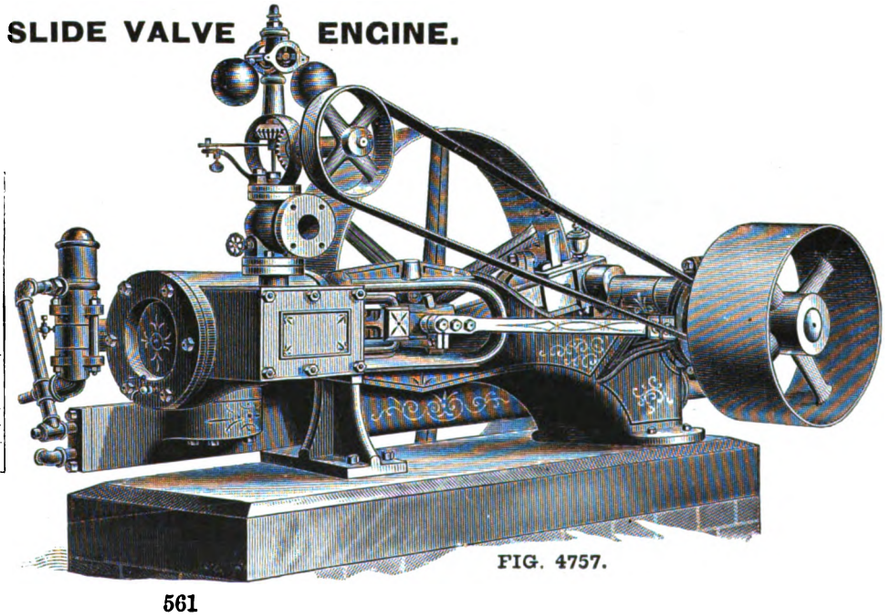


FIG. 4757.

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VERTICAL STEAM ENGINES.

REPRESENTS 50 TO 10 H. P.

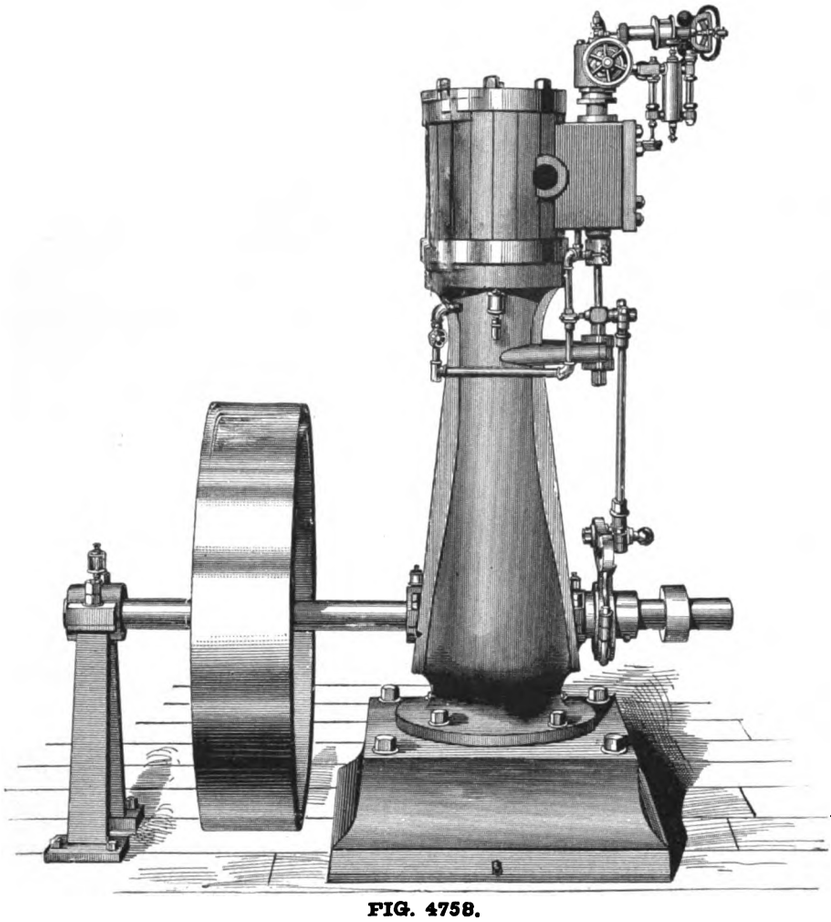


FIG. 4758.

Fig. 4758 represents engine with Wright's governor. At the same price we will furnish any other standard spring or ball governor that may be called for.

In these engines the parts are made interchangeable, and are easy of access for adjustment or repairs. The engine is furnished with boiler on same bases when called for.

These engines are adapted for any manufacturing purpose, and are especially adapted to electric lighting or quiet running and good governing, or where floor space and room is an object.

They do not require expensive foundations and can be placed upon the ordinary floor without annoyance to those on the other floors. Regularity of speed guaranteed under all variations of load and steam pressure; equal to the best automatic cut-off engines.

REPRESENTS 7 TO 3 H P.

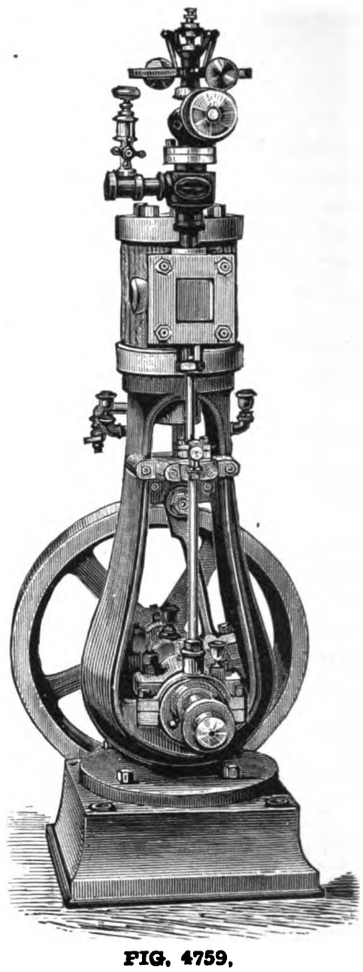


FIG. 4759.

YACHT ENGINE.

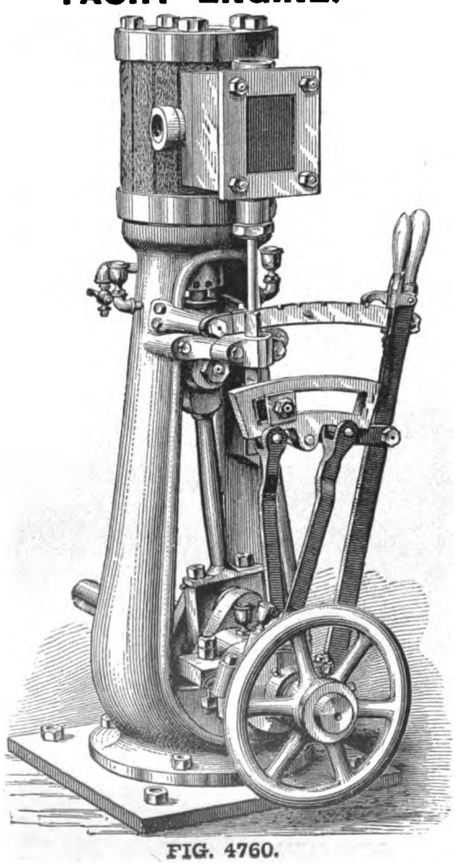


FIG. 4760.

PRICES, FIGS. 4758 AND 4759.

Horse power.	Size of cylinder.	Diam. of wheel, in.	Face of wheel, inches.	Weight of wheel, lbs.	Size on base.	Revolutions.	Prices.
3	3¼ x 5	20	3½	100	16 x 16	300	$150.00
4	3¾ x 5	20	3¾	120	16 x 16	300	160.00
5	4 x 6	24	4½	175	19 x 19	275	190.00
6	5 x 6	24	5	200	21 x 21	275	215.00
7	5¾ x 6	24	5½	225	21 x 21	275	250.00
10	7 x 7	30	7	375	24 x 24	250	290.00
12	7½ x 8	36	7½	475	30 x 30	225	330.00
15	8 x 8	36	8	525	30 x 30	225	365.00
18	9 x 9	36	9½	625	34 x 34	200	450.00
25	10 x 12	48	11	900	40 x 40	175	600.00
35	11 x 12	48	12	1,100	44 x 44	175	670.00
50	12 x 12	60	12	1,500	44 x 44	175	780.00

Above H. P. is figured on steam pressure of 60 lbs.

Sizes of steam connections, Figs. 4758, 4759 and 4760, same as for Fig. 4761. Shipping weights, Figs. 4758 and 4759, same as Fig. 4761.

PRICES, FIG. 4760.

Horse power.	Size of cylinder.	Height from floor to top of cylinder, in inches.	Approximate weight, in lbs.	Prices.
3 to 6	3¼ x 5	38	300	$150.00
4 to 8	3¾ x 5	39	325	160.00
5 to 10	4 x 6	42	400	190.00
6 to 12	5 x 6	42	425	215.00
7 to 14	5¾ x 6	43	450	250.00
10 to 20	7 x 7	55	700	290.00
12 to 25	7½ x 8	57	1,075	330.00
15 to 30	8 x 8	58	1,170	365.00
18 to 35	9 x 9	63	1,350	450.00
25 to 50	10 x 12	80	2,500	600.00
35 to 70	11 x 12	80	3,000	670.00
45 to 90	12 x 12	81	3,500	780.00

Above H. P. is figured on steam pressure of 100 lbs. and on varying number of revolutions.

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UPRIGHT VARIABLE CUT-OFF AND REVERSING ENGINES.

Horse power.	Size of cylinder.	Dimension of fly-wheel.	Weight of wheel. Lbs.	Number of revolutions.	Size on base.	Size of steam pipe. Inches.	Size of exhaust pipe. Inches.	Shipping weight. Lbs.	Prices.
3	3¼ x 5	20 x 3½	100	300	16 x 16	¾	1	425	$165.00
4	3¾ x 5	20 x 3¾	120	300	16 x 16	¾	1	460	185.00
5	4 x 6	24 x 4½	175	275	19 x 19	¾	1	585	220.00
6	5 x 6	24 x 5	200	275	21 x 21	1	1¼	655	250.00
7	5¾ x 6	24 x 5½	225	275	21 x 21	1	1¼	725	290.00
10	7 x 7	30 x 7	375	250	24 x 24	1¼	1½	1,155	335.00
12	7½ x 8	36 x 7½	475	225	30 x 30	1½	2	1,650	380.00
15	8 x 8	36 x 8	525	225	30 x 30	1½	2	1,765	420.00
18	9 x 9	36 x 9½	625	200	34 x 34	2	2½	2,100	520.00
25	10 x 12	48 x 11	900	175	40 x 40	2	2½	4,000	690.00
35	11 x 12	48 x 12	1,100	175	44 x 44	2½	3	4,600	775.00
50	12 x 12	60 x 12	1,500	175	44 x 44	2½	3	5,500	900.00

Price includes governor, lubricator, stop valve, oil cups.

Outboard bearing and stand is only furnished with the 10 h. p. and larger sizes. Style of governor changed to suit requirements of customer.

These engines are built with a simple arrangement of cut-off, which will give a range from zero to full stroke and allow of steam being used expansively. They can be reversed instantaneously, if so wished. Are built in best possible manner and thoroughly tested before leaving the works. Speed of engines and dimensions of wheels can be changed to meet any special requirements of work.

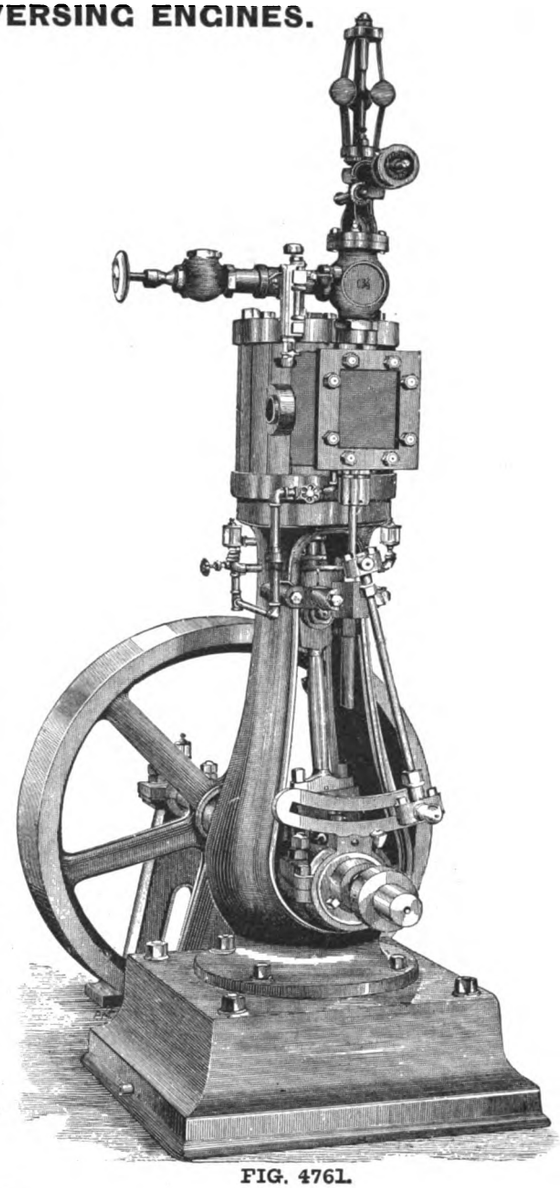


FIG. 4761.

PORTABLE ENGINES ON BOILERS.

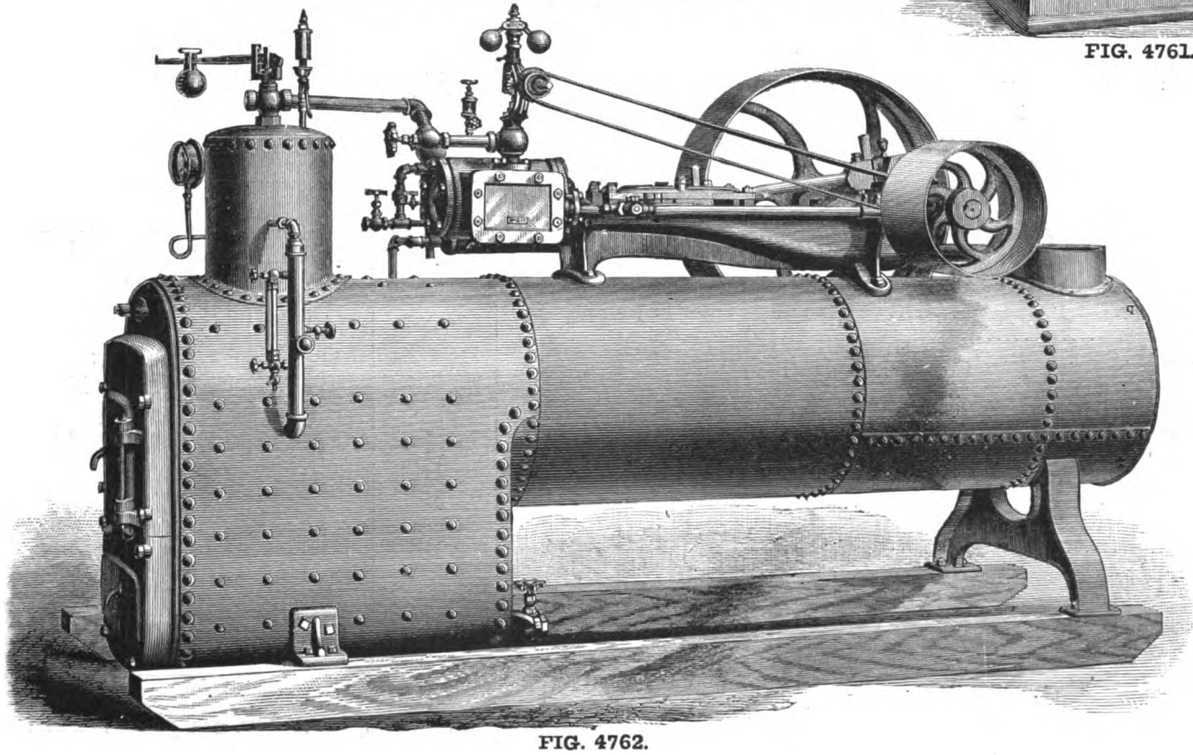


FIG. 4762.

REPRESENTS 6, 8, 9, 10, 12 AND 15 HORSE POWER. FOR PRICES SEE PAGE 564.

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PORTABLE ENGINES ON BOILERS.

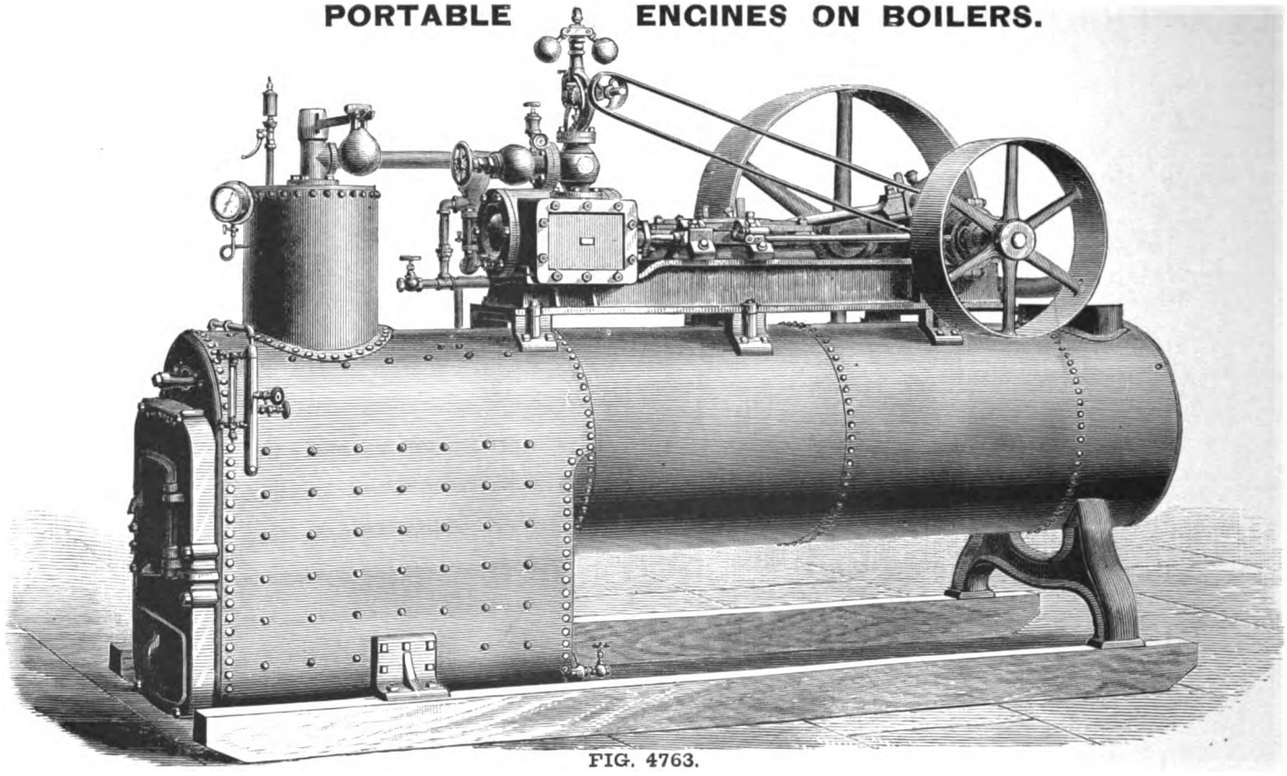


FIG. 4763.

REPRESENTS 20, 25, 30, 35, 40 AND 50 HORSE POWER.

PRICES, FIG. 4762.

Number of size	0	1	2	3	4	5
Horse power	6	8	9	10	12	15
Diameter of cylinder and length of stroke. . . . . in inches	5 x 8	6 x 9	7 x 9	7 x 10	8 x 10	8 x 12
Ordinary number of revolutions	220	200	200	180	180	150
Diameter of pulleys . . . . . in inches	14 & 32	16 & 36	16 & 36	20 & 44	20 & 44	22 & 48
Face of pulleys . . . . . "	10½ & 8½	10½ & 9½	10½ & 9½	10½ & 10½	10½ & 10½	10½ & 12½
Diameter of boiler . . . . . "	26	28	28	30	32	32
Length of furnace . . . . . "	34	36	36	38	38	44
Width of furnace . . . . . "	21	22	22	24	26	26
Height of furnace . . . . . "	29	32	32	34	38	38
No. of 3-inch tubes	17	18	20	22	26	26
Length of tubes . . . . . in inches	54	60	60	72	72	78
Diameter of smoke stack . . . . . "	12	13	13	14	15	15
Length of smoke stack . . . . . in feet	18	18	18	18	20	20
Estimated weight . . . . . in pounds	3,800	4,200	4,500	5,400	5,800	7,000
Prices on skids, complete	$382.00	$422.00	$438.00	$480.00	$517.00	$510.00
Prices on wheels, complete	$525.00	$567.00	$583.00	$628.00	$667.00	$720.00

PRICES, FIG. 4763.

Number of size	6	7	8	9	10	11
Horse power	20	25	30	35	40	50
Diameter of cylinder and length of stroke . . . . . in inches	9 x 12	10 x 12	10 x 15	11 x 15	12 x 16	14 x 16
Ordinary number of revolutions	150	150	125	125	125	125
Diameter of pulleys . . . . . in inches	32 & 48	32 & 54	36 & 60	36 & 60	36 & 60	36 & 72
Face of pulleys . . . . . "	8½ & 12½	8½ & 12½	9½ & 12½	9½ & 12½	9½ & 14½	9½ & 16½
Diameter of boiler . . . . . "	34	36	36	40	40	44
Length of furnace . . . . . "	52	52	52	52	60	64
Width of furnace . . . . . "	28	30	30	34	34	38
Height of furnace . . . . . "	38	40	40	44	44	50
No. of 3-inch tubes	30	34	34	40	42	48
Length of tubes . . . . . in inches	90	96	102	102	120	132
Diameter of smoke stack . . . . . "	16	18	18	20	20	22
Length of smoke stack . . . . . in feet	24	24	24	30	35	40
Estimated weight . . . . . in pounds	9,000	10,200	12,000	13,000	14,000	18,000
Prices on skids, complete	$657.00	$722.00	$813.00	$891.00	$1,023.00	$1,240.00
Prices on wheels, complete	$807.00	$888.00	$981.00	$1,059.00	$1,193.00	. . . . .

Nos. 10 and 11 have an additional leg between skids and boiler.

The price includes smoke stack, governor, heater, pump, governor belt, steam gauge, water gauge, whistle, safety valve, gauge cocks, check and blow-off, oil cups and pet cocks. If any of these parts are not wanted their prices will be deducted.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SINGLE AND DOUBLE CYLINDERS AND DRUMS, HOISTING ENGINES, WITH BOILERS.

Adapted for floating pile drivers, also pile driving, dock and bridge building, sewer construction, quarries, railroads, etc.

This engine combines all the advantages of the single drum engine described, Fig. 4766, but has the special one due to having double cylinders, thus enabling it to start from any position, as it has no centers—this being of great importance where heavy weights are to be hoisted and handled accurately, as in quarries. Winch heads are supplied on the end of each drum shaft. The boiler is fed by an injector.

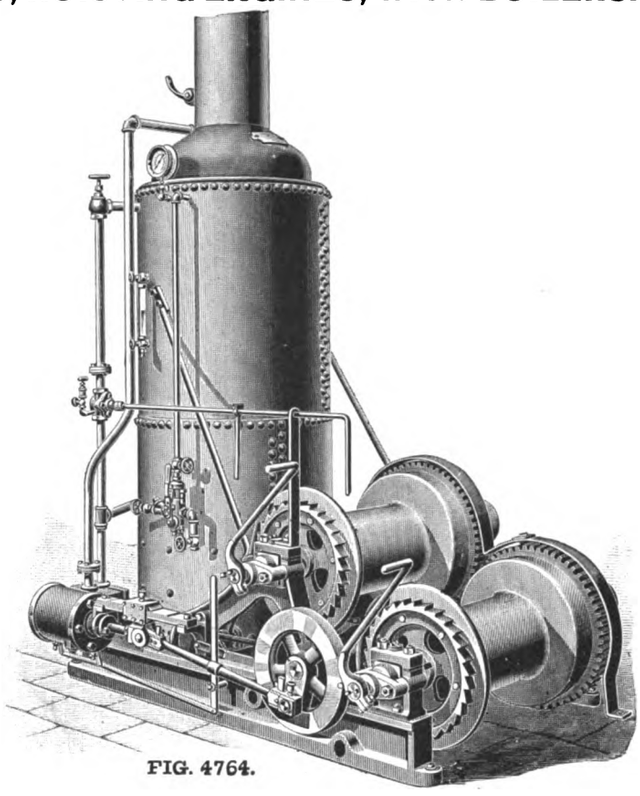


FIG. 4764.

PRICES, DOUBLE CYLINDERS, FIG. 4764.

Horse power usually rated.	Dimensions of cylinders.		Dimensions of hoisting drums.		Weight hoisted, single rope, average speed.	Suitable weight of pile-driving hammer for quick work.
	Diameter, inches.	Stroke, inches.	Diameter, inches.	Length, inches.		
10	5	8	12	22	2,000	1,500
12	6¼	8	14	22	3,000	2,000
20	7	10	14	26	5,000	3,500
30	8¼	10	14	27	8,000	5,000
40	8½	12	16	32	10,000	8,000
50	10	12	16	32	12,000	10,000

Horse power.	Dimensions of boilers.			Dimensions of bed plate.		Estimated shipping weight, with boiler complete.	Prices, with boilers and fixtures complete, including ratchets and pawls.	Prices, with boilers and fixtures complete, including ratchets, pawls and foot brakes.
	Diam., inches.	Height, inches.	Number of 2 inch tubes.	Width, inches.	Length, inches.			
10	32	75	48	47	80	6,500	$1,025.00	$1,075.00
12	36	75	57	50	86	8,000	1,150.00	1,200.00
20	40	84	80	54	89	9,600	1,350.00	1,400.00
30	42	90	88	57	94	11,500	1,500.00	1,550.00
40	48	96	115	70	117	20,000	2,350.00	2,400.00
50	50	102	124	70	117	22,000	2,450.00	2,500.00

PRICES, SINGLE CYLINDERS, FIG. 4764.

Horse power usually rated.	Dimensions of cylinders.		Size hoisting drums of engines with boilers.		Weight hoisted, single rope, average speed.	Suitable weight of pile-driving hammer for quick work.
	Diameter, inches.	Stroke, inches.	Diameter, inches.	Length, inches.		
10	7	10	12	22	2,500	1,800
15	8¼	10	14	23	3,000	2,500
20	8½	12	16	26	5,000	4,000
25	10	12	16	26	6,500	5,000

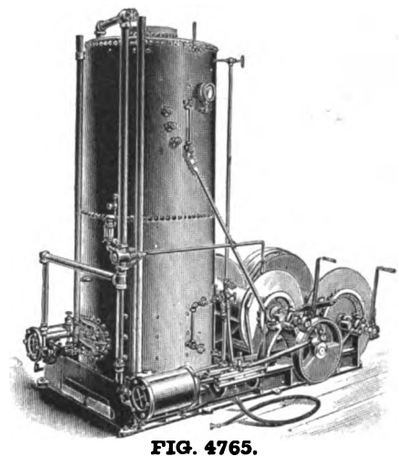


FIG. 4765.

Horse power.	Dimensions of boilers.			Floor space required bed plate.		Estimated shipping weight, with boiler.	Prices, with boilers and fixtures complete, including ratchets and pawls.	Prices, with boilers and fixtures complete, including ratchets, pawls and foot brakes.
	Diam., inches.	Height, inches.	Number of 2 inch tubes.	Width, inches.	Length, inches.			
10	34	78	52	45	86	6,500	$1,050.00	$1,100.00
15	36	81	57	47	87	8,550	1,200.00	1,250.00
20	40	84	80	54	102	10,000	1,600.00	1,650.00
25	42	90	88	54	102	11,500	1,700.00	1,750.00

DOUBLE CYLINDER ENGINES WITH BOILER, SINGLE AND DOUBLE DRUMS AND WINCHES.

PRICES, FIG. 4765.

Horse power.	Cylinder.		Diameter of drum, in inches.	Length of drum between flanges.	Diam. of boiler, in inches.	Height in feet and inches.	Number of tubes.	Length of tubes in inches.	Size of tubes, in inches.	Estimated weight of engine and boiler, lbs.	Will hoist with single line, in lbs. 80 lbs. steam.	Weight of pile-driving hammer for quick work.	Prices, with 1 drum and 1 winch.	Prices, with 2 drums and 2 winches.	Prices of low iron wheels.	Prices of pioneer trucks.
	Diam., in inches.	Stroke, in inches.														
8	4⅝	8	10	18 in.	32	6 ft. 8 in.	55	50	2	5,000	1,200 to 2,000	1,200	$875.00	$1,000.00	$45.00	$125.00
10	5	10	12	20 "	34	7 "	60	56	2	6,000	1,400 to 2,800	2,000	925.00	1,075.00	45.00	125.00
12	5½	10	12	20 "	34	7 "	60	56	2	6,000	1,400 to 3,000	2,100	950.00	1 100.00	45.00	125.00
14	6¼	10	12 to 14	22 "	36	7 "	65	56	2	6,500	1,800 to 3,500	2,400	1,050.00	1,200.00	50.00	135.00
16	6½	12	12 to 14	24 "	38	7 " 6 "	75	62	2	7,500	2,000 to 4,000	2,600	1,200.00	1,350.00	55.00	150.00
18	7¼	10	12 to 14	26 "	40	7 " 6 "	85	62	2	7,800	2,500 to 5,000	2,800	1,250.00	1,400.00	55.00	150.00
20	7	12	12 to 16	28 "	42	8 "	85	68	2	8,500	3,000 to 6,000	3,000	1,300.00	1,450.00	60.00	160.00
22	7¼	12	12 to 16	28 "	42	8 "	85	68	2	8,700	3,500 to 6,500	3,100	1,325.00	1,475.00	60.00	160.00
24	7½	12	12 to 16	30 "	44	8 " 6 "	100	74	2	9,500	4,000 to 7,000	3,200	1,375.00	1.525.00	65.00	160.00
30	8	12	12 to 18	30 "	44	8 " 6 "	100	74	2	10,000	5,000 to 8,000	3,600	1,425.00	1,550.00	70.00	175.00
35	8½	13	12 to 18	30 "	46	8 " 6 "	120	74	2	11,000	6,000 to 9,000	4,000	1,600.00	1,800.00	75.00	175.00
40	9	13	12 to 18	30 "	48	8 " 6 "	140.	74	2	14,000	7,000 to 11,000	5,000	1,800.00	2,000.00	85.00	200.00
50	9	16	12 to 20	30 "	48	8 " 6 "	140	74	2	14,000	7,000 to 11,000	5,000	2,000.00	2,250.00	85.00	200.00
60	10	16	12 to 30	36 "	52	9 "	160	80	2	16,000	10,000 to 14,000	6,000	2,300.00	2,550.00	100.00	225.00
70	11	18	12 to 32	36 "	54	9 "	185	80	2	18,000	12,000 to 18,000	8,000	2.600.00	3,000.00	125.00	250.00
80	12	20	12 to 34	40 "	60	10 "	200	92	2	22,000	20,000 to 30,000	10,000	3,000.00	3,500.00	150.00	300.00

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DOUBLE AND SINGLE CYLINDER FRICTION DRUM ENGINES AND BOILERS.

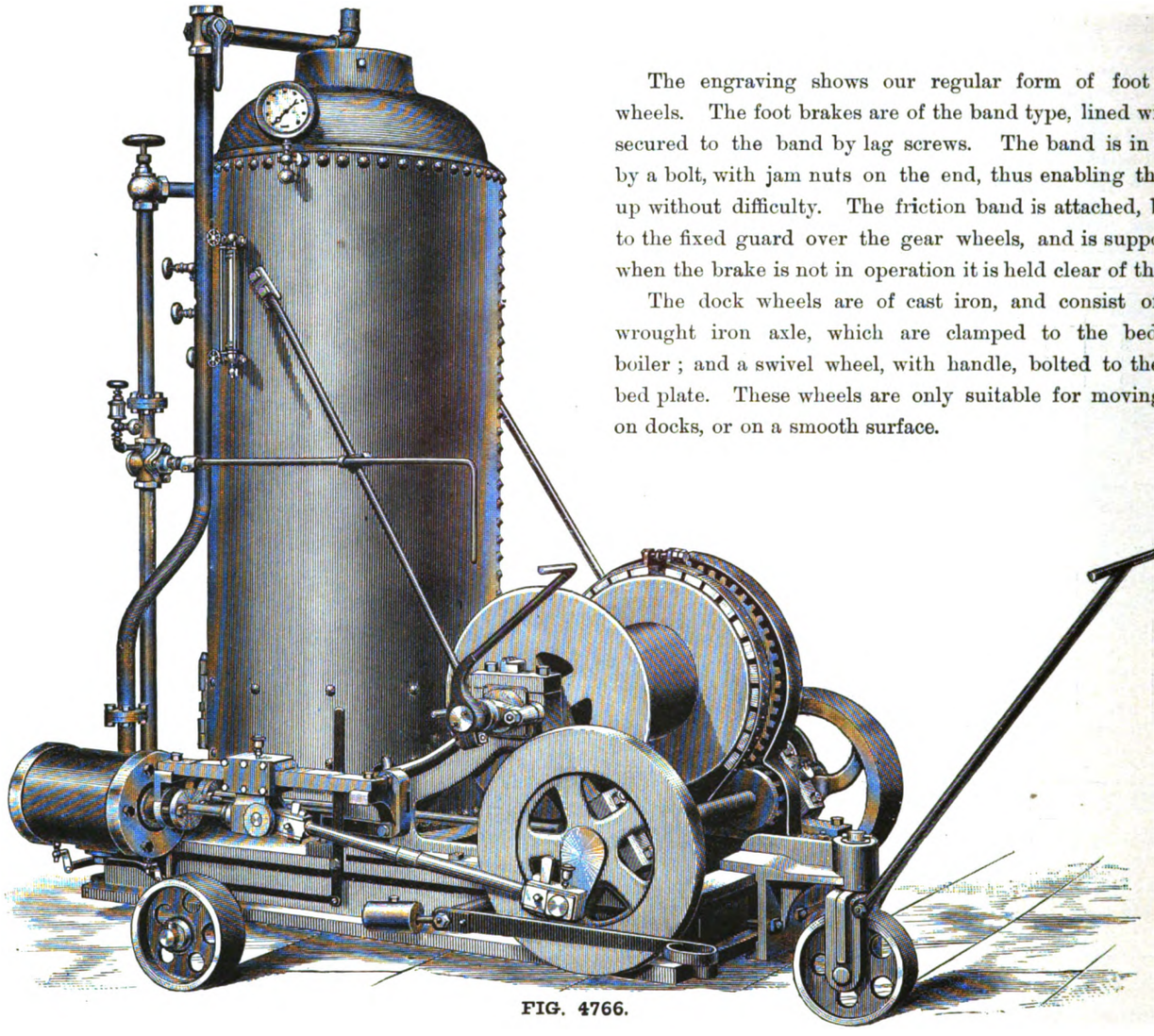


FIG. 4766.

The engraving shows our regular form of foot brakes and dock wheels. The foot brakes are of the band type, lined with blocks of wood secured to the band by lag screws. The band is in two pieces, joined by a bolt, with jam nuts on the end, thus enabling the wear to be taken up without difficulty. The friction band is attached, by means of a lug, to the fixed guard over the gear wheels, and is supported by it, so that when the brake is not in operation it is held clear of the drum flange.

The dock wheels are of cast iron, and consist of two wheels on a wrought iron axle, which are clamped to the bed plate under the boiler; and a swivel wheel, with handle, bolted to the front end of the bed plate. These wheels are only suitable for moving the engine about on docks, or on a smooth surface.

PRICES, WITH SINGLE CYLINDERS.

Horse power usually rated.	Dimensions of cylinders.		Weight hoisted single rope usual speed, lbs.	Suitable weight of pile driving hammer for quick work, lbs.	Dimensions of hoisting drums.			Dimensions of bed plates.		Dimensions of boilers.			Estimated shipping weights complete, lbs.	Prices. Engines with boilers and fixtures. No dock wheels or foot brakes.	Prices. Engines with boilers and fixtures, including foot brakes.	Prices. Extra for cast iron dock wheels.
	Diam., inches.	Stroke, inches.			Diam. body between flanges, inches.	Length body between flanges, inches.	Diam. flanges, inches.	Width, inches.	Length, inches.	Diam. shell, inches.	Height shell, inches.	Number of 2 inch tubes.				
4	5	8	1,200	1,000	10	20	22	38	60	28	63	40	3,550	$600.00	$625.00	$35.00
6	6¼	8	1,500	1,250	10	20	22	38	60	28	69	40	3,950	650.00	675.00	40.00
8	6¼	10	1,750	1,500	12	20	24	41	72	30	72	44	4,850	750.00	775.00	45.00
10	7	10	2,500	1,800	12	20	24	41	72	32	75	48	5,050	800.00	825.00	50.00
11	7	10	2,500	2,000	14	22	26	45	73	34	78	52	5,350	875.00	900.00	55.00
12½	8¼	10	4,000	2,500	14	23	29	47	73	36	75	57	6,550	975.00	1,000.00	60.00
15	8¼	10	4,000	2,800	14	23	29	47	73	36	81	57	6,750	1,025.00	1,050.00	65.00
20	8½	12	6,000	4,000	16	26	33	54	84	40	84	80	8,500	1,275.00	1,300.00	.....
25	10	12	8,000	5,000	16	26	33	54	84	42	90	88	9,500	1,325.00	1,350.00	.....

PRICES, WITH DOUBLE CYLINDERS.

8	5	8	2,000	1,500	12	22	24	47	67	32	75	48	5,150	$900.00	$925.00	$50.00
12	6¼	8	3,000	2,000	14	22	26	50	71	36	75	57	6,275	1,000.00	1,025.00	60.00
16	6¼	10	4,000	2,800	14	26	26	54	75	36	81	57	7,150	1,150.00	1,175.00	.....
20	7	10	5,000	4,000	14	26	26	54	75	40	84	80	7,950	1,250.00	1,275.00	.....
30	8¼	10	8,000	6,000	14	27	29	57	79	42	90	88	9,275	1,325.00	1,350.00	.....
40	8½	12	10,000	8,000	16	32	36	70	97	48	96	115	15,000	2,000.00	2,050.00	.....
50	10	12	12,000	9,000	16	32	36	70	97	50	102	124	18,000	2,200.00	2,250.00	.....

REVERSIBLE LINK MOTION AND FRICTION DRUM ENGINES COMBINED MADE TO ORDER AT FIVE PER CENT. ADVANCE ON ABOVE PRICES.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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DOUBLE CYLINDER REVERSIBLE LINK MOTION HOISTING ENGINES.

This engine is particularly adapted for all hoisting purposes where it is necessary to have a compact and simple reversible engine which can be handled with ease, either at the engine or at a distance, by persons of ordinary intelligence. This quality is of special value in connection with steam lighters, as the engine can be placed below the deck and handled from the deck or pilot house by means of rods, etc. The engine hoists, holds and lowers the load entirely by steam, and as the whole operation is performed by one lever it will readily be seen that any one, even an ordinary laborer, can handle it without difficulty. Our improved throttle valve connection insures a smooth and steady motion in starting, reversing and stopping. This engine has a winch head on end of drum shaft. For small mines they are exceedingly convenient, and will do a large amount of work in depths of from 50 to 200 feet or more. When used for mining purposes, we usually lag the drum about six inches larger in diameter than specified in table, and also apply our automatic safety brakes. Lagging drum is extra.

These are also made with single cylinders.

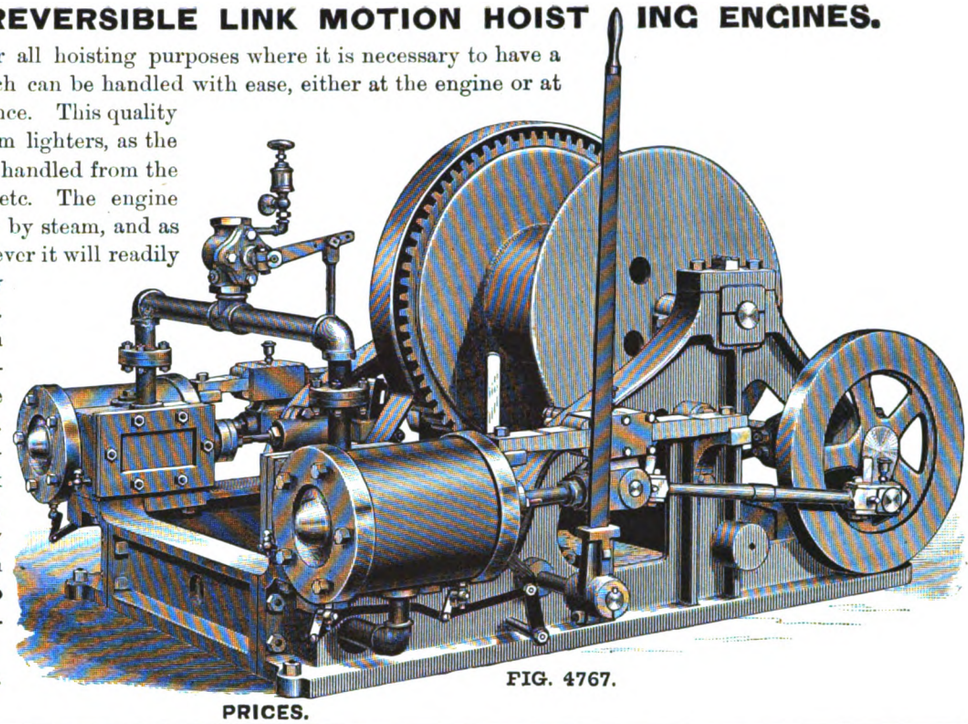


FIG. 4767.

PRICES.

Horse power usually rated.	Dimensions of cylinders.		Weight hoisted single rope, usual speed, lbs.	Dimensions of hoisting drums.		Size of bed plates.		Estimated shipping weight, lbs.	Prices of engines complete, without boilers.	Prices of engines complete, without boilers, with automatic brakes.	Prices extra, for cast iron dock wheels.
	Diameter, inches.	Stroke, inches.		Diameter, inches.	Length, inches.	Width, inches.	Length, inches.				
6	5	6	1,000	10	12	34	44	1,450	$410.00	$425.00	$20.00
8	5	8	1,650	14	14	36	56	2,325	500.00	525.00	25.00
12	6¼	8	2,500	14	15	39	59	2,650	550.00	575.00	25.00
20	7	10	3,500	14	19	44	70	3,325	650.00	675.00	30.00
30	8¼	10	6,000	16	26	54	72	4,725	750.00	775.00	50.00
40	8½	12	8,000	20	32	68	84	8,500	1,075.00	1,100.00	.....
50	10	12	10,000	20	32	68	84	9,000	1,175.00	1,200.00	.....

SINGLE CYLINDER ENGINES WITH BOILERS AND WITH DOUBLE OR SINGLE DRUMS AND WINCHES.

This cut represents a single cylinder engine, boiler and fixtures, with my improved patent friction drum attached, with or without low iron wheels, for light or heavy work of all kinds. It is adapted for land pile driving, coal hoisting, discharging vessels, sawing wood, running pump, etc. A governor can be attached to the steam pipe, a brake put on the drum, and then it will drive stationary power of any kind, and at the same time hoist, the power being taken off the fly wheel by a belt.

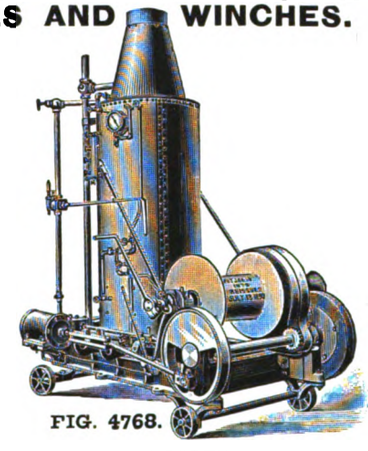


FIG. 4768.

PRICES.

Horse power.	Cylinder. Diam., in inches.	Cylinder. Stroke, in inches.	Diameter of drum, in inches.	Length of drum between flanges.	Diameter of boiler, in inches.	Height, in feet and inches.	Number of tubes.	Length of tubes, in inches.	Size of tubes, in inches.	Estimated weight of engine and boiler, lbs.	Will hoist with single line, in lbs. 80 lbs. steam.	Weight of pile driv'g hammer for quick work.	Prices with 1 drum and 1 winch.	Prices with 2 drums and 2 winches.	Prices of low iron wheels, net.
4	4⅝	8	9	16 in.	28	5 ft.	40	42	2	3,000	600 to 1,000	700	$600.00	$700.00	$35.00
5	5	10	9	18 "	28	5 " 8 in.	40	42	2	3,500	700 to 1,400	1,000	650.00	750.00	40.00
6	5¼	10	9	18 "	28	5 " 8 "	40	42	2	3,700	800 to 1,500	1,100	700.00	800.00	40.00
7	6¼	10	10	20 "	32	6 " 8 "	55	52	2	4,000	1,000 to 2,000	1,600	750.00	900.00	45.00
8	6¼	12	12	20 "	32	6 " 8 "	55	52	2	4,500	1,200 to 2,200	1,700	775.00	925.00	50.00
10	7¼	10	12 to 14	22 "	34	7 "	60	56	2	4,750	1,400 to 2,400	1,800	800.00	950.00	50.00
10½	7	12	12 to 14	22 "	34	7 "	60	56	2	5,000	1,600 to 2,600	2,000	825.00	975.00	55.00
11	7¼	12	12 to 16	22 "	34	7 "	60	56	2	5,000	1,700 to 2,700	2,100	875.00	1,025.00	60.00
12	7½	12	12 to 16	24 "	36	7 "	65	56	2	5,500	2,000 to 3,000	2,200	950.00	1,100.00	60.00
15	8	12	12 to 16	25 "	38	7 " 6 "	75	62	2	6,000	2,000 to 4,000	2,500	975.00	1,125.00	65.00
17½	8½	13	12 to 16	23 "	38	7 " 6 "	77	62	2	6,500	2,300 to 4,500	2,800	1,075.00	1,225.00	65.00
20	9	13	12 to 16	26 "	42	8 "	85	68	2	6,800	2,400 to 5,000	3,000	1,300.00	1,500.00	70.00
25	9	16	12 to 18	26 "	42	8 "	85	68	2	7,300	2,500 to 5,500	3,000	1,325.00	1,525.00	70.00
30	10	16	12 to 24	28 "	44	8 " 6 "	100	74	2	8,500	3,000 to 6,000	4,000	1,350.00	1,550.00	75 00
35	11	18	12 to 30	28 "	46	8 " 6 "	120	74	2	9,000	4,000 to 8,000	5,000	1,500.00	1,775.00	85.00
40	12	20	12 to 36	30 "	48	8 " 6 "	140	74	2	10,000	5,000 to 10,000	6,000	1,800.00	2,100.00	100.00

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DOUBLE CYLINDER FRICTION DRUM HOISTING ENGINES.

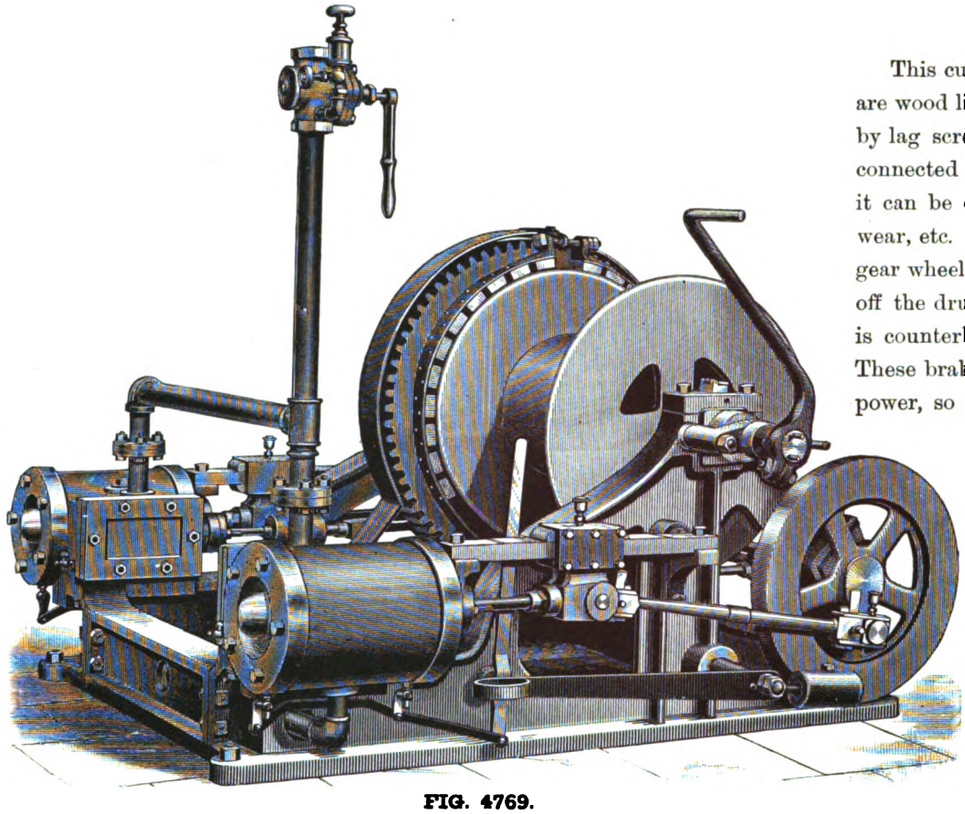


FIG. 4769.

This cut shows regular style of foot brakes. They are wood lined, the blocks being fastened to the band by lag screws. The band is made in two pieces and connected by a bolt with jam nuts on the end so that it can be easily and quickly adjusted to take up the wear, etc. It is fastened to the fixed guard over the gear wheel by means of a lug, which holds the brake off the drum flange when not in use. The foot lever is counterbalanced by a movable weight as shown. These brakes are specially constructed and have great power, so that with a very moderate pressure any load the engine can hoist can be easily held. They are not absolutely necessary to the operation of the engine, but are desirable where there is much lowering to be done as they relieve the drum friction of the greater portion of its wear, and are necessary when it is desired to operate the winch head while a load is hanging on the drum.

PRICES.

Horse power usually rated.	Dimensions of cylinders.		Weight hoisted, single rope, usual speed, lbs.	Dimensions of hoisting drums.		Size of bed plate.		Estimated shipping weight, lbs.	Prices of engines complete, without boilers.	Prices of engines complete, without boilers, including foot brakes.	Prices, extra, for cast iron dock wheels.
	Diameter, inches.	Stroke, inches.		Diameter, inches.	Length, inches.	Width, inches.	Length, inches.				
6	5	6	1,000	10	14	34	44	1,500	$400 00	$425.00	$20.00
8	5	8	1,650	12	14	36	56	2,200	475.00	500.00	25.00
12	6¼	8	2,500	14	16	39	59	2,700	525.00	550.00	25.00
20	7	10	3,500	14	18	44	70	3,250	625.00	650.00	30.00
30	8¼	10	6,000	16	26	54	72	4,050	725.00	750.00	50.00
40	8½	12	8,000	20	32	68	84	8,750	1,150.00	1,175.00	.....
50	10	12	10,000	20	32	68	84	9 000	1,225.00	1,250.00	.....

DOUBLE CYLINDER, SINGLE AND DOUBLE DRUM, LINK MOTION MINING ENGINES.

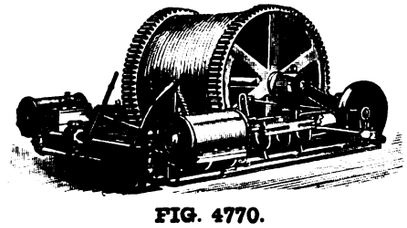


FIG. 4770.

PRICES.

Cylinder.		Diameter hoist drum.	Length hoist drum.	Hoist 300 feet per minute, in lbs.	Weight, in lbs.	Prices, with single drum.	Prices, with double drum.
Diameter, in inches.	Stroke, in inches.						
6	12	24 inches.	28 inches.	1,000	4,000	$800	$1,100
6½	12	26 "	30 "	1,200	4,500	850	1,150
7	12	30 "	30 "	1,400	5,000	900	1,200
8	13	40 "	40 "	1,600	6,000	1,050	1,450
9	13	44 "	44 "	2,000	6,500	1,400	1,800
9	16	48 "	46 "	3,000	7,500	1,600	2,050
10	16	54 "	46 "	4,000	8,000	1,700	2,200
11	18	60 "	56 "	5,000	9,500	2,400	3,000
12	20	60 "	60 "	6,000	12,000	2,700	3,300

PRICES, WITH DOUBLE SPUR GEAR ON SAME DRUM ADD 5 PER CENT.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SINGLE AND DOUBLE CYLINDER DOUBLE FRICTION DRUM HOISTING ENGINES,

WITH RATCHETS AND PAWLS, WITHOUT BOILER.

Specially adapted for railroads, bridge builders, scows, lighters, pile drivers, quarries, etc.

This cut represents the improved single cylinder double friction drum hoisting engine, with ratchets and pawls. The drums are perfectly independent in action, and a load can be hoisted on one drum, the ratchet thrown in and the load left suspended while the engine is run, and the other drum used for a separate hoist, etc. There is a band fly wheel on the outer end of crank shaft for transmitting power by belt for pumping, sawing off piles, and any other use desired. There is a winch head on the end of each drum shaft.

Double cylinder engines of this style are also built as per table below, and possess, in common with all double cylinder engines, the advantage of having no centers. They are similar to the engines described above, having ratchets and pawls, and winch heads on drum shafts, but have no band fly wheel. Foot brakes are also furnished, if desired.

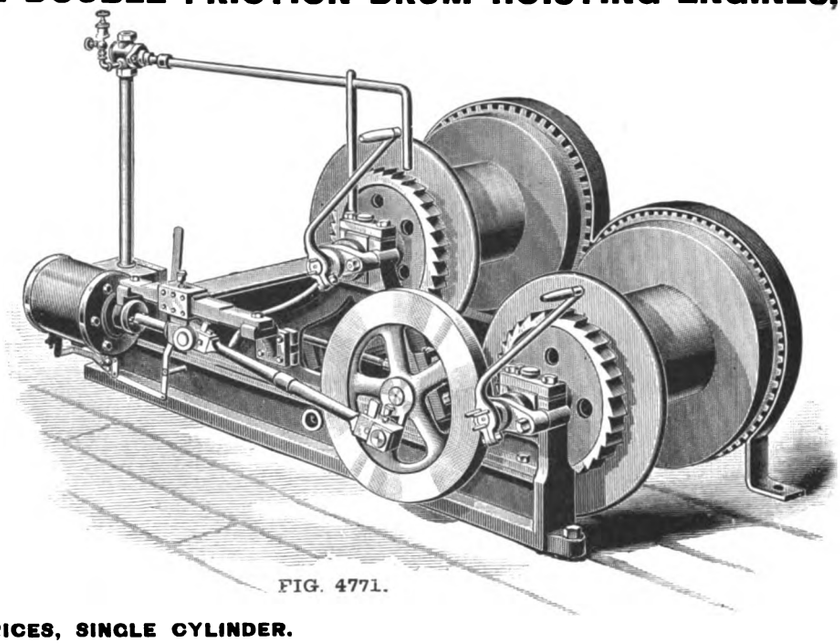


FIG. 4771.

PRICES, SINGLE CYLINDER.

Horse power usually rated.	Dimensions of cylinders.		Size hoisting drums.		Weight hoisted single rope average speed.	Suitable weight of pile driving hammer for quick work.	Estimated shipping weight. Lbs.	Prices of engines complete, with ratchets and pawls, without boilers.	Prices of engines complete, with ratchets and pawls and foot brakes.
	Diameter. Inches.	Stroke. Inches.	Diameter. Inches.	Length. Inches.					
10	7	10	12	17	2,000	1,700	4,000	$650.00	$700.00
15	8¼	10	14	18	3,000	2,500	5,000	725.00	775.00
20	8½	12	16	26	5,000	4,000	6,500	975.00	1,025.00
25	10	12	16	26	6,500	4,500	7,500	1,075.00	1,125.00

PRICES, DOUBLE CYLINDER.

12	6¼	8	14	16	2,500	2,000	4,400	$700 00	$750.00
20	7	10	14	18	5,000	3,500	5,500	800.00	850.00
30	8¼	10	14	20	8,000	6,000	5,875	925.00	975.00
40	8½	12	20	32	10,000	8,000	13,000	1,525.00	1,600.00
50	10	12	20	32	12,000	10,000	13,500	1,625.00	1,700.00

DOUBLE AND SINGLE CYLINDER FRICTION DRUM HOISTING ENGINES.

Horse power.	Cylinder.		Diameter of drum, in inches.	Length of drum between flanges.	Will hoist with single rope, 80 lbs. steam, in lbs.	Estimated weight of engine and boiler.	Prices, with 1 drum.	Prices, with 2 drums.
	Bore, in inches.	Stroke, in inches.						
4	4⅝	8	9 to 12	16 in.	600 to 1,000	1,000 lbs.	$325.00	$450.00
5	5	10	9 " 12	18 "	700 " 1,400	1,600 "	375.00	500.00
6	5½	10	9 " 12	18 "	800 " 1,500	1,600 "	425.00	550.00
7	6¼	10	10 " 14	18 "	1,000 " 2,000	1,700 "	440.00	640.00
8	6½	12	10 " 14	19½ "	1,200 " 2,200	2,200 "	450.00	650.00
10	7¼	10	10 " 14	21 "	1,400 " 2,400	2,500 "	460.00	660.00
10½	7	12	12 " 16	22 "	1,600 " 2,600	3,000 "	475.00	675.00
11	7¼	12	12 " 16	22 "	1,700 " 2,700	3,000 "	490.00	690.00
12	7½	12	12 " 16	24 "	2,000 " 3,000	3,100 "	500.00	700.00
15	8	12	12 " 16	26 "	2,000 " 4,000	4,000 "	525.00	725.00
17½	8½	13	12 " 16	26 "	2,300 " 4,500	4,000 "	700.00	900.00
20	9	13	12 " 16	26 "	2,400 " 4,800	4,500 "	750.00	1,000.00
26	9	16	12 " 18	26 "	2,500 " 5,000	5,500 "	800.00	1,050.00
30	10	16	12 " 24	28 "	3,000 " 6,000	6,000 "	850.00	1,100.00
35	11	18	12 " 30	28 "	4,000 " 8,000	7,000 "	1,000.00	1,275.00
40	12	20	12 " 34	30 "	5,000 " 10,000	8,000 "	1,200.00	1,500.00

DOUBLE CYLINDER ENGINES.

8	4⅝	8	10	16 in.	1,200 to 2,000	1,800 lbs.	$425.00	$550.00
10	5	10	12	20 "	1,400 " 2,800	2,500 "	510.00	710.00
12	5½	10	12	20 "	1,400 " 3,000	2,500 "	525.00	725.00
14	6¼	10	12 to 14	22 "	1,800 " 3,500	3,000 "	550.00	750.00
16	6½	12	12 " 14	24 "	2,000 " 4,000	3,500 "	600.00	800.00
20	7¼	10	12 " 14	26 "	2,500 " 5,000	4,200 "	625.00	825.00
21	7	12	12 " 16	28 "	3,000 " 6,000	4,400 "	650.00	850.00
22	7¼	12	12 " 16	28 "	3,500 " 6,500	4,400 "	675.00	875 00
24	7½	12	12 " 16	30 "	4,000 " 7,000	4,600 "	700.00	900.00
30	8	12	12 " 18	30 "	5,000 " 8,000	5,000 "	750.00	950.00
35	8½	13	12 " 18	30 "	6,000 " 9,000	5,500 "	1,000.00	1,250.00
40	9	13	12 " 18	30 "	6,500 " 10,000	7,000 "	1,050.00	1,300.00
50	9	16	12 " 20	30 "	7,000 " 11,000	8,000 "	1,100.00	1,350.00
60	10	16	12 " 30	36 "	10,000 " 14,000	9,000 "	1,200.00	1,450.00
70	11	18	12 " 32	36 "	12,000 " 18,000	10,000 "	1,400.00	1,700.00
80	12	20	12 " 34	40 "	20,000 " 30,000	12,000 "	1,800.00	2,200.00

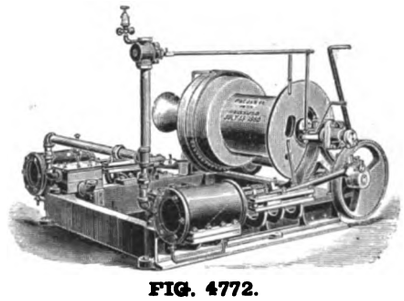


FIG. 4772.

This engine can be run with compressed air or steam. It has a winch on end of drum and is furnished with or without boiler or reverse link motion. If reverse link is wanted with the single cylinder and with friction drum, add $50.00 net, and for double cylinder, add $100.00 net.

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REVERSIBLE LINK — DOUBLE CYLINDER HOISTING ENGINES.

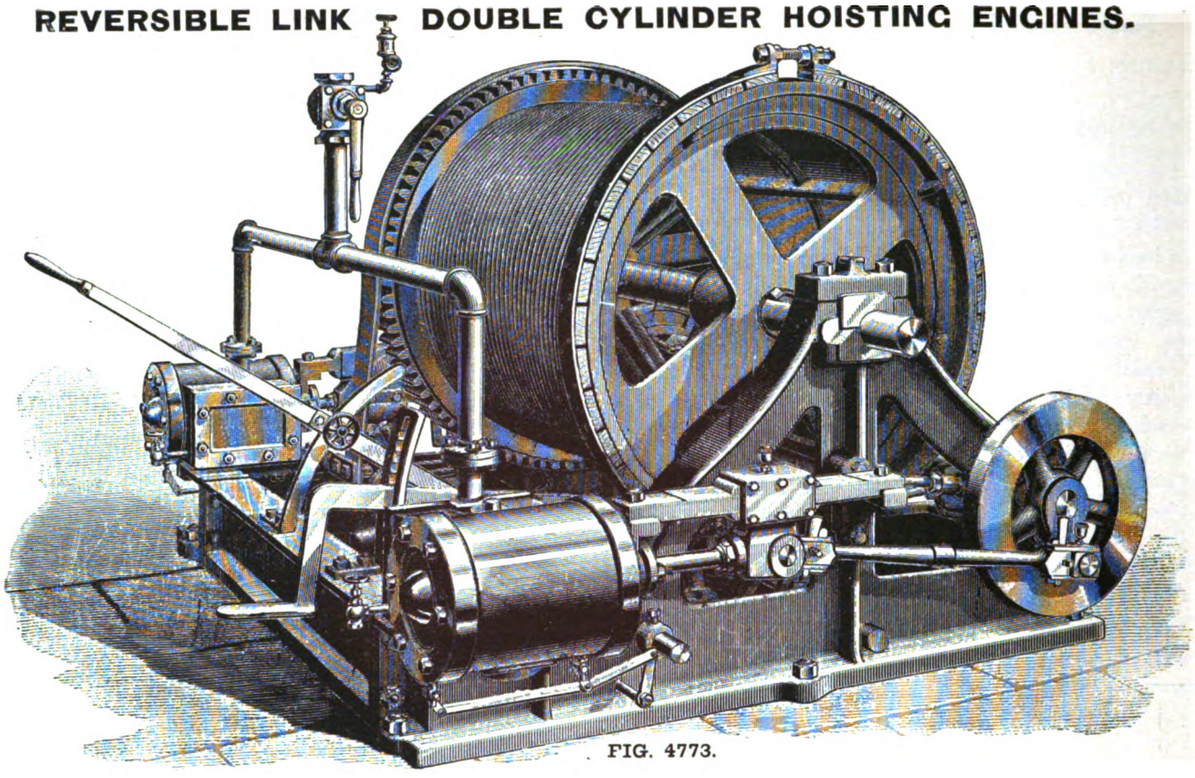


FIG. 4773.

PRICES.

Horse power usually rated.	Dimensions of cylinders.		Size of hoisting drum.		Size of wire rope for which drums are grooved. Diameter, inches.	Number of feet wire rope drums hold. Single coil.	Average weight engines hoist, lbs.	Average hoisting speed per minute, feet.	Size of base or engine bed plate.		Estimated shipping weight of engines only, lbs.	Prices of engines, complete, without boiler or fixtures, wire rope or sheave wheels.
	Diameter, inches.	Stroke, inches.	Diameter, inches.	Length, inches.					Width, inches.	Length, inches.		
12	6¼	8	23	22	⅝	215	1,500	250	49	59	3,050	$750.00
20	7	10	29	23	¾	225	2,000	275	54	73	5,125	975.00
30	8¼	10	41	39	⅞	440	3,000	350	72	74	8,050	1,250.00
40	8½	12	47	42	1	500	4,000	375	83	84	12,000	1,750.00
50	10	12	53	42	1	550	4,500	400	86	89	14,050	1,850.00
75	12¼	15	59	54	1	775	6,500	450	102	110	25,000	3,400.00
100	14	18	65	63	1	975	7,500	450	117	124	26,500	3,600.00

Engines with different size drums or cylinders from above made to order at short notice.

ROTARY HOISTING ENGINES.

OF SMALL POWER, FOR LIGHT, QUICK HOISTING. SPECIALLY ADAPTED FOR OYSTER PACKERS, AND FOR HOISTING ASHES, BARRELS, SMALL BALES, ETC.

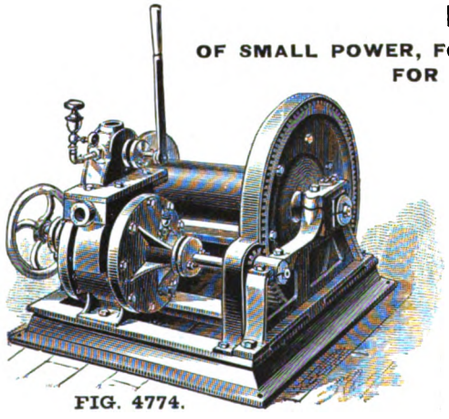


FIG. 4774.

This engine is extremely simple in construction. It is operated by a small lever, is reversible, and hoists, holds and lowers the load by steam. It has no centers, and is under perfect control of the operator. The working parts are not exposed, hence they will run in any weather, amid dust and dirt, without injury. They can be placed in any position—against a side wall or overhead—and will run equally as well as when on the floor, as they are perfectly balanced. By connecting the lever with rods they may be handled from a distance.

ONE SIZE MADE.

Size of cylinder, 9 in. diameter, 6 in. face; size of hoisting drum, 6 in. diameter, 16 in. face; size of base or bed plate, 28 in. by 30 in.; height from floor to top of steam chest, 22 in.; cog geared, 6 to 1; shipping weight, 500 lbs.; hoisting capacity, with single rope, 200 to 400 lbs.; 40 to 60 lbs. steam pressure at the engine; speed of hoisting, 75 to 100 feet per minute; size of steam pipe, 1 in.

PRICE, AS SHOWN, FIG. 4774, $160.00.

ROTARY SWINGING ENGINE FOR DERRICKS, ETC.

This engine is similar to Fig. 4774, and is especially designed for swinging derricks of all kinds, as it is reversible and is operated by one lever. This lever can be arranged by connecting rods so as to be operated by the man running the hoisting engine.

The advantage of this engine is, that being entirely independent of the hoisting engine, it can be worked simultaneously, and the boom can be swung at the same time that the load is being hoisted, thus saving time.

The engine is of the same type as Fig. 4774, except that the drum is compound geared.

Size of cylinder, 9 in. diameter, 6 in. face; size of hoisting drum, 12 in. diameter, 18 in. face; size of bed plate, 33½ in. by 43¾ in.; proportion of gearing, 25 to 1; shipping weight, 1,400 lbs.; hoisting capacity, with single rope, 1,700 to 2,000 lbs.; speed of hoisting, 50 to 60 feet per minute; size of steam pipe, 1 inch.

PRICE, ALL COMPLETE, $375.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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FRICTION DRUM AND BRAKE BELT HOISTER.

ADAPTED FOR FACTORIES, WAREHOUSES, DOCKS, ICE HOUSES, QUARRIES, MINES, ETC.

This is a compact, substantial and serviceable machine, and is mounted on a strong bed plate. The drum is loose on the shaft, and engages with the wood friction by being forced along the shaft by means of the lever shown in the cut. This lever is connected by a rod with the brake lever, so that both friction and brake levers are operated simultaneously. Thus, with the levers in the central position, as shown in the cut, the drum is free to revolve on its shaft, neither brake nor friction being applied. If the levers are moved down, the drum is still loose on the shaft, but the brake is applied and holds the drum or lowers the load as desired. If the levers are raised, then the drum is thrown into gear and hoists the load, while the break is inoperative. By means of this connection, it will be seen that the machine may be operated at a distance by means of suitable rods or ropes. If found to be more convenient, the friction and brake levers may be disconnected and worked separately.

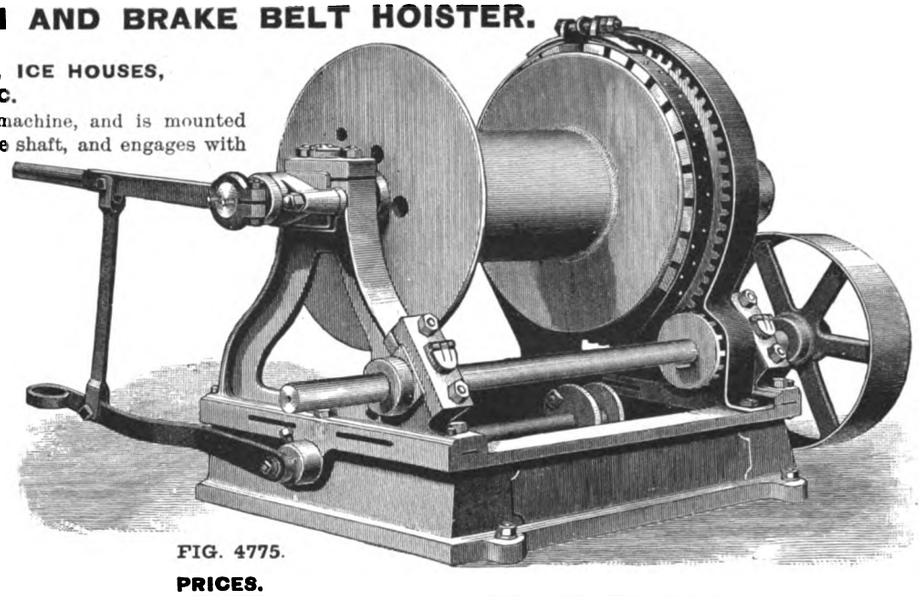


FIG. 4775.

PRICES.

Size of drum.		Size of pulley.		Proportion of gearing.		Weight hoisted, single rope, lbs.	Speed of hoist per minute, average, feet.	Size of bed plate.		Shipping weight, lbs.	Prices. Single drum with brake.	Prices. Double drum with brake.
Diameter, inches.	Length, inches.	Diameter, inches.	Face, inches.	Pinion. No. of teeth.	Spur wheel. No. of teeth.			Length, inches.	Width, inches.			
10 to 16	20	20	6½	16	66	1,000 to 1,500	100 to 150	28½	39	1,310	$300.00	$450.00
14 to 20	22	24	8½	13	59	2,000 to 3,000	150 to 200	36	45	2,200	400.00	550.00
16 to 24	26	30	8½	16	81	4,000	175 to 250	56	54	3,500	525.00	725.00
34	26	30	8½	16	81	5,000	175 to 300	56	54	4,000	650.00	975.00
41	40	36	10½	18	92	6,000	200 to 350	62	74	6,250	950.00	1,400.00
48	46	36	10½	18	107	8,000	250 to 400	63	83	9,450	1,400.00	2,500.00

Size of driving pulley and speed of hoist may be changed to suit the conditions.

NORDBERG AUTOMATIC CUT-OFF GOVERNOR.

This governor can be run at a speed of 200 revolutions and consists of a double beat poppet valve operated by a double trip mechanism. A sensitive regulator sets the point of cut-off, according to the demand of steam. The range of cut-off obtainable is from 0 to ¾ or ⅞ of stroke. An air dash pot causes the valve to drop gently on the seat. All contact edges about the trip gear are made in shape of removable hardened plates, of best English steel. These plates are reversible, and all eight edges can be used as contact edges.

The cut-off gear is operated by an independent eccentric furnished with the machine, and the regulator is driven by a belt.

All machines are provided with our patent safety stop, which will stop the engine in case of any accidents to the governor belt, or if the regulator should stick. The safety stop will keep a uniform tension on the governor belt. It will in no way interfere with the starting of the engine.

PRICES.

Size of governor valve.....	1 1-2	2	2 1-2	3	3 1-2	4	4 1-2	5	6	7	8	9
Height over all, in feet and inches.	3′ 5″	3′ 7″	3′ 11″	4′ 1″	4′ 5″	4′ 7″	5′ 6″	5′ 8″	5′ 9″	5′ 9″	7′ 5″	7′ 5″
Extreme swing of balls, in inches.	16	16	18	18	20	20	22	22	22	22	24	24
Width of belt, in inches.....	2	2	2½	2½	3	3	3	3	3	3	3½	3½
Revolutions per minute.....	115	115	112	112	98	98	98	98	98	98	86	86
Shipping weight.....	175	200	350	400	475	650	950	1,200	1,350	1,500	2,200	3,000
Diam. of bottom flange, in inches.	5¾	7	8	9	9	10	10	12	14	15	16	18
Diam. of side flange, in inches...	5½	6	7	8	8	10	10	10½	13	14	15½	17
From center of side flange to face of bottom flange, in inches.....	3½	4⅛	4¼	5½	5¾	6	6½	9	9	10	11	12
From center of bottom flange to face of side flange, in inches ...	4⅜	4½	5⅜	6	6½	6½	7	7½	8½	10¼	10¾	11¼
From bottom flange to center of rocker shaft, in inches.....	18⅝	20⅛	22¾	24	25⅜	26¾	34⅞	37⅛	38⅝	38⅝	50	51
From bottom flange to center of governor shaft, in inches.....	28⅛	29⅝	32⅞	34⅛	36¼	37¼	48	50¼	51¾	51¾	67¾	68⅜
Extreme lift of valve, in inches..	1 1/16	1 1/16	1 3/16	1 3/16	7/8	7/8	1 1/16	1 1/16	1 1/16	1 1/16	1¼	1¼
Throw of eccentrics, in inches ...	3	3	3	3	3	3	5	5	5	5	5½	5½
Diam. cyl. 300 ft. piston speed, in in.	6	8	10	12	14	16	18	20	23	27	31	35
" 400 " "	6	8	10	12	14	16	18	20	23	27	31	35
" 500 " "	5	7	9	10	12	14	16	18	21	24	28	31
" 600 " "	4½	6	8	9	11	13	15	16	19	22	25	28
Prices.....	$85	$100	$140	$165	$220	$240	$275	$350	$375	$425	$525	$600

Specifications of 10 in., 11 in. and 12 in. machines given on application. Prices, 10 in., $750.00; 11 in., $900.00; 12 in., $1,000.00.

Width of the eccentrics depends upon the size of the shaft.

Shafts, 2 to 7 inches inclusive, need eccentric 2¼ inches wide over all.

Shafts, 7½ to 12 inches inclusive, need eccentric 3 inches wide over all.

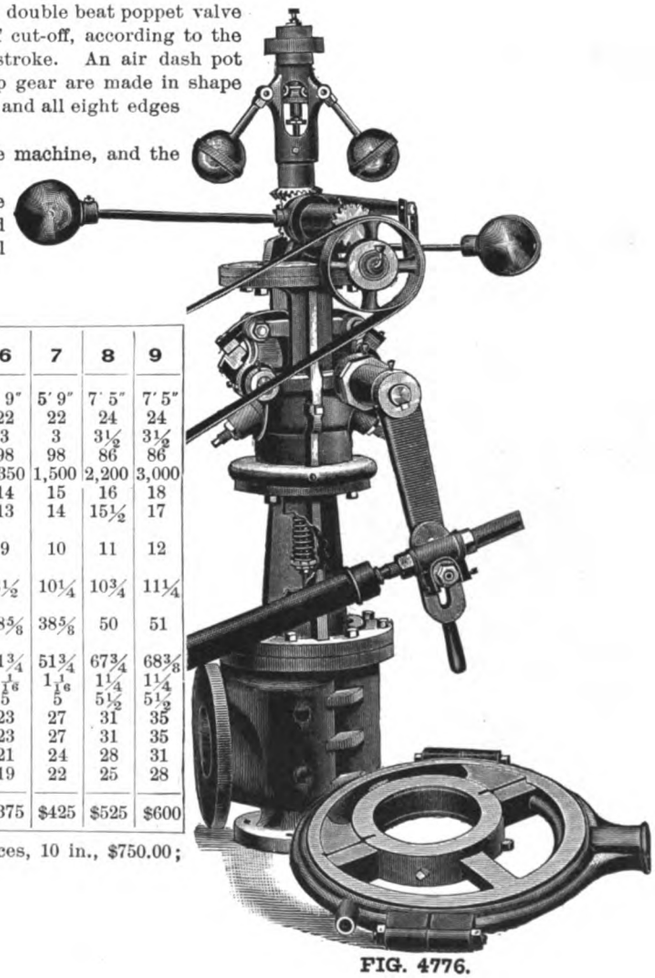


FIG. 4776.

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JUDSON STANDARD AND SPRING GOVERNORS.

CLASS B, STANDARD. **CLASS B, SPRING.** **CLASS A, STANDARD.** **CLASS A, SPRING.**

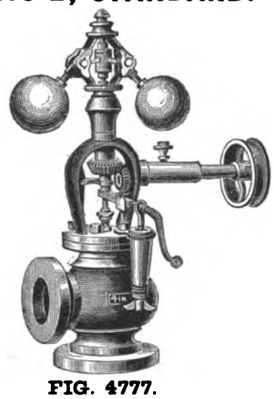


FIG. 4777.
Medium speed.

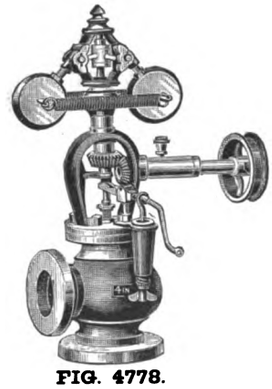


FIG. 4778.
High speed.

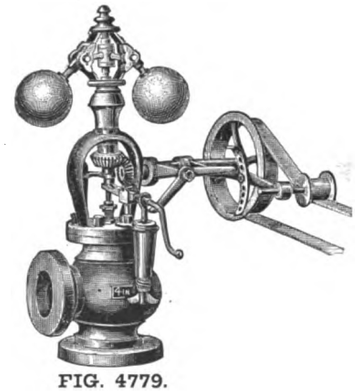


FIG. 4779.
Medium speed.

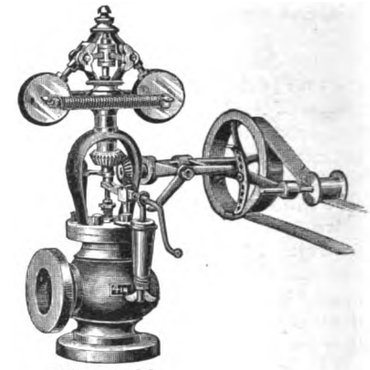


FIG. 4780.
High speed.

PICKERING STANDARD AND SPRING GOVERNORS.

CLASS B.
WITH SPEEDER.

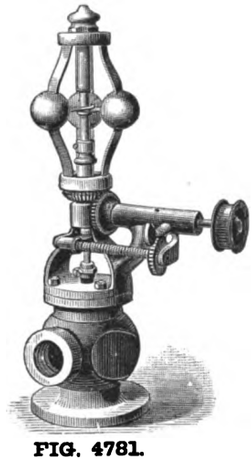


FIG. 4781.

CLASS B.
WITH SPEEDER AND SAWYERS' LEVER.

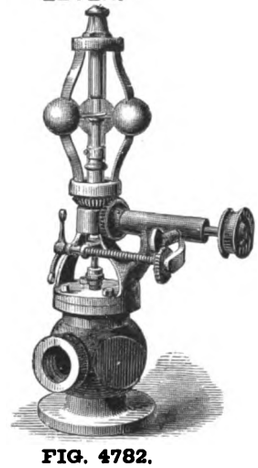


FIG. 4782.

CLASS A.
WITH SPEEDER, SAWYERS' LEVER AND AUTOMATIC STOP.

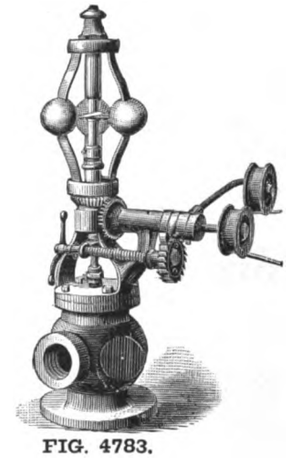


FIG. 4783.

HORIZONTAL VALVE CHAMBER.



FIG. 4784.

WATERS VALVE CHAMBERS.

WATERS HORIZONTAL.

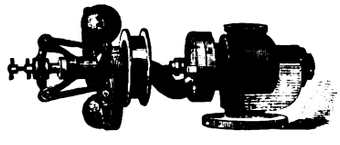


FIG. 4785.

Made in sizes ½, ¾, 1, 1¼, 1½ and 2 inch.



FIG. 4786.

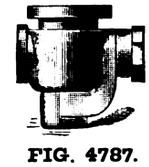


FIG. 4787.

Figs. 4786 and 4787 show different styles of valve chambers, which we furnish with either vertical or horizontal tops, having one or both openings screwed or flanged. Fig. 4786 up to and including 2 inches. Fig. 4787 up to and including 10 inches.

PICKERING HORIZONTAL.

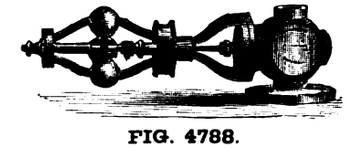


FIG. 4788.

Made in sizes 1, 1¼, 1½ and 2 inch.

WATERS GOVERNORS.



FIG. 4789.

Shows the style including and above 1½ inches.



FIG. 4790.

Shows the style including and below 3½ inches, flanged base.

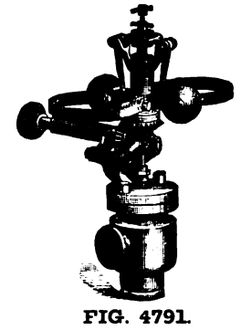


FIG. 4791.

Shows the style including and below 3½ inches, screw base.



FIG. 4792.

Shows the style of governor for horizontal steam pipe, flanged or screwed, as desired.

FOR PRICES, SEE TABLE PAGE 573.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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CARDNER STANDARD AND SPRING GOVERNORS.

STANDARD, CLASS A.

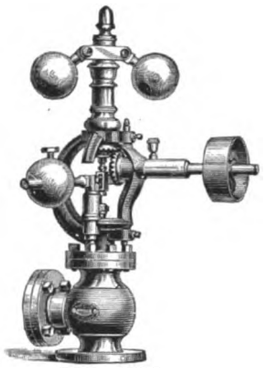


FIG. 4793.

STANDARD, CLASS B.

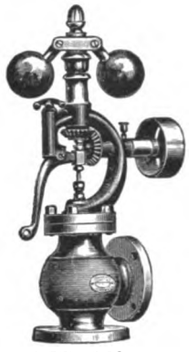


FIG. 4794.

SPRING, CLASS A. WITH SPEEDER, HAND LEVER AND AUTOMATIC STOP.

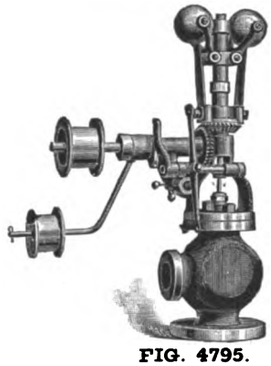


FIG. 4795.

SPRING, CLASS B. WITH SPEEDER AND HAND LEVER.

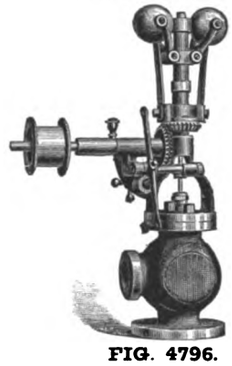


FIG. 4796.

HORIZONTAL.

MADE IN SIZES 1-2 TO 5 INCH.

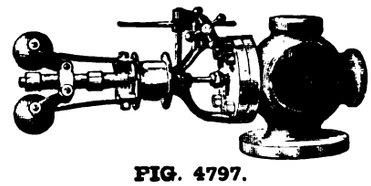


FIG. 4797.

PRICES, SAME AS SPRING B GOVERNORS.

SPRING MADE IN SIZES FROM 1-2 TO 7 INCHES.

PRICES, FIGS. 4777 TO 4797.

All class A governors have automatic stop, and class B without automatic stop.

In ordering governors, state which class is wanted, whether standard or spring, plain or finished, and with or without improved angle or globe stop valve, and whether screwed or flanged.

Size of governor, Diameter of opening.	½	¾	1	1¼	1½	2	2¼	2½	2¾	3	3½	4	4½	5	5½	6	7	8	9	10
	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$
Price, class B, plain	16.00	18.00	20.00	22.00	25.00	30.00	35.00	40.00	45.00	50.00	60.00	71.00	83.00	94.00	108.00	122.00	150.00	185.00	215.00	240.00
Price, class B, finished	18.00	20.00	22.00	25.00	29.00	34.00	40.00	45.00	51.00	58.00	69.00	81.00	94.00	106.00	121.00	136.00	166.00	202.00	235.00	260.00
Price, class A, plain			23.00	25.50	29.50	36.00	42.00	48.00	53.00	59.00	71.00	83.00	96.00	109.00	124.00	140.00	170.00	210.00	241.00	270.00
Price, class A, finished			25.00	28.50	33.50	40.00	47.00	53.00	59.00	67.00	80.00	93.00	107.00	121.00	137.00	154.00	186.00	227.00	261.00	290.00
Price, angle or globe stop valve					8.00	9.75	11.50	12.50	15.50	18.00	22.00	25.00	32.00	38.00	44.00	50.00	80.00	103.00	140.00	180.00

All governors are complete with speeder, turned flanged pulley, Sawyer's lever.

In ordering, if we are informed of speed of engine and diameter of pulley on engine shaft from which governor is driven, will put proper size of pulley on governor, otherwise our standard size of pulley will be furnished with each governor. When stop valves are ordered, angle will be sent unless globe is specified.

WRIGHT'S STEAM ENGINE GOVERNOR.

Owing to the peculiar form of the long valve stem, which is tapered and adapted to a tapered seat in the screw F, the use of packing is obviated. The pressure of the steam forces the end of the stem against the screw K, by which screw it is so nicely adjusted to its seat, as to prevent both friction and the escape of steam. After the screw is once properly set, it will need no further attention.

When ordering, inform us of the

1. Size wanted.
2. Pulley, whether flat or grooved.
3. Connections, whether screw or flange, and size of flange .....
4. Driving pulley on engine,
   - (*a*) Diameter .....
   - (*b*) Speed .....
   - (*c*) Distance from center to the center of governor outlet .....
   - (*d*) Can be moved { In .....inches. / Out ..... "

A driving pulley for the engine shaft will be an extra charge, and if ordered give

- (*e*) Diameter of engine shaft.

If in doubt what size is needed, give

5. (*a*) Revolutions per minute of engine .....
   - (*b*) Diameter of cylinder .....
   - (*c*) Length of stroke .....
   - (*d*) Size of steam pipe .....

PRICES.

½ inch	$16.00	2½ inch	$40.00
¾ "	18.00	3 "	50.00
1 "	20.00	3½ "	60.00
1¼ "	22.00	4 "	71.00
1½ "	25.00	4½ "	83.00
2 "	30.00	5 "	94.00

By the application of the springs S S to the ball arms, near the fulcrum of the arms, permitting wide ball movement, with slight increase of spring tension, it results in quick response to slight variations of speed.

The valve being upright in position, there is no wear against its seat, as must be the case when an ordinary governor is placed horizontally, to allow its being run without driving shaft and gears.

It is driven by the pulley on the revolving ball standard W, which supports the cross-bar, to which the springs and their adjusting screw U and plate T are attached; and the balls operate the valve through the rod M and the crank H, attached to the stem.

The valve is of the rotary type, and is so connected with the stem as to be free to adjust itself to its seat without binding or friction, thus obviating the only objection to this form of valve.

The speed of the engine is easily varied by the tension screw U, without changing the relative position of the valve and balls, and without increasing the friction and wear on the block N.

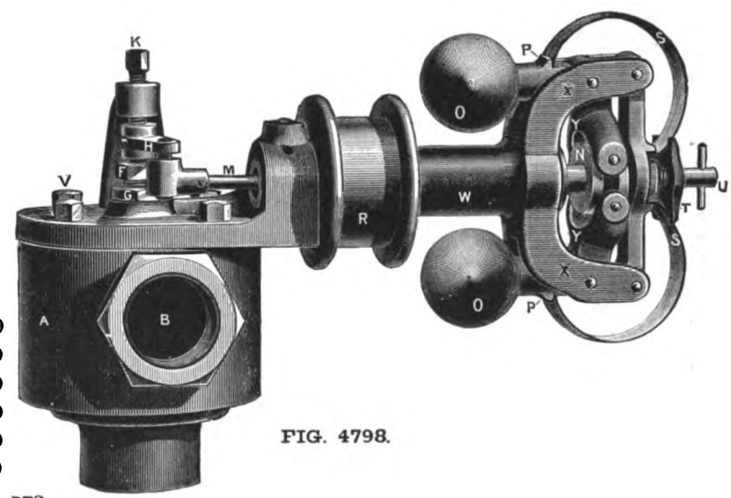


FIG. 4798.

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KNOWLES DOUBLE-ACTING PLUNGER PUMPS.

FOR FEEDING BOILERS, PUMPING WATER CONTAINING SEDIMENT OR GRIT, ETC.

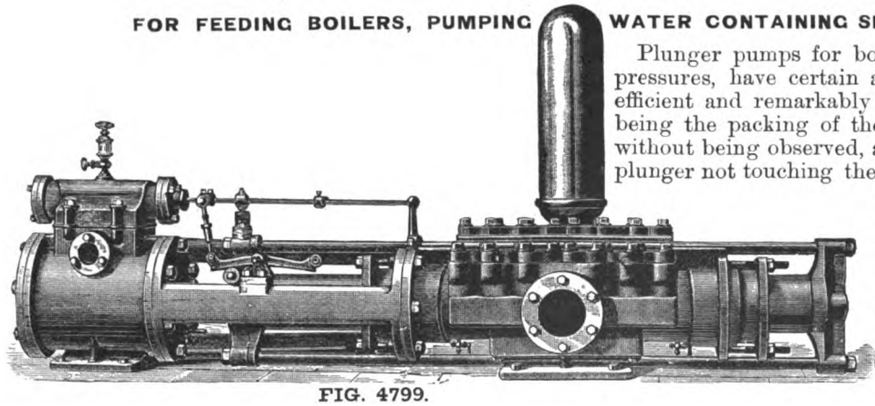


FIG. 4799.

Plunger pumps for boiler-feeding, especially under the higher range of pressures, have certain advantages over "piston" pumps. They are very efficient and remarkably durable, the only wearing part in the pump end being the packing of the plunger stuffing-boxes. No leak can occur there without being observed, and easily stopped by setting up the packing. The plunger not touching the pump castings, there is no cutting or wear, consequently they require no reboring or refitting, like piston pumps, when working on gritty or sandy water.

As feed pumps for steamboats of the Western and Southern rivers, where very high steam pressure is carried and where muddy water is the rule, the Knowles plunger pumps are superseding the expensive and cumbersome pumps known as "Doctors." They are also particularly adapted for pumping gritty or muddy water from quarries, wells, pits and similar places. The water cylinder and chest are in one piece. The piston rods do not enter the pump cylinders, and are therefore not exposed to the action of the water. The plungers are connected by substantial side rods and cross heads. The water valves are of special form, made of gun-metal composition or rubber, according to circumstances. The gun-metal valve seats are made removable, and are held firmly in place by the caps which form the hand-hole covers.

PRICES.

No.	Steam cylinder, inches.	Water plungers, inches.	Stroke.	Gallons, per stroke.	Capacity per minute at ordinary speed.	Steam pipe, inches.	Exhaust pipe, inches.	Suction pipe, inches.	Delivery pipe, inches.	Floor space required, inches.	Prices.
2	4	2½	5	.11	150 strokes, 16½ gals.	1¼	¾	1¼	1	56 x 12	$200.00
3	5½	3¼	7	.25	125 " 31 "	¾	1	2	1½	71 x 14	275.00
4	6	3¾	7	.33	125 " 42 "	¾	1	2	1½	71 x 14	300.00
5	7½	4½	10	.69	100 " 69 "	1	1¼	3	2½	90 x 21	
6	8	5	10	.85	100 " 85 "	1	1¼	3	2½	90 x 21	
7	12	6	12	1.47	100 " 147 "	2	2½	4	4	100 x 24	
8	14	7	12	2.00	100 " 200 "	2½	3	5	5	100 x 25	
9	16	8	12	2.61	100 " 261 "	2½	3	5	5		
10	18	10	16	5 44	75 " 408 "	2½	3	6	6		

DAVIDSON HEAVY PRESSURE OR BOILER FEEDERS.

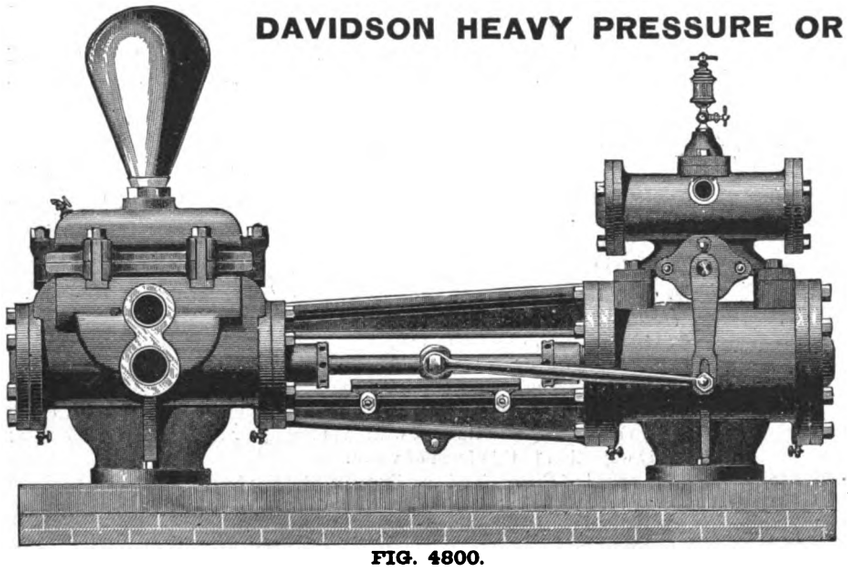


FIG. 4800.

These pumps are simple in construction, and having no dead point, are absolutely positive in action, starting from any point, and running full stroke under all conditions. They can be run at very slow piston speeds, desirable for boiler feeding, maintaining an unvarying water level, and at the very high speeds demanded for fire purposes.

Pumps from the accompanying table are constructed to operate hydraulic elevators by pumping into open or closed tanks, or directly into cylinders as for telescopic elevators.

In emergent cases the pumps can deliver double the amounts specified in table.

Hand levers always furnished with sizes Nos. 0 to 3½, and with No. 4 when ordered. The piston rod, valve seats, stems and lining of water cylinder are of the best composition metal, U. S. standard. All parts are made to standard gauges. They are perfectly interchangeable.

Suction and delivery openings on both sides of pump. Valves arranged for hot or cold water.

PRICES.

Size No.	Steam cylinder.	Water cylinder.	Stroke, inches.	Gallons, per stroke.	Capacity per minute at given speed. Strokes.	Gallons.	Steam pipe.	Exhaust pipe.	Suction pipe.	Discharge pipe.	Prices.	Size No.
0	2½	1½	3	.0259	200	5	¼	⅜	¾	½	$75.00	0
½	3	1¾	4	.039	150	5.85	¼	⅜	1	¾	85.00	½
1	3½	2	4	.05	150	7½	⅜	½	1¼	1	100.00	1
1½	4	2¼	4	.069	150	10.35	⅜	½	1¼	1	125.00	1½
2	4½	2½	6	.13	150	19½	½	¾	1½	1¼	150.00	2
2½	5	3	6	.183	150	27½	½	¾	2	1½	175.00	2½
3	5½	3¼	8	.28	125	35	¾	1	2	1½	200.00	3
3½	6	4	8	.435	125	54.37	¾	1	2½	2	250.00	3½
4	7	4	10	.54	120	65	1	1¼	2½	2	300.00	4
4½	8	5	10	.85	120	102	1	1¼	3	2½	350.00	4½
5	9	5¼	12	1.12	100	112	1	1½	3	2½	400.00	5
6	10	6	12	1.47	100	147	1¼	2	4	3	450.00	6
7	12	7	12	2.00	100	200	1½	2	5	4	525.00	7
7½	14	8¼	12	2.77	100	277	2½	3	6	5	600.00	7½
8	14	8¼	14	3.23	86	277	2½	3	6	5	650.00	8
8½	14	10	14	4.76	80	384	2½	3	8	7		8½
9	16	9¼	16	4.66	75	350	2½	3	7	6		9
10	18	10½	18	7.50	67	502	2½	3	8	7	Prices furnished on application.	10
11	20	11½	20	9.07	60	545	3	3½	9	8		11
12	22	13	22	12.65	55	695	3½	4	10	9		12
13	24	14	24	16.00	50	800	3½	4	10	10		13

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BLAKE'S BOILER FEED OR PRESSURE PUMPS.

Arranged for pumping hot or cold water, or other fluids.

They are constructed with composition piston rods, stuffing boxes, valve seats, valve bolts, and pump cylinder linings. The water pistons are also made of composition, and are suitably packed with adjustable fibrous packing, adapted for hot or cold liquids. All parts are interchangeable.

These pumps have large direct water passages, and full valve areas, which not only reduce water friction to a minimum, but enable them to be run at a speed that makes them efficient fire pumps.

Every pump has suction and delivery openings on both sides; consequently, connections can be made on either side desired. When ordering a pump, please answer the following questions: Whether for hot or cold water? To what height is water to be lifted by suction? Length of suction pipe? Against what pressure or height is water to be forced? Amount of water needed per hour?

The Nos. 0, 1½, 2½, 3, 4 and 4½ pumps are provided with hand power attachments.

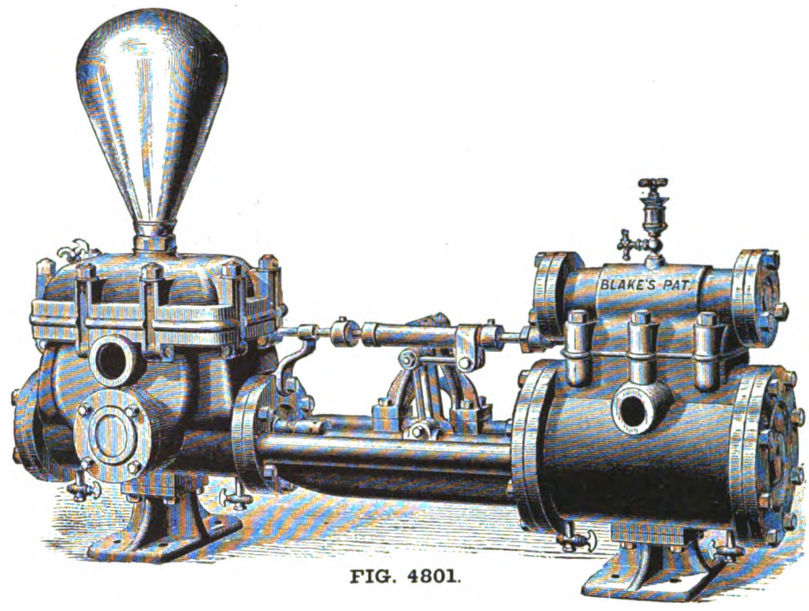


FIG. 4801.

PRICES, FIG. 4801.

No.	Steam cylinder.	Water cylinder.	Stroke.	Gallons per stroke.	Capacity per minute at ordinary speed.	Steam pipe.	Exhaust pipe.	Suction pipe.	Delivery pipe.	Floor space required.	Prices.
000	2½	1¼	3	.023	150 strokes, 3½ gals.	¼	⅜	½	⅜	17 x 5	$40.00
00	3	1¾	3	.031	150 " 4¾ "	¼	⅜	¾	½	18 x 5	55.00
0	3½	2⅛	3	.04	150 " 6 "	⅜	½	1	¾	24 x 6	85.00
1½	4	2⅜	5	.10	150 " 15 "	½	¾	1¼	1	37 x 8	125.00
2½	4½	2¾	6	.15	150 " 22 "	½	¾	1¼	1	37 x 8	150.00
3	5½	3¼	7	.25	125 " 31 "	½	¾	1½	1¼	41 x 9	200.00
4	6	3¾	7	.33	125 " 42 "	¾	1	2	1½	41 x 10	225.00
4½	6½	4⅛	8	.46	125 " 58 "	¾	1¼	2½	2	48 x 10	275.00
5	7¼	4½	10	.69	100 " 69 "	1	1½	2½	2	52 x 11	350.00
6	8	5	10	.85	100 " 85 "	1	1½	3	2½	53 x 12	375.00
6½	8	5	12	1.02	100 " 102 "	1	1½	3½	3	64 x 15	400.00
7	10	6	12	1.47	100 " 147 "	1¼	2	3½	3	66 x 15	450.00
8	12	7	12	2.00	100 " 200 "	1½	2½	5	4	66 x 16	525.00
9	14	8	12	2.61	100 " 261 "	2	3	5	4	66 x 18	600.00
10	16	9	18	4.96	70 " 347 "	2	3	8	6	98 x 28	.....
10½	16	10	24	8.16	50 " 408 "	2	3	8	6	116 x 28	.....
11	18	12	24	11.75	50 " 588 "	2½	3½	10	8	125 x 28	.....
12	20	14	24	16.00	50 " 800 "	3	4	10	8	125 x 28	.....

With hand power attachment.

REGULAR PATTERN.

For boiler feed or general pumping service. Arranged for pumping hot or cold water, or other fluids.

The pump cylinders are either plain iron with iron piston rods for pumping fresh cold water, or are arranged with pump linings, pistons, piston rods, valve seats and stems of best composition.

The pump valves are readily accessible. Its construction permits of using any material for valves to suit liquids of any temperature or consistency.

The water pistons are packed with fibrous packing, and arranged either for hot or cold liquids.

Every pump has suction openings on both sides of pump cylinder, and the discharge outlet can be turned in any direction required.

Prices for larger sizes or different proportion of cylinders furnished on application.

The first five sizes are made to work by hand when so desired.

CAMERON STEAM PUMPS.

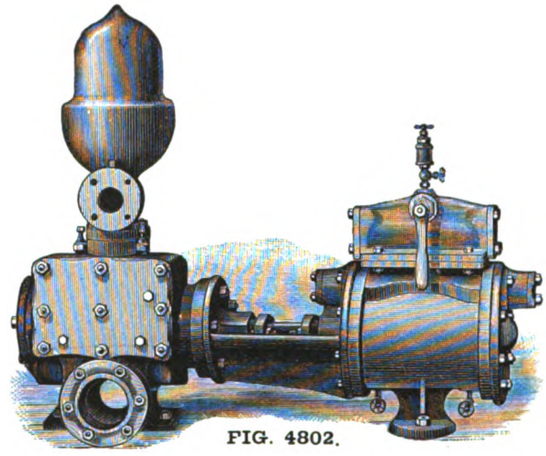


FIG. 4802.

PRICES, FIG. 4802.

Number.	Prices, with iron pump cylinder and piston rod.	Prices, having the pump lining, piston and piston rod of composition.	Diameter of steam cylinder, in inches.	Diameter of pump cylinder, in inches.	Stroke of piston, in inches.	Capacity per stroke, in gallons.	Capacity at ordinary speed per minute.	Boilers in horse power—they will supply.	Steam pipe.	Exhaust pipe.	Suction pipe.	Discharge pipe.	Length over all, in feet and inches.	Height over all, in feet and inches.	Width over all, in feet and inches.
0	$65.00	$70.00	3½	2	4	.054	8	25	⅜	½	1¼	1	2.8	1 6	.9
1	95.00	100.00	4	2	6	.081	12	40	⅜	½	1¼	1	3.4	1.6	.10
2	115.00	125.00	5	2½	6	.12	20	60	½	¾	1½	1¼	3.4	1.9	.11
3	165.00	175.00	6	3	7	.21	28	100	¾	1	2	1½	3.11	2.4	1.1
3a	185.00	200.00	6	3½	7	.29	38	140	¾	1	2½	2	3.11	2.4	1.3
4	210.00	225.00	7	3½	7	.29	38	140	¾	1	2½	2	3.11	2.4	1.3
4a	235.00	250.00	7	4	7	.39	50	250	¾	1	2½	2	4.3	2.5	1.4
5	275.00	290.00	7	3½	12	.5	50	....	1	1½	3	2½	4.10	3.1	1.5
5b	325.00	350.00	7	5	13	1.10	100	....	1	1½	4	3	5.3	3.7	1.8
6	325.00	340.00	8	4	12	.65	65	...	1	1½	3	2½	4.10	3.1	1.6
6a	350.00	375.00	8	5	13	1.10	100	....	1	1½	4	3	5.3	3.7	1.8
7	375.00	400.00	10	5	13	1.10	100	....	1¼	2	4	3	5.4	3.7	1.9
8	400.00	425.00	10	6	13	1.58	150	....	1¼	2	4	3½	5.4	3.9	1.9
9	470.00	500.00	12	7	13	2.16	200	....	1½	2½	5	4	5.6	4 5	2.
10a	540.00	575.00	14	8	13	2.83	261	....	2	3	5	5	6.1	4.6	2.2
10	.....	.....	14	9	18	4.96	325	....	2	3	6	5	6 9	5.3	2.6
11	.....	.....	16	10½	18	6.75	450	...	2½	4	8	6	7.6	6.4	3.1
12	.....	.....	18	12	20	9.80	587	....	3	4	10	8	8.7	6.10	3.5

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WORTHINGTON REGULAR PATTERN STEAM PUMPS.

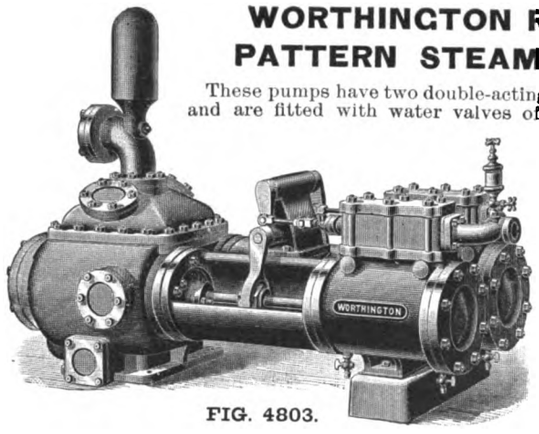


FIG. 4803.

These pumps have two double-acting plungers, or pistons, and are fitted with water valves of rubber or metal, as required. They are designed for boiler feeding, fire, hydraulic elevator and general service, where the water pressure does not exceed 150 lbs.

The stated capacities of the pumps, given below, are based upon a piston travel of about 50 to 100 feet per minute. In case of fire or other emergency this speed can be considerably increased.

A slight additional charge is made when pumps are fitted with brass plungers and piston rods. An extra charge is also made for bed-plates.

To designate the sizes, give the diameters of steam cylinders and water plungers, and length of stroke.

In addition to the sizes given in the list, a large number of other sizes and combinations can be supplied to meet the requirements of any particular service.

PRICES, FIG. 4803.

Diameter of steam cylinders.	Diameter of water plungers.	Length of stroke.	Displacement in gallons per stroke of one plunger.	Proper strokes per minute of one plunger, varying with kind of work and pressure.	Gallons delivered per minute by both plungers at stated number of strokes.	Diameter of plunger required in any single cylinder pump to do the same work at same speed.	Sizes of pipes for short lengths. To be increased as length increases.			
							Steam pipe.	Exhaust pipe.	Suction pipe.	Disch'rge pipe.
2	1 1/8	2 1/4	.013	100 to 300	2 to 7	1 3/8	3/8	1/2	1	3/4
3	2	3	.04	100 " 250	8 " 20	2 7/8	3/4	1/2	1 1/4	1
4 1/2	2 3/4	4	.10	100 " 200	20 " 40	4	1/2	3/4	2	1 1/2
5 1/4	3 1/2	5	.20	100 " 200	40 " 80	5	3/4	1 1/4	2 1/2	1 1/2
6	4	6	.33	100 " 150	70 " 100	5 1/2	1	1 1/2	3	2
7 1/2	4 3/8	6	.42	100 " 150	85 " 125	6 3/8	1 1/2	2	4	3
7 1/2	5	6	.51	100 " 150	100 " 150	7	1 1/2	2	4	3
7 1/2	4 1/2	10	.69	75 " 125	100 " 170	6 3/4	1 1/2	2	4	3
9	5 1/4	10	.93	75 " 125	135 " 230	7 1/8	2	2 1/2	4	3
10	6	10	1.22	75 " 125	180 " 300	8 1/2	2	2 1/2	5	4
10	7	10	1.66	75 " 125	245 " 410	9 3/4	2	2 1/2	6	5
12	7	10	1.66	75 " 125	245 " 410	9 3/4	2 1/2	3	6	5
14	7	10	1.66	75 " 125	245 " 410	9 3/4	2 1/2	3	6	5
12	8 1/2	10	2.45	75 " 125	365 " 610	12	2 3/4	3	6	5
14	8 1/2	10	2.45	75 " 125	365 " 610	12	2 1/2	3	6	5
16	8 1/2	10	2.45	75 " 125	365 " 610	12	2 1/2	3	6	5
18 1/2	8 1/2	10	2.45	75 " 125	365 " 610	12	3	3 1/2	6	5
20	8 1/2	10	2.45	75 " 125	365 " 610	12	4	5	6	5
12	10 1/4	10	3.57	75 " 125	530 " 890	14 1/4	2 1/2	3	8	7
14	10 1/4	10	3.57	75 " 125	530 " 890	14 1/4	2 1/2	3	8	7
16	10 1/4	10	3.57	75 " 125	530 " 890	14 1/4	2 1/2	3	8	7
18 1/2	10 1/4	10	3.57	75 " 125	530 " 890	14 1/4	3	3 1/2	8	7
20	10 1/4	10	3.57	75 " 125	530 " 890	14 1/4	4	5	8	7
14	12	10	4.89	75 " 125	730 " 1,220	17	2 1/2	3	10	8
16	12	10	4.89	75 " 125	730 " 1,220	17	2 1/2	3	10	8
18 1/2	12	10	4.89	75 " 125	730 " 1,220	17	3	3 1/2	10	8
20	12	10	4.89	75 " 125	730 " 1,220	17	4	5	10	8
18 1/2	14	10	6.66	75 " 125	990 " 1,660	19 3/4	3	3 1/2	12	10
20	14	10	6.66	75 " 125	990 " 1,660	19 3/4	4	5	12	10
17	10	15	5.10	50 " 100	510 " 1,020	14	3	3 1/2	8	7
20	12	15	7.34	50 " 100	730 " 1,460	17	4	5	12	10
20	15	15	11.47	50 " 100	1,145 " 2,290	21				
25	15	15	11.47	50 " 100	1,145 " 2,290	21				

WORTHINGTON COMPOUND STEAM PUMPS.

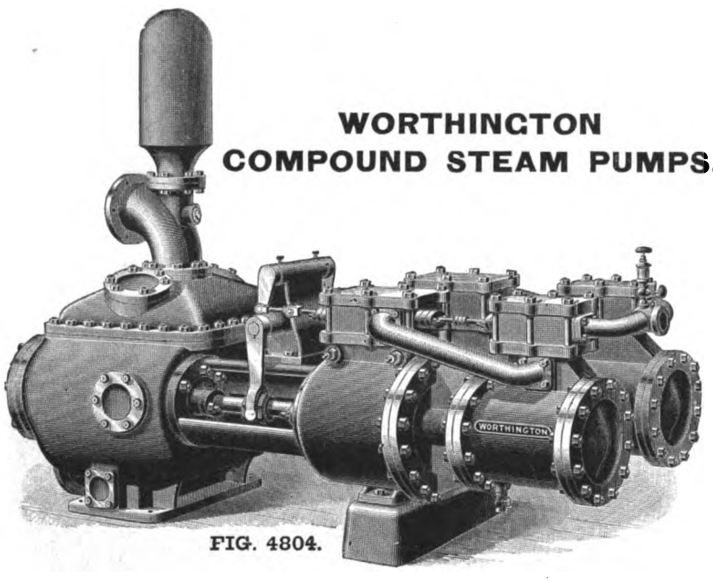


FIG. 4804.

PRICES, FIG. 4804.

Diameter of steam cylinders.	Diameter of water plungers.	Length of stroke.	Displacement in gallons per stroke of one plunger.	Proper strokes per minute of one plunger, varying with kind of work and pressure.	Gallons delivered per minute by both plungers at stated number of strokes.	Diameter of plunger required in any single cylinder pump to do the same work at same speed.	Sizes of pipes for short lengths. To be increased as length increases.			
							Steam pipe.	Exhaust pipe.	Suction pipe.	Disch'rge pipe.
8 & 12	7	10	1.66	75 to 125	245 to 410	9 7/8	2	3	6	5
8 " 12	8 1/2	10	2.45	75 " 125	365 " 610	12	2	3	6	5
10 " 16	8 1/2	10	2.45	75 " 125	365 " 610	12	2	3	6	5
12 " 18 1/2	8 1/2	10	2.45	75 " 125	365 " 610	12	2 3/4	3 1/2	6	5
14 " 20	8 1/2	10	2.45	75 " 125	365 " 610	12	2 3/4	5	6	5
8 " 12	10 1/4	10	3.57	75 " 125	530 " 890	14 1/4	2	3	8	7
10 " 16	10 1/4	10	3.57	75 " 125	530 " 890	14 1/4	2	3	8	7
12 " 18 1/2	10 1/4	10	3.57	75 " 125	530 " 890	14 1/4	2 1/4	3 1/2	8	7
14 " 20	10 1/4	10	3.57	75 " 125	530 " 890	14 1/4	2 1/2	5	8	7
8 " 12	12	10	4.89	75 " 125	730 " 1,220	17	2	3	10	8
10 " 16	12	10	4.89	75 " 125	730 " 1,220	17	2	3	10	8
12 " 18 1/2	12	10	4.89	75 " 125	730 " 1,220	17	2 3/4	3 1/2	10	8
14 " 20	12	10	4.89	75 " 125	730 " 1,220	17	2 3/4	5	10	8
10 " 16	14	10	6.66	75 " 125	990 " 1,660	19 3/4	2	3	12	10
12 " 18 1/2	14	10	6.66	75 " 125	990 " 1,660	19 3/4	2 1/4	3 1/2	12	10
14 " 20	14	10	6.66	75 " 125	990 " 1,660	19 3/4	2 1/2	5	12	10
12 " 17	10	15	5.10	50 " 100	510 " 1,020	14	2 1/2	3 1/2	8	7
14 " 20	10	15	5.10	50 " 100	510 " 1,020	14	2 1/2	5	8	7
14 " 20	12	15	7.34	50 " 100	730 " 1,460	17	2 3/4	5	12	10
12 " 17	15	15	11.47	50 " 100	1,145 " 2,290	21				
14 " 20	15	15	11.47	50 " 100	1,145 " 2,290	21				
16 " 25	15	15	11.47	50 " 100	1,145 " 2,290	21				
14 " 20	17	15	14.74	50 " 100	1,470 " 2,940	24				
18 1/2 " 29	16	18	15.66	40 " 75	1,250 " 2,345	22 1/2				

In the arrangement of steam cylinders here employed, the steam is used expansively, which cannot be done in the ordinary form. Having exerted its force through one stroke, upon the smaller steam piston, it expands upon the larger during the return stroke, and operates to drive the piston in the other direction. This is, in effect, the same thing as using a cut-off on a crank engine, only with the great advantage of uniform and steady action upon the water.

Compound cylinders are recommended in any service where the saving of fuel is an important consideration. In such cases their greater first cost is fully justified, as they require 30 to 33 per cent. less coal than any high-pressure form, on the same work.

On the large sizes a condensing apparatus is often added, thus securing the highest economical results.

Any of the ordinary forms of Worthington steam pumps can be fitted with these compound cylinders, and in proportions to suit any service. An extra patented pipe connection is sometimes employed that permits steam to be admitted directly from the boiler to the low-pressure cylinder, whereby a greatly augmented water pressure for fire or other emergency is secured.

Compound cylinders are extensively applied to hydraulic elevator pumps, tank pumps, fire pumps, pressure pumps, mine pumps, and to engines designed for the water supply of small cities and towns.

It should be remembered that, as the compounds use less steam, their boilers may be reduced materially in size and cost, compared with those required by the high pressure form. This principle of expansion, without condensation, cannot be used with advantage where the steam pressure is below 50 lbs.

A slight additional charge is made when pumps are fitted with brass plungers and piston rods. An extra charge is also made for bed plates.

To designate the sizes, give the diameters of steam cylinders and water plungers, and length of stroke.

In addition to the sizes given in the above list, a large number of other sizes and combinations can be supplied to meet the requirements of any particular service.

SNOW COMPOUND STEAM PUMPS.

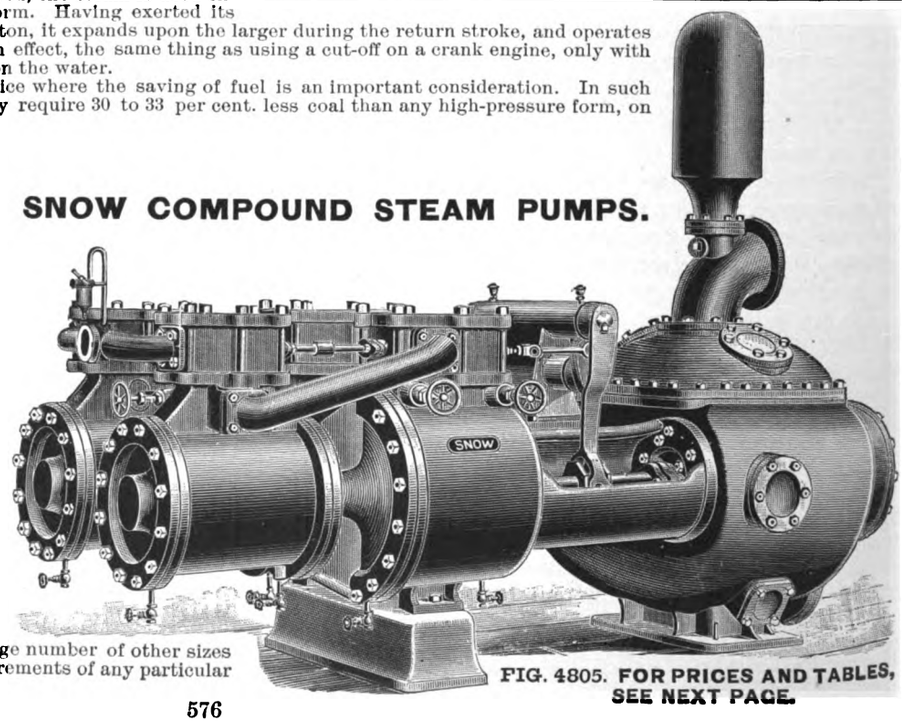


FIG. 4805. FOR PRICES AND TABLES, SEE NEXT PAGE.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PRICES, SNOW COMPOUND PUMPS, FIG. 4805.

Diameter of steam cylinders.	Diameter of water plungers.	Length of stroke.	Displacement in gallons per stroke of one plunger.	Proper strokes per minute of one plunger, varying with kind of work and pressure.	Gallons delivered per minute by both plungers at stated number of strokes.	Diameter of plunger required in any single cylinder pump to do the same work at same speed.	Diameter of pipes, in inches.				Prices.
							Steam.	Exhaust.	Suction.	Discharge.	
8 and 12	7	12	2.00	75 to 125	298 to 492	9 7/8	1 1/2	3	6	5	$760.00
8 " 12	8 1/2	12	2.95	75 " 125	438 " 738	12	1 1/2	3	6	5	825.00
10 " 16	8 1/2	12	2.95	75 " 125	438 " 738	12	2	3	6	5	960.00
12 " 18	8 1/2	12	2.95	75 " 125	438 " 738	12	2 1/2	4	6	5	1045.00
14 " 20	8 1/2	12	2.95	75 " 125	438 " 738	12	2 1/2	5	6	5	1130.00
8 " 12	10	12	4.10	75 " 125	612 " 1020	14 1/8	1 1/2	3	8	7	940.00
10 " 16	10	12	4.10	75 " 125	612 " 1020	14 1/8	2	3	8	7	1050.00
12 " 18	10	12	4.10	75 " 125	612 " 1020	14 1/8	2 1/2	4	8	7	.....
14 " 20	10	12	4.10	75 " 125	612 " 1020	14 1/8	2 1/2	5	8	7	.....
8 " 12	12	12	5.90	75 " 125	876 " 1464	17	1 1/2	3	10	8	.....
10 " 16	12	12	5.90	75 " 125	876 " 1464	17	2	3	10	8	.....
12 " 18	12	12	5.90	75 " 125	876 " 1464	17	2 1/2	4	10	8	.....
14 " 20	12	12	5.90	75 " 125	876 " 1464	17	2 1/2	5	10	8	.....
10 " 16	14	12	8.00	75 " 125	1188 " 1992	19 3/4	2	3	12	10	.....
12 " 18	14	12	8.00	75 " 125	1188 " 1992	19 3/4	2 1/2	4	12	10	.....
14 " 20	14	12	8.00	75 " 125	1188 " 1992	19 3/4	2 1/2	5	12	10	.....

DESCRIPTION, FIG. 4805.

Where a saving in fuel is desired this combination of high and low pressure cylinders is recommended. The steam acting through the entire stroke upon the smaller piston expands upon the larger during the return stroke. This is in effect the same as using a cut-off device and results in a saving of from 20 to 30 per cent. As compound cylinders require less steam, the size and cost of boilers may be materially lessened.

Compound cylinders are used extensively on hydraulic elevator pumps, fire, pressure and mine pumps; also on pumps designed for the water supply of small cities and towns.

If desired, by means of a special pipe attachment, steam may be led directly to the low pressure cylinder.
When pumps are fitted with brass plungers and piston rods, a slight additional charge is made. An extra charge will also be made for bed-plates.
Any number of combinations, in addition to the above list, can be supplied to meet the requirements of any service.

WORTHINGTON LOW SERVICE PUMPS.

PRICES, FIG. 4806.

Diameter of steam cylinders.	Diameter of water plungers.	Length of stroke.	Displacement in gallons per stroke of one plunger.	Proper strokes per minute of one plunger, varying with kind of work and pressure.	Gallons delivered per minute by both plungers at stated number of strokes.	Diameter of plunger required in any single cylinder pump to do the same work at same speed.	Sizes of pipe for short lengths, to be increased as length increases.				Prices.
							Steam pipe.	Exhaust pipe.	Suction pipe.	Discharge pipe.	
4 1/2	3 3/4	4	.20	100 to 200	40 to 80	5 1/4	1/2	3/4	2 1/2	1 1/2	.....
5 1/4	4 3/4	5	.38	100 " 150	75 " 110	6 3/4	3/4	1 1/4	3	2	.....
6	5 3/4	6	.67	100 " 150	130 " 195	8 1/8	1	1 1/2	4	2 1/2	.....
6	7 1/2	6	1.14	100 " 150	225 " 340	10 1/4	1	1 1/2	6	5	.....
7 1/2	7 1/2	6	1.14	100 " 150	225 " 340	10 1/4	1 1/2	2	6	5	.....
6	8 1/2	6	1.47	100 " 150	295 " 440	12	1	1 1/2	6	5	.....
7 1/2	8 1/2	6	1.47	100 " 150	295 " 440	12	1 1/2	2	6	5	.....
7 1/2	6	10	1.22	75 " 125	180 " 300	8 1/2	1 1/2	2	5	4	.....
7 1/2	7	10	1.66	75 " 125	245 " 410	9 7/8	1 1/2	2	6	5	.....
7 1/2	8 1/2	10	2.45	75 " 125	365 " 610	12	1 1/2	2	6	5	.....
9	8 1/2	10	2.45	75 " 125	365 " 610	12	2	2 1/2	6	5	.....
7 1/2	10 1/4	10	3.57	75 " 125	530 " 890	14 1/4	1 1/2	2	8	7	.....
10	10 1/4	10	3.57	75 " 125	530 " 890	14 1/4	2	2 1/2	8	7	.....
9	12	10	4.89	75 " 125	730 " 1220	17	2	2 1/2	10	8	.....
12	12	10	4.89	75 " 125	730 " 1220	17	2 1/2	3	10	8	.....
7 1/2	14	10	6.66	75 " 125	990 " 1660	19 3/4	1 1/2	2	12	10	.....
10	14	10	6.66	75 " 125	990 " 1660	19 3/4	2	2 1/2	12	10	.....
12	14	10	6.66	75 " 125	990 " 1660	19 3/4	2 1/2	3	12	10	.....
14	14	10	6.66	75 " 125	990 " 1660	19 3/4	2 1/2	3	12	10	.....
16	14	10	6.66	75 " 125	990 " 1660	19 3/4	2 1/2	3	12	10	.....
10	15	15	11.47	50 " 100	1145 " 2290	21					.....
12	15	15	11.47	50 " 100	1145 " 2290	21					.....
14	15	15	11.47	50 " 100	1145 " 2290	21					.....
17	15	15	11.47	50 " 100	1145 " 2290	21					.....
17	17	15	14.74	50 " 100	1470 " 2940	24					.....
20	17	15	14.74	50 " 100	1470 " 2940	24					.....

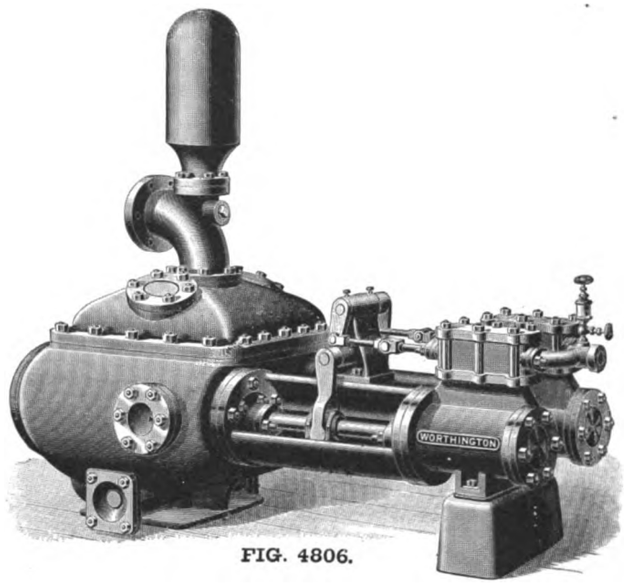


FIG. 4806.

DESCRIPTION, FIG. 4806.

These pumps were designed for use in connection with railroad water stations, oil tanks, oil refineries and other places where fluid is to be raised to a moderate height with ordinary steam pressure.

These patterns are of the same general form and interior construction as Fig. 4803, but have plungers or water pistons nearly or quite the diameter of their steam pistons. They cannot therefore feed their own boilers, but can be fitted at small additional cost with an "end feed," attached to the end of one of the water cylinders.

In any emergency the speed of the pumps may be considerably increased beyond the figures stated in the list.

A slight additional charge is made when pumps are fitted with brass plungers and piston rods. An extra charge is also made for bed-plates.

To designate the sizes give the diameters of steam cylinders and water plungers, and length of stroke.

In addition to the sizes given in the above list, a large number of other sizes and combinations can be supplied to meet the requirements of any particular service.

KNOWLES TANK PUMPS.

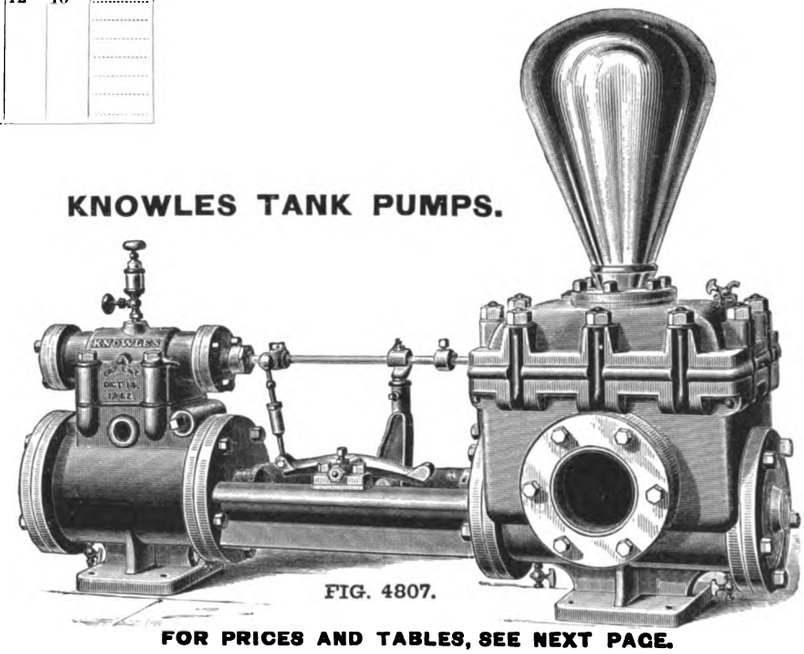


FIG. 4807.

FOR PRICES AND TABLES, SEE NEXT PAGE.

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PRICES, KNOWLES TANK PUMPS, FIG. 4807.

DESCRIPTION, FIG. 4807.

For pumping water or other liquids to limited heights and distances, these pumps possess special advantages; they combine large pumping capacity with small expenditure of steam. The steam cylinders, in proportion to the pump cylinders, are made smaller in diameter than with the regular pressure pumps, consequently the first cost is less—for amount of water pumped. These pumps are principally used at railroad water stations, gas and oil works, bleacheries, tanneries, refineries, plantations, distilleries, etc. A variety of valves are used adapted for pumping hot, cold, thick, thin, alkaline or other liquids.

For quarries and clay pits, also for coffer dams, tunnels, foundation pits, ore beds, sewerage and irrigating purposes, these pumps are especially adapted, having large water passages and valve openings.

The water cylinders are arranged with composition linings, valve seats, valve bolts, water pistons, piston rods, stuffing boxes; the water pistons are packed with a special form of adjustable packing.

Auxiliary boiler feed pumps, single action plungers, attached when required. Prices extra. Pumps with water cylinders entirely of composition, extra. The hand-power attachment applied to the first four sizes. In ordering, parties will please state fully the duty to be performed, also size and length of pipes.

PRICES.

Steam cylinder. Ins.	Water cylinder. Ins.	Stroke Ins.	Gall'ns per stroke.	Capacity per minute at ordinary speed.	Steam pipe. Ins.	Exhaust pipe. Ins.	Suction pipe. Ins.	Delivery pipe. Ins.	Floor space required. Inches.	Prices.
3¼	3¼	4	.15	125 strokes, 18 gals.	⅛	¾	1½	1¼	28 x 10	$125.00
4	4	5	.27	125 " 33 "	⅛	¾	2	1½	34 x 11	175.00
5	4	7	.39	125 " 49 "	¼	1	2½	2	44 x 12	238.00
5½	5½	7	.72	125 " 90 "	¾	1	3	2½	44 x 13½	300.00
6	5½	7	.72	125 " 90 "	¾	1	3	2½	44 x 13⅜	300.00
6	6	12	1.47	100 " 147 "	¾	1	4	4	66¾ x 19	350.00
6	7	12	2.00	100 " 200 "	¾	1	5	5	66¾ x 19	375.00
7	7	10	1.66	100 " 166 "	1	1¼	5	5	56¾ x 19	375.00
7½	7½	10	1.91	100 " 191 "	1	1¼	5	5	56¾ x 19	375.00
8	6	12	1.47	100 " 147 "	1	1¼	4	4	66¾ x 19	400.00
8	7	12	2.00	100 " 200 "	1	1¼	5	5	66¾ x 19	.....
8	8	12	2.61	100 " 261 "	1	1¼	5	5	66¾ x 20	.....
8	9	12	3.30	100 " 330 "	1	1¼	6	6	66¾ x 21½	.....
8	10	12	4.08	100 " 408 "	1	1¼	6	6	66¾ x 21½	.....
10	10	12	4.08	100 " 408 "	1¼	1½	6	6	66¾ x 21½	.....
10	10	16	5.44	75 " 408 "	1¼	1½	6	6	78⅜ x 21½	.....
10	12	12	5.87	100 " 587 "	1¼	1½	8	6	66¾ x 23¾	.....
10	12	16	7.83	75 " 587 "	1¼	1½	8	6	78⅜ x 23¾	.....
12	10	12	4.08	100 " 408 "	2	2½	6	6	66¾ x 21½	.....
12	10	16	5.44	75 " 408 "	2	2½	6	6	78½ x 21½	.....
12	12	12	5.87	100 " 587 "	2	2½	8	6	66¾ x 23¾	.....
12	12	16	7.83	75 " 587 "	2	2½	8	6	78¼ x 23¾	.....
14	12	12	5.87	100 " 587 "	2	2½	8	6	66¾ x 23¾	.....
14	12	16	7.83	75 " 587 "	2	2½	8	6	78¼ x 23¾	.....
14	14	16	10.66	75 " 800 "	2	2½	10	8	78½ x 27	.....
14	14	24	16.00	50 " 800 "	2½	3	10	8	108 x 27	.....
14	16	16	14.92	75 " 1,020 "	2½	3	12	10	80 x 35½	.....
14	16	24	20.88	50 " 1,044 "	2½	3	12	10	108 x 35½	.....
16	14	16	10.66	75 " 800 "	2½	3	10	8	78½ x 27	.....
16	14	24	16.00	50 " 800 "	2½	3	10	8	108 x 27	.....
16	16	16	14.92	75 " 1,020 "	2½	3	12	10	80 x 35½	.....
16	16	24	20.88	50 " 1,044 "	2½	3	12	10	108 x 35½	.....
16	18	24	26.44	50 " 1,322 "	2⅝	3	12	10	108 x 38	.....
16	20	24	32.64	50 " 1,632 "	2⅝	3	14	12	108 x 40	.....
18	16	24	20.88	50 " 1,044 "	3⅛	4	12	10	110 x 35½	.....
18	18	24	26.44	50 " 1,322 "	3⅛	4	12	10	110 x 38	.....
18	20	24	32.64	50 " 1,632 "	3⅛	4	14	12	110 x 40	.....
18	22	24	39.50	50 " 1,975 "	3⅛	4	14	14	110 x 42	.....
20	18	24	26.44	50 " 1,322 "	3½	4	12	10	118 x 38	.....
20	20	24	32.64	50 " 1,622 "	3½	4	14	12	118 x 40	.....
20	22	24	39.50	50 " 1,975 "	3½	4	14	14	118 x 42	.....
20	24	24	47.00	50 " 2,350 "	3½	4	16	16	118 x 44	.....

Also patterns for larger sizes or other combinations of cylinders.

SNOW LOW SERVICE PUMPS.

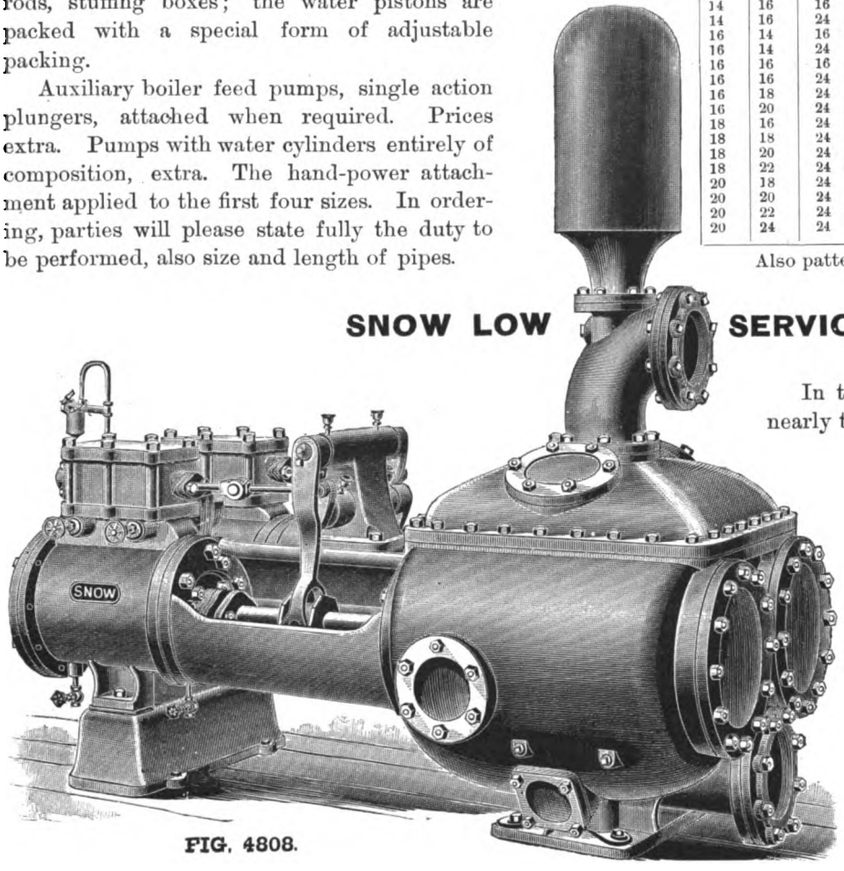


FIG. 4808.

DESCRIPTION, FIG. 4808.

In this pump the steam pistons and water plungers are of nearly the same diameter. Where low lifts occur a saving in steam results from the use of this pump. It is intended for service at railway water supply stations, tanneries, breweries, oil tanks, refineries, etc. These are generally constructed with water plungers. Water pistons will be substituted when desired. The speed may be considerably increased above the figures in the table below. Sizes are designated by the diameter of steam cylinders, the diameter of the water plungers, and the length of stroke. When pumps are fitted with brass plungers and piston rods a slight additional charge is made. An extra charge will also be made for bed plates.

Any number of combinations in addition to the above list can be furnished to meet the requirements of any service.

PRICES.

Diameter of steam cylinders.	Diameter of water plungers.	Length of stroke.	Displacement in gallons per stroke of one plunger.	Proper strokes per minute of one plunger, varying with kind of work and pressure.	Gallons delivered per minute by both plungers at stated number of strokes.	Diameter of plungers required in any single cylinder pump to do the same work at same speed.	Diameter of pipe, in inches.				Prices.
							Steam.	Exhaust.	Suction	Discharge.	
4¼	3¾	4	.19	100 to 200	38 to 76	5¼	½	1	2½	2	$105.00
5¼	4¾	5	.38	100 " 200	75 " 150	6¾	¾	1¼	3	2½	135.00
6	5¼	6	.67	100 " 150	134 " 200	8⅛	1	1½	4	3	180.00
7	6¾	8	1.23	100 " 150	245 " 370	9⅞	1¼	2	5	4	335.00
8	6	10	1.24	75 " 125	185 " 308	8⅛	1⅜	2	5	4	370.00
8	7	10	1.66	75 " 125	245 " 410	9⅞	1½	2	6	5	460.00
8	8¼	10	2.45	75 " 125	365 " 610	12	1½	2	6	5	475.00
10	8¼	10	2.45	75 " 125	365 " 610	12	2	2¼	6	5	500.00
10	10	10	3.40	75 " 125	510 " 850	14⅛	2	2½	8	7	580.00
12	10	12	4.10	75 " 125	612 " 1,020	14¾	2⅛	3	8	7	.....
8	12	10	4.90	75 " 125	730 " 1,220	17	1½	2	10	8	.....
10	12	10	4.90	75 " 125	730 " 1,220	17	2	2½	10	8	.....
12	12	12	5.90	75 " 125	880 " 1,500	17	2⅛	3	10	8	.....
10	14	10	6.65	75 " 125	1,000 " 1,660	19¾	2	2¼	12	10	.....
12	14	12	8.00	75 " 125	1,200 " 2,000	19¾	2½	3	12	10	.....
14	14	12	8.00	75 " 125	1,200 " 2,000	19¾	2⅝	3	12	10	.....
16	14	12	8.00	75 " 125	1,200 " 2,000	19¾	2⅞	3	12	10	.....

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SNOW DUPLEX STEAM AND FIRE PUMPS.

This engraving represents our standard design for duplex steam pumps. It is intended for all service when the requirements do not exceed a working pressure of 150 lbs. per square inch. These pumps are fitted with two double-acting plungers, rubber valves, brass seats, guards and springs, suitable for pumping hot or cold water.

Metal valves, with special seats and guards, can be furnished to suit any particular requirement. In emergency the capacities given below may be considerably increased. In comparing the capacities of pumps, it should be borne in mind that the Snow pump has two plungers and is therefore double the capacity of a single cylinder pump of the same dimensions.

Sizes are designated by the diameter of the steam cylinders, the diameter of the water plunger, and the length of the stroke.

Any number of combinations in addition to the above list can be supplied to meet the requirements of any service.

Bed plates extra. When pumps are fitted with brass plungers and piston rods, a slight extra charge is made.

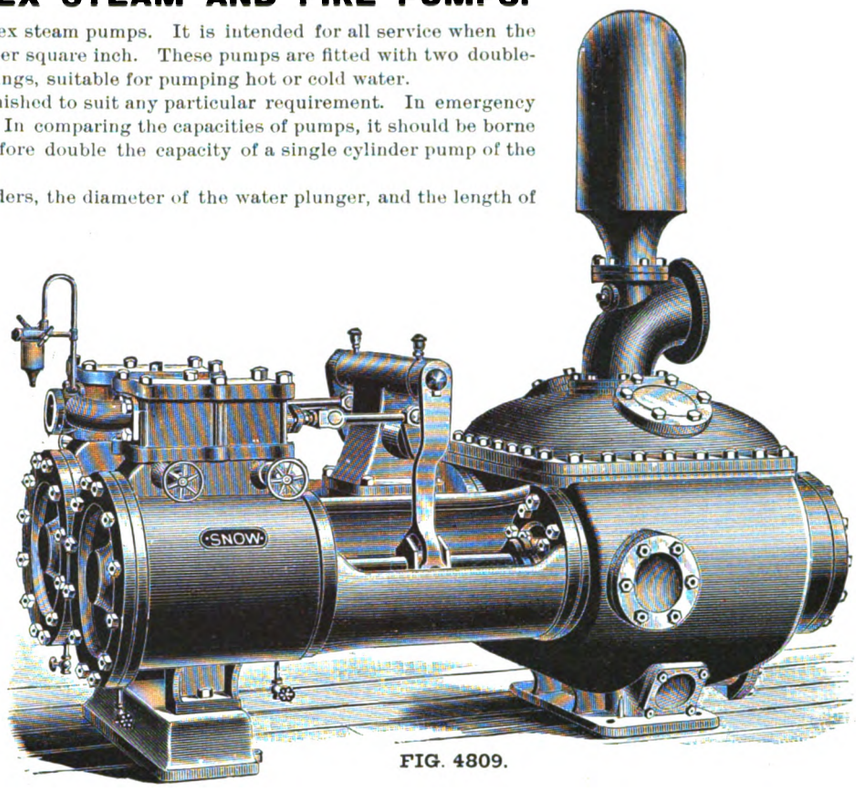


FIG. 4809.

DESCRIPTION, SNOW UNDERWRITERS FIRE PUMPS.

Each valve being controlled by its opposite steam piston, it is impossible for the pump to be on dead center, and the full power of the steam piston being transferred to the valve rod there can be no sticking of the valve to its seat. This is a valuable point, for, as is often the case, a fire pump remains unused for months at a time, and a pump that depends upon throwing its valve by tappet motion is unreliable. Single cylinder pumps are therefore unsuited for fire pumps.

In this pattern the valve and water passages are unusually large, ensuring the complete filling of the pump cylinders even when the pump is at its greatest speed.

Our fire pumps are provided with valves which connect the clearance space at each end of the steam cylinders with the exhaust; this permits of either diminishing or increasing the space between the head and the piston. This arrangement recommends itself; for as the clearance spaces are reduced to a minimum at the various speeds, a saving in steam results, at the same time permitting the pump to be run at a much higher rate of speed.

It is often of great advantage to have the compound arrangement of steam cylinders. This can be done with the larger sizes, resulting in a saving of from 20 to 30 per cent. in fuel. Snow fire pumps fitted with water pistons, instead of plungers, can be furnished, or the piston pattern.

THE SNOW UNDERWRITERS FIRE PUMP.

Owing to the inspectors of the Associated Factory Mutual Insurance Company finding many unreliable and worthless fire pumps, this association has drawn up a set of specifications providing for the construction of a machine to be known as the Underwriter fire pump.

We are prepared to build pumps according to these specifications, and while the cost is greater than the ordinary form of fire pump, a decrease in insurance premiums would more than cover this increase of expense.

When pumps are fitted with brass plungers and piston rods a slight additional charge is made. An extra charge will be made for bed plates.

Any number of combinations in addition to the above list can be supplied to meet the requirements of any service.

The sizes are designated by the diameter of steam cylinders, the diameter of the water plungers, and the length of stroke.

Diameter of steam cylinders.	Diameter of water plungers.	Length of stroke.	Displacement in gallons per stroke of one plunger.	Proper strokes per minute of one plunger, varying with kind of work and pressure.	Gallons delivered per minute by both plungers at stated number of strokes.	Diameter of plunger required in any single cylinder pump to do the same work at same speed.	Diameter of pipes, in inches.				Prices.
							Steam.	Exhaust.	Suction.	Discharge	
2½	1½	2	.015	150 to 300	4⅛ to 9	2⅛	¼	⅜	1	¾	$40.00
3	2	3	.041	100 " 250	8 " 20	2⅞	⅜	½	1¼	1	60.00
4½	2¾	4	.10	100 " 200	20 " 40	4	½	1	2	1½	95.00
5¼	3½	5	.21	100 " 200	40 " 80	5	¾	1¼	2½	2	115.00
6	4	6	.33	100 " 150	66 " 100	5⅝	1	1½	3	2	140.00
7	4½	8	.55	100 " 150	110 " 165	6⅜	1¼	2	4	3	215.00
8	5	10	.85	75 " 125	137 " 212	7⅛	1½	2	5	4	350.00
8	6	10	1.22	75 " 125	170 " 305	8½	1½	2	5	4	370.00
10	6	10	1.22	75 " 125	180 " 305	8½	2	2½	5	4	410.00
10	7	10	1.66	75 " 125	250 " 415	9⅞	2	2½	6	5	470.00
12	7	12	2.00	75 " 125	300 " 500	9⅞	2½	3	6	5	530.00
14	7	12	2.00	75 " 125	300 " 500	9⅞	2½	3	6	5	570.00
12	8½	12	2.95	75 " 125	440 " 740	12	2½	3	6	5	600.00
14	8½	12	2.95	75 " 125	440 " 740	12	2½	3	6	5	640.00
16	8½	12	2.95	75 " 125	440 " 740	12	2½	3	6	5	700.00
18	8½	12	2.95	75 " 125	440 " 740	12	3	4	6	5	740.00
20	8½	12	2.95	75 " 125	440 " 740	12	4	5	6	5	800.00
12	10	12	4.1	75 " 125	612 " 1,020	14⅛	2½	3	8	7	
14	10	12	4.1	75 " 125	612 " 1,020	14⅛	2½	3	8	7	
16	10	12	4.1	75 " 125	612 " 1,020	14⅛	2½	3	8	7	
18	10	12	4.1	75 " 125	612 " 1,020	14⅛	3	4	8	7	
20	10	12	4.1	75 " 125	612 " 1,020	14⅛	4	5	8	7	
14	12	12	5.90	75 " 125	885 " 1,480	17	2½	3	10	8	
16	12	12	5.90	75 " 125	885 " 1,480	17	2½	3	10	8	
18	12	12	5.90	75 " 125	885 " 1,480	17	3	4	10	8	
20	12	12	5 90	75 " 125	885 " 1,480	17	4	5	10	8	
18	14	12	8.00	75 " 125	1,200 " 2,000	19¾	3	4	12	10	
20	14	12	8.00	75 " 125	1,200 " 2,000	19¾	4	5	12	10	

PRICES, UNDERWRITERS FIRE PUMPS.

7	3½	8	.33	100 to 150	66 to 99	5	1¼	2	4	3	
8	4	10	.54	100 " 150	110 " 165	5⅝	1½	2	5	4	
10	4½	10	.69	100 " 150	140 " 210	6⅜	2	2½	5	4	
10	5	10	.85	100 " 150	170 " 250	7⅛	2	2½	5	4	$500.00
12	5	12	1.02	100 " 150	204 " 306	7⅛	2½	3	6	5	
12	6	12	1.46	100 " 150	284 " 420	8½	2½	3	6	5	600.00
14	7	12	2.00	100 " 150	400 " 600	9⅞	2½	3	6	6	700.00
16	7	12	2 00	100 " 150	400 " 600	9⅞	2½	3	6	6	
16	8	12	2.60	100 " 150	522 " 783	11¼	2½	3	8	6	
18	8½	12	2.95	100 " 150	590 " 885	12	3	4	8	6	
16	9	12	3.30	100 " 150	660 " 990	12¾	3	4	8	7	850.00
20	9	12	3.30	100 " 150	660 " 990	12¾	4	5	8	7	
20	10	12	4.10	100 " 150	816 " 1,224	14⅛	4	5	8	7	1,100.00

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DAVIDSON FIRE PUMPS.

For fire service the pumps are constructed to deliver large quantities of water, quietly, steadily and economically, against very heavy pressures. To obtain large capacity, with the minimum of friction, the water cylinders are provided with many small valves. Their sum aggregate very large suction and delivery valve areas, with small lifts, avoiding the hammer so common in other pumps when running at high speeds.

When ordering a fire pump state whether the water is to be pumped into a distributing tank, as for automatic sprinklers, or whether it is to be used as a regular fire pump, discharging water under heavy pressures for fire streams. When used for the latter, give capacity and number of streams required, and vertical and horizontal distance water is to be thrown. Two, four, six and eight way brass hose connections, with caps, as shown in cut, will be furnished, when ordered, at extra price.

The piston rod, valve seats, stems and lining of water cylinder are of the best composition metal, United States standard. Suction and delivery openings on both sides of pump.

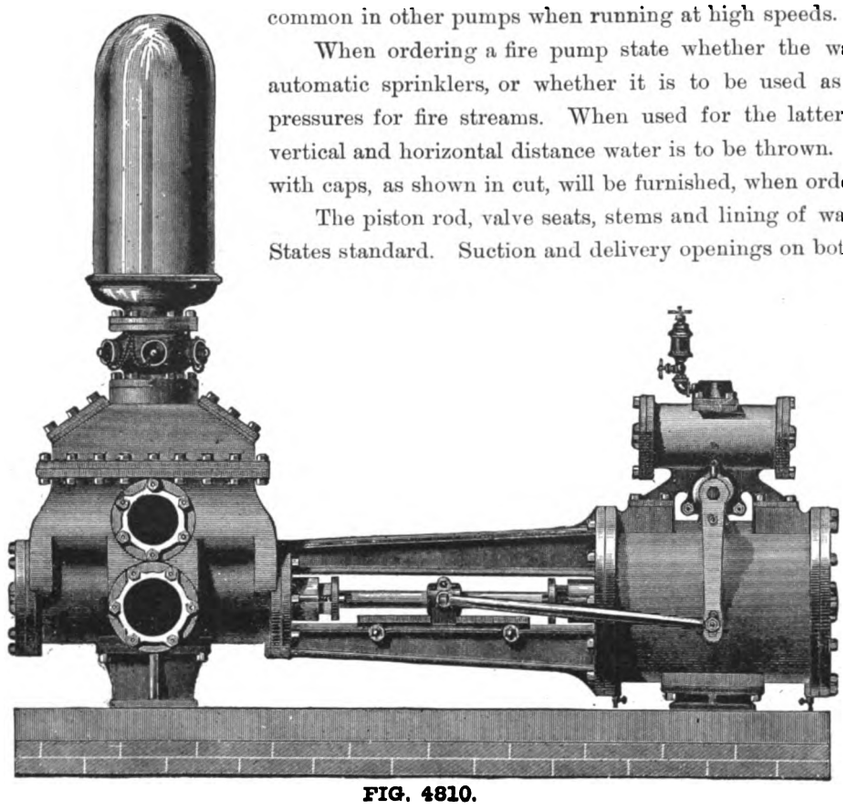


FIG. 4810.

PRICES.

Steam cylinder.	Water cylinder.	Stroke, inches.	Gallons per stroke.	Capacity per minute at given speed. Strokes.	Capacity per minute at given speed. Galls.	Strokes per minute capable of running.	Steam pipe.	Exhaust pipe.	Suction pipe.	Discharge pipe.	Prices.
9	5	12	1.02	150	153	1 to 300	1	1½	3½	3½	$400 00
10	5	12	1.02	150	153	1 to 300	1¼	2	3½	3½	430.00
12	5	12	1.02	150	153	1 to 300	1½	2	3½	3½	465.00
12	6	12	1.47	150	220	1 to 300	1½	2	5	4½	550.00
12	7	12	2.00	150	300	1 to 300	1½	2	5	4½	650.00
14	6	14	1.71	128	219	1 to 275	2½	3	5	4	650.00
14	7	14	2 33	128	298	1 to 275	2½	3	6	5	750 00
16	7	16	2.66	113	300	1 to 250	2½	3	6	5	.....
16	8	16	3.48	113	393	1 to 250	2½	3	7	6	.....
18	8	18	3.91	100	391	1 to 250	2½	3	7	6	.....
18	9	18	4.96	100	496	1 to 250	2½	3	8	7	.....
20	9	20	5.50	90	495	1 to 200	3	3½	8	7	.....
20	10	20	6.80	90	612	1 to 200	3	3½	8	7	.....
22	11	22	9.05	80	724	1 to 175	3½	4	9	8	.....
22	12	22	10.77	80	861	1 to 175	3½	4	10	9	.....
24	12	24	11.75	75	881	1 to 150	3½	4	10	9	.....
24	14	24	16.00	75	1,200	1 to 150	3½	4	10	9	.....
28	14	24	16.00	75	1,200	1 to 125	4	5	10	9	.....
30	14	24	16.00	75	1,200	1 to 125	5	6	10	9	.....
36	18	24	26.43	75	1,982	1 to 125	6	7	12	10	.....

BLAKE STEAM PUMPS.

They are economical in the use of steam, and exceptionally free from the usual wear and tear incidental to severe and fast running. They will start promptly as soon as steam is admitted, and can be driven at the highest speed without thumping or danger of striking the cylinder heads. The water passages are direct—the suction valves being under and the delivery valves over the water cylinders—and the valve areas large. Water friction is thereby reduced to a minimum, an important and necessary feature, especially when running at high speed.

The number and sizes of fire streams given are to show relatively about what can be done with each pump. A greater number of same sized streams to shorter distances, or a greater number of smaller sized streams to same distances, can be thrown. The arrangement and sizes of connections as given are from regular patterns, but these can readily be altered to meet the wants of purchasers.

The linings, piston rods, stuffing boxes, valve seats and valve bolts of the water cylinders are made of the best composition. The water pistons are also made of composition, suitably packed, and always tight.

PRICES.

Steam cylinder.	Water cylinder.	Stroke.	Gallons per stroke.	Capacity at 200 feet piston speed per minute. Galls.	Steam pipe.	Exhaust pipe.	Suction pipe.	Delivery pipes, or hose connections.	Number and size of fire streams.	Distance streams thrown.	Prices.
8	4½	10	.69	162	1	1½	3	1-2½ in.	1-1 in.	100	$375.00
8	5	12	1.02	204	1	1½	3½	1-3 "	1-1 "	125	400.00
10	5	12	1 02	204	1¼	2	4	1-3 or 2-2½	1-1 "	150	425.00
10	6	12	1.47	294	1¼	2	4	1-3 or 2-2½	1-1¼ or 2- ¾	150	450.00
12	6	12	1.47	294	1½	2½	4	1-3 or 2-2½	1-1½ or 2- ¾	175	500.00
12	7	12	2.00	400	1½	2½	5	1-4 or 2-3	1-1¼ or 2- ⅞	175	525.00
14	7	12	2.00	400	2	3	5	1-4 or 2-3	1-1¼ or 2- ⅞	200	600.00
14	8	12	2.61	520	2	3	5	1-4 or 2-3	1-1¾ or 2-1	200	625 00
16	8	18	3.92	520	2	3	8	1-6 or 3-3	1-1¾ or 2-1	225	.....
16	9	18	4.96	650	2½	3½	8	1-6 or 4-3	2-1¼ or 3- ⅞	200	.....
18	9	18	4.96	650	2½	3½	8	1-6 or 4-3	2-1¼ or 3- ⅞	225	.....
18	9	24	6.60	660	2½	3½	8	1-6 or 4-3	2-1¼ or 3- ⅞	225	.....
18	10	24	8.16	816	2⅝	3½	8	1-6 or 4-3	2-1¼ or 4-1	200	.....
20	9	18	4.96	650	2½	3½	8	1-6 or 4-3	2-1¼ or 4- ⅞	250	.....
20	9	24	6.60	660	2½	3½	8	1-6 or 4-3	2-1¼ or 4- ⅞	250	.....
20	10	24	8.16	816	2⅝	3½	8	1-6 or 4-3	2-1¼ or 4-1	225	.....
20	12	24	11.75	1,175	2½	3½	10	1-8 or 6-3	3-1¼ or 6-1	200	.....
24	12	24	11.75	1,175	3	4	10	1-8 or 6-3	3-1¼ or 6-1	225	.....
24	14	24	16.00	1,600	3	4	10	1-8 or 8-3	4-1¼ or 8-1	200	.....

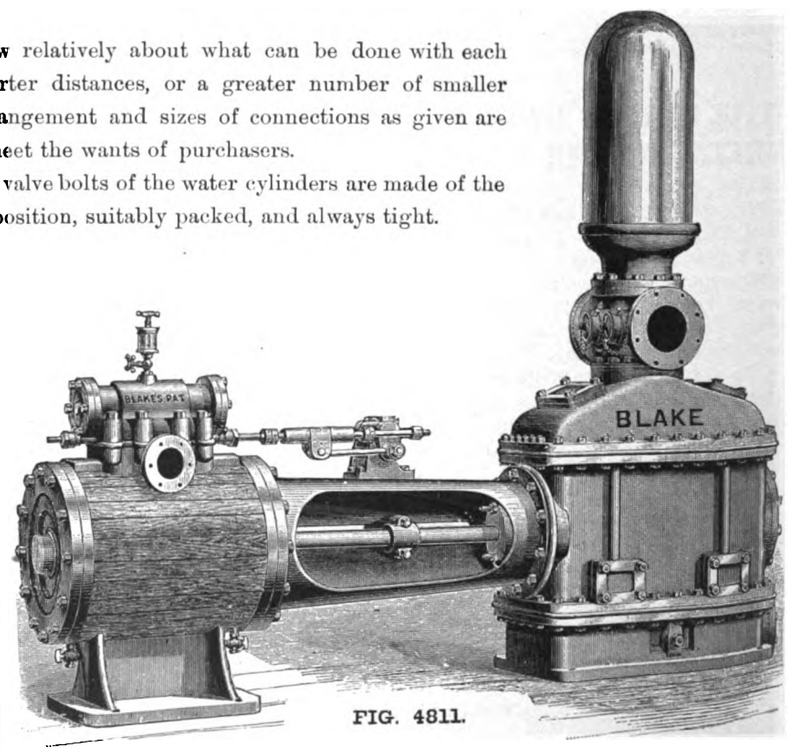


FIG. 4811.

PATTERNS ALSO FOR LARGER SIZES OR OTHER COMBINATIONS OF CYLINDERS.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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CAMERON FIRE PUMPS.

These pumps are made with large openings. They have each two or more outlets to which hose can be connected. They will start at any point by simply turning on steam, and may be run as fast as the steam will drive the piston, without any danger of the piston striking the cylinder cover.

PRICES.

Prices, with iron pump cylinder and piston rod.	Prices, with pump lining, piston and piston rod of composition.	Diameter of steam cylinder.	Diameter of pump cylinder.	Stroke.	Capacity for fire duty, in gallons, per min.	Steam pipe.	Exhaust pipe.	Section pipe.	Delivery openings of two-way valves.	Number and size of fire streams, and distances thrown horizontally.*
$325.00	$340.00	8	4	12	1.30	1	1 1/2	3	2-2 1/2 in.	1-1 in., 100 ft.
375.00	400.00	10	5	13	2.00	1 1/4	2	4	2-3 "	1-1 " 150 "
450.00	500.00	10	5	25	2.00	1 1/4	2	4	2-3 "	1-1 " 150 "
470.00	500.00	12	6	13	3.00	1 1/2	2 1/2	5	2-4 "	1-1 1/8 " 175 " or 2-1 in., 100 ft.
525.00	575.00	14	7	18	4.00	2	3	5	2-4 "	1-1 1/4 " 200 " " 2-1 " 150 "
		16	8	18	5.20	2 1/2	4	6	2-5 "	1-1 3/8 " 225 " " 3-1 " 125 "
		16	8	33	5.20	2 1/2	4	8	2 6 "	1-1 3/8 " 225 " " 3-1 " 125 "

Patterns for larger sizes or other combinations of cylinders.
* The vertical height would be about twenty-five per cent. less.

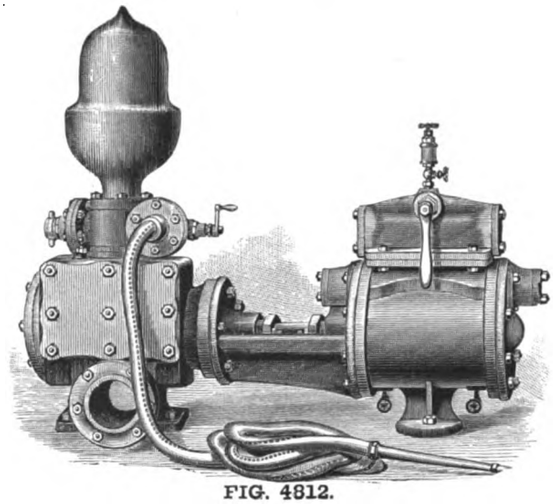


FIG. 4812.

HUGHES SPECIAL FIRE PUMPS.

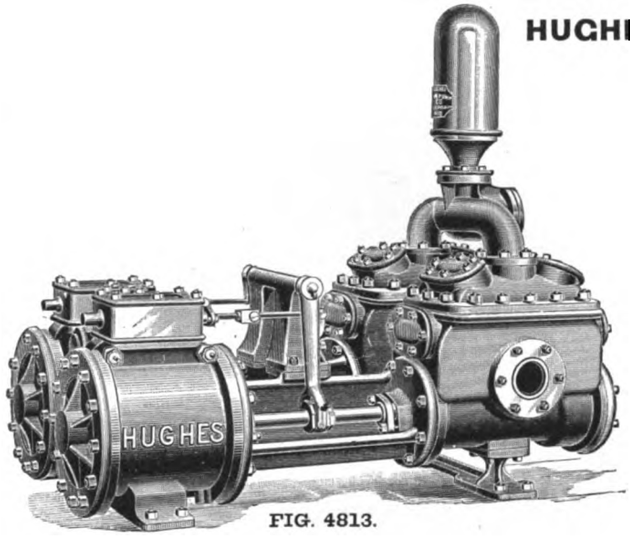


FIG. 4813.

PRICES.

No.	Steam cylinder.	Water cylinder.	Stroke.	Capacity at 200 ft. piston speed per min. in gallons.	Steam pipe.	Exhaust pipe.	Suction pipe.	Disch'ge pipe.	Number and size of fire streams.	Dist. stream thrown horizontally, ft.	Floor space required.	Prices.
152	8	4 1/2	10	272	1 1/2	2	4	3	1-1 in.	100	56x24	$355.00
153	8	5	12	400	1 1/2	2	4	3	2-1 "	100	56x24	375.00
154	10	5	12	400	2	2 1/2	4	3	2-1 "	100	65x36	450.00
155	10	6	12	484	2	2 1/2	5	4	3-7/8 "	100	65x36	455.00
156	12	7	12	796	2	2 1/2	6	5	4-1 "	100	65x40	550.00
157	14	8	12	1,044	2 1/2	3	6	5	5-1 "	100	65x40	690.00
158	16	8	12	1,044	3	3 1/2	6	5	5-1 "	100	95x48	780.00
159	18	9	12	1,309	3	4	6	5	6-1 "	100	102x50	
160	18	10	12	1,632	3	4	7	6	8-1 "	100	102x50	
161	18	9	18	1,782	3 1/2	4	7	6	9-1 "	100	126x50	
162	18	10	18	2,202	3 1/2	4	8	6	11-1 "	100	126x66	
163	20	10	18	2,202	3 1/2	4	8	6	11-1 "	100	126x70	
164	20	12	18	3,240	4	5	10	8	14-1 "	100	126x70	

WORTHINGTON STEAM PUMPS AND BOILERS.

The boiler base and bracket upon which the pump rests are made in such manner as to secure proper strength and stiffness with the least possible weight. A shaking grate is used in the boiler, and so constructed that the contents of the grate can be easily dumped without opening the fire door. The ash-pit door is made with sliding plate, in order that the draft may be more effectually controlled. An important improvement is secured by the attachment of a two-way cock on the exhaust pipe. By simply turning this, steam may be discharged either directly into the open air or into the chimney, if desirable to force the draft. The pumps are fitted with an auxiliary end feed, attached to one of the piston rods, for supplying the boiler with water. The "low service" or tank pumps are suitable only for places where water is to be forced not higher than fifty to seventy-five feet.

It is necessary that full particulars of the duty to be performed should be furnished with all orders.

PRICES, "REGULAR PATTERN" FOR GENERAL SERVICE.

Diameter of steam cylinder.	Diameter of water plungers.	Length of stroke.	Displacem't in gals. per stroke of one plunger.	Proper strokes per minute of one plunger, varying with kind of work and pressure.	Gallons delivered per minute by both plungers at stated number of strokes.	Diam. of plunger required in any single cylinder pump to do the same work at same speed.	Sizes of pipes for short lengths. To be increased as length increases. Steam pipe.	Exhaust pipe.	Suction pipe.	Discharge pipe.	Prices.
3	2	3	.04	100 to 250	8 to 20	2 7/8	3/8	1/2	1 1/4	1	$
4 1/2	2 3/4	4	.10	100 " 200	20 " 40	4	1/2	3/4	2	1 1/2	
5 1/4	3 1/2	5	.20	100 " 200	40 " 80	5	3/4	1 1/4	2 1/2	1 1/2	
6	4	6	.33	100 " 150	70 " 100	5 5/8	1	1 1/2	3	2	
7 1/2	4 1/2	6	.42	100 " 150	85 " 125	6 3/8	1 1/2	2	4	3	
7 1/2	5	6	.51	100 " 150	100 " 150	7	1 1/2	2	4	3	
7 1/2	4 1/2	10	.69	75 " 125	100 " 170	6 3/8	1 1/2	2	4	3	
9	5 1/4	10	.93	75 " 125	135 " 230	7 1/2	2	2 1/2	4	3	
10	6	10	1.22	75 " 125	180 " 300	8 1/2	2	2 1/2	5	4	

PRICES, "LOW SERVICE" OR TANK PUMPS.

4 1/2	3 3/4	4	.20	100 to 200	40 to 80	5 1/4	1/2	3/4	2 1/2	1 1/2	$
5 1/4	4 3/4	5	.38	100 " 150	75 " 110	6 3/4	3/4	1 1/4	3	2	
6	5 3/4	6	.67	100 " 150	130 " 195	8 1/8	1	1 1/2	4	2 1/2	
6	7 1/2	6	1.14	100 " 150	225 " 340	10 1/4	1	1 1/2	5	4	
7 1/2	7 1/2	6	1.14	100 " 150	225 " 340	10 1/4	1 1/2	2	5	4	
6	8 1/2	6	1.47	100 " 150	295 " 440	12	1	1 1/2	6	5	
7 1/2	6	10	1.22	75 " 125	180 " 300	8 1/2	1 1/2	2	5	4	
7 1/2	7	10	1.66	75 " 125	245 " 410	9 7/8	1 1/2	2	6	5	
7 1/2	8 1/2	10	2.45	75 " 125	365 " 610	12	1 1/2	2	6	5	
9	8 1/2	10	2.45	75 " 125	365 " 610	12	2	2 1/2	6	5	

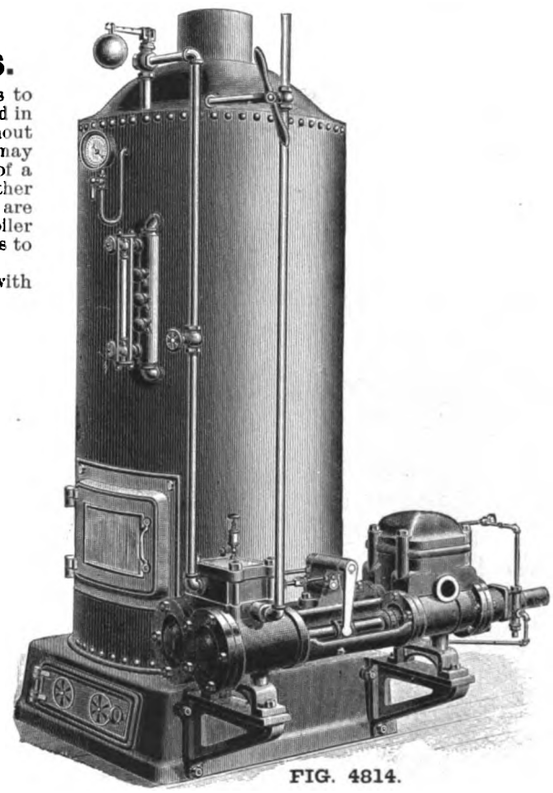


FIG. 4814.

A slight additional charge is made when pumps are fitted with brass plungers and piston rods. In addition to the sizes given in the above list, a large number of other sizes and combinations can be supplied to meet the requirements of any particular service.

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COMBINED BOILERS AND BLAKE PUMPS.

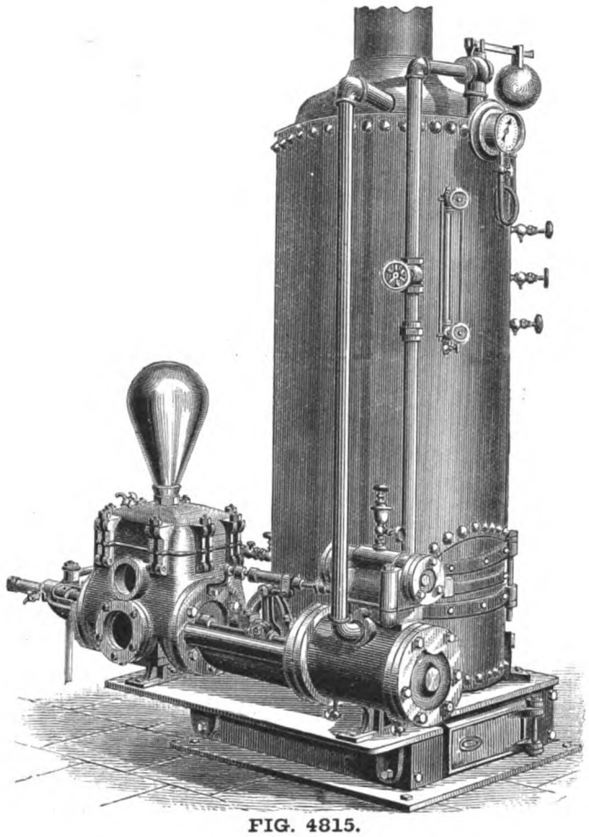


FIG. 4815.

Complete with auxiliary boiler feed pump, boiler base, smoke bonnet, section of smoke pipe, grate bars, gauge cocks, steam gauge, water gauge, safety valve, globe valves, blow-off cocks, steam and exhaust pipes, boiler feed connection, valves, unions and necessary fittings, etc.

It is light, portable and strong, and can be placed at the point of supply, be it spring, well, or river, and the water forced to any height or distance required.

The whole apparatus is of the best manufacture, the boiler being perfectly safe and guaranteed to 100 lbs. pressure, tested to 200 lbs., per square inch. When water is to be forced not higher than 50 to 75 feet, the tank pumps are preferable and less expensive. Auxiliary plunger pumps for feeding the boilers are attached to the main pumps without additional charge.

The pumps marked * are provided with our patent hand-power attachments, which are very convenient for filling the boilers, after blowing-off, or pumping when steam is down.

In ordering, parties will please state fully the particulars of duty to be performed.

PRICES.

Size No.	Dimensions of steam pump.							Dimensions of boiler.				Floor space required.	Prices, complete.
	Steam cylinder.	Water cylinder.	Stroke.	Gallons per stroke	Steam pipe.	Exhaust pipe.	Suction pipe.	Delivery pipe.	Diam. of shell.	Height of shell.	Tubes.	Length of tubes.		
000	2½	1½	3	.023	¼	⅜	½	⅜	15	36	20–1½	24	28 x 31	$150.00
00	3	1¾	3	.031	¼	⅜	¾	½	15	36	20–1½	24	28 x 31	165.00
0*	3½	2⅛	3	.04	⅜	½	1	¾	21	48	19 2	32	37 x 39	285.00
1½*	4	2⅜	5	.10	½	¾	1¼	1	21	48	19–2	32	37 x 39	325.00
2½*	4½	2¾	6	.15	½	¾	1¼	1	21	48	19–2	32	37 x 39	350.00
3*	5½	3¼	7	.25	½	¾	1½	1¼	24	60	25–2	42	41 x 47	
4*	6	3¾	7	.33	¾	1	2	1½	24	60	25–2	42	41 x 47	
4½*	6½	4⅛	8	.46	¾	1¼	2½	2	24	60	25–2	42	48 x 47	
5	7¼	4½	10	.69	1	1½	2½	2	30	72	46–2	48	52 x 54	
6	8	5	10	.85	1	1½	3	2½	30	72	46–2	48	53 x 55	
6½	8	5	12	1.02	1	1½	3½	3	30	72	46–2	48	64 x 56	
7	10	6	12	1.47	1¼	2	3½	3	36					
8	12	7	12	2.00	1½	2½	5	4	36					
9	14	8	12	2.61	2	3	5	4						
Tank pumps A*	4½	4⅛	6	.27	½	¾	2	1½	21	48	19–2	32	37 x 42	375.00
B*	6	5½	7	.72	¾	1	3½	2½	24	60	25–2	42	46 x 47	
C	7¼	7	10	1.66	1	1½	4	3	30	72	46–2	48	53 x 56	
CC	8	6	12	1.47	1	1½	3½	3	30	72	46–2	48	64 x 55	
D	8	8	12	2.61	1	1½	5	4	30	72	46–2	48	64 x 55	

Larger sizes, with upright, horizontal, locomotive or patent boilers, to order.

COMBINED SHAPLEY BOILERS AND KNOWLES PUMPS.

Complete with auxiliary boiler feed pump, base plate, smoke bonnet, grate bars, gauge cocks, steam gauge, water gauge, safety valve, globe valves, blow-off cocks, steam and exhaust pipes, boiler feed connection, valves, unions and necessary fittings, etc.

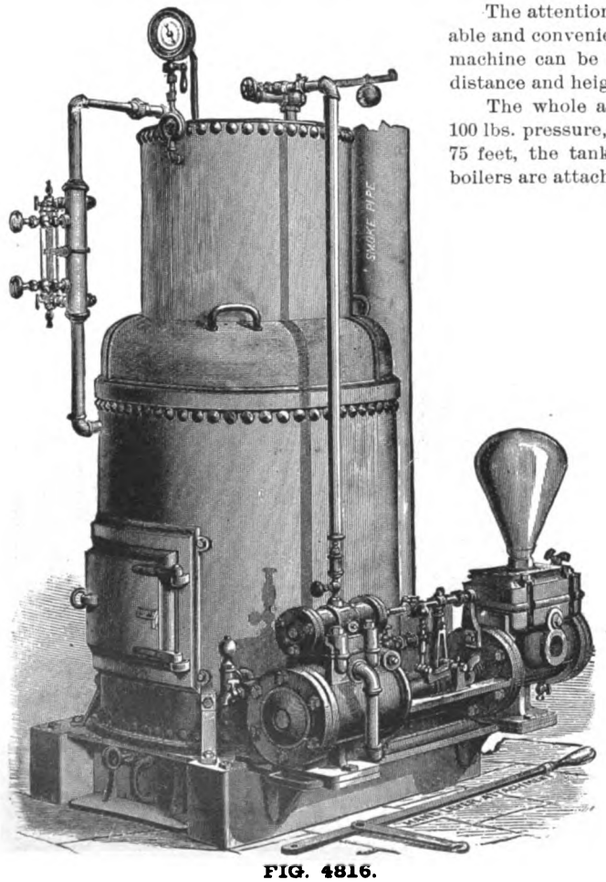


FIG. 4816.

The attention of railroad officials is particularly called to the especial advantage of this light, portable and convenient pumping apparatus for the water supply of tanks at watering stations. The entire machine can be placed at the point from which the water is to be taken, and the water forced to any distance and height required.

The whole apparatus is of the best manufacture, the boiler being perfectly safe and guaranteed to 100 lbs. pressure, tested to 200 lbs., per square inch. When water is to be forced not higher than 50 to 75 feet, the tank pumps are preferable and less expensive. Auxiliary plunger pumps for feeding the boilers are attached to the main pumps without additional charge.

PRICES.

Size No.	Steam cylinder. Inches.	Water cylinder. Inches.	Stroke. Inches.	Gallons per stroke.	Steam pipe. Inches.	Exhaust pipe. Inches.	Suction pipe. Inches.	Delivery pipe. Inches.	Floor space required. Inches.	Prices complete.
000	2½	1½	3	.023	¼	⅜	½	⅜	28 x 31	$165.00
00	3	1¾	3	.031	¼	⅜	¾	½	28 x 31	181.50
0*	3¼	2	4	.05	½	¾	1¼	1	37 x 39	311.50
1*	3½	2¼	4	.07	½	¾	1¼	1	38 x 40	357.50
2*	4	2½	5	.11	½	¾	1¼	1	38 x 40	385.00
3*	5	3¼	7	.25	¾	1	2	1½	40 x 44	
4*	5½	3¾	7	.34	¾	1	2	1½	40 x 44	
4½	7	4	7	.39	1	1¼	2½	2	40 x 46	
5	7	4½	10	.69	1	1¼	3	2½	54 x 58	
6	7½	5	10	.85	1	1¼	3	2½	56 x 58	
6½	8	5	12	1.02	1	1¼	4	4	58 x 58	
7	10	6	12	1.47	1¼	1½	4	4		
8	12	7	12	2.00	2	2½	5	5		
9	14	8	12	2.61	2	2½	5	5		
TANK PUMPS.										
	*4	4	5	.27	½	¾	2	1½	38 x 40	$412.50
	*5½	5½	7	.72	¾	1	3	2½	40 x 48	
	6	6	12	1.46	¾	1	4	4	58 x 58	
	7½	7½	10	1.99	1	1¼	5	5	56 x 58	
	8	8	12	2.65	1	1¼	5	5	58 x 58	
	10	10	12	4.08	1¼	1½	6	6		
	10	10	16	5.43	1¼	1½	6	6		

Larger sizes, with upright, horizontal, locomotive or patent boilers, to order.

The pumps marked * are provided with our patent hand-power attachments, which are very convenient for filling the boilers, after "blowing-off," or pumping when steam is down.

In ordering, parties will please state fully the particulars of duty to be performed.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BALANCE WHEEL STEAM PUMPS, SINGLE AND DUPLEX.

This is a direct and double acting crank and fly-wheel pump, so designed that its construction and operation can be readily understood by all persons. The pump valves, valve seats, piston and piston rod are made of brass, and the water cylinder has a lining of the same material. When so ordered, the entire pump cylinder and parts will be made of brass at difference in price of cost of the metal only. All the journals and pins have large wearing surfaces. The water valves are so arranged as to be readily accessible. The steam cylinder is provided with the ordinary flat slide valve, so set as to enable the crank to pass its center easily, and with but little stress to the bearings.

The balance wheel pump recommends itself for all situations. It is an excellent boiler feeder, and is especially valuable for fire purposes, being a most efficient steam fire engine. It is also frequently employed to furnish power for other purposes in addition to its pumping duty. At a small additional expense, we will apply our patent attachment whereby the pump can be disconnected from the steam cylinder, and the latter run independently as an engine.

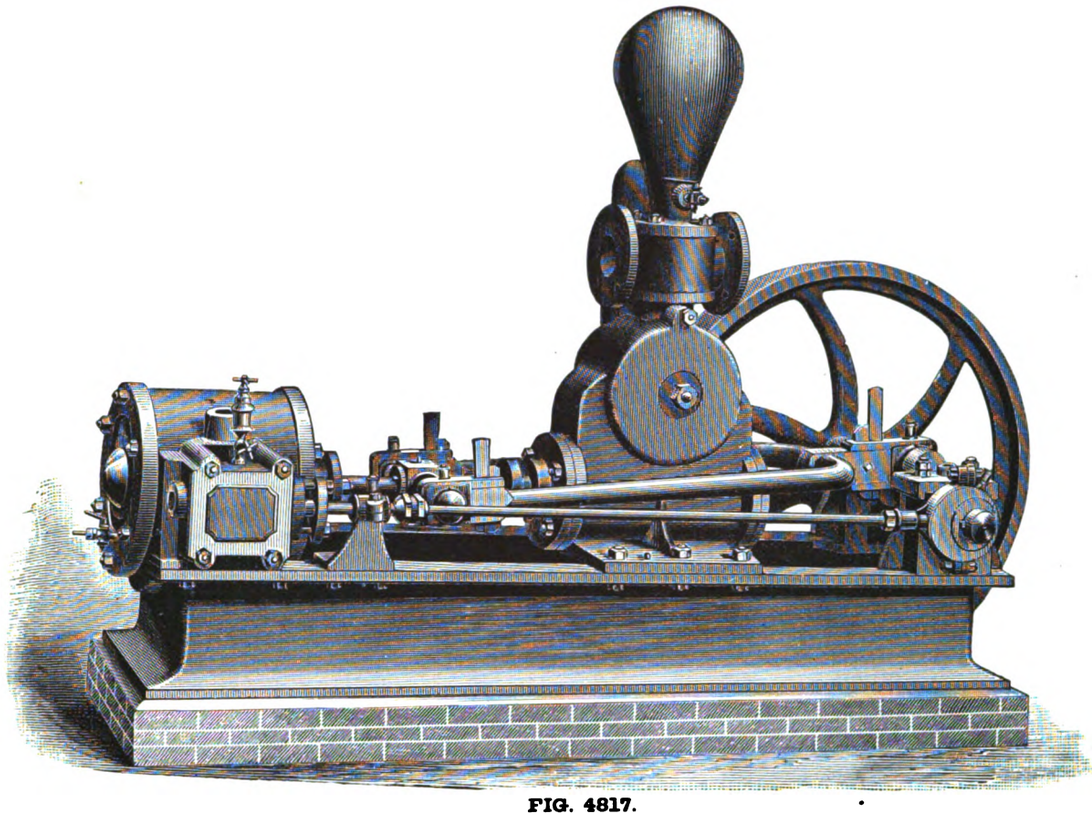


FIG. 4817.

PRICES.

No.	Diameter of cylinders, in inches.		Capacity in gallons per minute.	Diameter of pipes, in inches.				Price.
	Steam.	Pump.		Suction.	Discharge.	Steam.	Exhaust.	
1	4	2	16	1¼	1	¾	1	
2	5	2½	25	1½	1	¾	1	
3	7	3½	50	2	1½	1	1¼	
4	10	5	102	3	2	1¼	1½	
5	12	6	147	3½	2½	2	2½	
5½	12	7	200	4	3	2	2½	
6	14	7	200	4	3	2	2½	

PRICES FOR LARGER SIZES AND DUPLEX FURNISHED ON APPLICATION.

ACME PUMP AND STEAM ENGINE.

This pump has the regular four valve double acting piston water end, discharging the full contents of the water cylinder at each single stroke. It is well made and fully guaranteed, and the price is low for a first-class machine. This pump can be used as an engine to furnish power by removing the plugs in the base, which allow the air to come in to the drip. The highest speed may be obtained by this pump without the least jar or "water hammer."

PRICES.

No.	Weight of pump, in lbs.	Steam cylinder.	Water cylinder.	Gallons per stroke.	Capacity of 100 revolutions.	Size of steam pipe, inches.	Size of exhaust pipe, inches.	Size of suction pipe, inches.	Size of discharge pipe, inches.	Prices.
0	150	3	1⅝	.04	4 gal.	⅜	½	1	¾	$70.00
1	210	4	2⅛	.07	7 "	⅜	½	1	¾	95.00
2	328	5	2½	.12	12 "	½	¾	1¼	1	135.00
3	460	6	3	.20	20 "	½	¾	1½	1	170.00
4	750	7	3½	.33	33 "	¾	1	2	1½	200.00
5	1,050	8½	4¼	.49	49 "	1	1¼	3	2	275.00

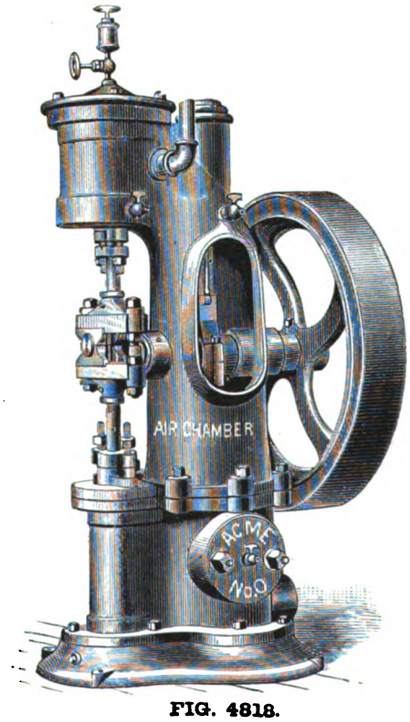


FIG. 4818.

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BUCKET PLUNGER STEAM PUMPS AND ENGINES.

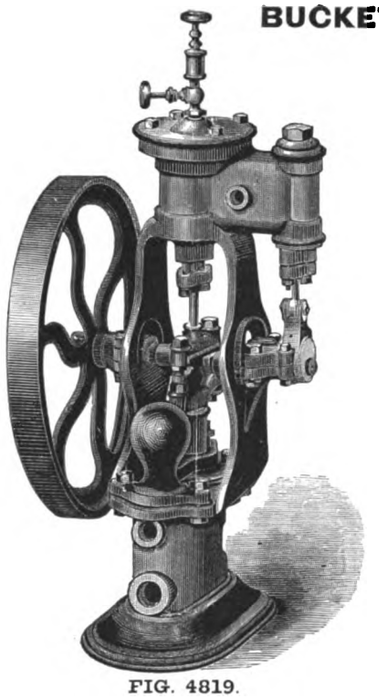


FIG. 4819.

PRICES, FIG. 4819.

Diameter steam cylinder, in inches.	Diameter water cylinder, in inches.	Stroke, in inches.	Revolutions per minute.	Gallons discharged.	Size of steam pipe. Inches.	Size of exhaust pipe. Inches.	Size of suction pipe. Inches.	Size of discharge pipe. Inches.	Prices.
3	1 3/4	2	100	2.8	3/8	1/2	1	3/4	$45.00
4	2 3/4	2 1/2	90	5.8	3/8	1/2	1 1/4	1	65.00
5	3	2 1/2	90	6.9	1/2	3/4	1 1/2	1 1/4	85.00

This pump can be used as an engine by removing the thumb screw in bottom of water cylinder to let in the air.

PRICES, FIG. 4820.

No.	Diameter steam cylinder.	Diameter water plunger.	Stroke.	Steam pipe.	Exhaust pipe.	Water pipes.	Revolutions per minute.	Gallons per minute.	Size of boiler.	Prices.
1	3 in.	1 3/4 in.	3 in.	3/8 in.	3/4 in.	1 in.	100	1.93	15 h. p.	$44.00
2	3 1/2 "	1 3/4 "	3 "	1/2 "	3/4 "	1 "	100	3.12	27 "	55.00
3	4 "	2 1/4 "	4 "	3/4 "	1 "	1 1/4 "	90	6.20	46 "	70.00
4	4 1/2 "	2 3/4 "	4 "	3/4 "	1 "	1 1/2 "	85	8.75	62 "	82.50
5	5 "	3 1/2 "	4 "	3/4 "	1 1/4 "	1 1/2 "	80	13.33	106 "	110.00
6	6 "	4 "	5 "	1 "	1 1/2 "	2 "	75	21.75	164 "	154.00

With each pump we furnish throttle valve, oil cup and let-off plugs.
We can make these pumps with brass plungers, if so desired, and line the cylinders with brass, also, at extra price.

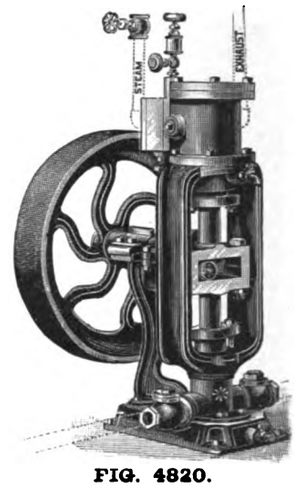


FIG. 4820.

KNOWLES ARTESIAN WELL PUMPS.



FIG. 4821.



FIG. 4822.

DEANE ARTESIAN ENGINE.

This engine was designed to operate the pump barrels in non-flowing artesian wells that are growing so rapidly in favor with brewers, dyers, scourers, etc.

The cylinder can be swung aside from over the well in less than one minute without disturbing any pipes, leaving the well so that rods and valves can be overhauled almost as readily as in an ordinary horizontal pump.

PRICES, FIG. 4823.

Diameter of steam cylinder, in inches.	Length of stroke, in inches.	Single strokes per minute.	Dimensions of base.	Size of steam supply pipe.	Size of steam exhaust pipe.	* Well head. Pipe.	* Well head. Outlet.	Weight ready for shipping.	Prices.
6	16	50 to 100	21 x 27	1	1 1/4	4	1 1/2	1,220	$330.00
7	16	50 to 100	21 x 27	1	1 1/4	4	1 1/2	1,300	360.00
8	24	35 to 60	34 x 24	1 1/2	1 1/2	7	4	2,060	450.00
10	24	35 to 60	34 x 24	1 1/2	1 1/2	7	4	2,260	550.00
12	24	35 to 60	34 x 24	1 1/2	1 1/2	7	4	2,380	600.00

*These dimensions can be reduced with bushing if necessary.

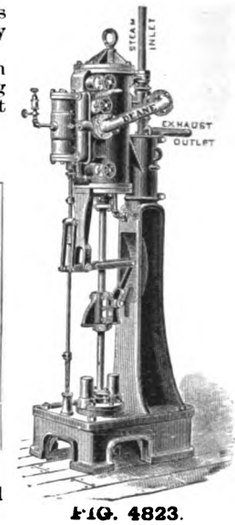


FIG. 4823.

Artesian barrels of sizes suitable for any situation supplied with these engines.

PRICES, FIG. 4821.

Steam cylinder. Inches.	Bucket. Inches.	Plunger. Inches.	Stroke. Inches.	Steam pipe. Inches.	Exhaust pipe. Inches.	Prices.	Capacity at 100 feet piston travel.
4	2 3/4 to 3 1/4	1 7/8 to 2 3/8	7	1/2	3/4		
6	2 3/4 to 4 1/4	1 7/8 to 3	12	3/4	1		
8	3 1/4 to 5 3/4	2 3/8 to 4	24	1	1 1/4		
10	3 1/4 to 8 1/2	2 3/8 to 6	24	1 1/4	2		
12	3 1/4 to 8 1/2	2 3/8 to 6	24	1 1/2	2 1/2		
14	3 3/4 to 8 1/2	2 5/8 to 6	24	2	3		
16	3 3/4 to 8 1/2	2 5/8 to 6	24	2	3		

Also patterns for larger sizes and other combinations.

The steam end is arranged to slide to one side upon the bed plate, which feature is very convenient when it is necessary to pull out the pump rods or take up the well piping.

This improved form of the Knowles vertical steam pump is especially designed for non-flowing "artesian" or bored wells, and for driven pipe wells where the water fails to rise within drafting distance—say 25 feet—of the surface. These pumps are much simpler, less expensive, and not so liable to get out of order as the more complicated and cumbersome "working beam" or rotative pumps. They will pump from the deepest wells—2,000 feet, if desired—and deliver a steady stream of water, or oil, to any point.

Above are given two views, i. e., the steam end, as it appears in position at the mouth of well, and the "working barrel" or pump end, located at the bottom. This latter is a casting of the hardest composition—not soft brass tubing—and is carefully bored out and fitted with pump bucket and foot valve. It is screwed on the lower end of the well piping through which the pump rod works. The pump rod connection between the pump bucket and the upper plunger is made of wood or extra heavy iron pipe. The action of the pump is fully controlled by a perfected arrangement of steam valves, making the up and down strokes equally uniform and regular. The pump bucket discharges water on the up stroke, and the upper plunger discharges on the down stroke, consequently the flow of water is steady and continuous. The pump bucket and foot valve are of special construction, and can be readily drawn up through the well piping for examination or repairs.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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VERTICAL STEAM PUMPS.

BLAKE'S DEEP WELL PUMPS.

VERTICAL DOUBLE-ACTING PISTON PATTERN.

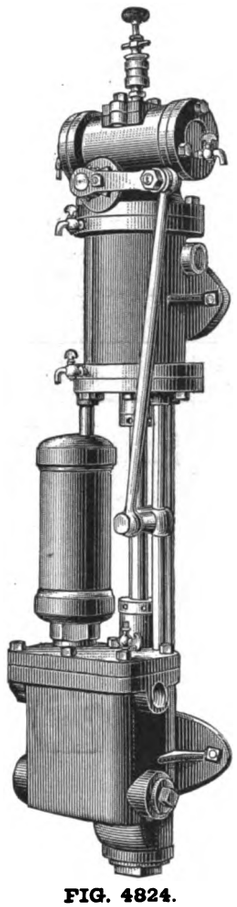


FIG. 4824.

These Improved pumps are adapted for deep wells and other contracted places requiring the steam and pump cylinders to be placed at considerable distance apart. The pumps, being double-acting, deliver a steady, continuous stream of water, and to any elevation or distance from well that may be necessary.

The steam cylinder is arranged for bolting to the wood-work at the mouth of the well. The water cylinder may be located at almost any depth—we have these pumps running in wells as deep as 150 feet—the elongated piston rod being provided with proper guides, etc.

The lining, piston rod, stuffing box, valve seats, valve bolts, etc., of the water cylinder are made of the best composition. The water piston is also made of composition suitably packed.

PRICES, FIG. 4825.

Steam cylinder.	Water cylinder.	Stroke.	Gallons per stroke.	*Capacity per minute at ordinary speed.	Steam pipe.	Exhaust pipe.	Suction pipe.	Delivery pipe.	Prices.
6	4½	7	.48	60 gals.	3/4	1	2½	2	
6	5	7	.60	70 "	3/4	1	3½	2½	
6	5½	7	.72	80 "	3/4	1	3½	2½	
8	5	12	1.02	80 "	1	1½	3½	3	
8	6	12	1.47	118 "	1	1½	3½	3	
10	6	12	1.47	118 "	1¼	2	3½	3	
10	7	12	2.00	160 "	1¼	2	4	3½	
10	7	18	3.00	160 "	1¼	2	5	4	
12	7	18	3.00	160 "	1½	2½	5	4	
12	8	18	3.92	200 "	1½	2½	5	4	
12	9	18	4.96	275 "	1½	2½	6	4	
12	10	18	6.12	327 "	1½	2½	8	6	
14	8	18	3.92	209 "	2	3	5	4	
14	9	18	4.96	275 "	2	3	6	4	
14	10	18	6.12	327 "	2	3	8	6	
16	10	24	8.16	327 "	2	3	8	6	
16	12	24	11.75	460 "	2	3			
18	14	24	16.00	640 "	2½	3½			

Also patterns for larger sizes or other combinations of cylinders.

* This column gives the capacities at the moderate speed of about 80 feet piston travel per minute. When necessary, this rate of speed can be increased.

Prices above given include tie rod and pump rod connection for a distance of about ten feet between steam and water cylinders. Greater length of connection, to suit any depth of well or shaft, furnished at extra cost.

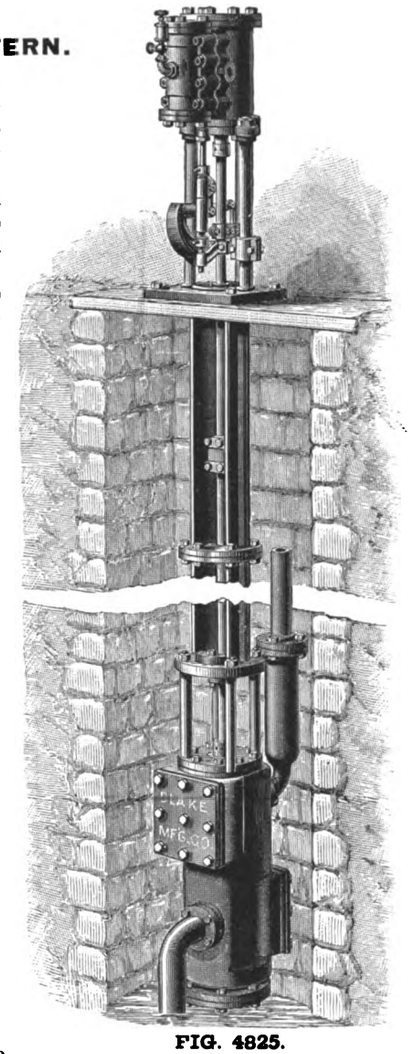


FIG. 4825.

DESCRIPTION, FIG. 4824.

These pumps are adapted to situations where economy of space and weight is demanded, and are especially suited for steamers, steam yachts, launches, etc., where floor space is limited. They also meet all the requirements of mine pumps, for lowering in shafts, etc.

Piston rod, valve seats, stems and lining of water cylinder are of the best composition metal, U. S. standard. Suction and delivery openings on both sides of pump. Valves arranged for hot or cold water.

PRICES, FIG. 4824.

Size No.	Steam cylinder.	Water cylinder.	Stroke. Inches.	Gallons per stroke.	Capacity per minute at given speed. Strokes.	Capacity per minute at given speed. Galls.	Steam pipe.	Exhaust pipe.	Suction pipe.	Discharge pipe.	Prices.
1	3½	2	4	.05	150	7½	3/8	1/2	1¼	1	
1½	4	2¼	4	.069	150	10.35	3/8	1/2	1¼	1	
2	4½	2½	6	.13	150	19½	1/2	3/4	1½	1¼	
2½	5	3	6	.183	150	27½	1/2	3/4	2	1½	
3	5½	3¼	8	.28	125	35	3/4	1	2	1½	
3½	6	4	8	.435	125	54.37	3/4	1	2½	2	
4	7	4	10	.54	120	65	1	1¼	2½	2	
4½	8	5	10	.85	120	102	1	1¼	3	2½	
5	9	5¼	12	1.12	100	112	1	1½	3	2½	
6	10	6	12	1.47	100	147	1¼	2	4	3	
7	12	7	12	2.00	100	200	1½	2	5	4	

Fig. 4826 is for sinking and recovering shafts, and is of the double plunger pattern.

A base plate can be attached to the bottom of the pump cylinder, and the pump used for general purposes after work in the shaft is completed.

PRICES, FIG. 4826.

No.	Prices.	Steam cylinder.	Plunger.	Stroke, in inches.	Capacity per stroke, in gallons.	Steam pipe.	Exhaust pipe.	Suction pipe.	Discharge pipe.
5	$350.00	7	3½	12	.5	1	1½	2½	2
6	400.00	8	4	12	.65	1	1½	3	2½
7	475.00	10	5	13	1.10	1¼	2	4	3
9	575.00	12	7	13	2.16	1½	2½	5	4
9A	575.00	12	6	13	1.58	1½	2½	5	4
9B		14	7	13	2.16	2	3	5	4
10		14	8	13	2.93	2	3	6	5
11		16	8	16	3.48	2½	4	6	5
12		18	9	16	4.4	3	4	6	5

VERTICAL MINING PUMP.

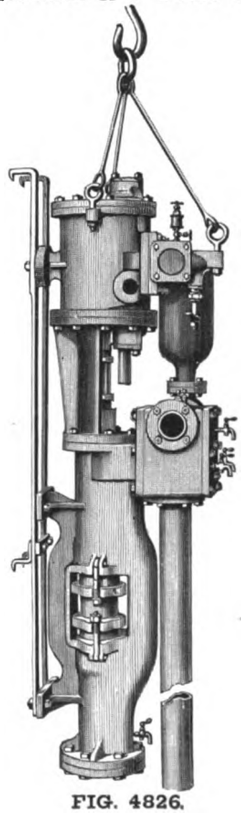


FIG. 4826.

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BLAKE'S VERTICAL SINKING PUMPS.

DOUBLE-ACTING PLUNGER PATTERN—FOR MINE AND WELL SHAFTS, ETC.

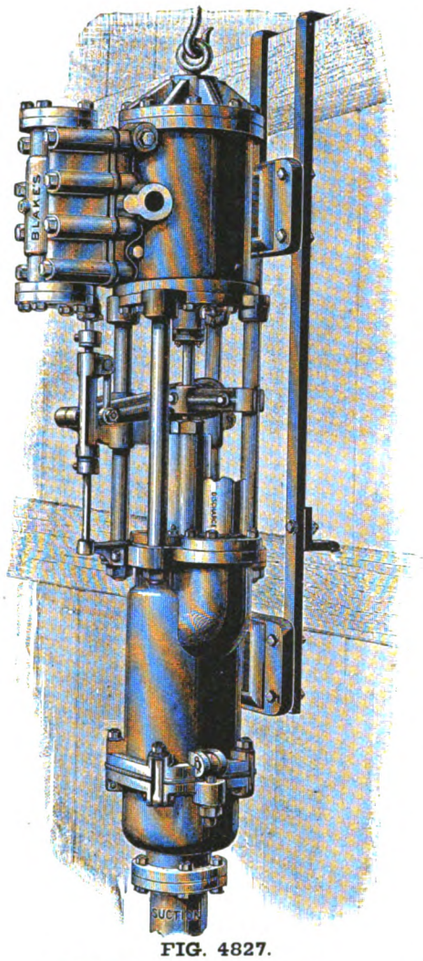


FIG. 4827.

For sinking new shafts, recovering old mines that have been "drowned out," and for mining operations requiring the use of a light, portable, and efficient steam pump, also for sinking wells and general excavation work, this improved sinking pump is especially adapted. It is easily handled, and can be placed in any position. Although designed to work vertically, it will also operate perfectly when placed on an angle or horizontally. Being compact in design and strongly made, it will withstand rough usage.

The pump, being vertical, requires but little room in the shaft. It will throw a steady, continuous stream of water, and will work equally as well when hanging by the tackle as when hooked to the timbering. It is positive in operation, quiet in action, having our new improved valve motion and a special cushioning arrangement of the steam cylinder.

Each pump is arranged with a ring bolt, firmly imbedded in the upper steam cylinder head, to which tackle for raising or lowering can be readily attached. Adjustable wrought iron dogs, for hanging the pump to the shaft timbering, are bolted to the cylinders.

The lower plunger works in a removable cylinder of gun-metal composition, which can be readily replaced with little trouble and expense by a new one when worn out. The water valves are of the best vulcanized rubber, and work on seats of gun-metal composition. Swing bolts admit of easy access to the water valves and pump barrel.

PRICES.

Steam cylinder.	Lower plunger.	Upper plunger.	Stroke.	Gallons per stroke.	* Capacity per minute at ordinary speed.	Steam pipe.	Exhaust pipe.	Suction pipe.	Delivery pipe.	Dimension over all.	Weight, lbs.	Prices.
6	5 3/8	3 3/4	7	.33	40 gallons.	3/4	1	3 1/2	2	60 x 18 x 13	700	$ .....
8	6 3/8	4 1/2	10	.69	80 "	1	1 1/2	4	2 1/2	78 x 22 x 15	1,000	.....
10	7	5	10	.85	100 "	1 1/4	2	4	3	78 x 22 x 22	1,350	.....
10	8 1/2	6	12	1.47	147 "	1 1/4	2	5	4	.....	.....	.....
12	8 1/2	6	12	1.47	147 "	1 1/2	2 1/2	5	4	.....	.....	.....
12	10	7	12	2.00	200 "	1 1/2	2 1/2	6	5	.....	.....	.....
14	10	7	12	2.00	200 "	2	3	6	5	.....	.....	.....
14	12	8 1/2	18	4.42	300 "	2	3	8	6	.....	.....	.....
16	12	8 1/2	18	4.42	300 "	2	3	8	6	.....	.....	.....
16	14	10	18	6.12	400 "	2	3	10	6	.....	.....	.....
18	14	10	18	6.12	400 "	2 1/2	3 1/2	10	6	.....	.....	.....

Also patterns for larger sizes or other combinations.

* Twice the above capacities can be had in emergencies; but for continuous work we advise the moderate rate of 100 feet piston travel per minute, which is about the speed the above capacities are figured at.

The suction nozzle is placed at the lowest end of pump—the most convenient point for attaching suction hose or pipe. The discharge nozzle is immediately above the water cylinder to one side.

AUTOMATIC FEED PUMPS AND RECEIVERS.

BLAKE'S.

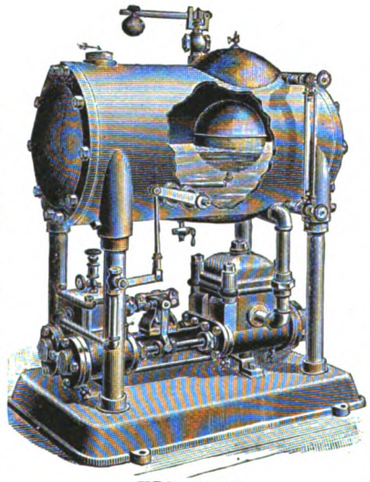


FIG. 4828.

REPRESENTS STYLE NO. 1.

DESCRIPTION, FIG. 4828.

This is a simple and effective apparatus for draining steam coils, radiators, heaters, drying cylinders, steam jackets, etc., and forcing the water of condensation in its hottest condition direct to the steam boilers. It is reliable and automatic in its operation. It does away with the expense and annoyance of traps and tanks and returns the condensed steam to the boiler in a steady continuous flow as fast as it accumulates in the receiver. It is not affected by variation of steam pressure, and entirely prevents all snapping and "water-hammer" in pipes, so often caused by the use of traps having intermittent action. The automatic steam pump and receiver can be used for other purposes than a boiler-feed appliance; for instance, for regulating the brine circulation in refrigerating machinery, for the temporator apparatus in beer cooling, and for other circulating purposes.

Referring to the engraving above it will be noticed that the condensed steam enters by the inlet nozzle at the top, and gravitates to the bottom of the receiver. This water cannot accumulate in any quantity, as in rising, it lifts the float and the steam pump takes it away immediately and forces it to the boiler. The pump is operated from the hollow float by means of the intermediate connection and balanced steam throttle. When the float rises the pump is started and the speed is regulated according to the quantity of water flowing into the receiver—the larger the quantity of water the faster the pump moves. The pump slows down as the supply of water drops off, and when it ceases the pump stops entirely.

The hollow copper float cannot fill with water by "sweating" or by actual leakage, as it is drained from the bottom through the hollow arm and axis. The interior of the float is in communication with the outside atmosphere.

PRICES.

Size.	Capacity per minute.	Heating surface it will drain.	Price.
A	9 gallons.	3,000 sq. ft.	$300.00
B	15 "	7,000 " "	350.00
C	36 "	15,000 " "	425.00
D	58 "	30,000 " "	525.00

Included in the price is the pump, with the attached receiver, the glass water gauge, drain cock, air cock, safety valve, and the suction and steam pipe connections shown by the engraving.

DEAN'S.

DESCRIPTION, FIG. 4829.

Duplex pump, with 6 inch steam cylinders, 4 inch plungers and 6 inch stroke, with automatic receiver.

The above cut shows the usual arrangement of the parts of this apparatus. It is essential to its successful operation that it should be set sufficiently low for water to flow to the inlet by gravity.

This apparatus is designed to receive the water of condensation from radiators, heating coils, cylinder jackets, pan jackets, kettle jackets, separators, drying cylinders, etc., and return it directly into the boiler without loss of heat. It performs this duty without the constant attention needed with an ordinary trap and tank, as it is entirely automatic in its operation.

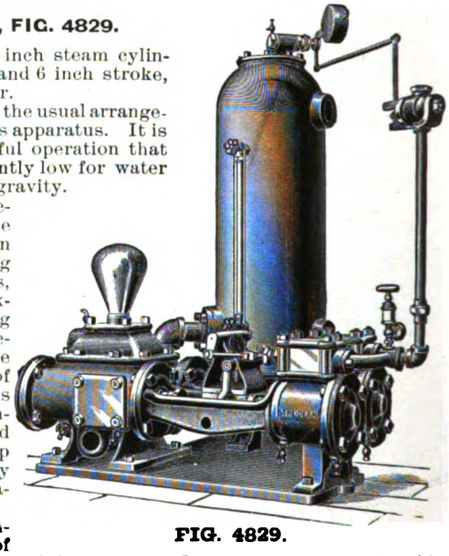


FIG. 4829.

The water of condensation is carried to one of the openings near the top of the receiver. On rising to a proper height, the pump is put in operation, preventing any further accumulation, and discharging the water back into the boiler. The throttle valve of the pump is actuated by an open vessel, immersed in the receiver, which cannot be made inoperative by collapsing or becoming filled.

PRICES.

Diameter of steam cyls., in inches.	Diameter of plungers, in inches.	Length of stroke, in inches.	Size of steam supply pipe.	Size of steam exhaust pipe.	Size of receiver inlet pipe.	Size of pump discharge pipe.	Gallons capacity per minute.	Prices.
3	2	3	1/2	1/2	2 1/2	3/4	9	$165.00
4 1/2	2 3/4	4	1	3/4	2 1/2	1 1/2	15	210.00
5 1/4	3 1/2	5	1 1/2	1 1/4	2 1/2	1 1/2	30	255.00
6	4	6	1	1 1/2	2 1/2	2	56	290.00

Prices include automatic throttle, glass gauge, safety valve, suction valve, lubricator, drip valve, air valve and pipe and fittings, as shown.

Larger sizes and different arrangement of parts made to order for special situations.

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WORTHINGTON AUTOMATIC FEED PUMPS AND RECEIVERS.

No.	Size of pumps.	Capacity in gallons per minute.	Square feet radiating surface apparatus will drain.	Space occupied in inches. Measurements over all. Length.	Width.	Height.	Prices.
1	3 x 2 x 3	12	5,000	38	23	19	$.....
2	4½ x 2¾ x 4	20	10,000	42	29	23	.....
3	5¼ x 3½ x 5	35	20,000	45	31	28	.....
4	6 x 4 x 6	60	40,000	50	33	28	.....

Prices cover both pump and receiver complete, and will be furnished on application.

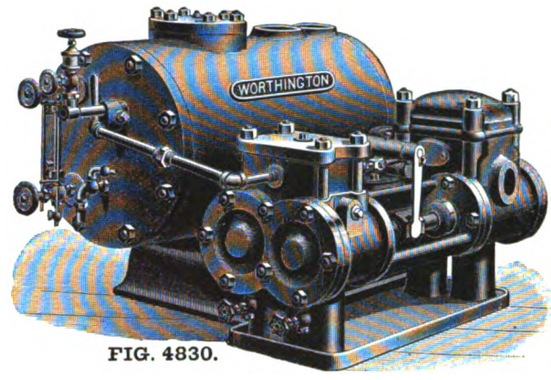


FIG. 4830.

DEANE'S INDEPENDENT CONDENSING APPARATUS.

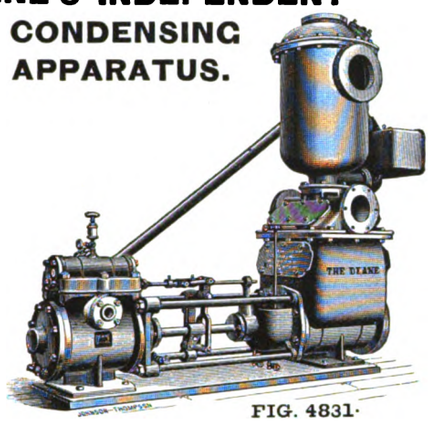


FIG. 4831.

These machines, being independent, have the following advantages:

They can be operated to free the cylinder from water and form the vacuum before starting the engine.

They can be adapted to a varying load and to different temperatures of injection water, so that it is not necessary to operate at all times a pump large enough for any emergency.

They use less power than mechanically connected pumps, and this power is not an additional load on the engine.

They will effect a saving of from 20 per cent. to 40 per cent. of the steam necessary to produce a given power; or will increase the power from 25 per cent. to 50 per cent.

PRICES.

Diam. of steam cyl. in inches	Diam. of vac. cyl., in inches.	Length of stroke, in inches.	Size of steam sup. pipe	Size of steam ex. h'st pipe.	Size of opening in con.	Size of discharge of pump.	Height to top of condenser.	Price, without condenser.	Prices of condenser.
5½	8	7	¾	1	To order.	4	5 ft. 2 in.	$275.00	$35.00
6	8	10	¾	1		4	5 ft. 5 in.	325.00	55.00
8	10	12	1	1¼		6	6 ft. 0 in.	500.00	70.00
10	12	12	1¼	2		6	6 ft. 8 in.	600 00	120.00
10	14	18	1⅜	2		8	6 ft. 11 in.	900.00	165.00
12	16	18	2	2½		8	7 ft. 9 in.	1,100.00	200.00
14	18	24	2	2½		10	9 ft. 8 in.	1,450.00	220 00
16	20	24	2	2½		10	10 ft. 4 in	1,800.00	250 00
16	22	24	2	2½		12	10 ft. 6 in.	2,000.00	250.00
18	24	24	3	3½		12	10 ft. 9 in.	2,400.00	320.00

Other sizes and combinations to order.

Full information should be given on the following points:

1.—The diameter of cylinder and length of stroke. 2.—The number of revolutions per minute. 3.—Steam pressure carried in boiler. 4.—Point of stroke at which steam is cut off. 5.—The water supply for injection, viz., whether salt or fresh, approximate distance from engine, approximate vertical height from surface to foot of engine.

Note.—From one gallon to one and a half gallons of injection water is required per minute per horse power, depending upon the temperature of the water, etc.

DESCRIPTION, FIG. 4832.

Cut shows duplex. Table is for single pumps.

We make other sizes and combinations to order.

*The "pressure" columns give approximately the hydraulic pressure in pounds per square inch, which can be exerted by the water plungers, with a steam pressure from of about 60 pounds in the steam cylinder, the pump then standing balanced. Increasing the steam pressure will give proportionately greater hydraulic pressure.

Automatic pressure regulators, complete, with balanced steam throttles, furnished when ordered. Prices extra.

These hydraulic pumps are double-acting, and will consequently deliver a steady, continuous flow of water. They are absolutely positive in operation, and can be run at the lowest speed possible. If desired, they can be operated automatically to run at varying speeds, according to the demands of the work to be performed.

On some of the largest hydraulic presses in this country we have these pumps in operation, where they are arranged in a series of two or more powers, and connected up to run automatically. The lowest power moves the ram of the press the greater distance against the minimum pressure, the next in the series moving the ram a less distance against the constantly increasing pressure, and so on, each in turn starting at the instant the preceding one attains its maximum pressure. By this arrangement a pumping plant of less first cost can be used and a saving of fuel secured.

BLAKE'S HYDRAULIC PRESSURE PUMPS.

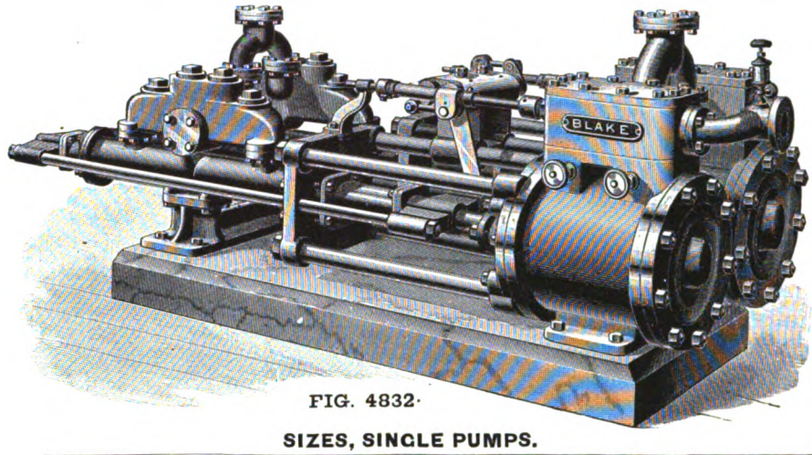


FIG. 4832.

SIZES, SINGLE PUMPS.

Steam cylinder. Inches.	Plungers. Inches.	Stroke. Inches.	Gallons per stroke.	*Pressure. Lbs.	Prices.
4½	½ to 1	6			
5½	½	7	.006	7,000	
5½	¾	7	.013	3,200	$.....
5½	1	7	.024	1 800	
6	½	7	.006	8,000	
6	¾	7	.013	3,500	
6	1	7	.024	2,000	
8	⅝	10	.013	9,000	
8	¾	10	.020	6,800	
8	1	10	.034	3,500	
8	1⅛	10	.043	3,000	
8	1¼	10	.053	2,300	
8	1⅜	10	.076	1,500	
8	1¾	10	.10	1,050	
8	2	10	.13	900	
8	⅝	12	.015	9,000	
8	¾	12	.023	6,800	
8	1	12	.04	3,500	
8	1⅛	12	.051	3,000	
8	1¼	12	.063	2,300	
8	1⅜	12	.09	1,500	
8	1¾	12	.12	1,050	
8	2	12	.16	900	
8	2¼	12	.20	700	
8	2½	12	.25	550	
10	¾	12	.023	8,600	
10	1	12	.04	5,500	
10	1⅛	12	.05	4,700	
10	1¼	12	.063	3,500	
10	1⅜	12	.09	2,500	
10	1¾	12	.12	1,900	
10	2	12	.16	1,500	
10	2¼	12	.20	1,200	
10	2½	12	.25	900	
10	2¾	12	.31	700	
10	3	12	.37	600	
12	1	12	.04	8,600	
12	1¼	12	.063	5,000	
12	1⅜	12	.09	3,000	
12	1¾	12	.12	2,500	
12	2	12	.16	2,000	
12	2¼	12	.20	1,500	
12	2½	12	.25	1,300	
12	2¾	12	.31	1,100	
12	3	12	.37	900	
14	1	12	.04	10,000	
14	1¼	12	.063	7,000	
14	1⅜	12	.09	5,000	
14	1¾	12	.12	3,500	
14	2	12	.16	2,700	
14	2¼	12	.25	2,000	
14	2½	12	.25	1,700	
14	2¾	12	.31	1,550	
14	3	12	.37	1,300	
16	1¼	12	.06	9,800	
16	1½	12	.09	6,800	
16	1¾	12	.12	5,000	
16	2	12	.16	3,800	
16	2¼	12	.20	3,000	
16	2½	12	.25	2,400	
16	2¾	12	.31	2,000	
16	3	12	.37	1,700	
16	1¼	18	.095	9,800	
16	1½	18	.135	6,800	$.....
16	1¾	18	.18	3,000	
16	2	18	.24	3,800	
16	2¼	18	.30	3,000	
16	2½	18	.37	2,400	
16	2¾	18	.46	2,000	
16	3	18	.55	1,700	
16	3½	18	.68	1,250	
16	4	18	98	950	
16	2	24	.32	3,800	
16	2¼	24	.40	3,000	
16	2½	24	.50	2,400	
16	2¾	24	.62	2,000	
16	3	24	.74	1,700	
16	3½	24	.90	1,250	
16	4	24	1.30	950	
18	2	18	.24	4,800	
18	2¼	18	.30	3,800	
18	2½	18	.37	3,100	
18	2¾	18	.46	2,500	
18	3	18	.55	2,100	
18	3½	18	.68	1,500	
18	4	18	.98	1,200	
18	2	24	.32	4,800	
18	2¼	24	.40	3,800	
18	2½	24	.50	3,100	
18	2¾	24	.62	2,500	
18	3	24	.74	2,100	
18	3½	24	.90	1,500	
18	4	24	1.30	1,200	
20	2	18	24	6,000	
20	2¼	18	.30	4,700	
20	2½	18	.37	3,800	
20	2¾	18	.46	3,100	
20	3	18	.55	2 600	
20	3½	18	.68	1,950	
20	4	18	.98	1,500	
20	2	24	.32	6,000	
20	2¼	24	.40	4,700	
20	2½	24	.50	3,800	
20	2¾	24	.62	3,100	
20	3	24	.74	2 600	
20	3½	24	.90	1,900	
20	4	24	1.30	1,500	
24	2	18	.24	8,600	
24	2¼	18	.30	6,800	
24	2½	18	.37	5,500	
24	2¾	18	.46	4,500	
24	3	18	.55	3,800	
24	3½	18	.68	2,860	
24	4	18	.98	2,100	
24	4½	18	1.23	1,700	
24	5	18	1.50	1,300	
24	2	24	.32	8,600	
24	2¼	24	.40	6,800	
24	2½	24	.50	5,500	
24	2¾	24	.62	4,500	
24	3	24	.74	3,800	
24	3½	24	.90	2,800	
24	4	24	1.30	2,100	
24	4½	24	1.65	1,700	
24	5	24	2.00	1,300	

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DUPLEX CRANK AND FLY-WHEEL AIR PUMP.

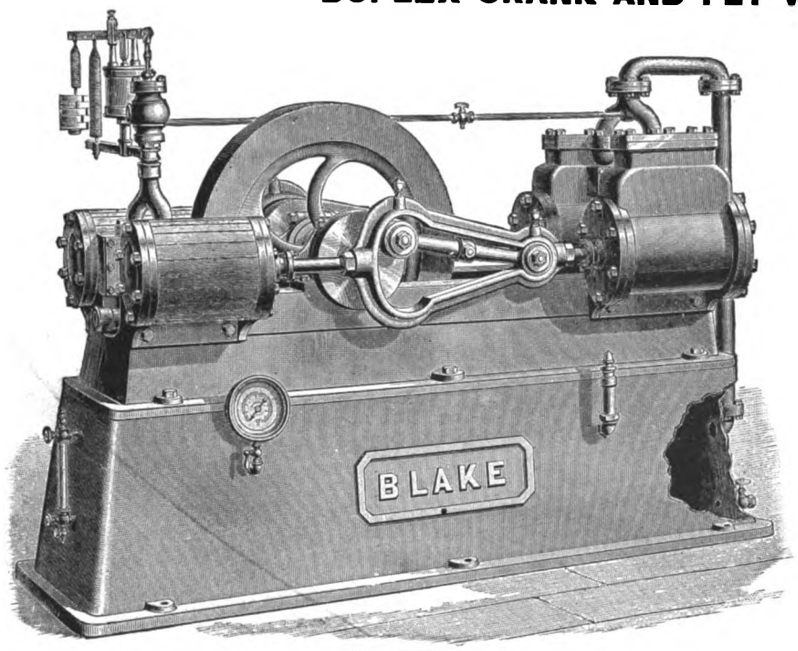


FIG. 4833.

DESCRIPTION, FIG. 4833.

It is built on the crank and fly-wheel duplex design, with automatic regulating device. The cranks are set at right angles, so that there is absolutely no "dead center." The operation is, therefore, perfectly positive, enabling the pump to stop and start at any point of stroke.

The speed of the pump is regulated automatically by the pressure of air in the receiver; decreasing the motion as the pressure increases; stopping or slowing down the pump when the required amount of pressure is attained; re-starting it and accelerating the motion in proportion to the withdrawal of the air from the receiver.

The governor valve on the steam pipe is connected with and moved by the regulator, which latter is operated by the air pressure. "Racking off" can be carried on at several points at the same time without varying the air pressure perceptibly. The pump does not require any attention from the engineer, as it regulates its own speed, starting and stopping automatically, as the air is used or shut off. Variation of the steam pressure does not affect the running of the pump, as the regulator controls the speed and keeps the air at a uniform pressure.

The price for the special air receiver, which will conveniently serve as a foundation bed, complete with air pressure gauge, safety valve, glass water gauge, and drain cock, etc., as shown by engraving, $.....extra.

The small amount of water used in the air cylinders to cool the air, seal the valves, and fill the cylinder heads will accumulate in the bottom of the air receiver. The glass water gauge is intended to show the height of this water and designate when it is necessary to draw it off through the drain cock at the bottom.

The air valves are readily reached through the covers in top of air cylinders. They are of special construction, very durable, and not liable to derangement.

PRICES, FIG. 4833.

Steam cylinders.	Air cylinders.	Stroke.	Cubic feet air per revolution.	Steam pipe.	Exhaust pipe.	Suction pipe.	Delivery pipe.	Prices.
4	5	5	.30	¾	1	2½	1½	$.....
6	7	6	.55	1	1½	3	2	.....
6	8	6	.75	1	1½	3	2	.....
8	10	8	1.45	1½	2½			.....
8	12	8	2 08	1½	2½			.....

Also patterns for larger sizes and other combinations of cylinders.

DUPLEX AIR PUMP.

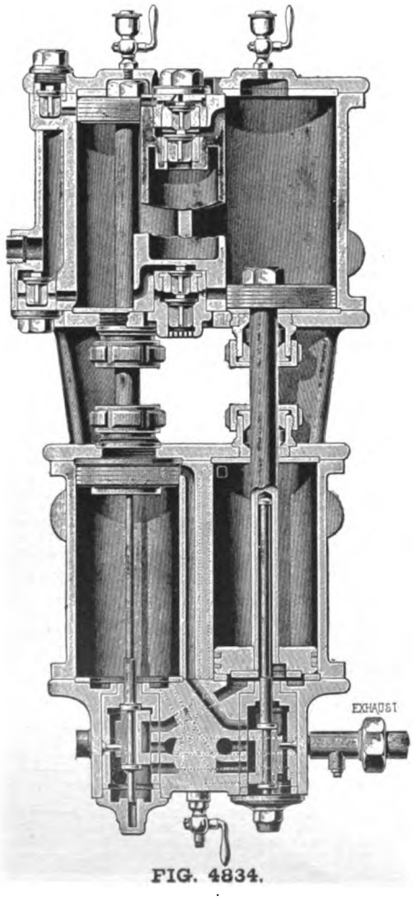


FIG. 4834.

DESCRIPTION, FIG. 4834.

A very simply constructed, durable and efficient steam engine and pump for compressing air, the duplex action being easy working and giving much greater efficiency than the ordinary single-acting pump. The steam cylinders are at the bottom, so the drainage is natural. The air cylinders are placed above the steam cylinders, thus insuring clean, dry air, as impurities and the condensation from steam cylinders cannot leak into the air chambers. All air valves are simple check valves, seating by gravity, and every valve in the pump can be readily examined by unscrewing a plug. These duplex pumps are made in three sizes, as follows:

PRICES.

No. 1 has 5 inch steam cylinders, large air cylinder 7 inches, and smaller air cylinder 5 inches diameter; designed for working with 120 to 140 lbs. steam pressure..... $100.00

No. 2 has 7 inch steam cylinders, large air cylinder 10 inches, and smaller air cylinder 7 inches diameter; designed for working with 120 to 140 lbs. steam pressure..... 200.00

No. 3 has 7 inch steam cylinders, large air cylinder 7 inches, and smaller air cylinder 5 inches diameter; designed for working with 50 to 80 lbs. steam pressure..... 200.00

Note.—The No. 1 and No. 2 duplex pumps are specially designed for working with locomotive steam pressure, and should never be worked with less than 120 to 140 lbs. steam.

The No. 3 duplex pump has been specially designed for working with a lower steam pressure, and is therefore adapted for manufacturing purposes where the steam pressure used is 50 to 80 lbs.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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RIDER HOT AIR PUMPING ENGINES.

Arranged for deep well pumping.—Five inch and 6 inch engines, $15.00 extra ; 8 inch and 10 inch, $20.00 extra ; the 4 inch engine is not sold for deep well pumping.

Kerosene burner and tank $10.00 for 4 and 5 inch, $12.00 for 6 inch, $15.00 for 8 inch, and $15.00 for 10 inch.

The prices named above include engine, pump, air and vacuum chambers, wrench, shovel and poker, oil and oil can—everything complete, ready for suction and discharge pipe, but do not include pipes of any kind.

Fuel.—The 4 inch engine is arranged to burn either coal gas, natural gas, gasoline gas, or kerosene.

The other sizes, in addition to above fuels, use wood, coke, bituminous and anthracite coals.

Size of cylinder.	Approximate capacity per hour at various heights.					
	50 feet.	100 feet.	150 feet.	200 feet.	250 feet.	300 feet.
4 in.	150					
5 "	350	200				
6 "	1,000	800	500	400		
8 "	2,000	1,200	900	700		
10 "	3,500	2,000	1,500	1,000	700	500

PRICES, FIG. 4835.

Size of cylinder.	Height to top of fly wheel.	Floor space.	Weight.	Revolutions per minute.	Price with rolling valve pump attached to cooler of engine.
	ft. in.	ft. in. ft. in.	lbs.		
4 in.	3 9	1 6 x 2 0	500	120 to 180	$150.00
5 "	5 0	2 2 x 2 9	1,050	100 to 160	225.00
6 "	6 0	2 4 x 3 4	1,800	100 to 120	300.00
8 "	7 2	2 5 x 3 11	3,000	100 to 120	400.00
10 "	7 9	2 8 x 4 4	3,600	80 to 110	500.00

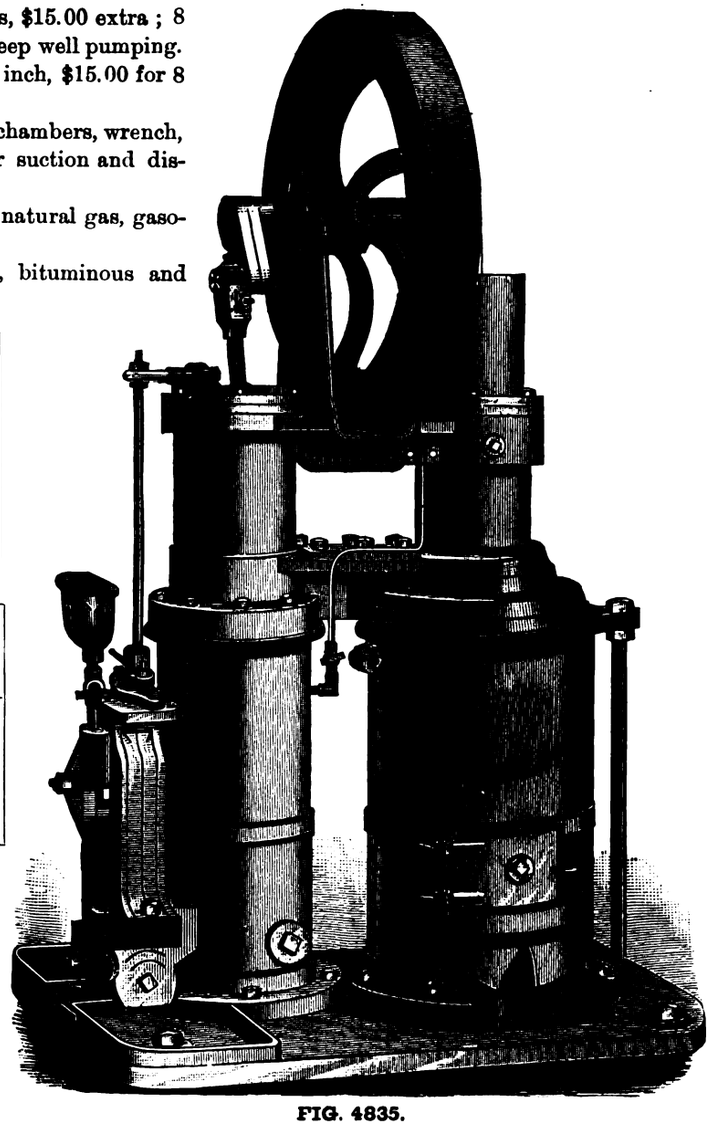


FIG. 4835.

ERICSSON HOT AIR PUMPING ENGINES.

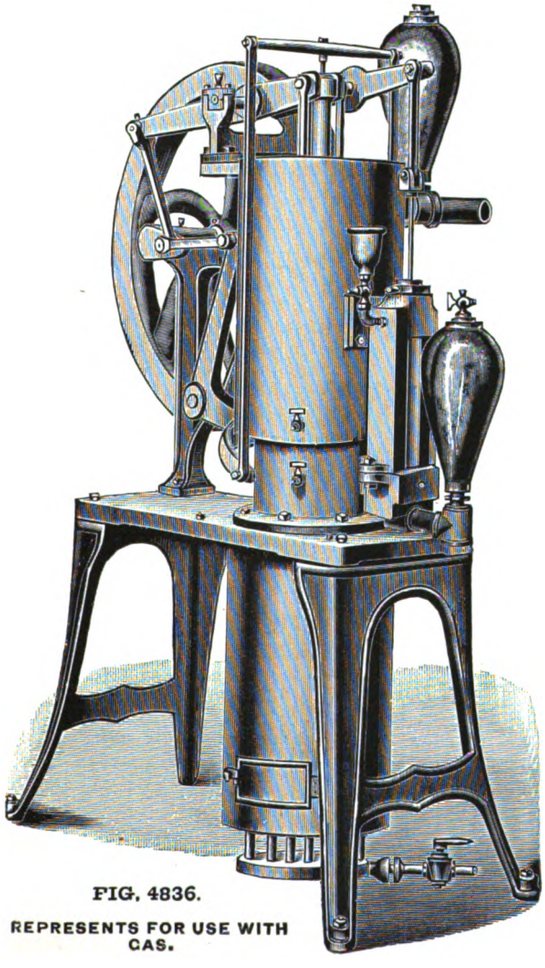


FIG. 4836.

REPRESENTS FOR USE WITH GAS.

The 5 inch engine weighs 325 lbs., requires ¾ inch pipe, and runs from 80 to 100 revolutions per minute ; the 6 inch weighs 550 lbs., requires 1 inch pipe, and runs from 70 to 90 revolutions per minute ; the 8 inch weighs 750 lbs., requires 1¼ inch pipe, and runs from 60 to 80 revolutions per minute ; the 10 inch weighs 1,350 lbs., requires 1½ inch pipe, and runs from 60 to 80 revolutions per minute.

PRICES, FIG. 4836.

Diameter of cylinder.	Floor space.	Height.	Cubic feet of gas per hour.	Anthracite coal per hour.	Gallons per hour 50 ft. high.	Prices with coal or wood furnace.	Prices with gas furnace.
5¼ in.	2 ft. 5 in. x 16 in.	4 ft. 2 in.	12	....	150	.....	$125.00
6 "	3 " 6 " x 24 "	4 " 5½ "	18	2½ lbs.	225	$180.00	180.00
8 "	4 " x 26 in.	5 " 5½ "	25	3⅓ "	500	225.00	225.00
10 "	4 " 4 in. x 3 ft. 2 in.	5 " 6 "	..	5 "	1,000	300.00	.....

Arranged for deep well pumping ; 8 inch engines are $10.00 extra, 10 inch and 12 inch are $15.00 extra. This price includes a deep well pump with its piston and air chamber, and also upper stuffing box and plunger, but does not include any pipe or pump rod.

These engines will pump approximately the number of gallons specified to a height of 50 feet ; but they will pump more water to a less height, and less water to a greater height.

The above prices include engine, pump, copper air chamber, vacuum chamber, furnace, wrench, oil can and oil.

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ECONOMIC CANC PUMP.

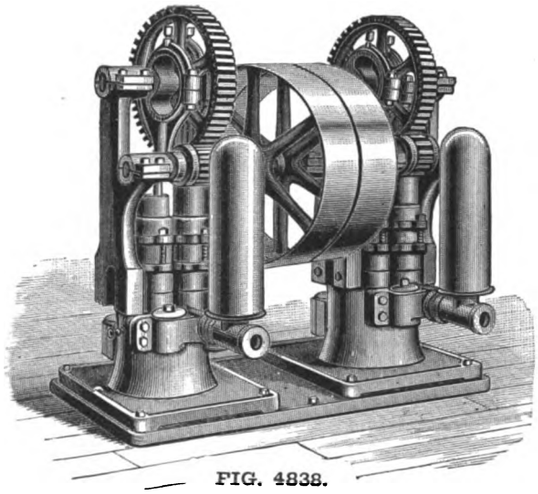


FIG. 4838.

PRICES, FIG. 4838.

Size of pump No.	Size of plunger, in inches.	Length of stroke, in inches.	Gallons per stroke.	Revolutions per minute.	Size of suction.	Size of discharge.	Size of pulleys.	Geared.	Prices complete.	Prices, with cut gears.
0	2	2½	.14	20 to 60	1	1	According to duty required.	5 to 1	$176 00	$194.00
1	3	3½	.44	10 to 50	1¼	1½		5 to 1	289.00	317.00
2	4½	4¾	1.32	10 to 40	2½	2		5 to 1	404.00	444.00
3	6	6	2.94	10 to 30	3	2½		6 to 1	625.00	685.00
4	8	8	6.96	10 to 25	4	3½		5 to 1		964.00
5	11	11	18.12	10 to 25	6	5		5 to 1		

On the above list a stroke is the full revolution of large gear, or the working of each plunger once.

ECONOMIC SINGLE PUMPS.

PRICES, FIG. 4839.

Size of pump No.	Size of plunger, in inches.	Length of stroke, in inches.	Gallons per stroke.	Revolutions per minute.	Size of suction.	Size of discharge.	Size of pulleys.	Geared.	Prices complete.	Prices, with cut gears.
0	2	2½	.07	20 to 60	1	1	12 x 2½	5 to 1	$82.00	$91.00
1	3	3½	.22	10 to 50	1¼	1½	15 x 3	5 to 1	137.00	151.00
2	4½	4¾	.66	10 to 40	2½	2	20 x 4	5 to 1	192.00	212.00
3	6	6	1.47	10 to 30	3	2½	24 x 4¼	5 to 1	300.00	330.00
4	8	8	3.48	10 to 25	4	3½	30 x 7	5 to 1		467.00
5	11	11	9.06	10 to 25	6	5	30 x 9	5 to 1		875.00

On the above list a stroke is the full revolution of large gear, or the working of each plunger once.

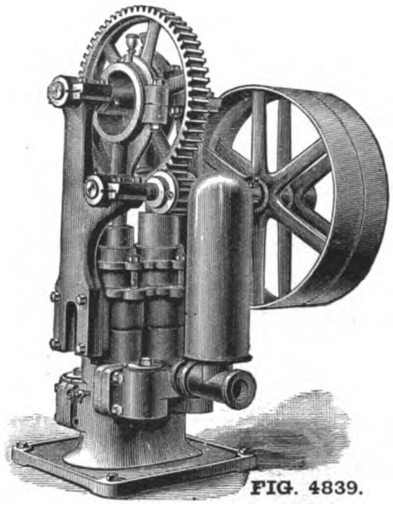


FIG. 4839.

Hot water. One style is designed expressly to pump hot water.

Cold water. Our cold water pump has special features over other similar pumps, which enables it to draft water from 20 to 25 feet, and pump to its full capacity.

Acid pumps, made of gun metal. Melter pumps, for sugar-houses. Pumps for paper mills.

TRIPLEX SUCTION AND FORCE PUMPS.

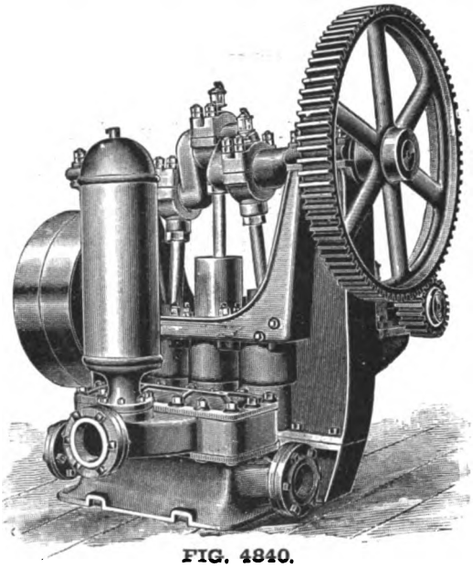


FIG. 4840.

It is capable of high or low pressure service, filling tanks, feeding boilers, supplying hydraulic elevators and pulp grinders, irrigating lands, creating air pressure or vacuum, etc., and can be adapted for any speed requirements from the high speed electric motors, gas or oil engines, to the lower speed of countershafts driven by any power.

The gears are machine cut. This pump is especially well adapted for feeding boilers under any pressure, and table below is compiled with particular reference to this duty though the pump is capable of manifold other adaptations admitting greater speed, 50 to 75, and giving proportionately greater results.

PRICES.

Diam. cyl.	Stroke.	Suction.	Disch'ge	Gears.	Pulleys.	Rev. per min.	Gals. per rev.	Boiler feeding duty. Adapted to boiler of	Water req'd per min. to feed boiler.	Prices.
2½ in.	4 in.	1½ in.	1½ in.	5 to 1	15 x 3 in.	20	¼	50 H.P.	3½ gals.	$125.00
3 "	4 "	1½ "	1½ "	5 to 1	15 x 3 "	25	⅓	100 "	6⅔ "	140.00
4 "	4 "	2 "	2 "	4 to 1	20 x 3 "	25	⅝	200 "	12⅝ "	200.00
4 "	6 "	2 "	2 "	5 to 1	20 x 3 "	25	¼	250 "	16 "	225 00
5 "	6 "	3 "	3 "	5 to 1	26 x 4 "	20	1½	300 "	19⅔ "	285.00
5 "	8 "	3 "	3 "	5 to 1	26 x 4 "	20	2	500 "	32 "	330.00
8 "	8 "	5 "	4 "	5 to 1	36 x 6 "	15	5	1000 "	64 "	600.00

VACUUM PUMPING ENGINE.

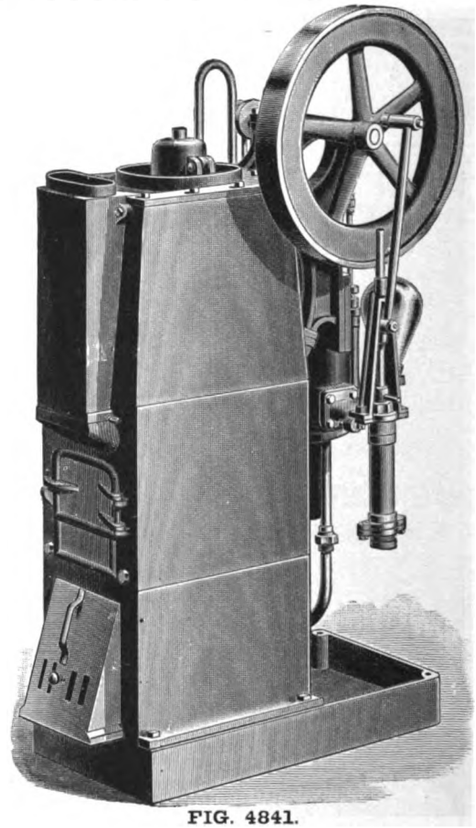


FIG. 4841.

PRICES.

Size No.	Space on floor.	Height.	Size suction.	Size discharge.	Gallons per hour, 50 feet high.	Prices, coal, wood, or gas.
2	30 in. x 18 in.	58 in.	1¼ in.	1¼ in.	500	$250.00
3	36 in. x 20 in.	62 "	1½ "	1½ "	750	300.00
4	36 in. x 20 in.	62 "	1½ "	1½ "	1,000	350.00

Larger sizes to order.

Deep well pumps at slight extra cost.

The above prices are for motor complete, including copper air and vacuum chambers, wrench, oil and oil can, and printed directions for setting and operating.

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DOUBLE-ACTING SUCTION AND FORCE PUMPS.

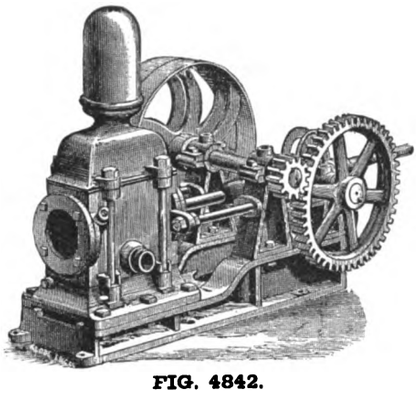


FIG. 4842.

DESCRIPTION, FIG. 4842.

The pump is geared 4 to 1, and for continuous service the pulley shaft may be run between 140 to 160 revolutions per minute, and against 75 pounds pressure per square inch. For feeding boilers, the piston should be made entirely of metal, for which an extra charge would be made. Always fitted for wrought iron pipe, unless otherwise ordered. Stroke, 4½ in. Nos. 2, 4 and 8 have outboard bearing to pulleys.

PRICES.

No.	Diam. cylinder.	Suc.	Dis.	Gal. per rev.	Prices.
2	2½ in.	1¼ in.	1 in.	1–5	$75.00
4	3 "	1¼ "	1 "	3–10	80.00
8	4 "	1½ "	1¼ "	1–2	85.00
12	5 "	2 "	1½ "	7–8	115.00
16	6 "	2½ "	2 "	1 1–4	135.00

DESCRIPTION, FIG. 4843.

Tight and loose pulleys, 4 in. face and 18 in. diameter. The piston is worked from a crank with a link motion, the crank pin working in a solid gun-metal box, while a guide on under side of the link prevents all undue wear of the piston-rod and stuffing-box. The pump may be run 25 to 30 revolutions per minute, and against 50 pounds pressure per square inch. Stroke, 4½ in.

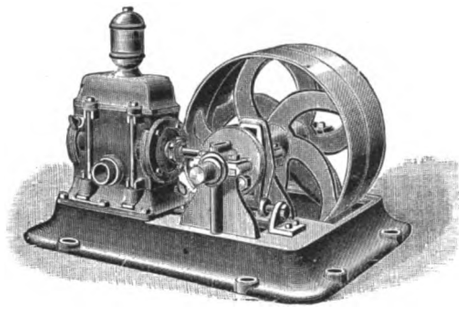


FIG. 4843.

In making inquiry or orders, always state duty intended or required of pump.

PRICES.

No.	Diam. cylinder.	Suc.	Dis.	Gal. per rev.	Iron, prices	Brass, prices.
4	3 in.	1¼ in.	1 in.	3–10	$70.00	$120.00
8	4 "	1½ "	1¼ "	1–2	75.00	135.00

DELUGE PUMPS.

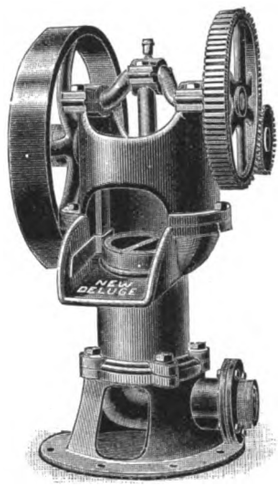


FIG. 4844.

DESCRIPTION, FIG. 4844.

This pump is adapted for contractors' use in pumping out excavations, coffer dams, quarries, etc., or for any purpose where it is only desired to raise and deliver water at surface.

Hose and coupling furnished, if desired, at market rates.

PRICES.

Diam. cyl.	Suc.	Stroke.	Gals. per stroke.	Prices.
6 in.	2½ in.	6 in.	3–4	$58.00
8½ "	3 "	6 "	1 1–2	68.00

HAND AND BELT BOILER FEED PUMPS.

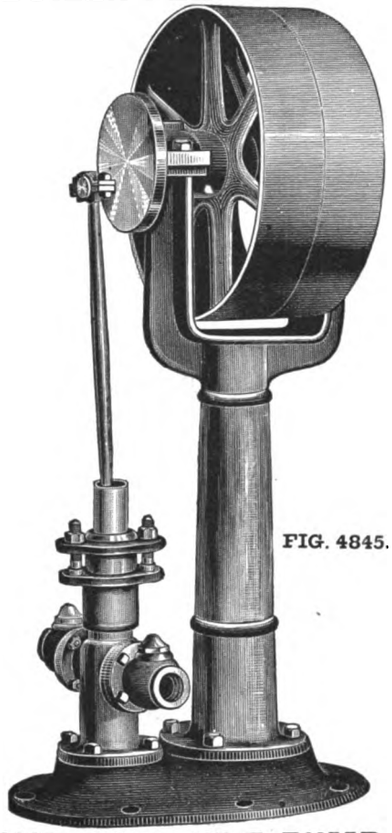


FIG. 4845.

DESCRIPTION, FIG. 4845.

There is a substantial wrought iron handle on the end of crank shaft, opposite the face-plate, so that the boiler can be filled by hand when necessary. The crank shaft has a bearing on each side of the pulleys. The plunger, piston and valves are brass. Each pulley is provided with a set screw for fastening it to the crank shaft.

PRICES.

No.	Size piston.	Suction fitted for.	Discharge fitted for.	Stroke.	Size pulleys, in.	Prices.
1	2 in.	1 in. pipe.	1 in. pipe.	3 in.	16 x 4	$34.00
2	2½ "	1 " "	1 " "	3 "	16 x 4	40.00
3	3 "	1¼ " "	1¼ " "	3 "	16 x 4	50.00
4	2 "	1¼ " "	1¼ " "	6 "	18 x 4	65.00
5	2½ "	1¼ " "	1¼ " "	6 "	18 x 4	75.00
6	3 "	1½ " "	1½ " "	6 "	18 x 4	85.00

DOUBLE-ACTING BOILER FEED PUMPS.

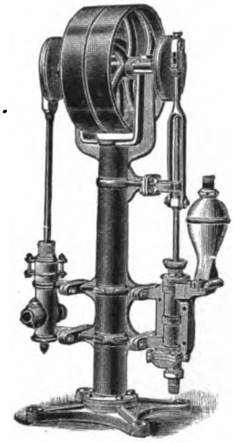


FIG. 4846.

This design represents a double-acting suction and force pump and boiler feed pump, bolted to a heavy iron column or standard, surmounted with tight and loose pulleys for power.

PRICES.

Boiler pump.			Dble.-act. force pump			Comp'te
Diam. cyl.	Suc. and dis.	Gal. per stroke	Dia. cyl.	Suc. and dis.	Gal. per rev.	Prices.
2½ in.	1¼ in.	1–8	3 in.	1½ in.	2–5	$130.00
2½ "	1¼ "	1–8	4 "	2 "	4–5	165.00

HAND AND BELT PUMPS.

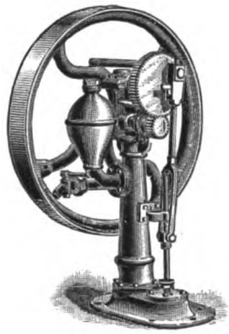


FIG. 4847.

This pump is powerfully geared, is provided with air chamber and cock spout.

PRICES.

No.	Pipe.	Stroke.	Fly-wheel.	Price.
1	1½ in.	7 in.	36 x 4½ in.	$70.00

Figs. 4847 and 4848 are used in connection with the artesian deep well cylinders. See Fig. 4851.

HAND AND BELT PUMP.

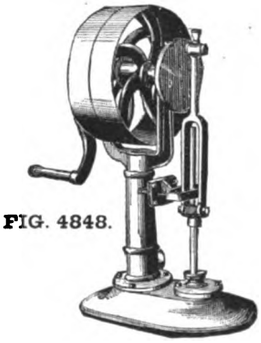


FIG. 4848.

PRICES.

No.	Pipe.	Dis.	Stroke.	Pulleys, each.	Price.
1	1½ in.	1¼ in.	4, 5 or 6 in.	15 x 3 in.	$25.00

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DOUBLE-ACTING POWER PUMPS.

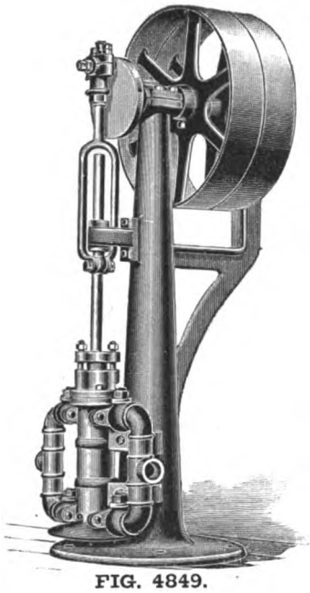


FIG. 4849.

With adjustable stroke from 2 inches to 7½ inches.

For feeding boilers, filling tanks, or forcing water and other liquids against pressure for any purpose.

PRICES, FIG. 4849.

2½ in. cylinder, 7½ in. stroke	$100.00
2¾ in. cylinder, 7½ in. stroke	110.00
3¼ in. cylinder, 7½ in. stroke	120.00
3½ in. cylinder, 7½ in. stroke	130.00

PRICES, FIG. 4850.

2½ inch	$50.00
2¾ inch	55.00
3¼ inch	60.00
3½ inch	65.00

Made with four check valves, and will draw water on twenty-five feet of suction.

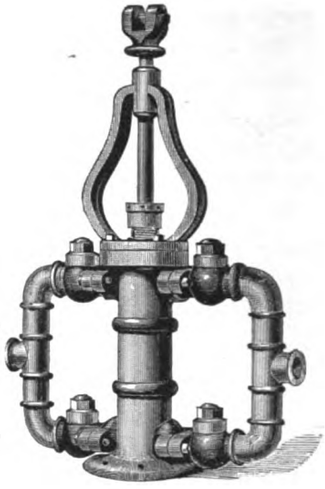


FIG. 4850.

BRASS ARTESIAN WELL PUMP CYLINDERS.

Inside diameter pump chamber.	Maximum stroke.	Length pump chamber.	Inside diameter suction and discharge pipes.	Inside diameter well casing.	Adapted for square wood rod.	Gal. per stroke.	PRICES, All brass, FIG. 4851.
1⅜ in.	16 in.	32 in.	1½ in.	3¼ in.	.....	.10	$15.00
1¾ "	16 "	32 "	2 "	3¾ "	1 in.	.16	18.00
2¼ "	16 "	32 "	2½ "	4¼ "	1¼ "	.27	24.00
2¾ "	16 "	32 "	3 "	4½ "	1½ "	.41	32.00
3 "	16 "	32 "	3¼ "	5 3/16 "	1¾ "	.50	45.00
3¼ "	16 "	36 "	3½ "	5 3/16 "	2 "	.57	50.00
1¾ "	24 "	40 "	2 "	3¾ "	1 "	.25	21.00
2¼ "	24 "	40 "	2½ "	4¼ "	1¼ "	.41	30.00
2¾ "	24 "	40 "	3 "	4½ "	1½ "	.61	38.00
3 "	24 "	44 "	3¼ "	5 3/16 "	1¾ "	.73	50.00
3¼ "	24 "	44 "	3½ "	5 3/16 "	2 "	.86	55.00
3¾ "	24 "	48 "	4 "	5⅝ "	2¼ "	1.15	65.00
4¼ "	24 "	48 "	4½ "	6¼ "	2½ "	1.47	75.00
4¾ "	24 "	48 "	5 "	6⅝ "	3 "	1.84	86.00
2¾ "	30 "	46 "	3 "	4½ "	1½ "	.77	45.00
3 "	30 "	50 "	3¼ "	5 3/16 "	1¾ "	.92	55.00
3¼ "	30 "	50 "	3½ "	5 3/16 "	2 "	1.06	60.00
3¾ "	30 "	54 "	4 "	5⅝ "	2¼ "	1.44	75.00
4¼ "	30 "	54 "	4½ "	6¼ "	2½ "	1.84	85.00
4¾ "	30 "	54 "	5 "	6⅝ "	3 "	2.30	100.00
5¾ "	30 "	54 "	6 "	8¼ "	3½ "	3.26	115.00
3¼ "	36 "	56 "	3½ "	5 3/16 "	2 "	1.30	70.00
3¾ "	36 "	60 "	4 "	5⅝ "	2¼ "	1.72	90.00
4¼ "	36 "	60 "	4½ "	6¼ "	2½ "	2.21	100.00
4¾ "	36 "	60 "	5 "	6⅝ "	3 "	2.76	125.00
5¾ "	36 "	60 "	6 "	8¼ "	3½ "	3.90	150.00
3¾ "	42 "	66 "	4 "	5⅝ "	2¼ "	2.	100.00
4¼ "	42 "	66 "	4½ "	6¼ "	2½ "	2.60	115.00
4¾ "	42 "	66 "	5 "	6⅝ "	3 "	3.22	130.00
5¾ "	42 "	66 "	6 "	8¼ "	3½ "	4.56	180.00

POWER WORKING HEAD FOR DEEP WELLS.



FIG. 4851.

DESCRIPTION, FIG. 4852.

This is a differential power working head, designed for wells 200 to 300 feet deep. Stroke 24 inches, $100.00.

It is fitted with discharge and suction connections of either 5 inch or 6 inch, and is used in connection with Fig. 4851.

We can furnish a geared working head with pump cylinder up to 7¾ inch diameter.

Prices on application.

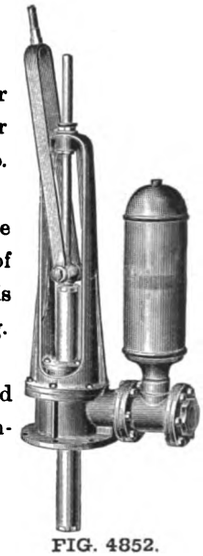


FIG. 4852.

PUMP COUNTERSHAFT.

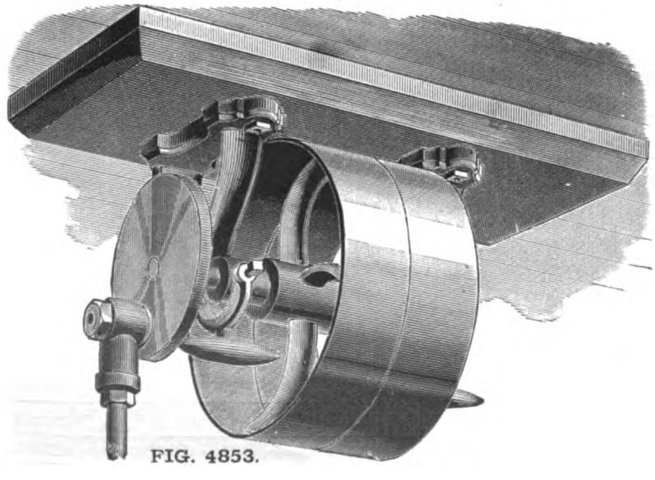


FIG. 4853.

GEARED PUMP COUNTERSHAFT.

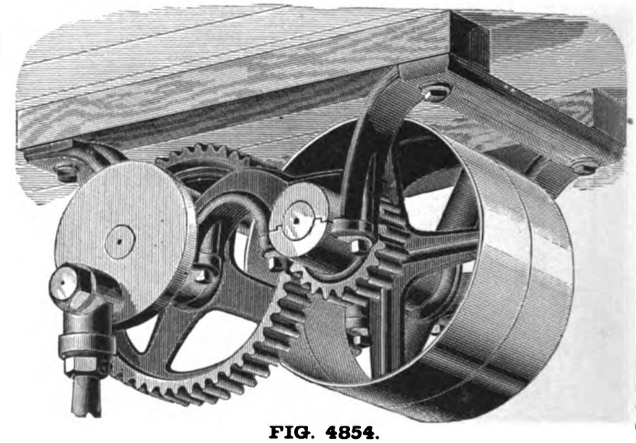


FIG. 4854.

No.	*Adapted for pump with stroke.	PRICES, FIG. 4853. Pulleys.	Prices.	PRICES, FIG. 4854. Pulleys.	Prices.
1	6, 8 or 10 inch	12 x 3½ inch.	$25.00	12 x 3½ inch.	$50.00
2	6, 8, 10, 12 or 16 inch	18 x 4 "	35.00	18 x 4 "	100.00

* Arranged for any length of stroke as given above, but always for 6 inch stroke, unless otherwise ordered.

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HORIZONTAL ROTARY PUMPS.

The number of pump is also diameter of discharge opening in inches. Where more than 25 feet of discharge pipe is attached to pump we recommend using one or two sizes larger than pump discharge.

For No. 12 and larger sizes we recommend a foot valve or flap valve and ejector for priming.

To use same, without priming apparatus, the water must flow to pump and rise as high as top of shell. All our pumps are made to run right-handed, as shown in illustrations, unless otherwise ordered. In our horizontal pumps the discharge as usually made will be in a vertical position.

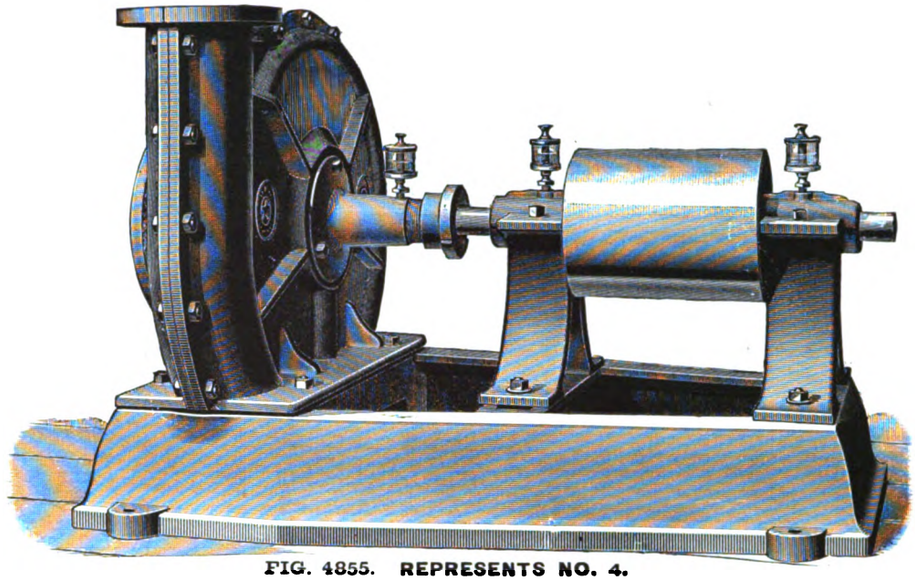


FIG. 4855. REPRESENTS NO. 4.

No.	Economical capacity in gallons per minute.	Actual capacity in gallons per minute.	Horse power required for each foot of lift. Minimum quantity.	Diameter and face of pulley, in inches.	Floor space required, in inches.	Shipping weight. Pounds.	Prices of pump, oiler and wrench, as per No. 4 style.	Prices of pump and primer, as per No. 5 style.
1½	20–40	160	.01	5 x 5	19 x 30	168	$35.00	$45.00
1¾	40–60	225	.016	6 x 6	21 x 33	232	50.00	60.00
2	60–80	325	.019	7 x 6	23 x 37	306	70.00	85.00
2½	80–100	400	.039	7 x 6	24 x 38	348	80.00	95.00
3	120–180	675	.047	7 x 7	25 x 39	400	95.00	115.00
4	200–300	1,300	.078	8 x 10	30 x 40	545	130.00	155.00
5	350–500	1,900	.14	10 x 10	34 x 54	826	165.00	195.00
6	500–700	2,700	.22	12 x 12	37 x 55	965	200.00	240.00
8	900–1,300	4,800	.34	18 x 12	45 x 63	1,560	310.00	375.00
10	1,600–2,200	7,500	.64	20 x 12	51 x 71	2,170	395.00	470.00
12	2,000–3,000	10,500	.88	24 x 14	62 x 78	3,050	500.00	
15	3,000–5,000	16,500	1.20	30 x 16	77 x 80	6,000	710.00	
18	5,000–7,000	22,000	1.80	36 x 18	93 x 103	9,000	1,300.00	
22	7,000–10,000	35,000	2.90	48 x 18	126 x 130	12,000		

DOUBLE SUCTION ROTARY PUMPS.

We shall be pleased to make prices on larger sized pumps if desired.

The number of pump is also diameter of discharge opening in inches.

Prices on bronze, brass or lead pumps on application.

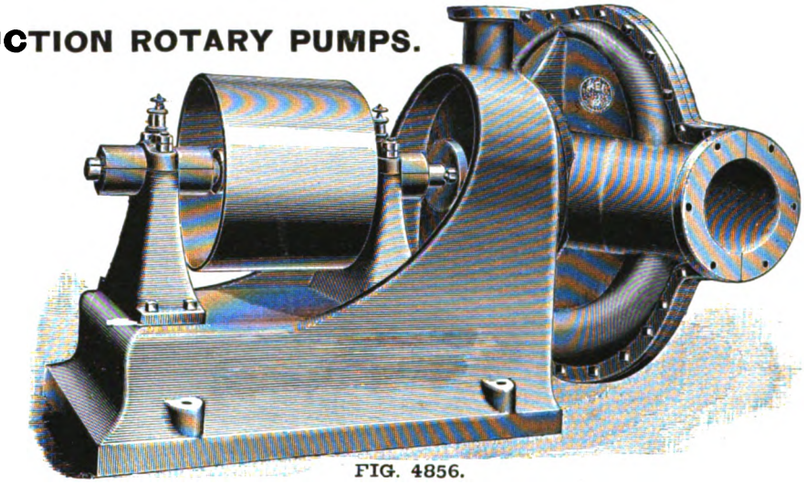


FIG. 4856.

Size discharge opening. Inches.	Size of pipe recommended.		Economical capacity in gallons per minute.	Actual capacity in gallons per minute.	Horse power required for each foot of lift. Minimum quantity.	Diameter and face of pulley, in inches.	Floor space required, in inches, about.	Shipping weight. Pounds.	Prices of iron pump.
	Suction.	Discharge.							
No. 1½	2	2	20–40	160	.01	5 x 5	20 x 32	225	$60.00
No. 1¾	2½	2	30–50	225	.016	6 x 6	20 x 32	300	75.00
No. 2	3	2½	40–70	325	.032	7 x 6	26 x 35	400	90.00
No. 2½	3½	3	80–100	400	.039	7 x 6	26 x 35	460	95.00
No. 3	4	3½	90–120	675	.05	7 x 7	27 x 38	550	100.00
No. 4	5	4½	160–350	1,300	.08	8 x 10	33 x 40	700	145.00
No. 5	6	5	330–600	1,900	.18	10 x 10	37 x 49	1,000	205.00
No. 6	8	6	500–900	2,700	.22	12 x 12	43 x 51	1,150	240.00
No. 8	10	8	1,000–2,000	4,800	.45	18 x 12	52 x 61	1,890	500.00
No. 10	12	10	1,600–3,000	7,500	.61	20 x 12	57 x 73	2,800	775.00
No. 12	15	12	2,000–4,000	10,500	.95	30 x 14	69 x 82	5,000	1,100.00
No. 15	18	15	3,500–7,000	16,000	1.35	32 x 15	89 x 78	6,500	1,325.00
No. 18	20	18	6,000–12,000	23,000	2.25	40 x 15	90 x 80	8,000	2,050 00

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ANTI-FRICTION CENTRIFUGAL DRAINAGE AND PRESSURE PUMPS.

DISCHARGE UP. DISCHARGE UNDER. DISCHARGE OVER.

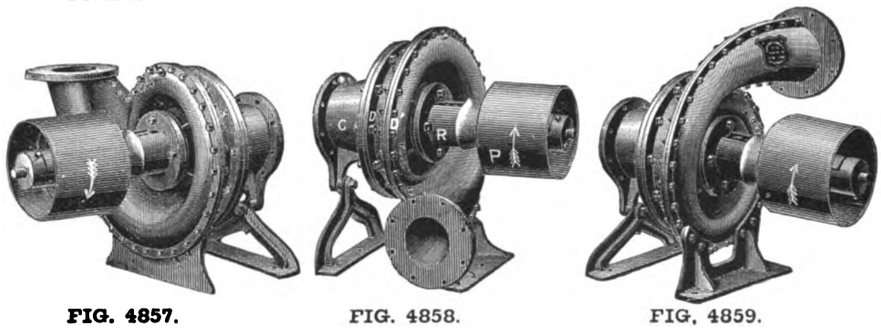


FIG. 4857. FIG. 4858. FIG. 4859.

Each size pump can be driven to discharge double the water capacity given in tables, but at a sacrifice of power. Special prices for pumps of brass or other composition. Our pressure pumps are specially built for raising water to greater heights than the drainage pump, in many instances having raised water from 90 to 110 feet. They are both similar in construction, except that the pressure pump has increased suction openings.

Prices will be furnished on application for the additional shaft, with coupling, pulley, outside standard bearing and cast base frame for the larger pumps, for driving by belt from engine, or other positive power. Also for furnishing suitable size, single or double engine, coupled direct, and self-contained, on cast base frame, if the water lift is not too great. Also for driving by suitable size cog-wheel or link belting, in situations where rubber or leather belting is impracticable.

A gallon of fresh water weighs 8⅓ lbs., and contains 231 cubic inches.

A cubic foot of water weighs 62½ lbs., and contains 1,728 cubic inches, or 7½ galls.

To find the horse power necessary to elevate water to a given height, multiply the total weight of water in lbs. by the height in feet, and divide the product by 33,000. An allowance of 25 per cent. should be added for friction.

PRICES, EITHER STYLE.

No. and style of pump.	Suction opening.	Discharge opening.	Diam. of pulley.	Face of pulley.	Number of revolutions per minute required to raise water to different heights.												Capacities per minute.	Prices, without foot valves.
Drainage.	Ins.	Ins.	Ins.	Ins.	4 ft.	6 ft.	9 ft.	12 ft.	16 ft.	20 ft.	25 ft.	30 ft.	40 ft	50 ft.	60 ft.	80 ft.	Galls.	Iron.
No. 3	3	3	6	6	700	780	885	1,000	1,120	1,260	1,420	1,580					250	$80.00
" 4	4½	4½	8	8	437	495	555	620	700	805	925	1,050					600	125.00
" 6	6	6	12	8	297	330	365	408	458	515	575	638					1,200	200.00
" 9	9	9	with coupling.		160	180	200	220	244	272	302	334					3,500	550.00
" 15	15	15			140	158	178	198	221	248	276	307					12,000	1,000.00
" 22	22	22			93	105	119	134	150	167	186	210					30,000	2,200.00
Pressure.	Ins.	Ins.	Ins.	Ins.														
No. 2	3	2	6	6	675	740	830	930	1,040	1,180	1,315	1,460	1,660	1,860	2,060	3,000	150	75 00
" 3	4½	3	8	8	425	475	530	585	660	750	850	950	1,070	1,200	1,330	1,560	400	125.00
" 4	6	4	12	8	280	310	345	385	435	490	550	620	755	900	1,050		800	200.00
" 6	9	6	with coupling.		180	202	225	250	280	312	347	388	480	585	700		1,800	450.00
" 10	15	10			132	150	168	188	210	237	264	300	374	452	530		7,000	900.00

CATARACT CENTRIFUGAL WRECKING AND DREDGING PUMPS.

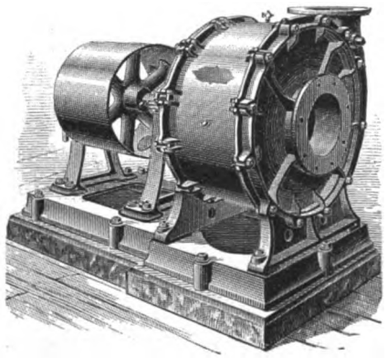


FIG. 4860.

PRICES, FIG. 4860.

Size of pump.	Suction and discharge openings.	Dimensions of pulley.		Water lift of pump, in feet.									Working capacities. Gallons per minute.	Prices of special pump.
				4 ft.	6 ft.	8 ft.	10 ft.	12 ft.	15 ft.	20 ft.	25 ft.	30 ft.		
	Diam. inches.	Dia. In.	Face In.	Revolutions per minute for above lifts.										
No. 4	4	8	8	410	430	450	465	485	515	560	610	655	500 to 600	$150.00
" 6	6	12	8	310	320	335	350	365	385	420	455	490	1,200 to 1,600	225.00
" 8	8	16	12	255	270	280	290	305	320	350	380	410	2,500 to 3,000	350.00
" 10	10	24	16	205	215	225	235	245	260	280	305	325	4,000 to 5,000	500.00
" 12	12	30	18	185	190	200	210	220	230	250	270	295	6,000 to 7,500	675.00
" 15	15	with thrust bearing & coupling.		155	160	168	175	182	193	210	225	245	9,000 to 12,000	.....
" 20	20			125	130	135	140	145	155	168	180	195	15,000 to 18,000	.....
" 24	24			105	110	115	120	125	130	140	152	163	22,000 to 25,000	.....
" 30	30			90	95	100	105	110	115	120	130	140	30,000 to 35,000	.....

ROTARY PUMPS.

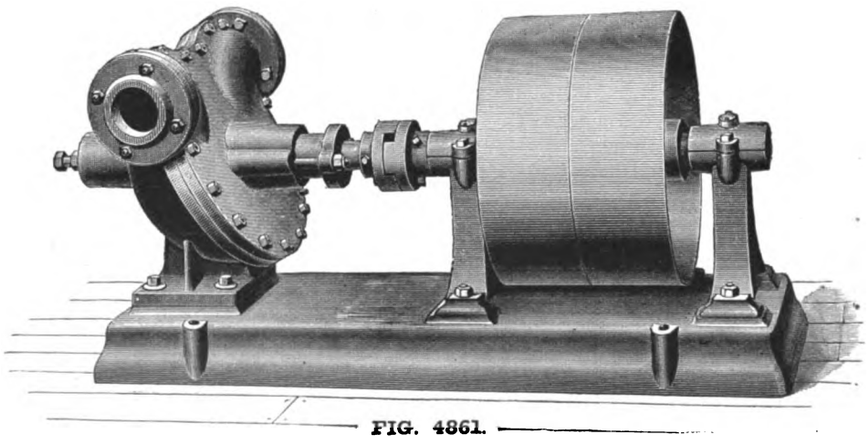


FIG. 4861.

PRICES.

Inlet.	Outlet.	Revolutions per minute.	Capacity per hour.	Weight.	Prices.
2 inches.	2 inches.	150	3,000 galls.	250 pounds.	$80.00
2½ "	2½ "	120	6,000 "	590 "	105.00
3 "	3 "	120	10,000 "	690 "	125.00

DUC'S ROTARY PUMPS.

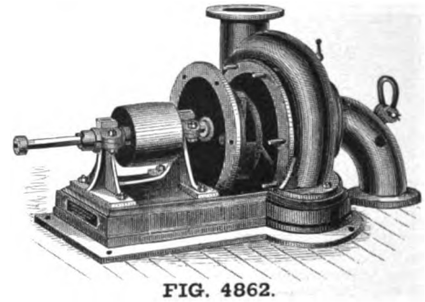


FIG. 4862.

Showing wheel withdrawn.

PRICES.

Number of pump.	Capacity in galls. per minute.	Number of revolutions per minute.	Diameter of pulley, in inches.	Face of pulley, in inches.	Prices.
4	725	1,500	4¾	4¼	$140.00
6	1,600	1,000	7	6½	210.00
8	2,800	750	9	8½	400.00
10	4,400	600	11½	10	550.00
12	6,400	500	13¾	12	.....
15	10,000	400	17¼	15	.....
20	17,500	300	23	20	.....

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ROTARY FORCE PUMPS.

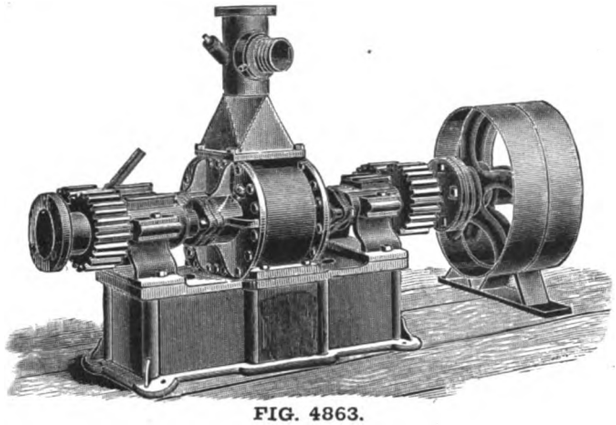


FIG. 4863.

The suction and discharge openings can be fitted for cast iron or wrought iron pipe or hose, as ordered.

PRICES.

No.	Suc.	Dis.	Pulleys.	Rev. per minute.	Gal. per rev.	Iron. Prices.	Bronze. Prices.
1	2 in	1½ in.	12 x 3½ in.	225 to 250	¼	$100.00	$160.00
2	2½ "	2 "	15½ x 4 "	175 to 200	½	115.00	180.00
3	3 "	2½ "	17½ x 5 "	150 to 175	1	160.00	260.00
4	5 "	4 "	20 x 6 "	125 to 150	1⅔	225.00	325.00
5	6 "	5 "	24 x 8 "	100 to 125	2½	275.00	400.00

IRON VERTICAL PUMPS.

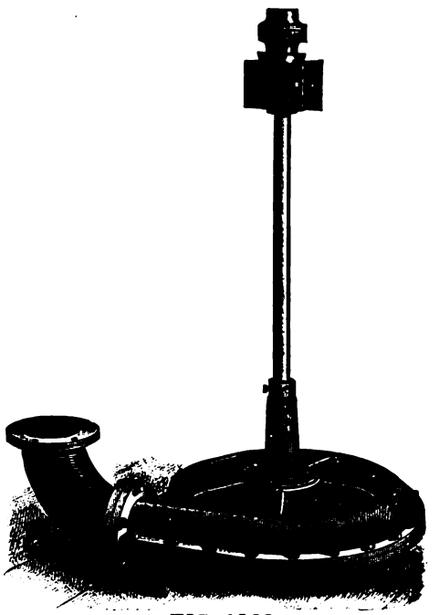


FIG. 4866.

HORIZONTAL CENTRIFUGAL PUMPS.

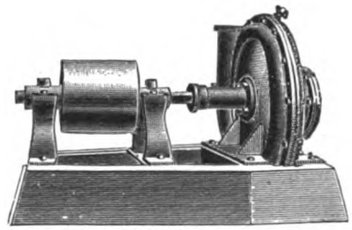


FIG. 4864.

PRICES, FIG. 4864.

No.	Iron.	Brass.	No.	Iron.	Brass.
1¾	$50.00	$100.00	6	$200.00	$410.00
2	70.00	125.00	8	310.00	
2½	80.00	150.00	10	395.00	
3	95.00	175.00	12	500.00	
3½	110.00	230.00	15	710.00	
4	130.00	275.00	18	1000.00	

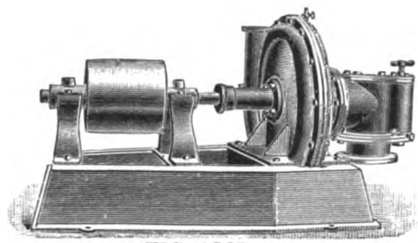


FIG. 4865.

PRICES, FIG. 4865.

No.	Iron.	Brass.	No.	Iron.	Brass.
1¾	$60.00	$120.00	6	$240.00	$495.00
2	85.00	150.00	8	375.00	
2½	95.00	175.00	10	470.00	
3	110.00	210.00	12	600.00	
3½	135.00	270.00	15	850.00	
4	155.00	330.00	18	1250.00	

VERTICAL SUBMERCED CENTRIFUGAL PUMPS.

DESCRIPTION, FIG. 4867.

For irrigating and draining sugar and rice plantations; for contractors' use, draining sewers, coffer dams, wheel and lock pits, excavations, etc., etc.; for sugar-houses, bleacheries, and dye works, oil mills, tanneries, breweries, distilleries, starch factories, etc.

This vertical or submerged centrifugal pump is adapted for any use where submerged pumps can be used. These pumps are constructed without valves, hence will raise water containing sand, gravel, clay, coal, tan bark or other impurities. They will also pump still slop, brewers' mash, and pulp, as readily as clear water, and will not clog or get foul.

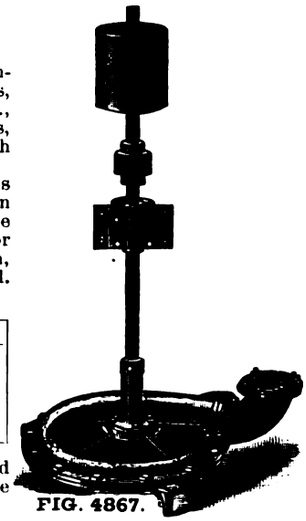


FIG. 4867.

PRICES.

No.	Iron.	Brass.	No.	Iron.	Brass.	No.	Iron.	Brass.
1¾	$40.00	$90.00	3½	$95.00	$200.00	10	$330.00	
2	60.00	110.00	4	110.00	240.00	12	420.00	
2½	70.00	135.00	6	170.00	360.00	15	600.00	
3	75.00	150.00	8	265.00		18	850.00	

Table showing number of revolutions per minute necessary and power required to raise water to different heights with the different sizes of pumps.

No. of pump.	Capacity per minute, gallons.	Horse power required per foot lift.	Size of discharge pipe, inches.	Diameter of pulley, inches.	Face of pulley, inches.	Revolutions per minute. 6 ft.	10 ft.	16 ft.	20 ft.	25 ft.	35 ft.	40 ft.	50 ft.
1¾	200	.085	1¾	6	6	425	680	825	900	975	1,120	1,170	1,284
2	300	.126	2	7	8	400	525	650	720	780	908	960	1,058
2½	450	.190	2½	7	8	375	475	600	675	720	875	940	1,010
3	650	.270	3	7	8	350	425	500	550	650	850	910	990
3½	1,000	.425	3½	10	10	325	410	475	525	625	825	900	950
4	1,250	.504	4	10	10	275	350	459	500	600	800	890	920
5	1,850	.765	5	10	10	260	330	430	480	560	750	860	900
6	2,650	1.10	6	12	12	209	240	360	420	490	580	610	650
8	4,750	1.90	8	15	12	185	225	310	360	390	450	475	500
10	7,500	3.14	10	18	14	166	220	285	320	360	414	436	470
12	10,000	4.	12	20	14	160	210	246	268	285	320	335	365
15	16,000	6 75	15	30	18	100	148	208	220	236	264	277	300
18	22,000	9.65	18	40	24	80	110	148	155	168	204	220	254

PRICES, FIG. 4866.

No.	Economical capacity in gallons per minute.	Actual capacity in gallons per minute.	Horse power required for each foot of lift, minimum quantity.	Diameter and face of pulley, in inches.	Floor space required, in inches.	Distance from bottom of pump to center of coupling.	Coupling is bored for connecting shaft.	Shipping weight, pounds.	Prices of pump, with elbow, one pair couplings, pulley and one bearing.
1½	20–40	160	.01	5 x 5	17 x 21	2 ft. 9 in.	1 in.	110	$30.00
1¾	40–60	225	.016	6 x 6	21 x 28	3 "	1 "	140	40.00
2	60–80	325	.019	7 x 6	25 x 29	3 " 4 "	1 1/16 "	181	60.00
2½	80–100	400	.039	7 x 6	27 x 30	3 " 4 "	1 1/16 "	200	70.00
3	120–180	675	.047	7 x 7	27 x 32	3 " 4 "	1 1/16 "	214	75.00
4	200–300	1,300	.078	8 x 10	30 x 39	4 "	1 7/16 "	346	110.00
5	350–500	1,900	.14	10 x 10	30 x 45	4 " 7 "	1 11/16 "	549	140.00
6	500–700	2,700	.22	12 x 12	38 x 48	4 " 7 "	1 13/16 "	665	170.00
8	900–1,300	4,800	.34	18 x 12	45 x 56	5 " 5 "	2 "	1,175	265.00
10	1,600–2,200	7,500	.64	20 x 12	52 x 68	5 " 5 "	2 "	1,800	330 00
12	2,000–3,000	10,500	.88	24 x 14	64 x 72	6 "	2 3/16 "	2,480	420.00
15	3,000–5,000	16,500	1.20	30 x 16	77 x 102	6 " 6 "	3 1/4 "	4,570	600.00
18	5,000–7,000	22,000	1.80	36 x 18	98 x 126	7 "	3 3/4 "	6,800	950.00
22	7,000–10,000	35,000	1.90	48 x 18	122 x 156	7 " 6 "	5 "	9,800	

The number of pump is also diameter of discharge opening in inches. The life of pump can be prolonged by supporting the shaft by a collar placed on same, and allowed to run on a bearing. This will keep the weight of shaft off the pump step.

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ROTARY PUMPS FOR MACHINISTS' TOOLS.

This pump is used for drawing and forcing oil, soda water, or other lubricants. from a small tank to which it can be attached for supplying a continuous stream to the cutters, drills or other small tools used in any machine, and it is particularly advantageous where a good and continuous feed of oil or soda water is desired. The lubricant can be used over and over by allowing it to run back into the tank from which the pump draws after it has run off the tools. **PRICE, $15.00.**

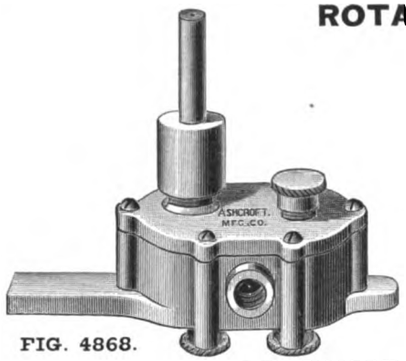


FIG. 4868.

ROTARY FORCE PUMP.



PRICES, FIG. 4869.

No.	Suc.	Dis.	Pulley.	Gal. per min. 100 revs.	Iron.	Bronze.
1	1¼ in.	1 in.	18 x 4 in.	13	$25.00	$47.00
2	1¼ "	1 "	18 x 4 "	14	28.00	52.00
3	1½ "	1¼ "	18 x 4 "	17	32.00	57.00
4	1½ "	1½ "	36 x 4 "	27	45.00	75.00
5	2 "	2 "	36 x 4 "	36	50.00	85.00
6	2 "	2 "	36 x 4 "	45	60.00	110.00

Always fitted for wrought iron screwed suction.

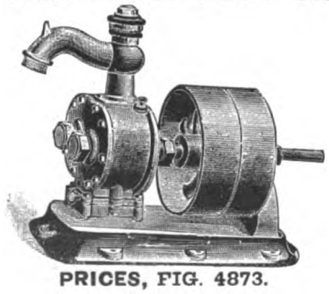
HAND OR POWER PUMP.



PRICES, FIG. 4871.

No.	Suc.	Dis.	Diam. balance wheel.	Gals. per min. 100 revs.	Iron.	Bronze.
1	1¼ in.	1 in.	14½ in.	13	$19.00	$41.00
2	1¼ "	1 "	14½ "	14	22.00	46.00
3	1¼ "	1¼ "	14½ "	17	26.00	51.00

ROTARY FORCE PUMP ON FRAME.



PRICES, FIG. 4873.

No.	Suc.	Dis.	Pulleys, each.	Gals. per min 100 revs.	Iron.	Bronze.
1	1¼ in.	1 in	8 x 2½ in	13	$27.00	$49.00
2	1¼ "	1 "	8 x 2½ "	14	32.00	56.00
3	1½ "	1¼ "	8 x 2⅝ "	17	38.00	63.00
4	1½ "	1½ "	12 x 3⅛ "	27	48.00	78.00
5	2 "	2 "	12 x 3½ "	36	54.00	90.00

VERTICAL WRECKING PUMPS.

These vertical pumps are single acting, but the flow of water from the pumps is practically constant, as the peculiar design and operation of pumps gives this effect. These pumps will handle large quantities of water. They will not grind out and lose their suction power, causing excessive slippage, but will fully discharge their correct theoretical capacity of water at any speed.

A full and comparatively long stroke, with an even, smooth motion on the up as well as on the down stroke, are special features of this pump. The steam cylinder is positive and does not require any lever or other hand gear to work it "off the center." There are no belts to slip, or complicated mechanism to get out of order.

These pumps are simply "lift" pumps, and are not designed to elevate water above their discharge nozzles, but they will draw water any distance within the limit of "suction" power.

The water cylinder is lined with brass; the valve seats, etc., are also of brass. The piston rods are brass covered, so that these pumps are adapted for salt as well as for fresh water. Valves of best vulcanized rubber are used, with the largest area possible to pass obstructions.

PRICES, FIG. 4870.

Steam cylinder, ins.	Water cylinder, ins.	Stroke, ins.	Capacity per minute at ordinary speed.	Steam pipe, ins.	Exhaust pipe, ins.	Suction pipe, ins.	Prices.
6	12	10	350 to 400 gals.	¾	1	6	$.....
10	20	12	1,000 " 1,200 "	1¼	1½	10	.....
14	25	12	1,400 " 1,600 "	2	2½	12	.....
16	27	12	1,600 " 1,800 "	2½	3	12	.....
18	30	10	1,800 " 2,000 "	2½	3	14	.....
18	30	16	2,000 " 2,300 "	2½	3	14	.....
18	33	16	3,200 " 3,600 "	2½	3	16	.....

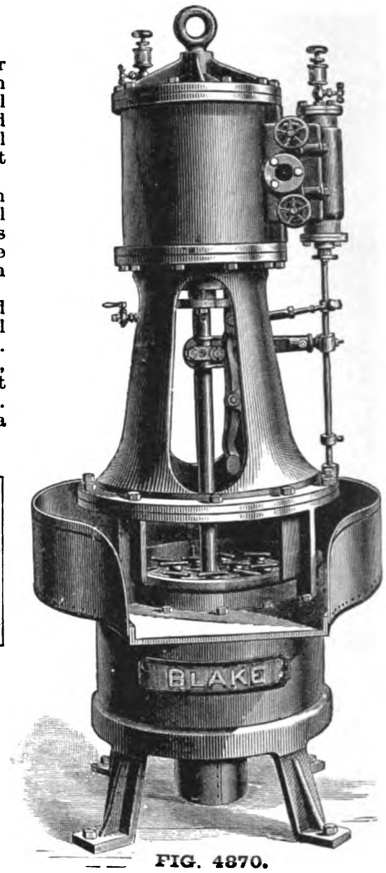
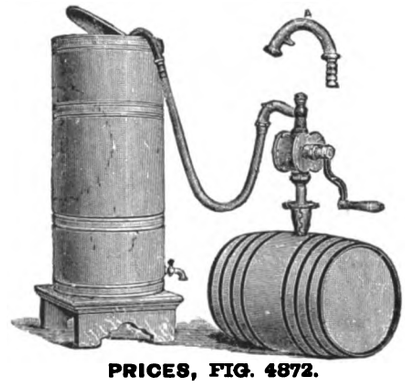


FIG. 4870.

ROTARY BARREL PUMP.



PRICES, FIG. 4872.

No.	Suc.	Dis. for hose.	Gal. per min. 150 rev.	Iron.	Bronze.
1	1 in.	1 in.	13	$17.00	$39.00
2	1 "	1 "	14	20.00	44.00
3	1¼ "	1¼ "	17	24.00	49.00

ROTARY FORCE PUMP.



FIG. 4874.

DESCRIPTION, FIG. 4875.

Set the regulator at the fourth hole from right-hand side, attach hose to the inlet, then put the body of the filler into the bung hole of the barrel; turn the handle or spindle until the pointer catches the hook; oil will now run into and fill the barrel, the filler closing automatically.

If it fills too full, put the regulator into the fifth hole from the right-hand side and keep changing it until you get to the tenth hole; then, if it fills too full, loosen the screw that holds the spring in the handle, then pull the end of the spring to the left, through the handle a quarter of an inch, tighten the screw and proceed filling another barrel. If this fills the barrel too full, pull the string through the handle a little more and continue this until it is adjusted to the pressure of the tank. Should the barrel not fill full enough, then reverse the adjustment of the spring by pushing it back through the handle. The filler must be handled with care.

PRICE, $20.00.

AUTOMATIC BARREL FILLER.



FIG. 4875.

The shaft is long enough to use 2 wheels or 4 men.

PRICES, FIG. 4874.

No.	Suc.	Dis.	Diam. balance wheel.	Gal. per min. 100 revs.	Iron.	Bronze.
1	1¼ in.	1 in.	20 in.	13	$20.00	$42.00
2	1¼ "	1 "	20 "	14	23.00	47.00
3	1½ "	1¼ "	20 "	17	27.00	52.00
4	1½ "	1½ "	20 "	27	35.00	65.00
4A	1½ "	1½ "	36 "	27	39.00	69.00
5	2 "	2 "	20 "	36	40.00	75.00
5A	2 "	2 "	36 "	36	44.00	79.00
6	2 "	2 "	36 "	45	50.00	100.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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HAND PUMPS.

REVOLVING TOP CISTERN.



FIG. 4876.

Has side brackets for bolting to wall. Fitted for lead or wrought iron pipe.

No.	Dia. cyl.	Suc.	Iron. Prices.	Brass cyl. Prices.	Brass. Prices.
0	2 in.	1 in.	$3.50	$5.50	$7.75
1	2¼ "	1 "	4.00	6.00	8.75
2	2½ "	1¼ "	4.50	7.00	10.50
3	2¾ "	1¼ "	5.00	8.00	14.00
4	3 "	1¼ "	5.50	10.00	17.00
5	3¼ "	1½ "	6.50	13.00	21.00
6	3½ "	1½ "	8.00	18.00	27.00

REVOLVING TOP CISTERN.



FIG. 4877.

With bolt base, fitted for lead or wrought iron pipe.

No.	Dia. cyl.	Suc.	Iron. Prices.	Brass cyl. Prices.	Brass. Prices.
0	2 in.	1 in.	$3.50	$5.50	$7.75
1	2¼ "	1 "	4.00	6.00	8.75
2	2½ "	1¼ "	4.50	7.00	10.50
3	2¾ "	1¼ "	5.00	8.00	14.00
4	3 "	1¼ "	5.50	10.00	17.00
5	3¼ "	1½ "	6.50	13.00	21.00
6	3½ "	1½ "	8.00	18.00	27.00
8	4 "	2 "	10.00	25.00	35.00

OPEN TOP PITCHER PUMP.

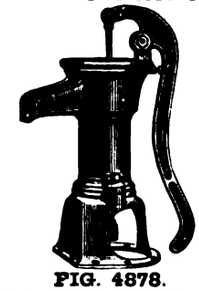


FIG. 4878.

With revolving brake, bolt fastened, fitted for wrought iron or lead pipes.

No.	Dia. cyl.	Suc.	Gal. per stroke.	Prices.
1	2½ in.	1 in.	1-12	$4.25
2	3 "	1¼ "	1-8	4.75
3	3½ "	1¼ "	1-6	5.25
4	4 "	1½ "	1-5	5.75
5	4½ "	1½ "	3-10	6.25

All these brass pumps have all parts brass, except the lever, bearer and base.

ANTI-FREEZING WELL PUMPS, WROUGHT IRON CONNECTING PIPES AND SAND VALVES.



FIG. 4879.

No.	Dia. cyl.	Suc.	Stroke.	Capacity per stroke.	Prices.
2	2½ in.	1¼ in.	6 in.	1-8 gal.	$8.00
3	2¾ "	1¼ "	6 "	1-7 "	8.25
4	3 "	1½ "	6 "	1-6 "	8.50
5	3¼ "	1¼ "	6 "	1-5 "	8.75

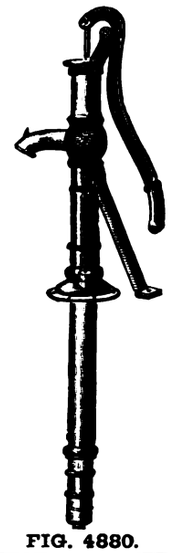


FIG. 4880.

No.	Dia. cyl.	Suc.	Stroke.	Capacity per stroke.	Prices.
2	2¼ in.	1 in.	6 in.	1-10 gal.	$7.00
3	2½ "	1¼ "	6 "	1-8 "	7.50
4	2¾ "	1½ "	6 "	1-7 "	8.00
5	3 "	1¼ "	6 "	1-6 "	8.50

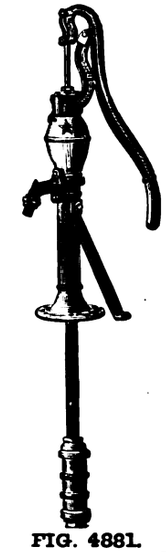


FIG. 4881.

No.	Dia. cyl.	Suc.	Stroke.	Capacity per stroke.	Prices.
3	2¾ in.	1¼ in.	6 in.	1-7 gal.	$13.00
4	3 "	1¼ "	6 "	1-6 "	13.00
5	3¼ "	1¼ "	6 "	1-5 "	13.50
6	3½ "	1½ "	6 "	1-4 "	14.50

SUCTION AND FORCE PUMPS, WITH COCKS AND AIR CHAMBERS.

ON PLANK, DOUBLE DISCHARGE AND BRASS PISTON ROD.



FIG. 4882.

BOLTED BASE, DOUBLE DISCHARGE.



FIG. 4883.

PRICES, FIG. 4882.

No.	Dia. cyl.	Suc. and dis.	Gal. per stroke.	Prices.		
				Iron.	Brass cyl.	Brass.
2	2½ in.	1¼ in.	1-8	$12.50	$18.00	$23.50
4	3 "	1¼ "	1-6	14.50	19.50	35.00
6	3½ "	1½ "	1-3	21.50	29.50	42.50
8	4 "	2 "	2-5	22.50	35.50	52.50

The 2½ and 3 in. pumps work 6 in. stroke, and the 3½ and 4 in., 7½ in.

PRICES, FIG. 4883.

No.	Dia. cyl.	Suc. and dis.	Gal. per stroke.	Prices.		
				Iron.	Brass cyl.	Brass.
2	2½ in.	1¼ in.	1-8	$12.50	$18.00	$23.50
4	3 "	1¼ "	1-6	14.50	19.50	35.00
6	3½ "	1½ "	1-3	21.50	29.50	43.50
8	4 "	2 "	2-5	22.50	35.50	52.50

The 2½ and 3 in. pumps work 6 in. stroke, and 3½ and 4 in., 7½ in.

PRICES, FIG. 4884.

No.	Dia. cyl.	Suc. and dis.	Gal. per stroke.	Iron. Prices.	Brass cyl. Prices.	Brass. Prices.
0	2 in.	1 in.	1-10	$18.00	$27.00	$35.00
2	2½ "	1¼ "	1-7	19.00	28.00	37.00
3	2¾ "	1¼ "	1-6	20.00	29.00	40.00
4	3 "	1¼ "	1-5	22.00	30.00	42.00
5	3¼ "	1½ "	1-4	26.00	33.00	49.00
6	3½ "	1½ "	3-10	28.50	37.50	56.00

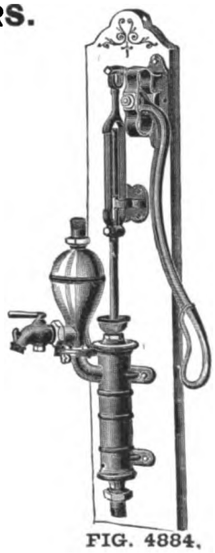


FIG. 4884.

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POWER AND HAND SUCTION AND FORCE PUMPS.

DOUBLE ACTING.



FIG. 4885.

Figs. 4885 and 4886 have the cylinders lined with brass; the pistons, piston rods, valves and valve seats are bronze.

We fit them for hose connections, though we furnish connections for either lead or iron pipe, if ordered. Only one set of connections goes with a pump at list price. Stroke, 5 inches for all sizes.

For spring pistons, brass, add to lists Nos. 2 and 4, $3.00; No. 8, $4.00; No. 12, $6.00; No. 16, $8.00.

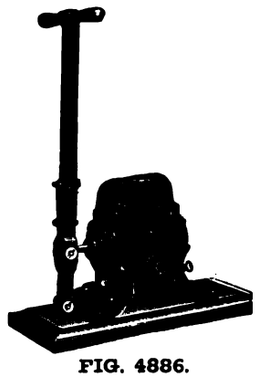


FIG. 4886.

Fig. 4887 has leather valves grouped together under the air chamber. Suction and discharge pipe fitted for iron pipe connections, at an extra cost can be fitted for lead or hose connections.



FIG. 4887.

PRICES.

No.	Dia. cyl.	Suc.	Dis.	Gals. per rev.	Iron.	Brass.
2	2½ in.	1¼ in.	1 in.	1/6	$35.00	$85.00
4	3 "	1¼ "	1 "	3/10	40.00	90.00
8	4 "	1½ "	1¼ "	1/2	45.00	105.00
12	5 "	2 "	1½ "	7/8	55.00	125.00
16	6 "	2½ "	2 "	1¼	60.00	175.00

PRICES.

No.	Dia. cyl.	Suc.	Dis.	Gal. per rev.	Iron.	Brass.
2	2½ in.	1¼ in.	1 in.	1/6	$27.00	$75.00
4	3 "	1¼ "	1 "	3/10	27.00	75.00
8	4 "	1½ "	1¼ "	1/2	28.00	90.00
12	5 "	2 "	1½ "	7/8	42.00	110.00

PRICES.

No.	Dia. cyl.	Double suc.	Double dis.	Gal. per rev.	Prices, iron.	Prices, brass.
2	2½ in.	1¼ in.	1 in.	1/6	$16.00	$60 00
4	3 "	1¼ "	1 "	3/10	18.00	65.00
6	3½ "	1½ "	1¼ "	3/8	24.00	80.00
8	4 "	1½ "	1¼ "	1/2	31.00	90.00

DELUGE PUMPS.

SIDE INLET.

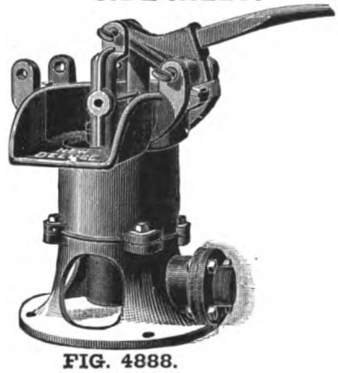


FIG. 4888.

BOTTOM INLET.

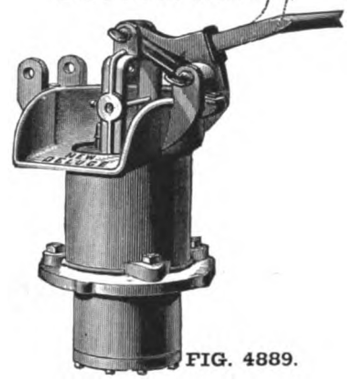


FIG. 4889.

THESE PUMPS WILL LIFT WATER 15 TO 20 FEET.

The cylinder is lined with brass, the valves rubber faced.

PRICES, FIG. 4888.

Dia. cyl.	Suc.	Stroke.	Gal. per stroke.	Prices.
6 in.	2½ in.	4 in.	1/2	$26.00
8½ "	3 "	6 "	1½	31.00

PRICES, FIG. 4889.

Dia. cyl.	Suc.	Stroke.	Gal. per stroke.	Prices.
6 in.	2½ in.	4 in.	1/2	$25.00
8½ "	3 "	6 "	1½	30.00

CHALLENGE PUMPS.



FIG. 4890.

PRICES.

No.	Dia. cyl.	Suc.	Dis.	Prices. Iron.	Prices. Brass.
12	5 in.	2 in.	1½ in.	$45.00	$125 00
16	6 "	2½ "	2 "	50.00	175.00

SUCTION AND BILGE PUMPS.

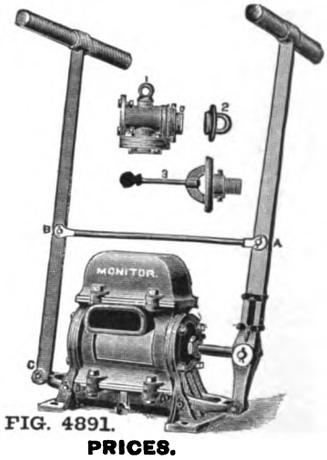


FIG. 4891.

PRICES.

No.	Dia. cyl.	Suc.	Dis.	Stroke.	Gal. per rev.	Price.
16	6 in.	2½ in.	2 in.	5 in.	1¼	$50.00

For spring piston, brass, add to list, No. 12, $6.00; No. 16, $8.00.

BOTTOM INLET DIAPHRAGM PUMPS.

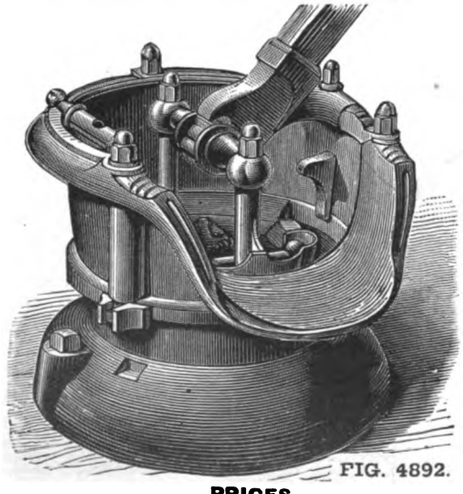


FIG. 4892.

PRICES.

No. 2. Pump fitted for 2½ in. wrought iron pipe, $18.00
No. 3. Pump fitted for 3 in. wrought iron pipe, 23.00

DESCRIPTION, FIG. 4892.

This pump is designed for vessels, clay-pits, sewers, and all places where a low-priced, large, easy-working, durable pump is required. It has simple valves and no cylinder. The operating diaphragm, which is of the best rubber, when moved by the brake, creates a vacuum, lifts and displaces the water at every stroke.

The cylindrical holding clamps, with their conical sustaining bars, prevent the diaphragm from sagging or breaking. This pump works as well in pumping dirty water, or water containing sand, coal dust, molasses, etc. It will deliver about 80 gallons per minute.

SIDE INLET DIAPHRAGM PUMP.

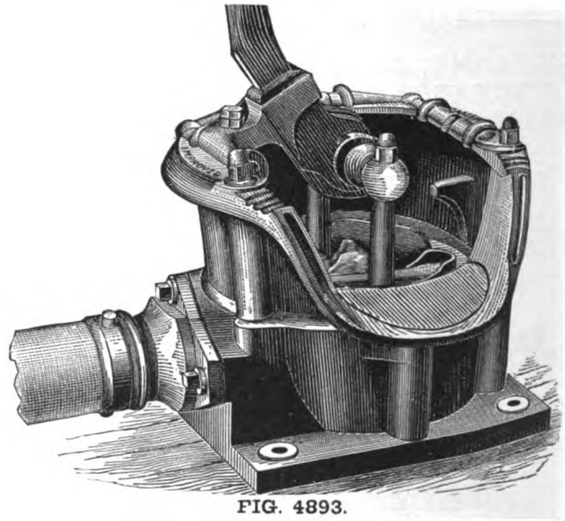


FIG. 4893.

PRICE, fitted for 3 inch suction hose $26.00

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FRICTIONLESS NON-CHOKABLE PUMPS.

BOTTOM INLET.

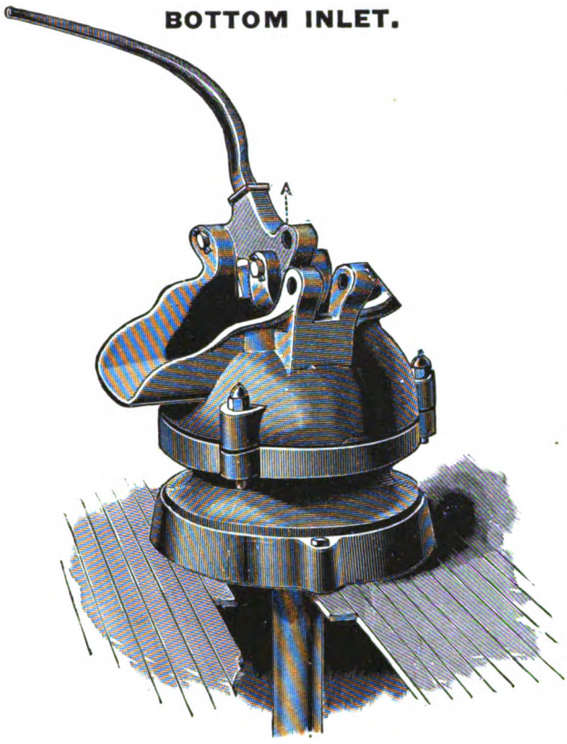


FIG. 4894.

Capacity, 3,500 to 4,000 gallons per hour. Will pump gravel, sewage matter, fine coal, etc., without perceptible wear. Fitted for wrought iron pipe connections.

PRICES, FIG. 4895.

No. 1 pump—Capacity, ¾ gallon per stroke or 1,500 gallons per hour for 2½ inch iron pipe or suction hose $20.00

No. 2 pump—Capacity, 1½ gallons per stroke or 3,500 gallons per hour for 3 inch iron pipe or suction hose $26.00

Brass nipple, couplings and globe basket strainer $9.00

3 inch suction hose, on iron rings, made expressly for this pump, at $1.50 per foot.

SIDE INLET.

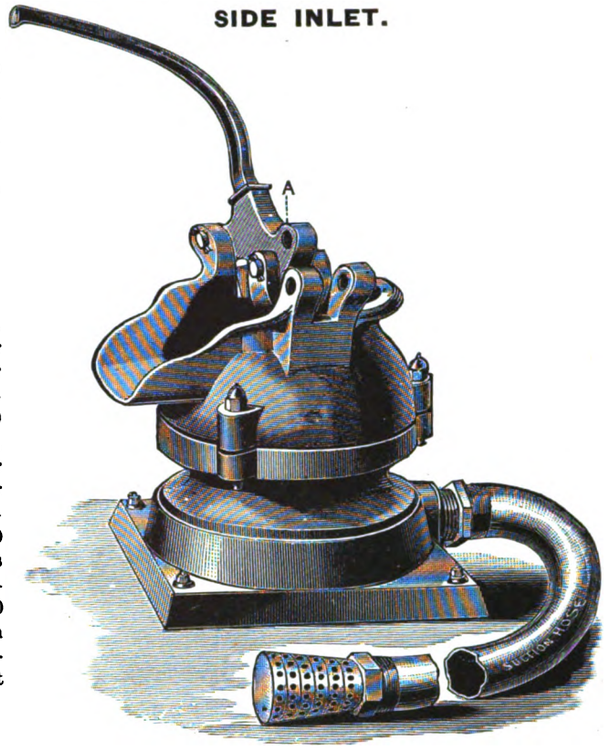


FIG. 4895.

PRICES.

No. 1 pump—Capacity, 1,500 gallons per hour.....$18.00
No. 2 pump—Capacity, 3,500 gallons per hour..... 24.00

TRIPLEX ELECTRIC PUMPS.

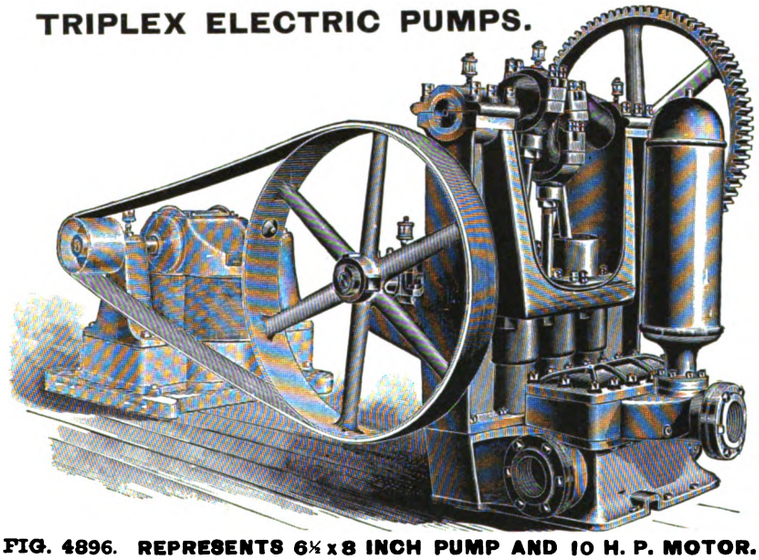


FIG. 4896. REPRESENTS 6½ x 8 INCH PUMP AND 10 H. P. MOTOR.

It has raw-hide pinion and pulley for belt. It can be brought within surprisingly small limits and is practically noiseless in operation. It readily commends itself for house or office building service where any noise is objectionable. Pump will be arranged for any speed requirements.

PRICES, WITHOUT DYNAMO OR BELT.

Diameter cylinder.	Stroke.	Suction.	Discharge.	Geared.	Revolutions per minute.	Gallons per revolution.	Prices.
1¼ in.	2 in.	¾ in.	¾ in.	5 to 1	50 to 60	1-35	$50.00
1¾ "	2½ "	1¼ "	1¼ "	5 to 1	50 to 60	1-14	75.00
2 "	3 "	1¼ "	1¼ "	5 to 1	40 to 50	1-8	115.00
2½ "	4 "	1½ "	1½ "	5 to 1	40 to 50	1-4	140.00
3 "	4 "	1½ "	1½ "	5 to 1	35 to 45	1-3	160.00
4 "	4 "	2 "	2 "	5 to 1	35 to 45	5-8	225.00
4 "	6 "	2 "	2 "	5 to 1	30 to 40	4-5	250.00
5 "	6 "	3 "	3 "	5 to 1	30 to 40	1 1-2	320.00
5 "	8 "	3 "	3 "	5 to 1	30 to 40	2	365.00
6½ "	8 "	4 "	4 "	5 to 1	30 to 40	3 1-4	550.00
8 "	8 "	5 "	4 "	5 to 1	30 to 40	5	700.00
8 "	10 "	6 "	5 "	5 to 1	30 to 40	6 1-2	
8 "	12 "	6 "	5 "	5 to 1	30 to 40	7 4-5	

GALVANIZED HAND SUCTION PUMPS.

SOLDERED JOINTS.



FIG. 4897.

SCREW JOINTS.



FIG. 4898.

PRICES.

Inside diameter.	Price per lineal foot. Soldered joint. Fig. 4897.	Prices, Fig. 4898. Add to prices, Fig. 4897.
1½ inches.	$0.55	
2 "	.60	$2.80
2½ "	.65	3.35
3 "	.70	4.50
3½ "	.75	5.00
4 "	.80	6.00
4½ "	.90	7.00
5 "	1.20	8.00

Pumps shorter than 5 foot long charged as 5 foot long.

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METROPOLITAN LOCOMOTIVE DOUBLE-TUBE INJECTOR.

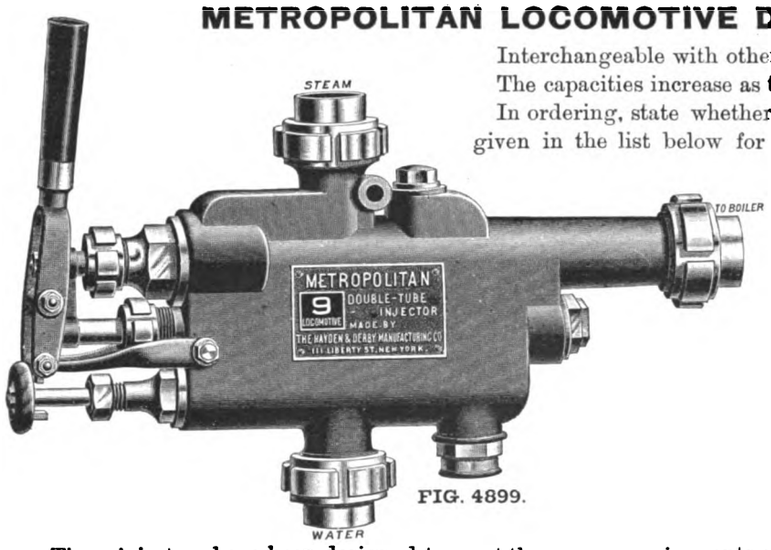


FIG. 4899.

Interchangeable with other standard makes.

The capacities increase as the steam pressure increases.

In ordering, state whether the pipe connections are for iron or copper pipe. The sizes given in the list below for copper pipe are the outside diameters of same. The tail pipes of the couplings are bored to fit the above figures, unless advised to the contrary, when they will be left blank.

PRICES, FIG. 4899.

Size.	Prices.	Size of pipe connections.						Gallons per hour, at 125 lbs. steam.
		Steam.		Suction.		Delivery.		
		Iron.	Copper.	Iron.	Copper.	Iron.	Copper.	
4	$60.00	1	1¼	1	1¼	1	1¼	550
5	75.00	1¼	1½	1¼	1½	1¼	1½	950
6	90.00	1¼	1½	1¼	1½	1¼	1½	1,250
7	110.00	1½	1¾	1½	1¾	1½	1¾	1,800
8	125.00	1½	1¾	2	2¼	2	2	2,300
9	140.00	1½	1¾	2	2¼	2	2	2,900
10	160.00	2	2¼	2	2¼	2	2¼	3,400

These injectors have been designed to meet the severe requirements of modern locomotive service. They work at all steam pressures from 25 lbs. to 250 lbs. without any adjustment of the water or steam supply. They are provided with an independent lifting apparatus, which constantly supplies the forcing apparatus and enables the injector to perform its work steadily, whether the engine is running at a high speed or standing still.

Under no circumstances can the water run out of the overflow, and the engineer is not required to run his head out of the cab window to determine whether the water is going out of the overflow or into the boiler.

The capacity is not regulated by cutting off the water supply, as in other injectors, but by reducing the quantity of steam in the lifting apparatus. By reducing the steam to the lifting apparatus, a less quantity of water is raised, and consequently a smaller quantity must be forced. This method of regulating the capacity enables the injector to run as steadily with a minimum capacity as when discharging its maximum capacity, and also enables the capacity to be reduced over 60 per cent., i. e., the minimum capacity is 40 per cent. of the maximum capacity.

The construction is very simple. There are no complicated levers or movable parts to wear, break or interfere with the numerous pipe connections and fittings found in every locomotive cab. The valve stems are guided by packing, and there is no chance for wear or lost motion. The tubes are removed from the front end of the injector, so that they can be taken out for cleaning without taking off the injector. Owing to the independent lifting apparatus these injectors will always lift the water, no matter how hot the suction pipe and injector becomes, when used as a heater to heat the water in the tender.

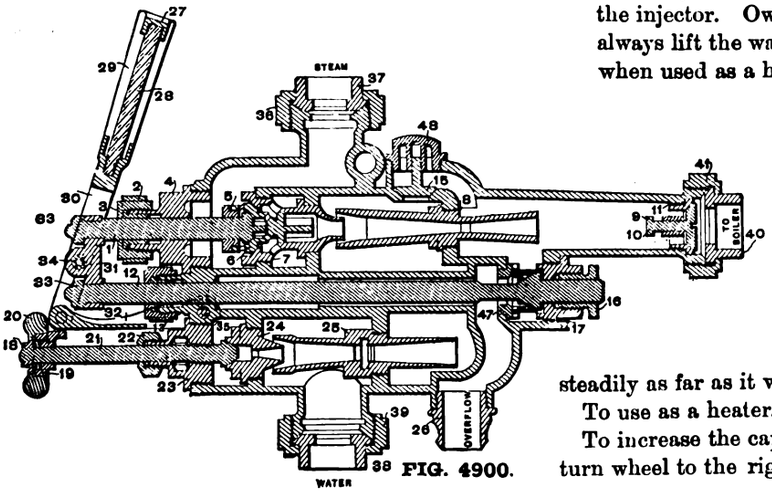


FIG. 4900.

To connect and operate. Place the injector above the level of the water in the tender, within reach of the engineer. Take steam from the dome, or highest parts of the boiler, through a dry pipe.

Should the injector be placed entirely outside of the cab, extension handles must be used, which we furnish when so ordered.

To start the injector. Pull the lever out slightly until the resistance of the main steam valve is felt. This lifts the water. As soon as the water is lifted, pull the lever back steadily as far as it will go. The injector will then be feeding.

To use as a heater. Pull the lever back out by one steady motion.

To increase the capacity, turn the wheel to the left. To decrease the capacity, turn wheel to the right.

PARTS FOR REPAIRS.

In ordering parts for repairs, be very careful to state the quantity of each part required. Refer to Fig. 4900 and call the parts by the name given in the list below. Always specify the size and serial number of the injector you wish the parts for.

1. Steam valve stem.
2. Packing nut for No. 1.
3. Gland for No. 1.
4. Steam center piece.
5. Steam swivel ring.
6. Steam valve.
7. Forcing steam tube.
8. Forcing combining tube.
9. Line check ring.
10. Line check valve.
11. Seat for line check.
12. Overflow valve stem.
13. Packing nut for No. 12.
14. Gland for No. 12.
15. Overflow valve.
16. Overflow packing gland.
17. Overflow center piece.
18. Regulating valve handle nut.
19. Regulating valve wheel disc.
20. Regulating valve wheel.
21. Regulating valve stem.
22. Packing nut for No. 21.
23. Regulating valve center piece.
24. Lifting steam tube.
25. Lifting combining tube.
26. Overflow nozzle.
27. Lever nut.
28. Lever rod.
29. Lever handle.
30. Lever.
31. Connecting link.
32. Fulcrum.
33. Nut for steam and overflow stems.
34. Lever bolts.
35. Fulcrum bolt.
36. Union nut steam end.
37. Tail pipe steam end.
38. Tail pipe suction end.
39. Union nut suction end.
40. Tail pipe delivery end.
41. Union nut delivery end.
42. Nut for bolt No. 34.
43. Nut for bolt No. 35.
44. Overflow funnel.
47. Overflow valve seat.
48. Overflow cap.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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METROPOLITAN LOCOMOTIVE AUTOMATIC INJECTORS.

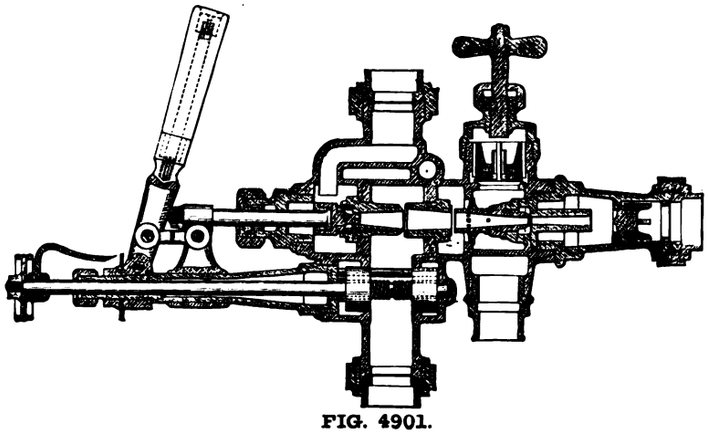


FIG. 4901.

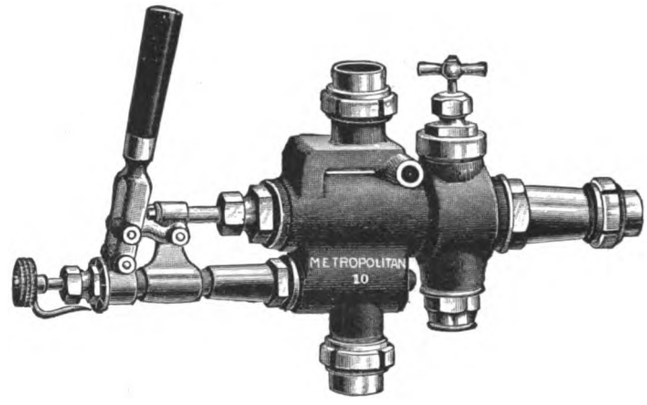


FIG. 4902.

PRICES.

Size.	Prices.	Size of pipe connections.						Gallons per hour at 125 pounds steam.
		Steam.		Suction.		Delivery.		
		Iron.	Copper.	Iron.	Copper.	Iron.	Copper.	
5	$75.00	1¼	1½	1¼	1½	1¼	1½	950
6	90.00	1¼	1½	1¼	1½	1¼	1½	1,200
7	110.00	1½	1¾	1½	1¾	1½	1¾	1,750
8	125.00	1½	1¾	2	2¼	2	2¼	2,200
9	140.00	1½	1¾	2	2¼	2	2¼	2,800
10	160.00	2	2¼	2	2¼	2	2¼	3,400

In ordering state whether the pipe connections are for iron or copper pipe. The sizes given in the above list for copper pipe are the outside diameters of same. The tail pipes of the couplings are bored to fit the above figures, unless advised to the contrary, when they will be left blank.

The pipe connections and threads of these injectors are interchangeable with the other makes of locomotive injectors.

These machines are designed to cover the hardest service on locomotives.

They work steadily whether the engine is running fast or slow, stopping or reversing, and should the feed be interrupted, they restart at once without any attention from the engineer.

They require no regulation under the variations of working steam pressure, performing their work steadily, and retain their automatic features whether the water valve is wide open or nearly closed. The minimum capacity is about 50 per cent. of the maximum capacity.

These machines are constructed so that there are no small passages to become filled with dirt, scale or lime, and by removing the coupling of the delivery pipe the tubes may be removed.

To connect.—The injector should be placed horizontally above the level of the water in the tender, within reach of the engineer. Take steam from the dome or highest part of the boiler through dry pipe. When it is desired to have a tight overflow, unscrew the nozzle and an iron pipe can be screwed in its place. The inside of the overflow pipe must never be less than the inside of the nozzle. When it is necessary to attach the injector outside of the cab, extension fittings must be used, which we furnish with the injector when so ordered.

To operate.—To start, pull out the lever; to stop, push in the lever.

Note.—Below 80 pounds do not open the water valve full.

To use as a heater.—Close the overflow valve and pull out the lever.

Repairs.—In ordering parts for repairs be very careful to state the number and quantity of each part required, as shown in Fig. 4903, and the size and factory number of the injector.

PARTS FOR REPAIRS.

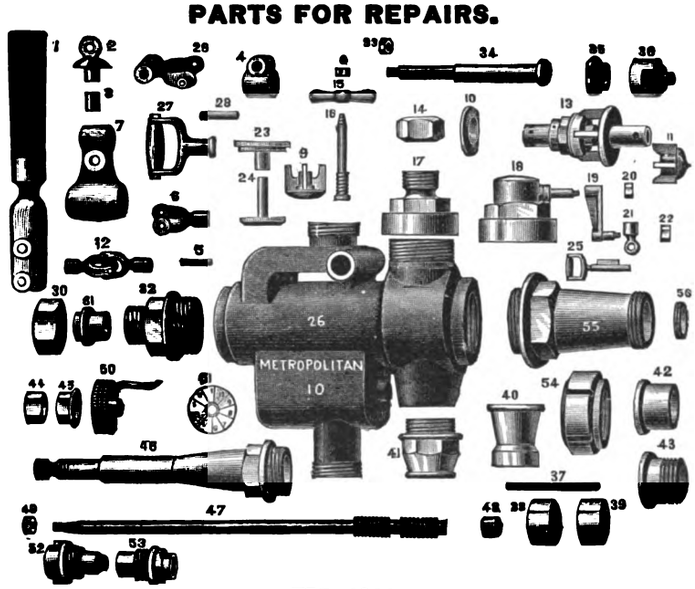


FIG. 4903.

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HANCOCK LOCOMOTIVE INSPIRATOR.

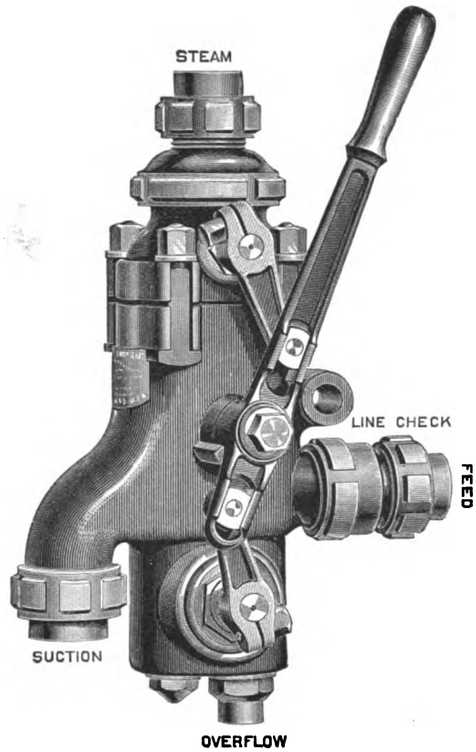


FIG. 4904.

PRICES, FIG. 4904.

¾ inch connections all round. Case 15.	No. 10,	Suitable for	$30.00
	No. 12½,	narrow gauge and	32.50
	No. 15,	elevated railroads.	35.00
Steam, ¾ inch. Suction and feed, 1 inch. Case 20.	No. 17½		40.00
	No. 20,	12 inch to 14 inch cylinder	50.00
Steam and feed, 1¼ inch. Suction 1½ inch. Case 30.	No. 22½,	13 inch to 14 inch cylinder	65.00
	No. 25,	14 " " "	70.00
	No. 27½,	15 " " "	75.00
	No. 30,	16 " " "	85.00
Steam 1¼ inch. Suction and feed, 1½ inch. Case 40.	No. 32½,	16 inch to 17 inch cylinder	90.00
	No. 35,	17 " to 18 " "	100.00
	No. 37½,	18 " " "	110.00
	No. 40,	18 " to 20 " "	120.00
Steam and feed, 1½ inch. Suction 2 inch. Case 50.	No. 42½		140.00
	No. 45		150.00
	No. 47½		155.00
	No. 50		160.00

When ordering an inspirator, give the size of cylinder and service.

We furnish steam or starting valves, check valves and our patent feed cock for all sizes over No. 20, for

Steam or starting valve	$10.00
Check valve	10.00

For all sizes below No. 20 and including No. 20, for

Steam or starting valve	$7.50
Check valve	7.50
Quarter turns	3.00
Return bends	3.00
Union joints	3.25
Patent feed cock, 1 inch	8.00
" " " 1½ "	12.00
" " " 2 "	15.00
" " " 2¼ "	18.00

HANCOCK IMPROVED STANDARD INSPIRATOR.

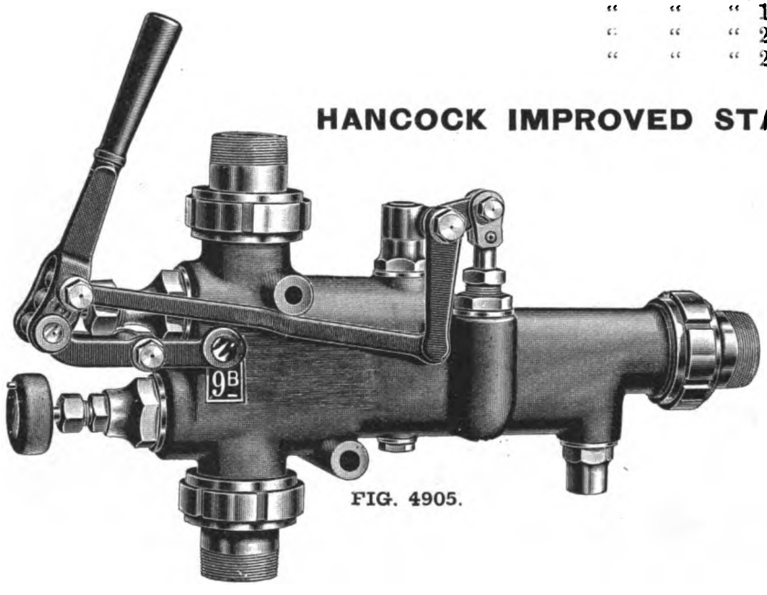


FIG. 4905.

PRICES, FIG. 4905.

Size No.	Price.	Gallons per hour 125 lbs.	Gallons per hour 170 lbs.	Size of connections, iron pipe. Steam.	Suction.	Feed.
5	$75 00	975	1,030	1¼	1¼	1¼
6	90.00	1,250	1,325	1½	1½	1½
7	110.00	1,775	1,890	1½	1½	1½
8	125.00	2,250	2,400	2	2	2
9	140.00	2,825	3,020	2	2	2
10	160.00	3,450	3,675	2	2	2

PRICES, ATTACHMENTS FOR FIG. 4905.

Size of couplings,	¾ inch.	1 inch.	1¼ inch.	1½ inch.	2 inch.
Main steam valve,	$8.00	$10.00	$12.00	$15.00	$18.00
Boiler checks,	6.00	8.00	10.00	12.00	15.00
" " flanged	8.00	10.00	12.00	15.00	20.00

LITTLE GIANT LIFTING LOCOMOTIVE INJECTOR.

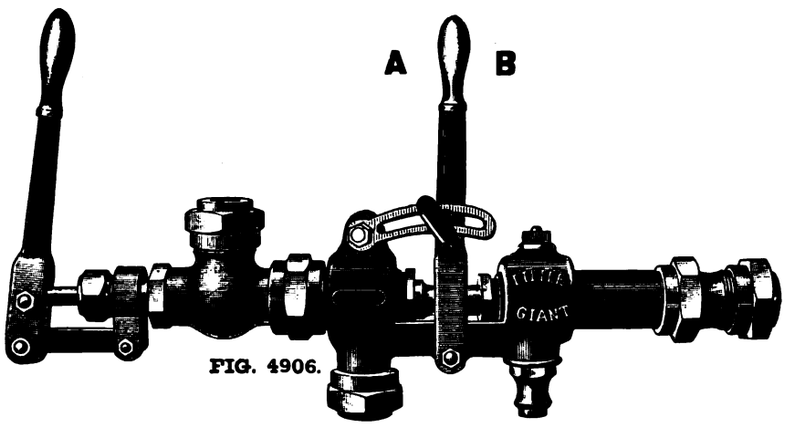


FIG. 4906.

SIZES, FIG. 4906.

Sizes.	Size copper pipe.	Size iron pipe.	Gallons per hour.
No. 4	⅞	¾	540
No. 5	1⅛	1	840
No. 6	1⅜	1¼	1,260
No. 7	1⅜	1¼	1,750
No. 8	1⅜	1½	2,200
No. 9	1¾	1½	2,750
No. 10	1¾	1½	3,400

PRICES, FIG. 4906.

Sizes.	Injector.	Steam valve.	Boiler check.
No. 4	$50.00	$7.50	$6.50
No. 5	65.00	9.25	8.00
No. 6	80.00	11.50	10.00
No. 7	95.00	11.50	10.00
No. 8	115.00	14.00	12.00
No. 9	130.00	14.00	12.00
No. 10	145.00	14.00	12.00

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KORTING LOCOMOTIVE INJECTOR.

PRICES, FIGS. 4907, 4908 AND 4009.

Size injector.	Prices.	Pipe connections.	Steam pressure, 120 lbs. Gallons per hour.	Combined water regulator and dirt strainer, Fig. 4909.	Dirt strainer, plain, Fig. 4908.
No. 00	$20.00	1/8 in.	55		$1.00
" 0	21.00	1/4 "	110		1.25
" 1	23.00	3/8 "	160		1.50
" 2	28.00	1/2 "	225	$8.00	2.00
" 3	38.00	3/4 "	375	10.00	2.50
" 3½	46.00	3/4 "	500	10.00	2.50
" 4	55.00	1 "	650	12.00	3.00
" 5	60.00	1¼ "	850	15.00	4.00
" 6	65.00	1¼ "	1,050	15.00	4.00
" 7	85.00	1½ "	1,500	18.00	5.00
" 8	100.00	1½ "	2,000	18.00	5.00
" 9	120.00	2 "	2,300	23.00	7.00
" 10	135.00	2 "	2,650	23.00	7.00
" 12	165.00	2½ "	3,950	30.00	10.00
" 14	250.00	2½ "	5,000	30.00	10.00
" 16	300.00	3 "	6,500	40.00	15.00

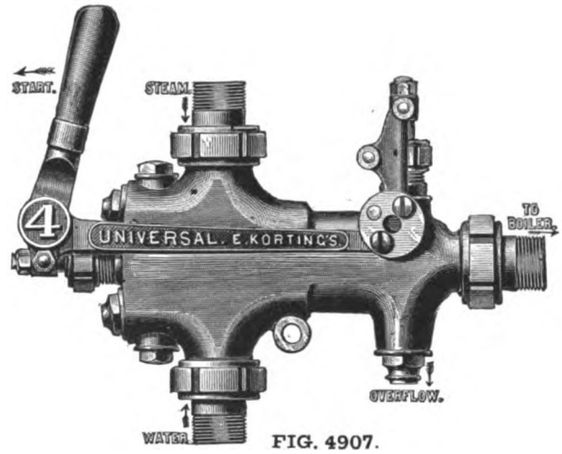
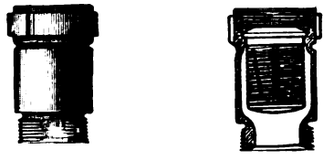
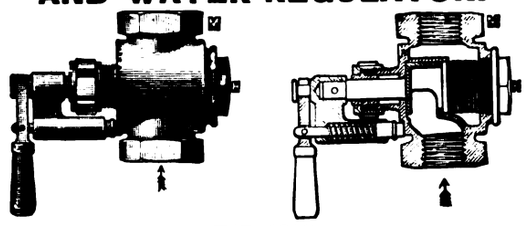


FIG. 4907.

PLAIN DIRT STRAINERS.


FIG. 4908.

COMBINED DIRT STRAINER AND WATER REGULATOR.


FIG. 4909.

ANGLE STEAM STOP VALVE.

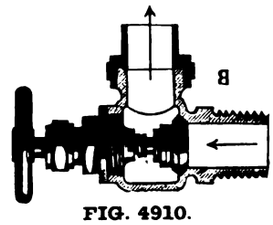


FIG. 4910.

ANGLE MAIN CHECK VALVE

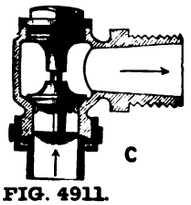


FIG. 4911.

DESCRIPTION, FIGS. 4910 AND 4911.

These valves have a taper shank, screwed with next size larger pipe thread, to give shank strength, and they are intended to screw direct into boiler shell, while the other end is fitted with coupling and pipe nipple.

These valves are principally used for locomotive service.

PRICES, WITH UNIONS.

Size.....	½	¾	1	1¼	1½	2	2½	3
Fig. 4910,	$3.00	$3.50	$5.00	$7.00	$10.00	$15.00	$20.00	$28.00
Fig. 4911,	2.50	3.00	4.00	6.00	9.00	13.00	17.00	24.00

MONITOR LOCOMOTIVE INJECTOR.

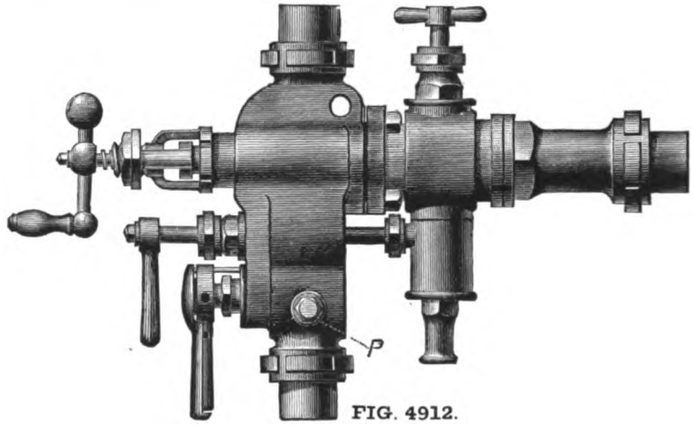


FIG. 4912.

Size of injectors No.....	4	5	6	7	8	9	10
Capacity in gallons per hour, at 140 lbs. pressure.....	550	950	1,250	1,800	2,300	2,900	3,400
Prices.....	$60.00	$75.00	$90.00	$110.00	$125.00	$140.00	$160.00

TABLE OF DIAMETERS OF CONNECTIONS.

No.	Iron pipe, inside diameter.			Copper pipe, outside diameter.		
	Steam.	Suction.	Delivery.	Steam.	Suction.	Delivery.
4	¾ in.	¾ in.	¾ in.	1 in.	1 in.	1 in.
5	1¼ "	1¼ "	1¼ "	1½ "	1½ "	1½ "
6	1¼ "	1¼ "	1¼ "	1½ "	1½ "	1½ "
7	1½ "	1½ "	1½ "	1¾ "	1¾ "	1¾ "
8	1½ "	2 "	2 "	1¾ "	2¼ "	2¼ "
9	1½ "	2 "	2 "	1¾ "	2¼ "	2¼ "
10	2 "	2 "	2 "	2¼ "	2¼ "	2¼ "

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METROPOLITAN AUTOMATIC INJECTOR.

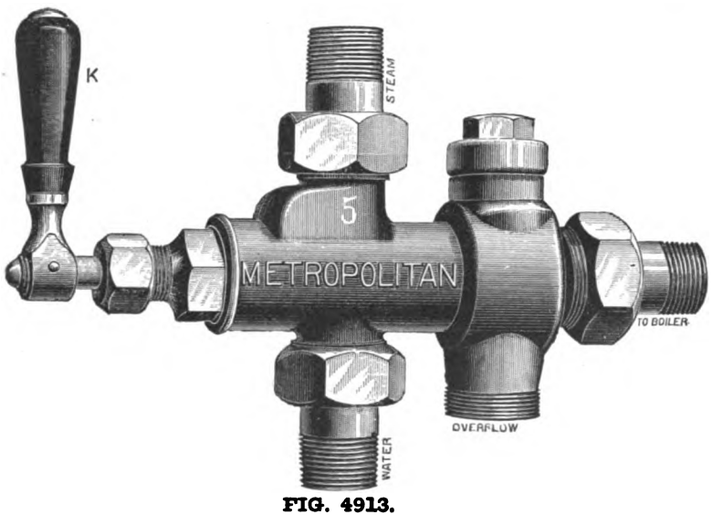


FIG. 4913.

PRICES, FIG. 4913.

Size.	Prices.	Size of pipe connection.	Gallons per hour, 65 lbs. pressure.	Horse power.
2	$15.50	3/8	60	4 to 6
3	16.00	3/8	80	6 to 8
3½	18.00	1/2	120	8 to 15
4	20.00	1/2	165	15 to 20
5	25.00	3/4	250	20 to 30
6	30.00	3/4	350	30 to 45
7	40.00	1	500	45 to 65
8	45.00	1	600	65 to 80
9	55.00	1¼	800	80 to 100
10	60.00	1¼	1,000	100 to 130
11	75.00	1½	1,300	130 to 170
12	90.00	1½	1,750	170 to 230
13	110.00	2	2,300	230 to 300
14	125.00	2	2,850	300 to 375

FOR STATIONARY, MARINE AND PORTABLE BOILERS. OPERATED ENTIRELY BY ONE HANDLE.

Note.—When ordering an injector, please state horse power of boiler or boilers, range of steam pressure, quantity of water required per hour, temperature of water, also distance from water supply to injector. When required, we furnish special injectors for high steam pressure.

These injectors are especially adapted for stationary, marine and portable boilers. They are very simple in construction and operated entirely by one handle. They are absolutely automatic, and should the water supply be interrupted from any cause they restart at once. This feature commends them for traction engines, hoisting engines and marine boilers—in fact, all places that are subject to a severe jar; also, where the water supply is taken from the city pressure, for should the feed be interrupted they cannot blow back and fill the pipes with steam or damage the meter, should one be used. They lift 15 feet, and will always start, no matter how hot the suction pipe and the injector become. They work equally as well, whether lifting or taking the water from an overhead tank or city pressure.

These injectors start at steam pressure of 25 pounds on a short lift or when water flows to them, and work up to steam pressure of 135, requiring no adjustment of the water supply for varying steam pressure. Owing to their simplicity any one can repair them, by regrinding the valves and replacing the jets, without sending the machine to the factory.

To connect and operate the Metropolitan automatic injector.—Always connect injector so that the boiler connection of machine is horizontal, having the steam connection on top and the suction connection underneath injector, placing a check valve in the delivery pipe between the injector and the boiler.

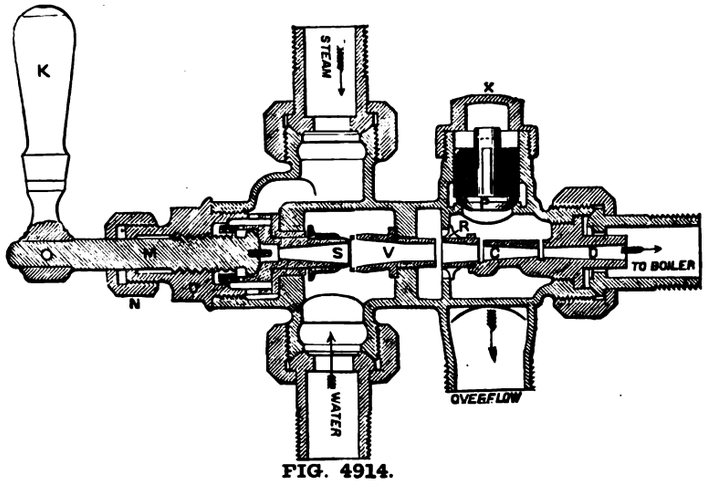


FIG. 4914.

PRICES OF PARTS, FIG. 4914.

SIZE OF INJECTOR.....	2-3	3½-4	5-6	7-8	9-10	11-12	13-14
S—Steam jet.....	$0.75	$1.00	$1.25	$1.50	$1.75	$2.00	$2.50
V—Suction jet.....	.50	.60	.70	.90	1.20	1.40	1.60
C-D-R—Combining and delivery tube and auxiliary check.....	2.00	2.50	3.00	3.50	4.00	5.00	7.00
P—Overflow valve.....	.50	.60	.70	.80	1.00	1.20	1.40
O—Steam plug.....	.80	.90	1.00	1.20	1.40	1.60	1.80
M—Steam valve and stem.....	.90	1.00	1.00	1.30	1.50	1.70	1.90
N—Packing nut.....	.30	.40	.50	.70	1.00	1.20	1.40
K—Steam valve handle.....	.60	.70	.80	1.00	1.20	1.40	1.60
Coupling nut and tail pipe.....	1.00	1.50	2.00	3.00	4.00	5.00	6.00

Note.—We always recommend a globe valve placed in the steam pipe, which can be closed in case it is desired to take off the injector. At all other times it should remain open. Also a globe valve placed in the suction pipe close to the injector to regulate the feed.

To start.—Open steam valve *K* one-half turn.

To stop.—Close steam valve *K*.

Note.—On very high steam, and on long lifts, open steam valve *K* full.

Parts for repairs for Metropolitan automatic injector.—Parts of the Metropolitan for repairs can be had at nominal prices. All orders for such parts must distinctly state the size of the injector; also the factory or serial number of the injector, care being taken to call the parts by the name given in the list, and not by a name of your own.

By removing the overflow cap *X*, the valve *P* may be ground to its seat by turning it back and forth with a screwdriver. Should the working parts become coated with lime, let them stand overnight in a solution of one part muriatic acid to ten parts water.

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METROPOLITAN DOUBLE-TUBE INJECTOR.

FOR STATIONARY AND MARINE BOILERS.

PRICES, FIG. 4915.

Size.	Prices.	Pipe connections.	Gallons per hour.	Horse power.	Drip funnel.
2½	$18 00	½	120	8-15	$1.00
4½	20.00	½	165	15-20	1.00
5½	25 00	¾	250	20-30	1.25
6½	30.00	¾	350	30-45	1.25
7½	40.00	1	500	45-65	1.50
8½	45.00	1	600	65 80	1.50
9½	55.00	1¼	800	80-100	2.00
10½	60.00	1¼	1,000	100-130	2.00
11½	75.00	1½	1,300	130-170	2 50
12½	90.00	1½	1,750	170-230	2.50
13½	110.00	2	2,300	230-300	3.00
14½	125.00	2	2,850	300-375	3.00
15½	150.00	2½	3,500	375-500	3.50

Note. When ordering an injector, please state horse power of boiler or boilers, range of steam pressure, quantity of water required per hour, temperature of water, also distance from water supply to injector. When required we furnish special injectors for high steam pressure.

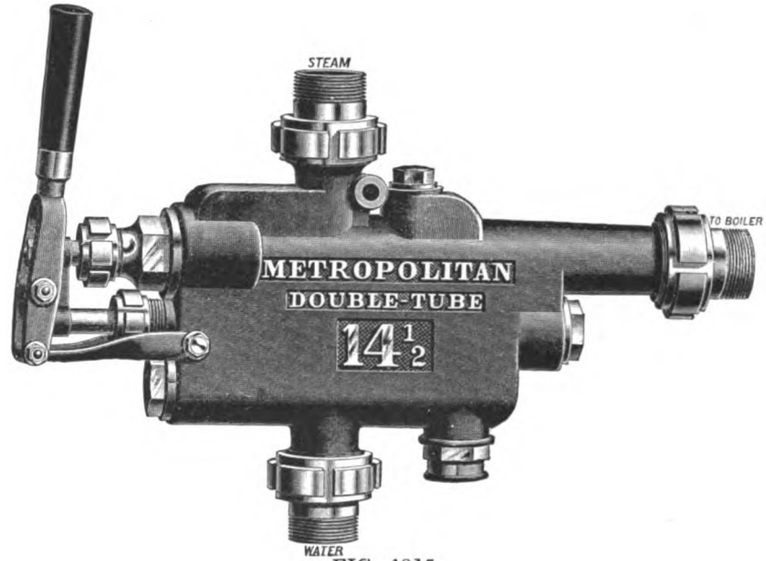


FIG. 4915.

These machines are provided with an independent lifting and forcing apparatus and have been designed to meet the demand for a complete machine that will work steadily under all conditions.

They require no adjustment of steam or water supply when working at lowest or highest steam pressure, lifting hot or cold water, lifting water a great height, or when supplied from an overhead tank or water pressure. These injectors can always be relied upon; owing to their independent lifting apparatus they will always promptly start, no matter how hot the injector and the suction pipe become.

Their construction is very simple. They are operated entirely by one lever. There are no outside connecting rods or complicated levers to operate the overflow valves. When seated the overflow valves are held to the seats by a pressure equal to that necessary to force against the boiler pressure. This simple arrangement of the overflow valves relieves all strain on the working parts and makes it absolutely impossible for any water to run out of the overflow when the injector is feeding.

By removing the cap No. 48 the valve No. 15 can be ground to its seat. The valve seat No. 47 and the steam valve seats can be removed and ground to the valves without disconnecting the injector. The tubes can all be removed from the front end of the injector for cleaning.

We recommend these injectors for all purposes where a high grade machine is required.

To connect and operate. Always connect the injector so that the boiler connection of the injector is horizontal, having the steam connection on top and the water connection underneath the injector. Place a check valve in the discharge pipe between the injector and the boiler; also a globe valve in the suction pipe to regulate the feed.

To start the injector pull the lever back slightly until the re sistance of the main steam valve is felt. This lifts the water. As soon as the water is lifted pull the lever back as far as it will go with one steady motion.

The injector will then be feeding.

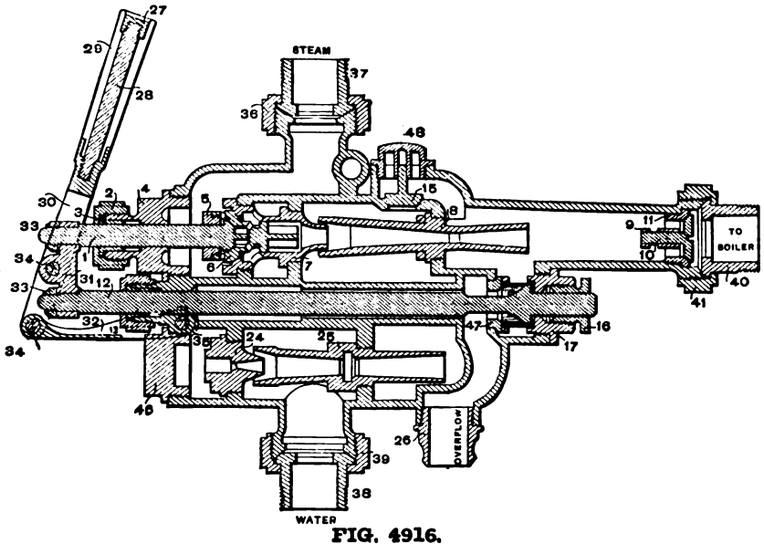


FIG. 4916.

PARTS FOR REPAIRS.

In ordering parts for repairs refer to Fig. 4916 and call the parts by the name given in the list below. Always specify the size and serial number of the injector you wish the parts for.

1. Steam valve stem.
2. Packing nut for No. 1.
3. Gland for No. 1.
4. Steam center piece.
5. Steam swivel ring.
6. Steam valve.
7. Forcing steam tube.
8. Forcing combining tube.
9. Line check ring.
10. Line check valve.
11. Seat for line check.
12. Overflow valve stem.
13. Packing nut for No. 12.
14. Gland for No. 12.
15. Overflow valve.
16. Overflow packing gland.
17. Overflow center piece.
24. Lifting steam tube.
25. Lifting combining tube.
26. Overflow nozzle.
27. Lever nut.
28. Lever rod.
29. Lever handle.
30. Lever.
31. Connecting link.
32. Fulcrum.
33. Nut for steam and overflow stems.
34. Lever bolts.
35. Fulcrum bolt.
36. Union nut, steam end.
37. Tail pipe, steam end.
38. Tail pipe, water end.
39. Union nut, water end.
40. Tail pipe, delivery end.
41. Union nut, delivery end.
42. Nut for bolt No. 34.
43. Nut for bolt No. 35.
44. Overflow funnel.
46. Lifting steam cap.
47. Overflow valve seat.
48. Overflow cap.

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INSPIRATORS AND INJECTORS.

HANCOCK INSPIRATORS.

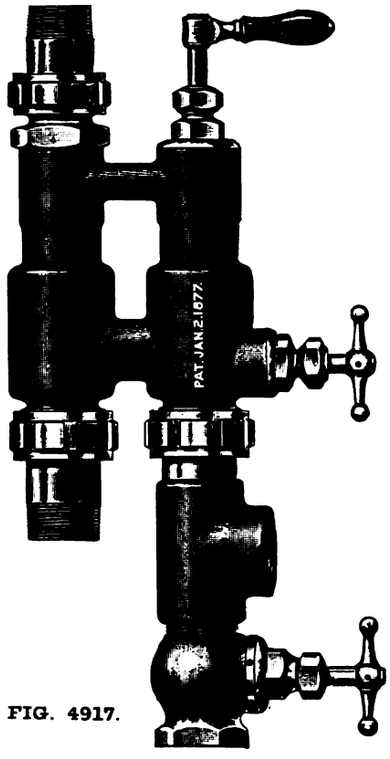


FIG. 4917.

PRICES, FIG. 4917.

No. of inspirator	Steam.	Suction and feed.	Gals. per hour, 60 lbs. pressure.	Prices.
No. 7½	⅜	⅜	60	$16.00
No. 8¾	⅜	½	90	18.00
No. 10	⅜	½	120	20.00
No. 12½	½	¾	220	25.00
No. 15	½	¾	300	30.00
No. 17½	¾	1	420	40.00
No. 20	¾	1	540	45.00
No. 22½	1	1¼	720	55.00
No. 25	1	1¼	900	60.00
No. 30	1¼	1½	1,260	75.00
No. 35	1¼	1½	1,740	90.00
No. 40	1½	2	2,230	110.00
No. 45	1½	2	2,820	125.00
No. 50	2	2½	3,480	150.00
No. 55	2	2½	3,600	175.00

The capacity of these machines is estimated with a 4-foot lift and 60 lbs. steam. With a greater lift the capacity will be proportionately reduced.

KORTING DOUBLE TUBE INJECTORS.

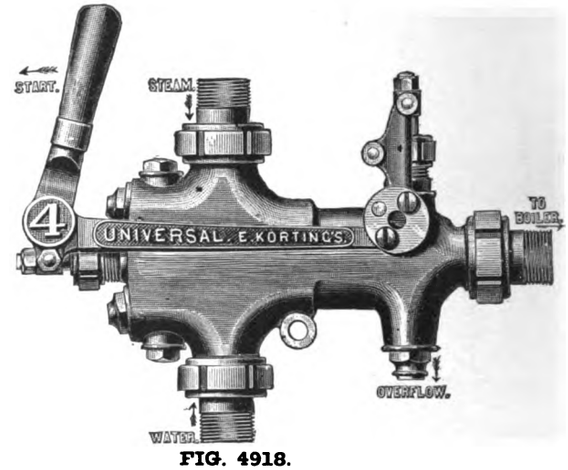


FIG. 4918.

PRICES, FIG. 4918.

Size.	Prices of injector.	Capacity in horse power.	Gallons per hour.	Pipe connections.	Iron strainer.	Dirt stop. Brass.	Drip funnel.
No. 00	$20.00	5	40	⅛ in.	$0.50	$1.00	$0.40
No. 0	21.00	12	100	¼ "	.50	1.25	.40
No. 1	23.00	20	150	⅜ "	.50	1.50	.50
No. 2	28.00	35	225	½ "	.60	2.00	.60
No. 3	38.00	50	350	¾ "	.70	2.50	.80
No. 3½	46.00	75	500	¾ "	.70	2.50	.80
No. 4	55.00	100	600	1 "	.85	3.00	.80
No. 5	60.00	120	800	1¼ "	1.15	4.00	1.00
No. 6	65.00	150	1,000	1¼ "	1.15	4.00	1.00
No. 7	85.00	200	1,300	1½ "	1.45	5.00	1.20
No. 8	100.00	250	1,750	1½ "	1.45	5.00	1.20
No. 9	120.00	300	2,200	2 "	2.00	7.00	1.40
No. 10	135.00	350	2,800	2 "	2.00	7.00	1.40
No. 12	165.00	525	3,500	2½ "	2.85	10.00	1.60
No. 14	250.00	675	4,500	2½ "	2.85	10.00	1.60
No. 16	300.00	900	5,500	3 "	3.45	15.00	1.60

LITTLE GIANT INJECTOR, NON-LIFTING.

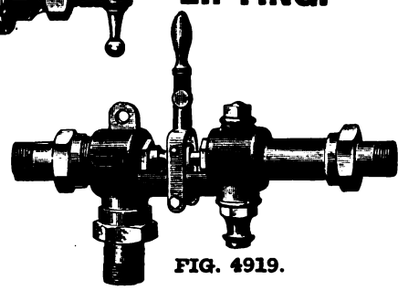


FIG. 4919.

LITTLE GIANT INJECTOR, LIFTING.

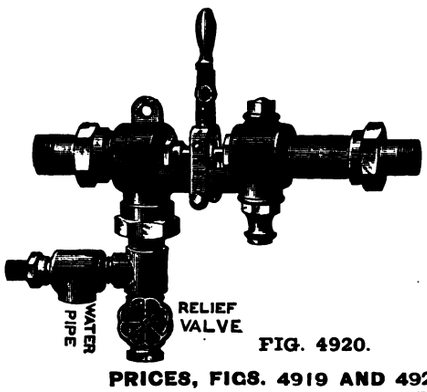


FIG. 4920.

PRICES, FIGS. 4919 AND 4920.

Size No.	1	2	3	4	5	6
Size of connections, iron pipe	⅜	⅜	½	¾	1	1¼
Horse power		16	32	64	96	144
Gals. of water thrown per hour,	60	120	240	480	720	1,080
Prices, non-lifting,	$15.00	$20.00	$27.00	$40.00	$50.00	$65.00
Prices, lifting	17.00	22.00	29.00	42.00	53.00	69.00

Size No.	7	8	9	10	12
Size of connections, iron pipe,	1¼	1½	1½	2	2½
Horse power	193	244	301	365	560
Gals. of water thrown per hour,	1,450	1,830	2,280	2,760	4,200
Prices, non-lifting,	$75.00	$95.00	$105.00	$120.00	$150.00
Prices, lifting	79.00	101.00	111.00	128.00	160.00

ECLIPSE INJECTORS.

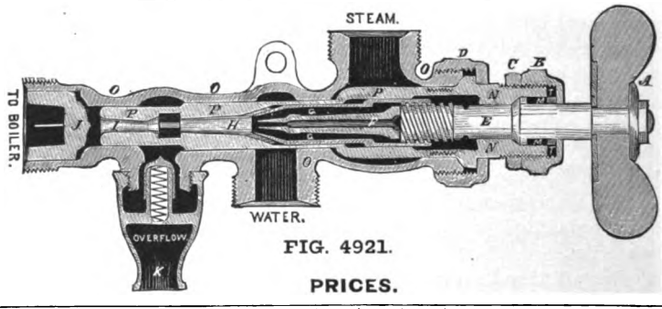


FIG. 4921.

PRICES.

Sizes	A	1	2	3	4	5	6	7	8	9	10	12
Prices	$15	$18	$22	$35	$50	$60	$75	$90	$100	$115	$130	$150
Size of pipe connections	¼	⅜	½	¾	1	1¼	1¼	1½	1½	2	2	2½
Nominal h. p. at 70 lbs. pressure		8	20	30	55	85	125	175	225	285	350	500
Number of gals. per minute		¾	2½	4	8	12	18	24	31	39	48	66

If desired, we can furnish the inside working parts in duplicate, thus giving the advantage of two machines.

PRICES, DUPLICATE PARTS.

Sizes	A	1	2	3	4	5	6	7	8	9	10	12
Prices	$5	$7	$10	$12	$15	$20	$23	$25	$27	$30	$40	$50

PRICES FOR LOCOMOTIVE ATTACHMENTS.

Sizes	2	3	4	5 & 6	7 & 8	9 & 10	12
	½ inch.	¾ inch.	1 inch.	1¼ inch.	1½ inch.	2 inch.	2½ inch.
Starting valve	$5.00	$7.00	$8.00	$11.00	$13.00	$16.00	$18.00
Water cocks	1.75	2.50	3.60	6.00	6.50	9.50	14.00
Check valves	4.25	5.00	6.50	8.00	9.00	9.50	14.00
Dipper for water pipe	.50	.50	.50	.65	.80	1.00	1.25

Extension rod, with universal joint, $5.00.

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MONITOR INJECTORS.

CLASS C, NON-LIFTING.

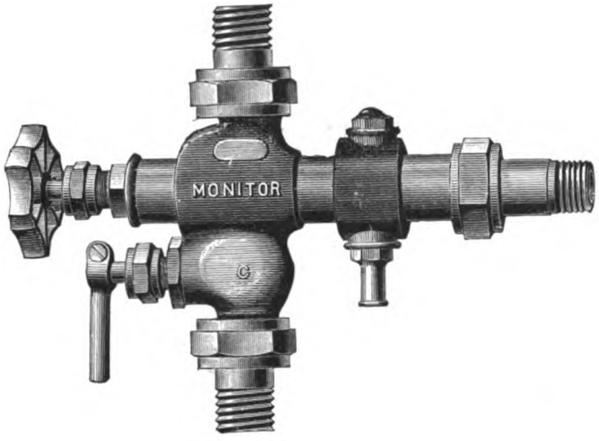


FIG. 4922.

CLASS D, LIFTING.

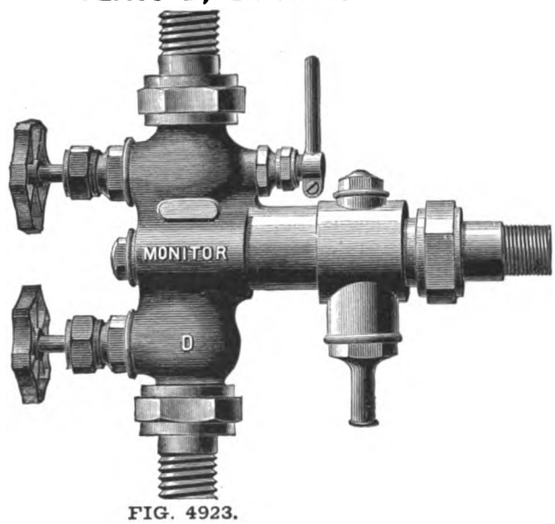


FIG. 4923.

FOR STATIONARY, PORTABLE AND MARINE BOILERS.

PRICES, FIGS. 4922 AND 4923.

Size of injector.	Inside diameter of pipe, in inches.	Delivery per hour in gallons, at a steam pressure of			Prices, class C monitor, non-lifting. Fig. 4922.	Prices, class D monitor, lifting. Fig. 4923.
		120 lbs.	60 lbs.	20 lbs.		
No. 2	½	170	135	90	$17.00	$19.00
" 2½	½	255	210	120	21.00	24.00
" 3	¾	375	285	195	27.00	32.00
" 4	1	615	480	315	40.00	45.00
" 5	1¼	900	690	450	50.00	55.00
" 6	1¼	1,230	960	570	60.00	65.00
" 7	1½	1,650	1,260	840	75.00	80.00
" 8	1½	2,130	1,590	1,050	90.00	100.00
" 9	2	2,640	1,980	1,310	110.00	120.00
" 10	2	3,240	2,465	1,635	130.00	140.00
" 12	2½	4,320	3,300	2,350	160.00	180.00
" 14	2½	6,100	4,650	3,200	200.00	225.00
" 16	3	8,050	6,050	4,180	250.00	275.00
" 18	3	9,850	7,550	5,390	325.00	350.00
" 20	3½	12,000	9,420	6,530	400.00	450.00

These injectors are fitted with steam and water valves, which are usually separate and charged extra.

FRIEDMANN PATENT INJECTORS.

FOR STATIONARY, PORTABLE AND MARINE BOILERS.

PRICES, FIGS. 4924 AND 4925.

CLASS C, NON-LIFTING.

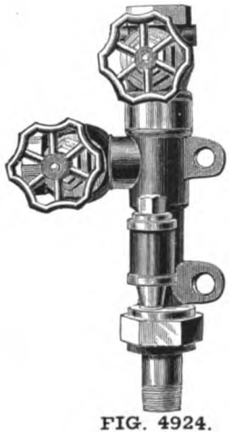


FIG. 4924.

Size of injector.	Minimum inside diameter of pipe, in inches.	Delivery per hour in gallons, at a steam pressure of			Prices, class C, non-lifting. Fig. 4924.	Prices, class D, lifting. Fig. 4925.
		120 lbs.	60 lbs.	20 lbs.		
No. 2	½	170	135	90	$17.00	$19.00
" 3	¾	375	285	195	27.00	32.00
" 4	1	615	480	315	40.00	45.00
" 5	1¼	900	690	450	50.00	55.00
" 6	1¼	1,230	960	570	60.00	65.00
" 7	1½	1,650	1,260	840	75.00	80.00
" 8	1½	2,130	1,590	1,050	90.00	100.00
" 9	2	2,640	1,980	1,310	110.00	120.00
" 10	2	3,240	2,465	1,635	130.00	140.00
" 12	2½	4,320	3,300	2,350	160.00	180.00
" 14	2½	6,100	4,650	3,200	200 00	225.00
" 16	3	8,050	6,050	4,180	250.00	275.00
" 18	3	9,850	7,550	5,390	325.00	350.00
" 20	3½	12,000	9,420	6,530	400.00	450.00

CLASS D, LIFTING.

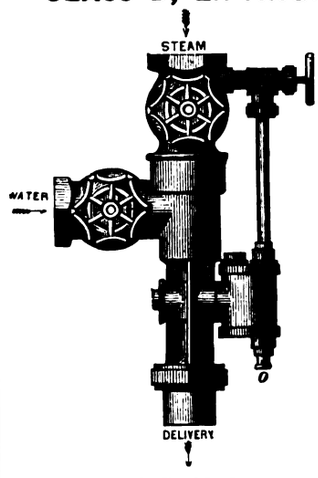


FIG. 4925.

These injectors are fitted with steam and water valves, which are usually separate and charged extra.

Class C, non-lifting, is applied in all cases where there is a head of water, or pressure from hydrant, dam or reservoir. This class of injector should be placed below the level of the water supply.

Class D, lifting, is applied only when water to feed boilers is taken from rivers, ponds, low reservoirs, wells, buckets, etc., where there is no head of water ; and will raise water, according to steam pressure, from six to twenty-five feet.

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FRIEDMANN EJECTORS.



FIG. 4926.

PRICES.

No.	000	00	0	1	2	3	4	5	6
Delivery per hour, in gallons, at 45 lbs. steam pressure	250	500	900	1,200	2,000	3,000	5,000	8,000	10,000
Diameter of steam pipe, in inches	3/8	1/2	3/4	3/4	1 1/4	1 1/4	1 1/2	2	2 1/2
Diameter of delivery pipe, in inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
Diameter of suction pipe, in inches	3/4	1	1 1/4	1 1/2	2	2 1/2	2 1/2	3	4
Boiler capacity, horse power	3 to 4	3 to 4	3 to 4	5 to 6	7 to 8	10 to 15	25	35	45
Prices	$8.00	$14.00	$20.00	$30.00	$50.00	$75.00	$100.00	$125.00	$150.00

At 80 lbs. steam pressure the ejector will throw 50 per cent. more water.

The ejector will force water or liquids as follows :

At 14 lbs. steam pressure .....20 feet in height.
" 28 " " " .....40 " "
" 42 " " " .....60 " "
At 56 lbs. steam pressure.....75 feet in height.
" 70 " " " .....90 " "
And upward, according to pressure.

THE H-D EJECTOR OR JET PUMP.



FIG. 4927.

These ejectors are used for lifting and conveying water and other liquids from one level to another in factories, pits, mines, wells, cisterns, breweries, tanneries. Also as a bilge pump for steam-boats.

The couplings and tubes are independent of the body, and when worn out or damaged can be replaced at a small cost. Also enables the ejector to be taken for cleaning without disconnecting the pipes.

PRICES.

Sizes.	Prices.	Pipe connections. Steam.	Pipe connections. Suction and delivery.	Capacity per hour.	Prices, strainer.
No. 1 brass.	$8.00	3/8	1/2	250 gallons.	$0.50
No. 2 "	10.00	1/2	3/4	500 "	.75
No. 3 "	15.00	3/4	1	960 "	1.00
No. 4 "	20.00	1	1 1/4	1,300 "	1.25
No. 5 "	25.00	1 1/4	1 1/2	2,000 "	1.50
No. 6 iron.	35.00	1 1/4	2	4,000 "	1.75
No. 7 "	40.00	1 1/2	2 1/2	8,000 "	
No. 8 "	50.00	2	3	11,000 "	
No. 9 "	65.00	2 1/2	4	15,000 "	

Size No. 6 has iron body, balance brass. Sizes No. 7 and 8 have iron body and delivery connection, balance brass. Size No. 9 has brass tubes, balance iron.

Sizes No. 6, 7, 8 and 9 made entirely of brass to order.

PRICES OF EJECTOR PARTS.

Size No.	1	2	3	4	5	6	7	8	9
Steam jet	$0.50	$0.70	$0.85	$1.00	$1.25	$1.50	$1.75	$2.00	$2.50
Delivery tube	.75	1.00	1.25	1.50	1.75	2.00	2.50	4.00	6.00
Tail pipe steam end	.40	.65	.80	1.25	1.75	1.75	2.00	2.25	3.00 *2.50
Coupling nut steam end	.60	.85	1.20	1.75	2.25	2.25	3.00	3.75	5.00 *4.00
Tail pipe delivery end	.65	.80	1.25	1.75	2.00	2.25	3.00 *2.50	4.00 *3.00	5.00 *4.00
Coupling nut delivery end	.85	1.20	1.75	2.25	3.00	3.75	5.00 *4.00	6.00 *5.00	7.00 *6.00

*Refers to parts being iron. All other parts are brass.

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HANCOCK EJECTORS.

PRICES, FIG. 4928.

Size No.	Suction and feed.	Steam.	Capacity per hour.	Prices.
1	½ in.	⅜ in.	244	$7.00
2	¾ "	⅜ "	550	10.00
3	1 "	½ "	977	15.00
4	1¼ "	½ "	1,525	20.00
5	1½ "	¾ "	2,200	25.00
6	2 "	1 "	3,900	50.00
7	2½ "	1¼ "	6,000	80.00
8	3 "	1½ "	8,800	125.00
9	4 "	2 "	15,600	135.00
10	5 "	2 "	24,300	150.00
11	6 "	2½ "	35,000	175.00

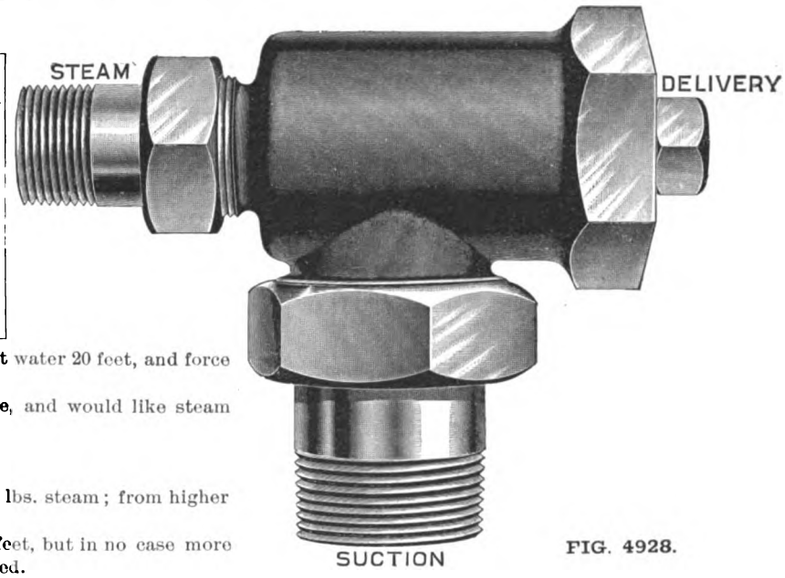


FIG. 4928.

Capacity based on steam at 60 lbs., and at that pressure will lift water 20 feet, and force above ejector 15 to 20 feet.

We can adapt these ejectors to any required steam pressure, and would like steam pressure to be used, stated with the order.

MODEL EJECTOR.

Capacities of ejectors are based on a working pressure of 50 lbs. steam; from higher pressure better results will be obtained.

If possible, place the ejector so that its lift may not be over 10 feet, but in no case more than 20 feet. When over 10 feet a check-valve should always be used.

PRICES, FIG. 4929.

Size ejector	A	B	C	D	E	F	G	H	I
Size pipe, supply and discharge	½	¾	1	1¼	1½	2	2½	3	4
Size steam pipe	⅜	½	¾	1	1¼	1½	1½	2	2½
Gallons per hour	240	480	960	1,200	1,900	2,900	4,800	7,200	10,000
Prices	$7.50	$10.00	$13.00	$17.00	$22.00	$30.00	$40.00	$55.00	$75.00

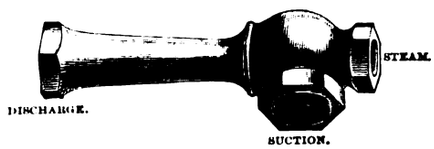


FIG. 4929.

PRICES, FIG. 4930.

Size.	Prices.	Capacity per hour in gallons.	Suction and discharge pipe.	Steam pipe.	Prices of strainer.
No. 0	$6.00	300 gals.	½ in.	¼ in.	$ .60
" 1	8.00	500 "	¾ "	⅜ "	.70
" 2	10.00	800 "	1 "	½ "	.85
" 3	15.00	1,200 "	1¼ "	¾ "	1.15
" 4	20.00	1,700 "	1½ "	¾ "	1.45
" 5	30.00	3,000 "	2 "	1 "	2.00
" 6	40.00	5,000 "	2½ "	1¼ "	2.85
" 7	50.00	7,500 "	3 "	1½ "	3.45
" 8	90.00	12,000 "	4 "	2 "	5.00

KORTING EJECTOR.

It has two steam and two discharge outlets for convenience of piping; either may be used.

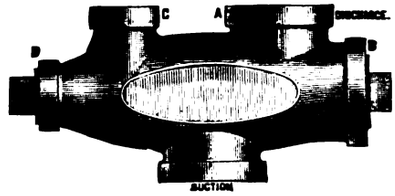


FIG. 4930.

ACID SYPHON PUMPS.

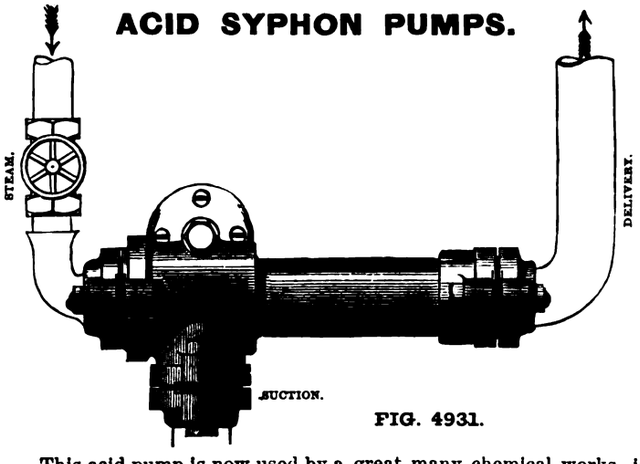


FIG. 4931.

This acid pump is now used by a great many chemical works, in lifting their acids and other chemicals to be conveyed to any part of the building. The machine is made of lead, encased in an iron shell for strength, and fitted with a platinum steam nozzle to give that part durability.

PRICES.

Size.	Prices.	Gallons per hour.	Suction and delivery pipe.	Steam pipe.
No. 0	$22.00	187	¾ in.	½ in.
" 1	28.00	375	1 "	¾ "
" 2	35.00	750	1¼ "	¾ "
" 3	46.00	1,125	1½ "	1 "
" 4	58.00	1,870	2 "	1¼ "
" 5	74.00	2,625	2 "	1¼ "
" 6	90.00	3,750	2½ "	1½ "
" 7	120.00	7,500	3 "	2 "

VAN DUZEN'S STEAM JET PUMPS.

FOOT STRAINER FOR FIG. 4933.

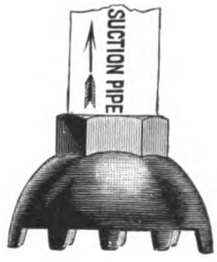


FIG. 4932.

The pumps are made of brass, the foot strainer is cast iron with brass strainer.

Threads are for gas-pipe connections.

If strainer is wanted it must be so stated in the order.

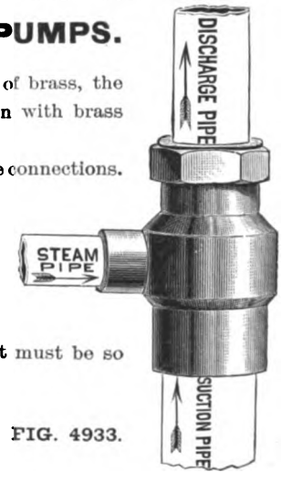


FIG. 4933.

PRICES.

Size of pump.	Prices, Fig. 4933.	Prices of foot strainer, Fig. 4932.	Discharge pipe.	Suction pipe.	Steam pipe.	Steam jet diameter.	Capacity per hour, in gallons.
No. 1 "L"	$7.00	$0.75	½ in.	¾ in.	⅜ in.	1/16 in.	300
" 2 "L"	8.50	1.00	¾ "	1 "	⅜ "	1/16 "	500
" 3 "L"	10.50	1.25	1 "	1¼ "	½ "	2/16 "	750
" 4 "L"	13.00	1.50	1¼ "	1½ "	½ "	2/16 "	1,200
" 5 "L"	16.00	2.00	1½ "	2 "	¾ "	3/16 "	1,700
" 6 "L"	20.00	2.50	2 "	2½ "	¾ "	4/16 "	3,000
" 7 "L"	26.00	3.00	2½ "	3 "	1 "	5/16 "	5,000
" 8 "L"	36.00	4.00	3 "	4 "	1 "	6/16 "	7,500
" 9 "L"	50.00	5.00	4 "	5 "	1¼ "	8/16 "	10,000
" 10 "L"	75.00	6.00	5 "	6 "	1½ "	1 "	14,000

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JET PUMPS AND WATER LIFTERS.

DEFIANCE PUMPS.

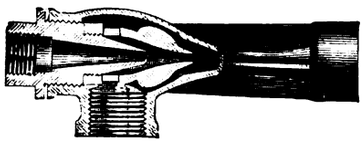


FIG. 4934.

Gas pipe size.....inches,	¾	1	1¼	1½	2	2½	3	4	5	6
Delivery per hour in gallons at 50 lbs. steam pressure.....	280	350	850	1,400	2,300	2,800	3,500	6,000	13 000	16.000
Diameter of steam pipe.....	⅜	½	¾	1	1	1¼	1½	1½	2	2
Diameter of delivery pipe.....	¾	1	1¼	1½	2	2½	3	4	5	6
Prices—brass.....	$12.00	$16.00	$25.00	$35.00	$50.00	$65.00	$85.00	$100.00	$150.00	$200.00

Strainers for above accompany each pump without extra charge.
A higher pressure of steam will give a corresponding increased result.

THE DANIELS SYPHON OR WATER LIFTER.

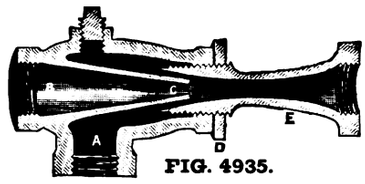


FIG. 4935.

A. Suction pipe.
B. Steam connection.
C. End of cone or steam delivery.
D. Jam nut.
E. Adjustable brass nozzle.

PRICES.

No. 1—suction and discharge,	1	inch			$6.00
" 2— " " "	1¼	"			8.00
" 3— " " "	1½	"			10.00
" 4— " " "	2	"			12.00
" 5— " " "	2½	"			20.00

Sizes of steam delivery at cone.—1 inch—¼ inch. 1¼ inch—$\frac{5}{16}$ inch. 1½ inch—$\frac{7}{16}$ inch. 2 inch—$\frac{9}{16}$ inch. 2½ inch—$\frac{11}{16}$ inch.

BLAKESLEE JET PUMPS.



FIG. 4936.

PRICES, WITH BRASS FITTINGS.

Size of pump.	Suction pipe.	Discharge pipe.	Steam pipe.	Steam opening.	Capacity per minute.	Prices.
Inch.	Inch.	Inch.	Inch.	Inch.	Galls.	
¾	¾	½	⅜	$\frac{3}{16}$	8	$8.00
1	1	¾	½	$\frac{4}{16}$	15	10.00
1¼	1¼	1	½	$\frac{5}{16}$	20	12.00
1½	1½	1¼	¾	$\frac{6}{16}$	30	14.00
2	2	1½	¾	$\frac{7}{16}$	40	16.00
2½	2½	2	1	$\frac{8}{16}$	50	20.00
3	3	2½	1	$\frac{9}{16}$	60	24.00

Brass pumps will be furnished at an additional cost.

LANSDELL'S PORTABLE RAILWAY SYPHON.

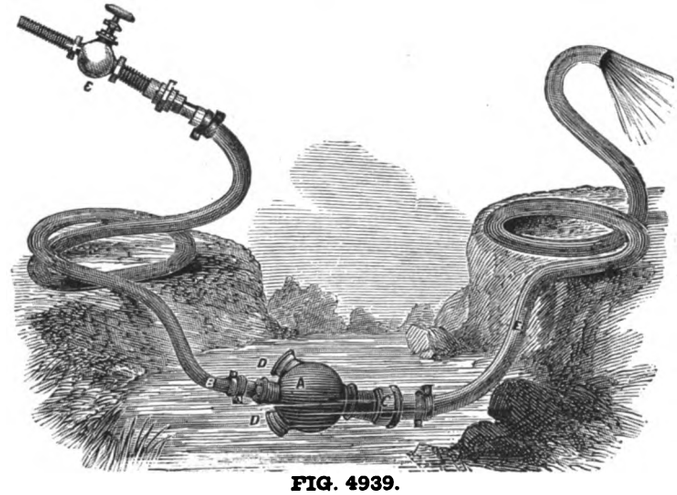


FIG. 4939.

PRICES.

No. 1,	25	feet each of steam and discharge hose and fittings.....				$110.00
	30	" " " " " "				125.00
	35	" " " " " "				135.00
	40	" " " " " "				145.00
	45	" " " " " "				155.00
	50	" " " " " "				165.00
No. 2,	25	" " " " " "				145.00
	30	" " " " " "				155.00
	40	" " " " " "				180.00
	50	" " " " " "				200.00

Every locomotive provided with this appliance can be used as a fire engine, throwing water from the tender or any adjacent water. At all times and in all weathers.

LANSDELL'S STEAM SYPHON PUMP.



FIG. 4937.

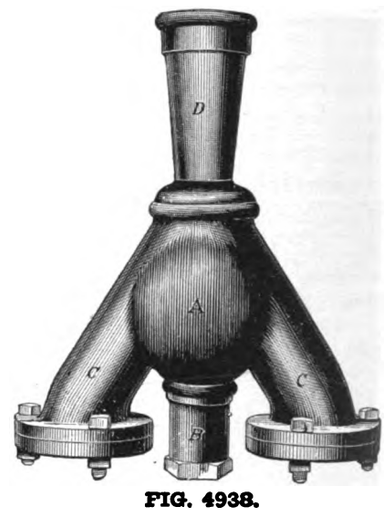


FIG. 4938.

Sizes from ¾ to 2 inches have suctions finished with screw ends as in Fig. 4937.

Larger sizes have flanged suctions as in Fig. 4938.

Prices herewith are for syphon only and do not include any pipe connections.

PRICES.

Size.	Capacity in gallons per minute.	Horse power required.	Diameter of discharge.	Diameter of steam.	Prices. Iron body.	
					High pressure	Low pressure.
		Double	suction.			
No. 3.	30	1	¾	½	$8.00	$10.00
No. 4	50	1½	1	¾	10.00	12.50
No. 5.	120	4	1½	1	17.50	20.00
No. 6.	200	6	2	1¼	22.50	25 00
No. 7.	320	8	2½	1½	35.00	40.00
No. 8.	450	12	3	1½	45.00	50.00
No. 9.	800	25	4	2	65.00	75.00
No. 10.	1,800	50	6	2½	150.00	175.00
		Single	suction.			
No. 11.	60	3	1¼	1	12 50	15.00

High pressure pumps are constructed to work with 30 lbs. and upwards of steam pressure. Low pressure from 30 to 15 lbs. Pumps to work below 15 lbs., single suctions larger than 1¼ and pumps in lead or brass, are made to order.

DESCRIPTION, FIG. 4939.

For supplying locomotive tenders from any body of water within reach, near the side of the road. B is the steam hose attached to the locomotive boiler by a steam cock; A, the steam syphon; C, the steam cock, to be tapped into the boiler; D, D, the suction orifices; E, the discharge hose.

Steam is let on through the hose B, and water is forced through the discharge hose E into the tender. No. 1 will supply the ordinary quantity of water required by a tender in 10 to 12 minutes; No. 2, in 6 to 8 minutes.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PULSOMETER STEAM PUMP.

PRICES, INCLUDING FOOT VALVE AND GUN METAL SEATS.

Size, weight, capacity, etc.					Price, per each style pump.			
Steam pipe.	Suction.	Discharge.	Gallons per minute.	Weight.	No.	Flat valve.	Ball valve.	Gun metal.
1/8 inch.	1 inch.	1 inch.	10	35	1	$50.00	$50.00	
1/4 "	1 1/4 "	1 1/4 "	20	125	2	75.00	79.00	$120.00
3/8 "	2 "	2 "	60	210	3	100.00	106.00	175.00
1/2 "	2 1/2 "	2 1/2 "	100	355	4	150.00	158.00	280.00
1/2 "	3 "	3 "	175	475	5	175.00	187.00	350.00
3/4 "	3 1/2 "	3 1/2 "	300	695	6	225.00	241.00	475.00
3/4 "	4 "	4 "	425	850	7	275.00	300.00	625.00
1 "	5 "	5 "	700	1,600	8	400 00	440.00	1,000.00
1 1/2 "	7 "	6 "	1,000	2,000	9	500.00	550.00	1,250.00
2 "	8 "	8 "	2,000	5,000	10	1,000.00		

The above capacity is estimated on a total height of 25 feet, with 40 lbs. steam pressure at pump. Flat valve pumps are used for all general purposes. Ball valve pumps are used only for pumping out waste of breweries, slaughter-houses, thick pulp in paper mills, tanneries, etc. Gun metal pumps are used only for chemicals and such liquors liable to crystallize, etc.

The Pulsometer Steam Pump.—The pulsometer is a simple piece of casting, formed in one piece, consisting of a pair of chambers, called working chambers, side by side, joined at their top ends by tapering necks with a third chamber situated between them. These three chambers are connected at or near their bottom ends with certain passages which are covered with suitable valves, and are also provided with an inlet and outlet opening for water, and at their top ends with means for connecting with a steam pipe leading to boiler.

Operation.—It is only necessary to place the pulsometer in the desired position, and connect it with the proper suction and delivery pipes and with a steam supply, when it will, by simply opening the steam valve as per directions, perform within its scope all that the most complicated steam piston pump can do.

Its two working chambers fill and discharge alternately just the same as a steam pump, but it has no piston. The level surface of the water within the chamber serves as a most perfect piston in the action of the pulsometer.

Explanation.—The steam enters at the top, or neck, of pump and passes into whichever chamber the position of the steam ball valve permits, and pressing upon the surface of the water therein forces it down and out past the discharge valves and through the discharge pipe. So soon as the water line has been forced downward to the discharge outlet, the steam above it instantly condenses, owing to the peculiar construction of the pulsometer, and a nearly perfect vacuum is formed, and the chamber in consequence suddenly fills again.

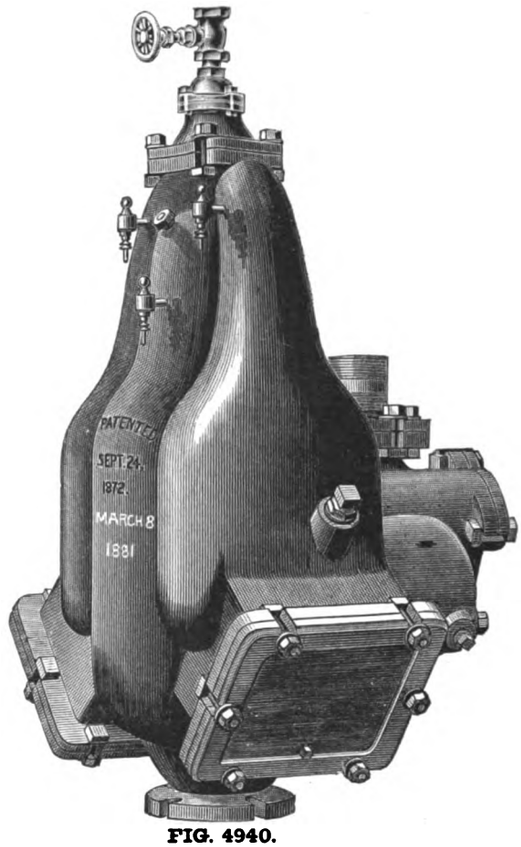


FIG. 4940.

Now, while the steam is entering this chamber, which we will designate as the "left-hand" one, the steam ball valve is seated over the entrance to the "right-hand" chamber, preventing the entrance of steam thereto; but so soon as the sudden collapse of steam occurs, it is instantly drawn over to its seat at the entrance to the "left-hand" chamber, thus cuts off the admission of steam thereto, and allows it to enter the other chamber and expel the water therefrom in the same manner as described for the "left-hand" chamber.

The steam and water occupy the same chamber alternatively, and will thus alternate, keeping up a continuous outflow as long as steam and water are supplied.

MASLIN STEAM VACUUM PUMPS.

PRICES.

No.	Size of steam pipe.	Size of suction pipe.	Size of discharge pipe.	Gallons per minute.	Prices of pump.	Price of retention valve, useful in high or long deliveries.	Size of boiler recommended to successfully operate pump where constantly in use.
3	3/8 in.	2 in.	2 in.	65	$100.00	$8.00	No. 3, 6 h. p.
5	1/2 "	3 "	3 "	200	175.00	15.00	" 5, 9 "
7	3/4 "	4 "	4 "	425	275.00	25.00	" 7, 15 "

All pumps have gun metal valve seats, guards and bolts, unless otherwise ordered.

The above capacity is estimated on a total height of 25 feet, with 50 lbs. steam pressure at pump.

Pumps of special metals and extra large capacity built to order.

In ordering a pump it is to the interest of the purchaser to fully inform us on the following questions:

1. For what purpose is the pump to be used?
2. What is the maximum quantity of liquor to be pumped per hour?
3. What is the liquid to be pumped? And is it hot, cold, clear, gritty, fresh, salt, alkaline, or acidulous?
4. To what height is liquid to be lifted by suction, and what is the length of suction pipe, and number of elbows and bends?
5. To what height is liquid to be pumped? Length and size of discharge pipe, and number of elbows and bends?
6. What is the average pressure of steam at boiler? And how far will boiler be from pump?

A rough sketch, showing how and where you desire to locate the pump, will aid considerably in furnishing information.

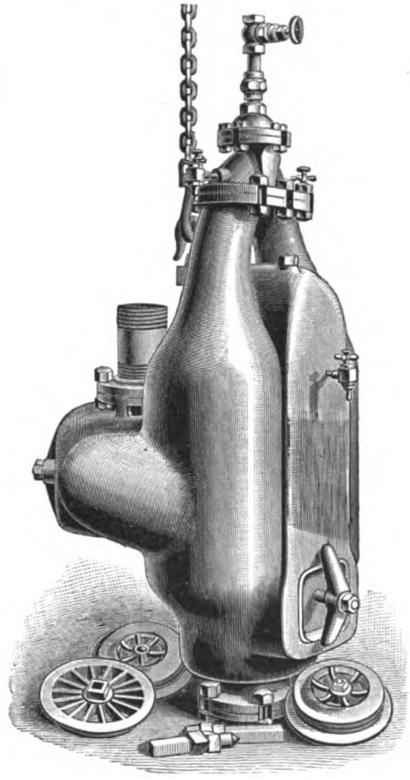


FIG. 4941.

STEAM RAILROAD WATER STATION.

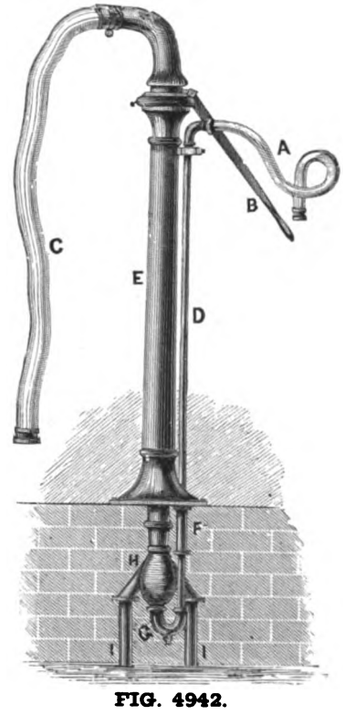


FIG. 4942.

This water station dispenses with tanks, tank-houses and attendants. It cannot freeze, and costs little.

PRICES.

15 ft. each steam and discharge hose, 18 ft. pipe below base of column, } $350.00

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BOILER COVERINGS.

ASBESTOS SHEET FIRE FELT.

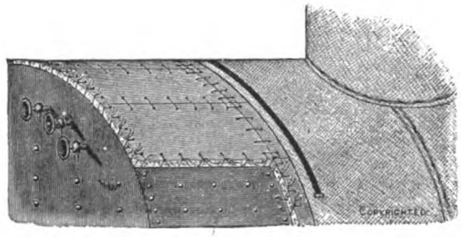


FIG. 4943.

Sheet fire felt, for covering boilers, etc., is composed entirely of asbestos fiber. It is fireproof, and will not char, burn or disintegrate when placed on a superheated steam surface, or on a breeching or up-take. It is light in weight, less than 1½ lbs. to the square foot, 1½ inch thick. Sheet fire felt is made in sections, which can be removed and replaced without injury. It is especially valuable for marine boilers.

PRICES, FIG. 4943.

In sheets 3 x 2 feet, ½ in. thick	per sq. ft.,	20 cts.
" " " 1 " "	" "	27 "
" " " 1½ " "	" "	35 "
Superator jackets, for protecting fire felt from moisture (indispensable on marine boilers)	" "	10 "

ASBESTOS FURNACE CEMENT.

This is the strongest and most durable cement in use for "setting-up" and repairing broken joints, in furnaces, ranges, heaters, stoves, etc. It is prepared ready for use, adheres readily and firmly to castings, tin, etc., and "sets" in a few hours. When subjected to heat it vitrifies without shrinking or becoming porous or shaking loose, is inodorous, and effectually prevents escape of smoke, gases and dust, thus insuring perfect draught. It is also invaluable for cementing and lining furnace doors of steam boilers, or as a protection for any work exposed to direct heat, flames, etc. Its color is gray, like castings, and in the unopened tin package will keep an indefinite length of time without deterioration.

PRICES.

	Per lb.		Each.
Casks, 600 to 400 lbs	6 cts.	10-lb. cans	$1.00
Kegs, 300 to 100 "	6½ "	5-lb. "	.60
Pails, 50 and 25 "	7½ "	2-lb. "	.35
		1-lb. " per doz.	2.25

HAIR FELT.

For covering steam pipes, boilers, water pipes, refrigerators, ice houses, etc.

PRICES.

¼	inch	thick	5	cents	per	square	foot.
½	"	"	6½	"	"	"	"
¾	"	"	7½	"	"	"	"
1	"	"	8½	"	"	"	"
1¼	"	"	9½	"	"	"	"
1½	"	"	11½	"	"	"	"
2	"	"	13	"	"	"	"

In rolls of 300 square feet, 3 feet and 6 feet wide.

ASBESTOS MILL-BOARD.

Our mill-board is composed wholly of pure asbestos. It is strictly fire and acid proof, and is valuable for packing joints in contact with fire, oils, etc. It is also used for fire-screens, partitions, linings under stoves, grates, etc. In sheets 40 x 40 and 42 x 44 inches, from $\frac{1}{32}$ to ½ inch thick, weighing from 1½ to 28 lbs. **PRICE,** per lb. ..... **16 CTS.**

Approximate weight per sheet 40 x 40 in.:

$\frac{1}{32}$	$\frac{1}{16}$	$\frac{3}{32}$	⅛	$\frac{3}{16}$	¼	⅜	½	inch, thickness.
1¼	3½	5½	8	10½	14	21	28	lbs.

Special quality, made from demagnetized long fiber. Especially adapted for electrical work, etc. **PRICE,** per lb. ..... **25 CTS.**

MAGNESIA COVERINGS.

For boilers, domes, cylinders, flues, tanks, etc.

PRICES.

Magnesia sectional blocks. 1⅜ in. thick, in 3 in. and 6 in. widths, 36 in. in length, 35 cents per sq. foot. Canvas covered blocks. ..... 40 cts.

Magnesia plastic covering, dry. Prepared carbonate magnesia and fiber, for trowel work. ..... per barrel, $8.00

Gross weight, per barrel, 80 lbs.; net weight, 60 lbs.

Dolomagnesia, dry. A light plaster covering. ..... per barrel, 5.00

ASBESTOS AND MINERAL WOOL BLOCKS.

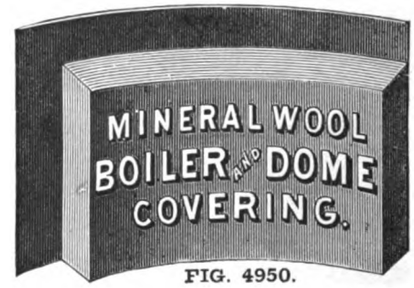


FIG. 4950.

Made in blocks 18 x 12 x 1½ inches of thick asbestos sheeting and filled with mineral wool.

In ordering covering for boilers, domes, etc., simply give the number of square feet which are to be covered.

For boilers, drums, etc.

PRICE, 35 CTS. per sq. ft.

MINERAL WOOL.

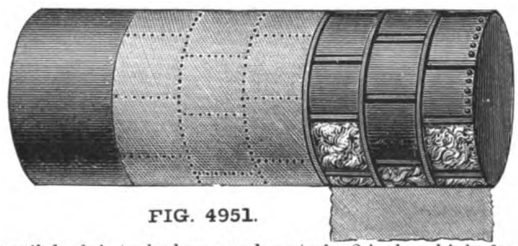


FIG. 4951.

Heavy sail duck is tacked on wooden studs, 2 inches high, forming sections about 1½ feet square; for boilers in machine shops common burlaps are used to hold the mineral wool, and sheet-iron jackets cover the whole.

Mineral wool is essentially a vitreous substance converted to a fibrous condition. In appearance it consists of a mass of very fine fibers interlacing each other in every direction, thus forming an innumerable number of minute air cells. The resemblance of these fibers to those of wool or cotton has given to the material the name of mineral wool in this country, and of silicate cotton elsewhere, but it is only in appearance and softness that any similarity exists between the mineral and organic fibers. Mineral wool appears in a variety of colors, principally white, but often yellow or gray and occasionally quite dark. The quality of the wool is not at all dependent upon, or affected by, its color, as all the peculiar properties which constitute its value are present in equal proportions in any of the shades. Mineral wool partakes of the nature of glass without its brittleness, the fibers being soft, pliant and inelastic. They are of irregular thickness and cross each other in all possible directions. It is made by converting scoria and certain rocks while in a melted condition to a fibrous state.

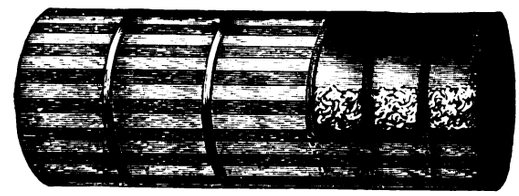


FIG. 4952.

Strips of black walnut are screwed on transverse wooden collars, two inches high, the mineral wool then filled between, and the whole bound with brass bands, forming a neat and substantial jacket.

PRICES, MINERAL WOOL.

Average.	Lbs. per cubic foot.	Lbs. per bag.	Cubic foot to ton.	Bags to a ton.	Prices per 100 lbs. In ton lots.	Prices per cubic foot In ton lots.
Ordinary slag wool	15	60	133	33	$1.00	15c.
Selected " "	11	45	180	45	1.67	19c.
Extra " "	9	36	222	55	4.00	36c.
Ordinary rock "	12	48	168	42	2.00	24c.
Selected " "	8	32	250	62½	4.00	32c.
Extra " "	5	20	400	100	7.00	35c.

Note. In less than ton lots add 25c. per 100 lbs. to factory prices.

Note. We keep a stock in New York from which we can make quick shipment of small lots. For price, ex store, add 25 cts. per 100 lbs. to above list, in ton lots, or 50 cts. in less than ton lots.

Package. The material is packed in three-bushel burlap bags, for which a uniform charge of 12 cents each is made. If returned to us free of all expenses, freight prepaid, and in good order, we credit them at full price charged. This privilege of allowance for empty bags is only open for thirty days after receipt of goods.

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PIPE COVERINGS.

FIBROID SECTIONAL COVERINGS.

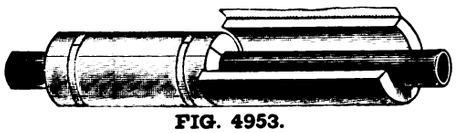


FIG. 4953.

For steam pipes, hot air and hot blast pipes and heated surfaces.

PRICES.

Inside diameter of pipe.	Prices, per lineal foot.	Elbows, each.	Tees, each.	Globe valves, each.
½ in.	$0.22	$0.20	$0.30	$0.25
¾ "	.22	.25	.33	.25
1 "	.24	.25	.33	.25
1¼ "	.25	.25	.33	.25
1½ "	.25	.25	.33	.25
2 "	.27	.27	.36	.27
2½ "	.31	.31	.41	.41
3 "	.36	.36	.48	.48
3½ "	.40	.40	.53	.53
4 "	.44	.44	.59	.59
4½ "	.47	.50	.65	.65
5 "	.50	.58	.75	.75
6 "	.60	.65	.90	.90
7 "	.65	.83	1.20	1.20
8 "	.75	1.00	1.35	1.35
9 "	.80	1.10	1.50	1.50
10 "	.90	1.25	1.75	1.75

Can be supplied with or without an air space.
Made in canvas-finished sections, 24 inches in length.
Fibroid sectional blocks, 1½ inch thick, for boilers, drums, and large surfaces, 35 cents per square foot.

MAGNESIA SECTIONAL COVERING.



FIG. 4954.



FIG. 4955.



FIG. 4956.

PRICES.

Inside diameter of pipe.	Weight of covering, per lineal foot.	Prices per lineal foot, canvas-jacketed.	Elbows and 45 degree elbows.	Tees.	G. valves.	Crosses.
½ in.	8 ozs.	$0.15	$0.16	$0.24	$0.20	$0.28
¾ "	9 "	.16	.20	.26	.20	.34
1 "	10 "	.18	.20	.26	.20	.34
1¼ "	12 "	.20	.20	.26	.20	.34
1½ "	15 "	.22	.20	.26	.20	.34
2 "	18 "	.24	.22	.29	.22	.38
2½ "	20 "	.27	.25	.33	.33	.42
3 "	24 "	.30	.29	.38	.38	.48
3½ "	26 "	.34	.32	.42	.42	.52
4 "	30 "	.38	.35	.47	.47	.60
4½ "	38 "	.42	.40	.52	.52	.64
5 "	44 "	.46	.46	.60	.60	.72
6 "	48 "	.50	.52	.72	.72	.80
7 "	55 "	.55	.66	.96	.96	.88
8 "	65 "	.60	.80	1.08	1.08	.96
9 "	75 "	.65	.88	1.20	1.20	1.08
10 "	85 "	.75	1.00	1.40	1.40	1.20

For wrought iron pipe and fittings. In canvas-jacketed sections, 36 inches in length.

MINERAL WOOL SECTIONAL COVERING.



FIG. 4957.

For steam pipes, hot water pipes, boilers, etc. Will keep cold water pipes from freezing.

PRICES.

	Size of pipe, in inches, inside diameter..	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
	Size of pipe, in inches, outside diameter.	⅞	1⅛	1⅜	1⅝	1⅞	2⅜	2⅞	3½	4	4½	5	5½	6⅝	7⅝	8⅝	9⅝	10¾	13
Prices per ft. in lth. Cents.	Paper casing.....	18	19	21	22	23	25	27	31	35	39	43	46	51	57	65	70	77	90
	Paper casing cas. cov.....	18	19	21	23	25	27	30	34	38	42	46	50	55	61	70	76	82	95
	Asbestos casing.....	18	19	21	23	25	27	30	34	38	42	46	50	55	61	70	76	82	95

CORRUGATED AIR SPACE SECTIONAL COVERING.

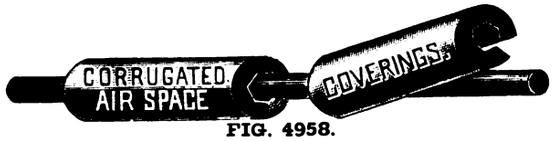


FIG. 4958.

For steam pipes, water and gas pipes. Made in sections 3 ft. long.

Classification.	A. Cold water or gas pipe.	B. Low pressure steam.	C. High pressure steam.	D. Asbestos, extra combination.
Diam. of pipe.	Price, per running foot.			
½	$0.14	$0.16	$0.18	$0.21
¾	.15	.18	.20	.23
1	.17	.20	.22	.25
1¼	.19	.22	.24	.27
1½	.20	.24	.26	.29
2	.22	.25	.28	.30
2½	.25	.28	30	.34
3	.29	.31	.33	.37
3½	.32	.34	.36	.40
4	.34	.37	.39	.44
4½	.37	.40	.42	.48
5	.40	.42	.44	.50
6	.45	.52	.54	.60
7	.50	.60	.63	.75
8	.55	.65	.69	.80
9	.60	.70	.75	.85
10	.65	.75	.80	.90
11	.70	.80	.85	.95
12	.75	.85	.90	1.00

Fittings for elbows, tees, valves, etc., sent with covering when required.
Special prices will be given for boiler and drum covering, and pipe over 12 in. diameter, and special thickness or style made to order.

REMOVABLE ASBESTOS AND HAIR FELT PIPE COVERINGS.



FIG. 4959.

This form of our air-chamber covering is composed of asbestos fiber and standard hair felt. These materials are enclosed in a strong wrapper or case of non-porous sheathing, which is protected on the inner layer by loose asbestos fiber. We offer it as the most durable form of hair felt covering, suitable for all but very high pressure service.
In sections three feet long, with strips and staples.

PRICES.

Inside diameter of pipe.	Covering, per foot.	Elbows, each.	Tees, each.	Valves, each.
From ½ inch to 1½ inch.	$0.18	$0.18	$0.25	$0.19
2 "	.20	.20	.27	.21
2½ "	.23	.23	.31	.31
3 "	.26	.26	.37	.37
3½ "	.30	.30	.40	.40
4 "	.33	.33	.45	.45
4½ "	.35	.35	.48	.48
5 "	.37	.37	.51	.51
6 "	.43	.43	.58	.58
7 "	.49	.49	.67	.67
8 "	.54	.54	.73	.73
9 "	.60	.60	.82	.82
10 "	.66	.66	.90	.90

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BOILER CLEANERS AND COMPOUNDS.

HOTCHKISS MECHANICAL CLEANER.

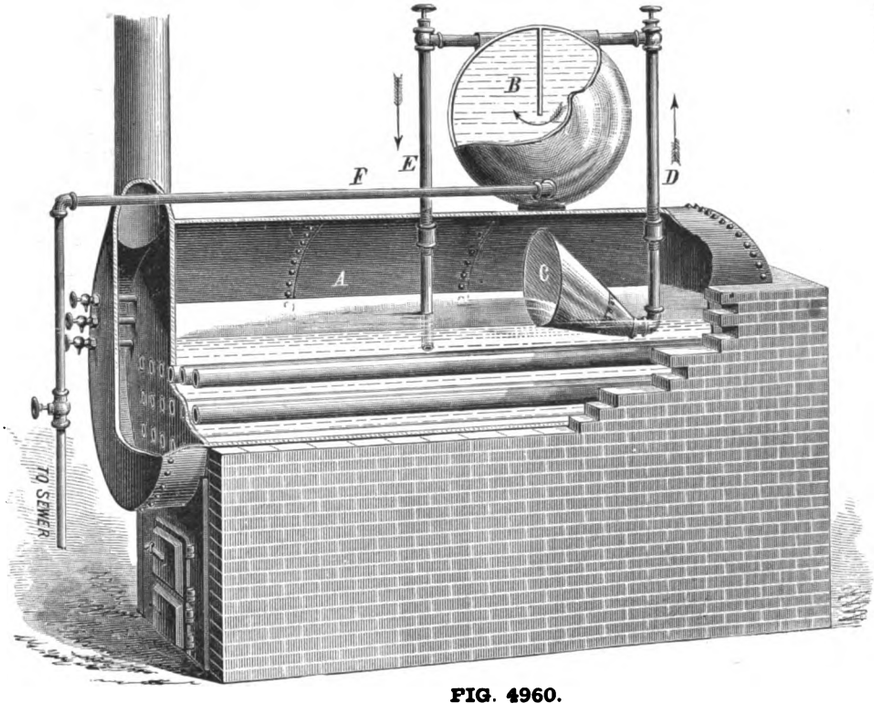


FIG. 4960.

The Hotchkiss mechanical boiler cleaner, when properly applied to a steam boiler, never fails to remove all muddy solutions and sediments from the water before they become baked into scale.

The cleaner is automatic and certain in its action, and will outwear a new boiler.

The 1½ inch circulating pipes, about 8 feet long, and the 1 inch blow-off pipe, together with labor of attaching the cleaner, cost not to exceed $10.00.

PRICES, SPECIAL FITTINGS.

For boilers up to 75 horse power.....$75.00
" " over 75 " 150.00

BOILER COMPOUNDS.

Houghtin's, for boilers and tubes, per gal.....75c.
Lord's, in powdered form, in casks or barrels, 600, 500, 400, 350 and 250 lbs., per lb.....10c.
In half barrels, 160 lbs.....11c.

EXTRACT OF SODIUM TANITE.

In barrels, ½ barrels or kegs, per gal.....$1.00

PITTSBURGH BOILER SCALE RESOLVENT.

In barrels, 50 gals., per gal.....40c.
In ½ barrels, 30 gals., per gal.....45c.

BERRYMAN FEED WATER HEATER AND PURIFIER.

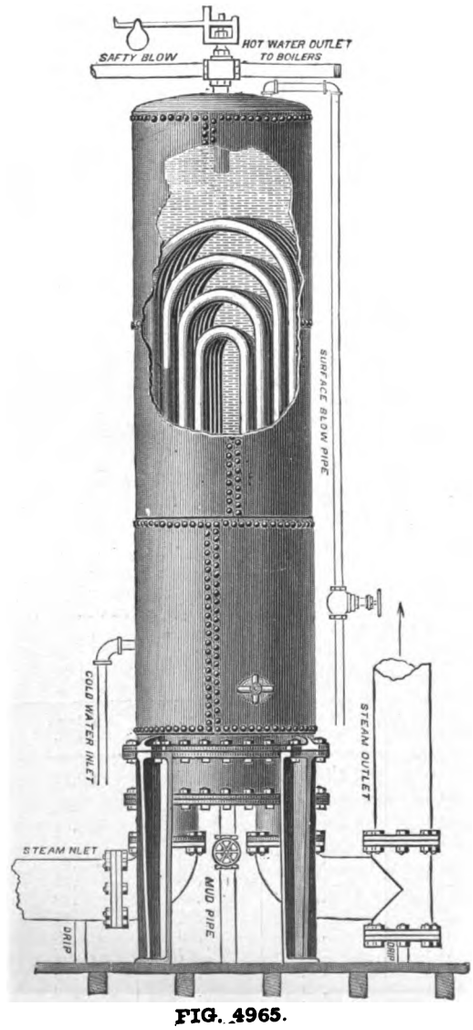


FIG. 4965.

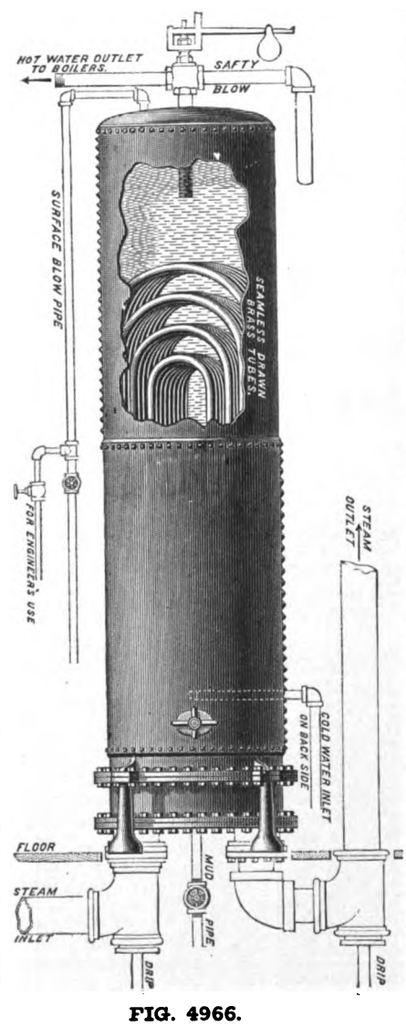


FIG. 4966.

PRICES.

No.	Size.	Horse power.	Exhaust.	Prices.
1	10 x 30	15	2½	$75.00
2	12 x 48	30 to 40	3	150.00
3	15 x 72	60 to 75	4	250.00
4	18 x 72	80 to 100	5	375.00
5	20 x 84	110 to 125	6	425.00
6	20 x 96	125 to 150	6	450.00
7	22 x 96	150 to 175	6	475.00
8	24 x 96	180 to 225	7	550.00
9	27 x 120	240 to 300	8	700.00
10	32 x 120	350 to 450	8	900.00
11	40 x 144	500 to 650	10	1,200.00
12	45 x 192	750 to 1,000	12	1,800.00
13	51 x 192	1,000 to 1,500	16	2,300.00
14	60 x 192	1,800 to 2,000	16	3,500.00

No flanges, steam fittings or valves furnished.

DESCRIPTION.

The special advantages gained in this make of heater are: That it contains a much greater quantity of water than any other heater, giving ample time for settling so much of the impurities as will separate by heat at a temperature that may be attained in the use of the exhaust steam. The very large amount of heating surface in this heater gives a much higher degree of heat in the feed-water, and with so large a body of water, and the same being under a pressure constantly maintained by the feed-pump, is in a quiescent condition, hence there is ample time for the impurities to separate and settle. The shape of the tube-sheets is concave, and a mud or blow-off pipe, placed in the center of the tube-sheet, which extends to the water space, will, because of the pressure, carry off all the deposits; and, by the same means, it will be seen that a surface blow-off pipe is provided to carry off all the lighter substance, which rises to the top of the water in the heater. The use of the blow-off pipes at the top and bottom of the Berryman, the same requiring not more than a few seconds three or four times in ten hours, keeps the heater clean, while it is an absolute fact that the water in the heater has become so thoroughly purified at the point where the feed pipe takes the water for the boilers that scale is prevented, and boilers are kept clean. This make of heater will heat to the highest possible degree of heat with the use of the exhaust steam.

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COUBERT WATER TUBE FEED WATER HEATER.

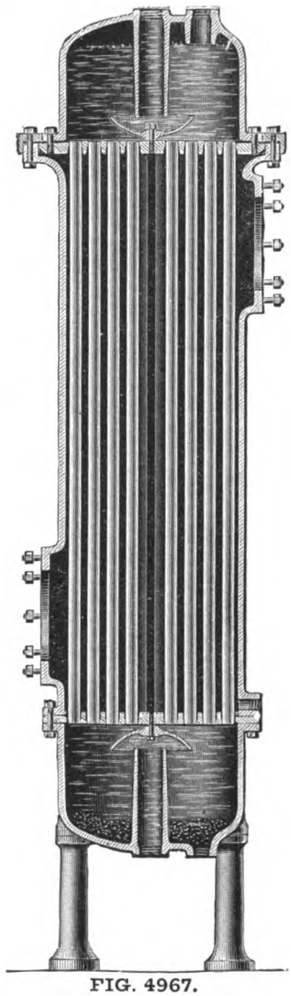


FIG. 4967.

DESCRIPTION.

It is essentially composed of two cast iron water chambers connected together by a cluster of seamless drawn brass tubes, rigidly secured at their ends to the tube plates, by means of a roller tube expander.

The lower water chamber rests on legs on the floor, while the upper water chamber is free to move vertically as the tubes expand or contract.

The tubes are surrounded by a cast iron shell provided with inlet and outlet nozzles, to which are connected the exhaust pipes.

The water inlet and outlet pipes are made to project inside of the water chambers, and opposite them are placed dish-shaped deflectors, the purpose of which is to deflect the current and thereby promote the separation of scum and sediment.

Suitable surface and mud blows and also a hand-hole are provided for cleaning.

PRICES.

No.	Horse power.	Diam. of shell.	Total height of legs.	Diam. of exhaust.	Feed pipe.	Approximate shipping weight.	Prices.
		ins.	ft. ins.	ins.	ins.	lbs.	
1	50	12	5 3	6	1½	700	$165.00
2	60	12	5 9	6	1½	750	178.00
3	70	12	6 4	6	1½	800	191.00
4	80	12	6 11	6	1½	850	204.00
5	100	12	8 0	6	1½	950	230.00
6	130	16	6 3	8	2	1,100	269.00
7	160	16	7 1	8	2	1,275	308.00
8	200	16	8 2	8	2	1,450	360.00
9	240	16	9 4	8	2	1,600	412.00
10	300	21	8 8	10	2½	2,150	490.00
11	350	21	9 5	10	2½	2,400	555.00
12	400	21	10 4	10	2½	2,650	620.00
13	500	25	9 5	12	3	3,200	750 00
14	600	25	10 7	12	3	3,500	880.00
15	700	25	11 8	12	3	3,800	1,010.00
16	800	29	10 8	16	4	4,300	1,140.00
17	900	29	11 7	16	4	4,700	1,270.00
18	1,000	29	12 4	16	4	5,100	1,400.00

The above prices do not include flanges, valves or fittings.

For larger sizes, up to 5,000 H. P., prices will be furnished on application.

Horizontal heaters are also furnished.



FIG. 4968.

CORRUGATED TUBE FEED WATER HEATER.

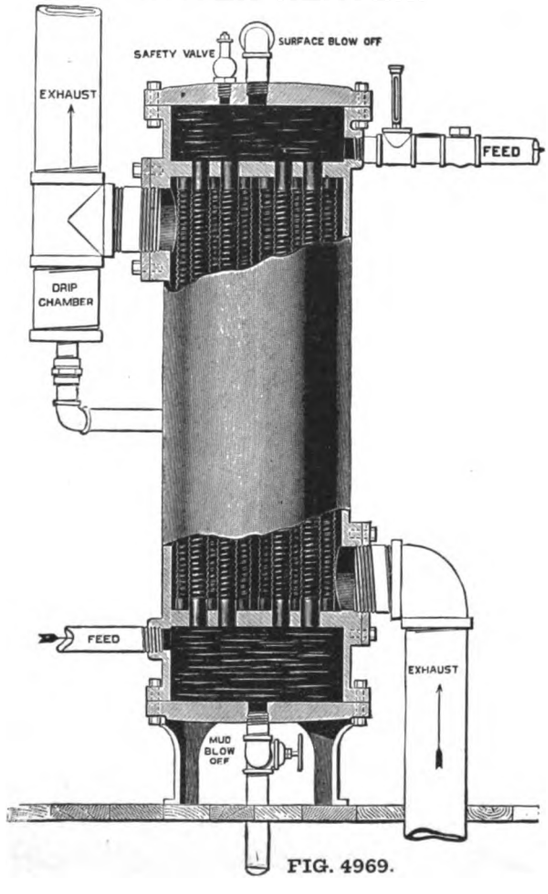


FIG. 4969.

PRICES, FIG. 4969.

H. P.	Prices.	H. P.	Prices.	H. P.	Prices.
20	$35.00	80	$120.00	500	$600.00
25	45.00	100	150.00	600	750.00
30	55.00	150	250.00	700	900.00
40	65.00	200	300.00	800	1,050.00
50	80.00	300	400.00	900	1,200.00
60	100.00	400	500.00	1,000	1,400.00

PRICES, FIG. 4970.

Size.	Dimensions. Diameter, in inches.	Dimensions. Height, in inches.	Size of exhaust in inches.	Size of feed pipe, in inches.	Horse power.	Prices.
A	12	27	3	1	Up to 40	$75.00
B	12	31	4	1	" " 50	100.00
C	12	38	4	1	" " 60	120.00
D	16	37	5	1¼	" " 80	140.00
E	16	41	5	1¼	" "100	180.00
F	16	46	6	1½	" "125	240.00
G	16	57	6	1½	" "150	300.00
H	20	50	8	1½	" "200	375.00
I	20	64	8	2	" "300	500.00
J	40	64	10	2½	" "400	750.00
K	40	78	10	2½	" "500	900.00
L	40	96	12	2½	" "600	1,050.00

ADVANCE FEED WATER HEATER.

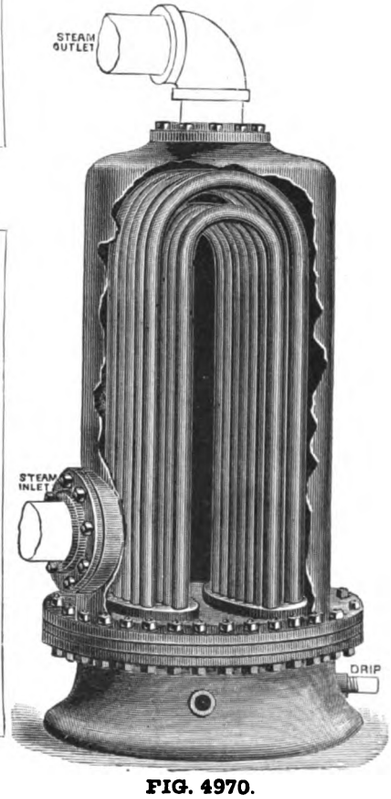


FIG. 4970.

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CORRUGATED TUBE FEED WATER HEATERS.

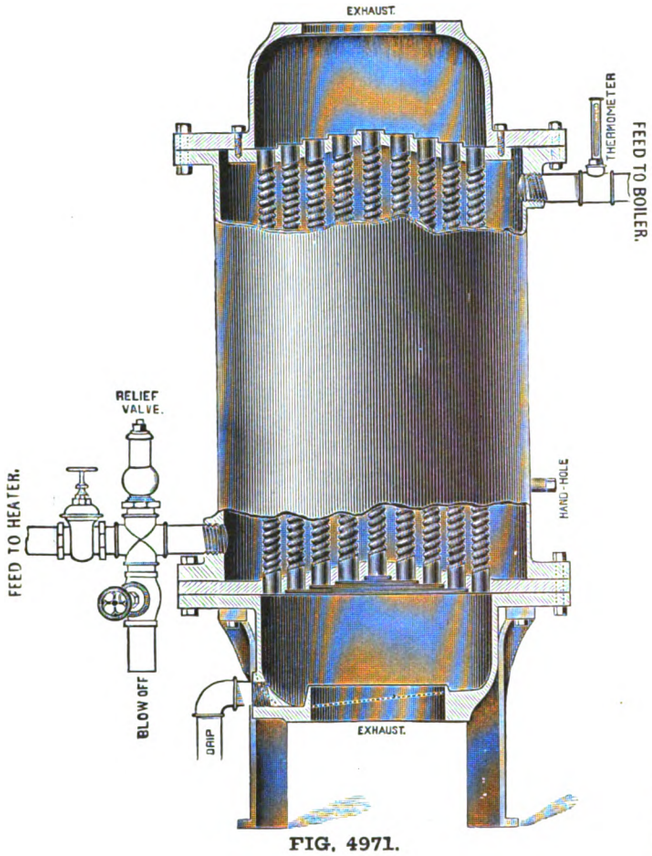


FIG. 4971.

PRICES, FIG. 4971.

H. P.	15	20	25	30	40	50	60	75
Prices.	$65.00	$75.00	$85.00	$95.00	$105.00	$125.00	$140.00	$165.00
H. P.	100	125	150	200	250	300	350	
Prices.	$230.00	$270.00	$305.00	$390.00	$460.00	$560.00	$625.00	
H. P.	400	500	600	700	800	900	1,000	
Prices.	$690.00	$790.00	$950.00	$1,100.00	$1,275.00	$1,400.00	$1,500.00	

BUNNELL FEED WATER FILTER.

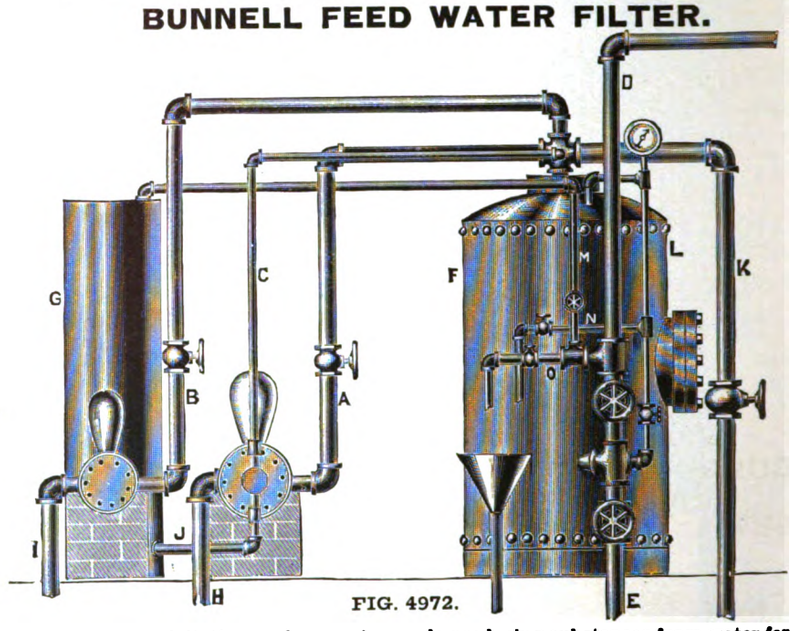


FIG. 4972.

The Bunnell process of chemical precipitation and mechanical filtration, for precipitating and removing scale-producing substances from water for feeding steam boilers, is the only practical apparatus for the purpose ever introduced. By its use feed-water, which is impregnated with the almost universally present scale-producing materials, is positively and completely freed from them before it enters the boiler.

It will be readily understood that the introduction into a steam boiler of water, pure as relates to scale-forming substances, will, in the nature of things, prove a certain preventive of scale, and by no other procedure can this most desirable end be attained.

PRICES ON APPLICATION, STATING ALL CONDITIONS.

NATIONAL FEED HEATERS, WITH BRASS TUBES.

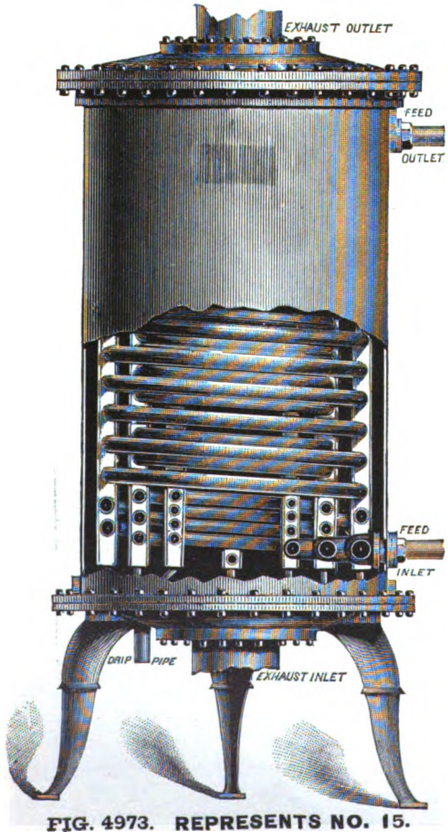


FIG. 4973. REPRESENTS NO. 15.

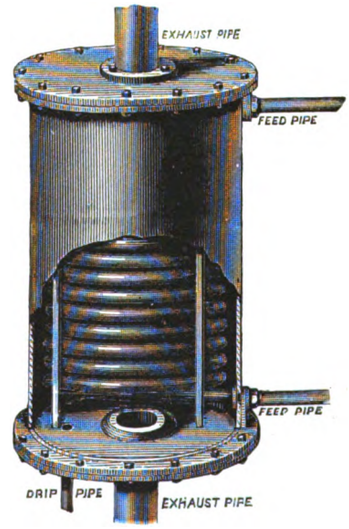


FIG. 4974. REPRESENTS NO. 8.

Nos. 1 to 10 have single coil, Nos. 11 and 12 have 2 coils, Nos. 13, 14, 15 and 16 have 3 coils, No. 17 has 4 coils, and No. 18 has 6 coils.

No. 1 to No. 6 exhaust in and out at top; No. 7, and above, exhaust in at bottom and out at top.

Size of exhaust pipe can be varied to suit engine.

Never reduce the size of the drip pipe, and always keep it open.

In connection with a condenser, it will heat water to 140° or 150°, increasing the vacuum.

PRICES, FIGS. 4973 AND 4974.

No.	Horse power.	Diameter of feed pipe. Inches.	Diam. of exhaust pipe. Inches.	Dimensions of heater. Height Inches.	Dimensions of heater. Diam. Inches.	Prices.
1	8	½	2	11	11	$20.00
2	12	½	2½	17	11	25.00
3	20	¾	2½	16	16	35.00
4	25	1	3	19	19	45.00
5	30	1	4	23	20	55.00
6	40	1	4	25	20	65.00
7	50	1	4	31	20	80.00
8	60	1	4	36	20	100.00
9	80	1	4	41	20	120.00
10	100	1 or 1¼	5	52	20	150.00
10½	125	1¼ or 1½	6	52	22	200.00
11	150	1½	8	52	29	250.00
12	200	1½ or 2	8	58	29	300.00
13	300	2	10	52	42	400.00
14	400	2 or 2½	10	64	42	500.00
15	500	2 or 2½	10	76	42	600.50
16	800	3	12	88	42	1,000.00
17	1,000	3	12	88	56	1,500.00
18	2,000	4½	16	100	70	2,500.00

The diameters given are across the heads, and the height is flange to flange.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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VACUUM EXHAUST STEAM ECONOMIZER.

It converts the water to be purified into vapor, and re-converts the vapor back into a liquid state by the entering water to be purified, preventing any loss of heat units.

The water is supplied to the purifying chamber, in which it is subjected to the action of heat, which removes the impurities from the water, and causes the impurities to fall or descend into the sediment well: the heated vapor rising enters a condensing chamber, and the moment it comes in contact with the condensing surface all of the heat units in the vapor are extracted therefrom, and imparted to the entering volume of water before it enters the vaporizing chamber, and the vapor then drops in the form of liquid at the highest temperature at which it can remain as liquid, and by bringing the water in contact with the steam in the chamber below atmospheric pressure, the water is converted into vapor with a less number of heat units than would be required if pressure above the atmosphere was allowed to accumulate therein.

The pure water remains above the impurities and flows through the delivery pipe.

The grease and light impurities are prevented from passing out with the pure water by the partition wall extending below the level of the delivery pipe, which entirely prevents them from entering the pump.

The check valve upon the overflow is for the purpose of maintaining a partial vacuum within the vacuum exhaust steam economizer, at the same time relieving any pressure or superfluous water contained therein.

The globe valves shown are for removing any accumulation of oil or scum, and for draining the vacuum exhaust steam economizer.

PRICES.

50	horse power and above at	$3.00	per	horse	power.
75	" " " "	2.75	"	"	"
100	" " " "	2.50	"	"	"
150	" " " "	1.75	"	"	"
200	" " " "	1.60	"	"	"
250	" " " "	1.55	"	"	"
300	" " " "	1.50	"	"	"
400	" " " "	1.45	"	"	"
500	" " " "	1.40	"	"	"
750	" " " "	1.30	"	"	"
1,000	" " " "	1.25	"	"	"
1,250	" " " "	1.25	"	"	"
1,500	" " " "	1.25	"	"	"
1,750	" " " "	1.20	"	"	"
2,000	" " " "	1.15	"	"	"

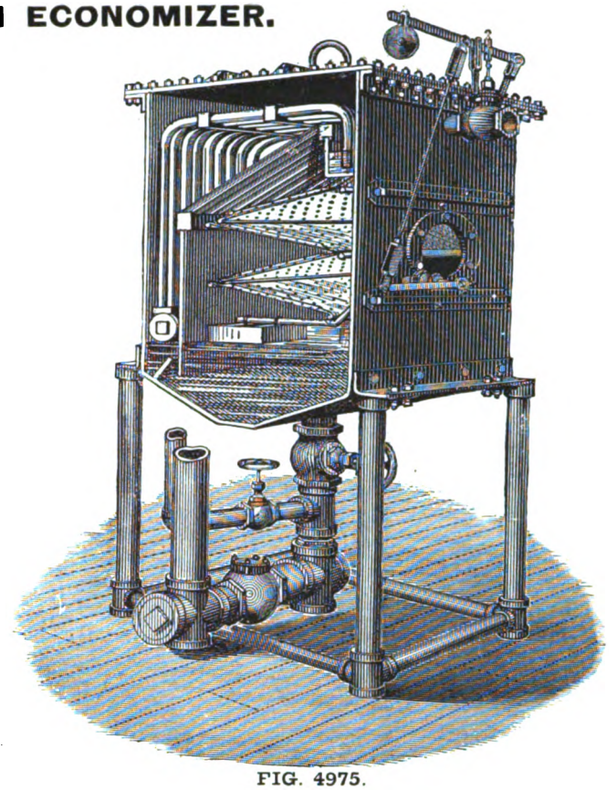


FIG. 4975.

CORRUGATED BRASS HEATER, WITH SETTLING CHAMBER.

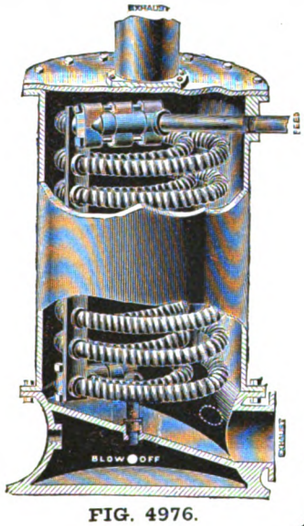


FIG. 4976.

PRICES, FIG. 4977.

Size of pipe, in	¾	1	1¼	1½	2
Diameter of cylinder.	12¼	14¼	16¾	20¼	24
Height of cylinder...	12	14	16½	20	24
Size of exhaust connection					
Feet of pipe in coil..	15	17	24	35	46
Prices	$20.00	$30.00	$45.00	$80.00	$130.00

PRICES, FIG. 4976.

Horse power.	Prices.	Horse power.	Prices.	Horse power.	Prices.	Horse power.	Prices.
8	$20.00	30	$65.00	150	$275.00	700	$1,050
10	25.00	40	80.00	200	350.00	800	1,300
12	30.00	50	95.00	300	475.00	900	1,650
15	35.00	60	115.00	400	585.00	1,000	2,000
20	45.00	80	135.00	500	700.00		
25	55.00	100	170.00	600	850.00		

WROUGHT IRON PIPE COIL HEATER.

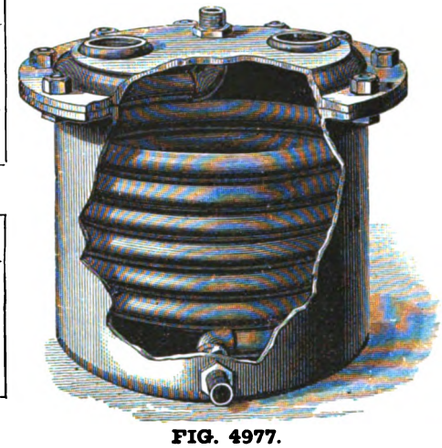


FIG. 4977.

STRATTON SEPARATOR.

The Stratton separator is based on the principle that, if a rotative motion is imparted to the steam, all the liquid particles it may contain, being heavier than the steam, acquire centrifugal force and are projected to the outside of the current.

The separator consists of a vertical cylinder with an internal central pipe, extending from the top downward, for about half the height of the apparatus, leaving an annular space between the two.

The water collected in the separator is at the temperature of the steam and consequently very hot; if it is desired to save this and return it to the boiler, the trap should be made to discharge into the feed tank, from which the pump can take it to feed the boilers.

SCREW ENDS.

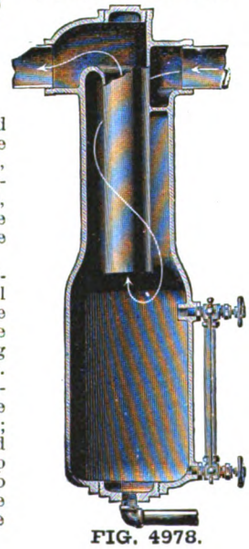


FIG. 4978.

Diameter of steam pipe.	Diameter of body.	Length over all.	Size of drip.	Distance across nozzles. Screwed ends.	Distance between flanges. Flanged ends.	Weight.	Prices. Screwed ends.	Prices. Flanged ends.
1 in.	5½ in.	17 in.	¾ in.	6¼ in.	.....	35 lb.	$12.00	.....
1½ "	6½ "	21 "	¾ "	7¼ "	.....	50 "	20.00	.....
2 "	7¾ "	25½ "	1 "	8½ "	9½ in.	75 "	30.00	$35.00
2½ "	9 "	33 "	1 "	11 "	12 "	130 "	40.00	46.00
3 "	11 "	41 "	1¼ "	12¾ "	13¾ "	200 "	50.00	58.00
3½ "	12½ "	46½ "	1¼ "	14½ "	15½ "	275 "	62.00	72.00
4 "	14½ "	52½ "	1¼ "	15½ "	16½ "	350 "	75.00	87.00
4½ "	15½ "	56 "	1¼ "	17½ "	18½ "	460 "	90.00	104.00
5 "	17 "	64 "	1½ "	. ...	20 "	600 "	.....	126.00
6 "	20 "	76 "	1½ "	.....	22½ "	900 "	.....	160.00
7 "	21½ "	79 "	1½ "	.....	28 "	1,350 "	.....	200.00

We also make separators with top or bottom outlet.

PRICES FOR THESE ON APPLICATION.

FLANGED ENDS.

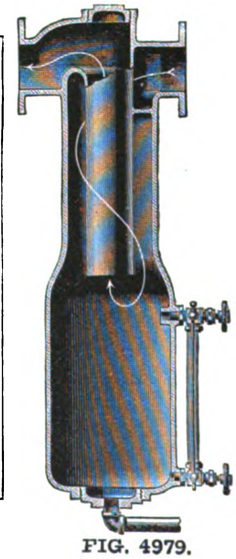
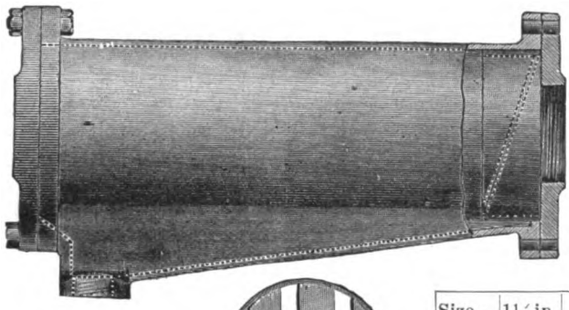


FIG. 4979.

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GREASE EXTRACTORS OR SEPARATORS.

BARNARD'S EXTRACTOR.



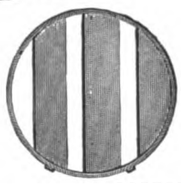


FIG. 4980.

It consists of a shell cast with a sloping pocket at the bottom, a series of rings with sloping bars cast across, and flanges bolted on the ends to connect with the steam pipe.

The end view of ring shows the bars, the space between which is more than the area of the connected steam pipe. The bars of one ring cover the openings of the next, and so on, thus compelling the steam to take a zigzag course through the shell. The oil or water coming in contact with the bars will run down through cored openings at the bottom of bars into the sloping pocket to the opening at bottom, where it is drained off.

Size...	1½ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.
Prices	$35.00	$40.00	$50.00	$60.00	$70.00	$80.00	$100.00	$125.00	$150.00

Larger sizes quoted when desired.

STEWART EXTRACTOR.

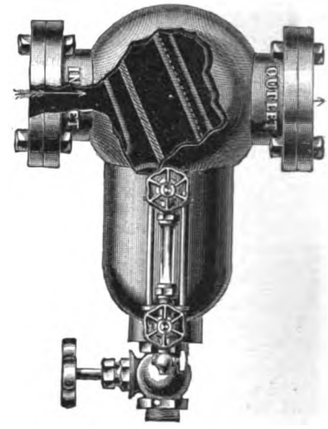


FIG. 4981.

PRICES, FIG. 4981.

1,	$20.00,	oil cylinder,	extra,	$10.00
1¼,	25.00,	"	"	10.00
1½,	30.00,	"	"	10.00
2,	40.00,	"	"	15.00
2½,	45.00,	"	"	15.00
3,	50.00,	"	"	20.00
3½,	60.00,	"	"	20.00
4,	70.00,	"	"	25.00
4½,	75.00,	"	"	25.00
5,	85.00,	"	"	25.00
6,	110.00,	"	"	30.00
7,	125.00,	"	"	30.00
8,	160.00,	"	"	35.00
9,	190.00,	"	"	40.00
10,	220.00,	"	"	45.00

HINE ELIMINATOR.

FOR HORIZONTAL PIPE.

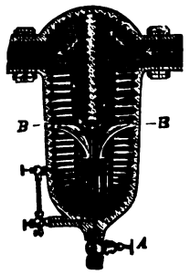


FIG. 4982.

FOR VERTICAL PIPE WHERE COURSE OF STEAM IS DOWNWARD.

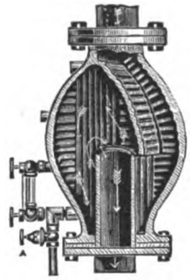


FIG. 4983.

FOR VERTICAL PIPE WHERE COURSE OF STEAM IS UPWARD.

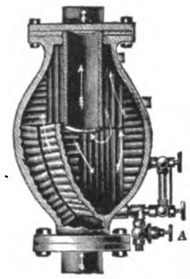


FIG. 4984.

PRICES, FIGS. 4982, 4983 AND 4984.

Sizes of pipe in inches, and prices for eliminator suitable to such sizes. For vertical style under 6 inches, 10 per cent. will be added to these prices.

1-1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
$20.00	$25.00	$30.00	$35.00	$45.00	$52.00	$64.00	$72.00	$83.00	$104.00	$120.00	$145.00	$165.00	$185.00	$225.00

Complete with water gauge, flanges, bolts and drip valve. For larger sizes than herein designated, prices will be given.

The especial features in construction and method of operation of the eliminator will be seen by referring to the sectional views here given. The interior surfaces are deeply corrugated throughout, which adds greatly to their strength and serves to break up the steam in its passage through.

In figure 4982, horizontal style, a corrugated vertical diaphragm interposes between the inlet and outlet side. By force of the incoming current the steam is driven against this diaphragm, and by expansive impingement of the transverse corrugated surfaces, the initial separation takes place before the turning of the steam into the outlet side. At proper aërial distances below this vertical diaphragm are two converging discs B B, between which the particles eliminated pass into the chamber below, out of and away from the steam current, and are discharged from valve A, while the clean dry steam passes on under the diaphragm, being deflected by an inward extending pipe at the point of outlet.

Figures 4983 and 4984, vertical style. At the side on one end, a corrugated deflecting partition extends half the length of the body, forming the inlet. At the opposite end a vertical pipe cast with a flange and standing out from the body forms the outlet. The steam in passing through the deflecting partition obtains centrifugal action, and by expansive contact with the inner corrugated surfaces is broken up, and the water, oil, grease or other particles eliminated readily flow down the vertical corrugations and out, while the steam, diverted from its direct current, passes through the vertical pipe to point of delivery.

CURTIS STEAM SEPARATOR.

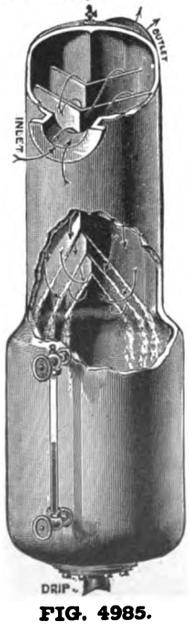


FIG. 4985.

For supplying dry steam to steam engines, steam pumps, etc.

The purpose of this steam separator is to obviate the trouble in steam pipes leading from boilers, by removing the entrained water, and supplying dry steam to engine cylinders and steam pumps, also preventing condensation in heating pipes, etc. By examination of the sectional view, it will be seen that the steam, in its passage through the separator, is sharply deflected downward, and then as sharply deflected upward. Steam, being a highly elastic fluid, readily accommodates itself to these changes of direction. The water and solids, by their momentum, continue onward instead of turning with the steam, and are projected against the inclined faces of the deflectors, and gradually falling are gathered in a stream against the back side of the separator, and flow downward to the base. The separation is perfect.

PRICES, FIG. 4985.

Size of steam pipe.	Prices.	Size of steam pipe.	Prices.
2 inch.	$34.00	7 inch.	$101.00
3 "	40.00	8 "	128.00
4 "	52.00	9 "	162.00
5 "	64.00	10 "	204.00
6 "	80.00	12 "	306.00

THE DANIELS EXHAUST PIPE HEAD.

This head can be used on all exhaust pipes, as it keeps the roof perfectly dry, and prevents the accumulation of ice, and avoids spattering of pavements and buildings with water.



FIG. 4986.

PRICES, FIG. 4986.

SCREWED.		FLANGED.	
Sizes for 2 inch iron pipe	$25.00	Sizes for 5 inch iron pipe	$50.00
" 2½ " "	27.50	" 6 " "	60.00
" 3 " "	30.00	" 8 " "	85.00
" 3½ " "	35.00	" 10 " "	120.00
" 4 " "	40.00	" 12 " "	150.00

Sizes made up to 24 inches.

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EXHAUST PIPE HEADS.

MAYPOLE'S.

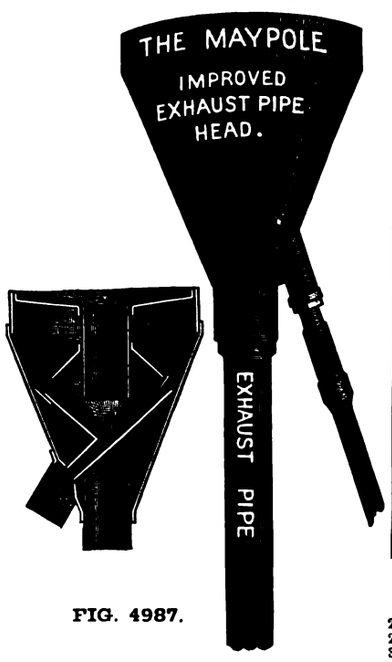


FIG. 4987.

PRICES, FIG. 4987.

1½ in. pipe	$22.00	10 in. pipe	$150.00
2 or 2½ in. pipe	28.00	12 "	175.00
3 " 3½ "	35.00	13 "	200.00
4 " 4½ "	45.00	14 "	235.00
5 in. pipe	55.00	15 "	250.00
6 "	66.00	16 "	285.00
7 "	85.00	17 "	315.90
8 "	100.00	18 "	350.00
9 "	120.00		

PRICES, FIG. 4988.

Size exhaust pipe.	Prices.	Dimensions. Width.	Dimensions. Height.	Diam. of drip pipe.
1 in. or 1¼ in.	$20.00	13 in.	17 in.	¾ in.
2 in. or 2½ in.	25.00	16 "	21 "	1 "
3 in. or 3½ in.	30.00	19 "	24 "	1 "
4 in. or 4½ in.	40.00	22 "	28 "	1 "
5 in.	50.00	25 "	32 "	1¼ "
6 in.	60.00	29 "	36 "	1¼ "
7 in.	75.00	33 "	42 "	1¼ "
8 in.	90.00	36 "	46 "	1½ "
9 in.	105.00	40 "	51 "	1½ "
10 in.	125.00	44 "	55 "	2 "
11 in. or 12 in.	150.00	48 "	61 "	2 "
13 in.	175.00	52 "	65 "	2½ "
14 in.	200.00	56 "	70 "	2½ "
15 in.	235.00	61 "	74 "	3 "
16 in.	250.00	64 "	80 "	3 "
17 in.	270.00	68 "	85 "	3½ "
18 in.	300.00	73 "	90 "	3½ "

PRICES, FIG. 4989.

2 inch	$25.00	5 inch	$50.00
2½ "	28.00	6 "	60.00
3 "	30.00	7 "	70.00
3½ "	35.00	8 "	85.00
4 "	40.00	10 "	120.00
4½ "	45.00	12 "	150.00

LYMAN'S.

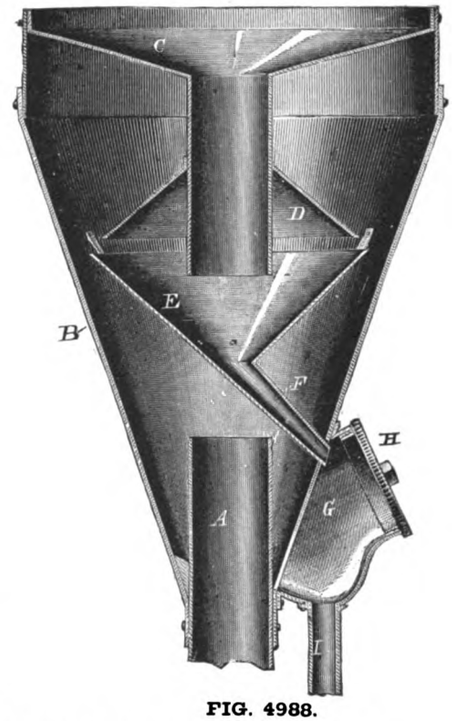


FIG. 4988.

CENTRIFUGAL HEAD.

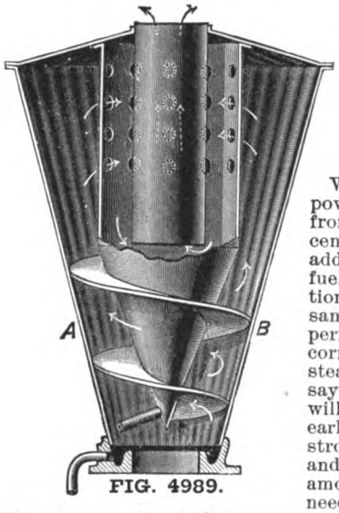


FIG. 4989.

Will increase the power of engine from 20 to 30 per cent. without any additional cost of fuel or consumption of steam, or same duty can be performed with a corresponding less steam pressure—say 12 lbs.—which will admit of an earlier cut-off on stroke of piston, and economize the amount of fuel needed.

This is accomplished by connecting the exhaust pipe to a condensing chamber where a continuous vacuum is maintained. The vacuum which can be maintained in condensing operations depends on the quantity and temperature of the water at disposal, the degree of perfection of engine, and the sizes of ports and passages in engine cylinder as compared with the amount of evaporation. 24 inches or 12 lbs. per square inch can be adopted as a safe basis of economy when using a condenser on a steam engine. This exhaust steam adjustable condenser induces and maintains a current of water by the action of the exhaust steam, thus providing for its own water supply without the aid of any pump whether lifting or from a head of water, and when the water supply flows to condenser, only one foot head is required without the need of tail pipe below, or tank above. If the water has to be lifted, a small jet of live steam, or water pressure jet, is employed to bring the water to condenser, and, after starting, this jet can be closed, and the action of the exhaust steam alone will continue to lift and discharge the water as long as the exhaust steam supply continues and the air is excluded, which necessitates tight connections and stuffing boxes. The construction of this condenser allows it to act as a perfect air pump by reason of utilizing the exhaust steam velocity, which removes any air that is contained in the steam, and ejects the water in a continuous stream as it passes through the condenser.

EXHAUST STEAM ADJUSTABLE CONDENSER.

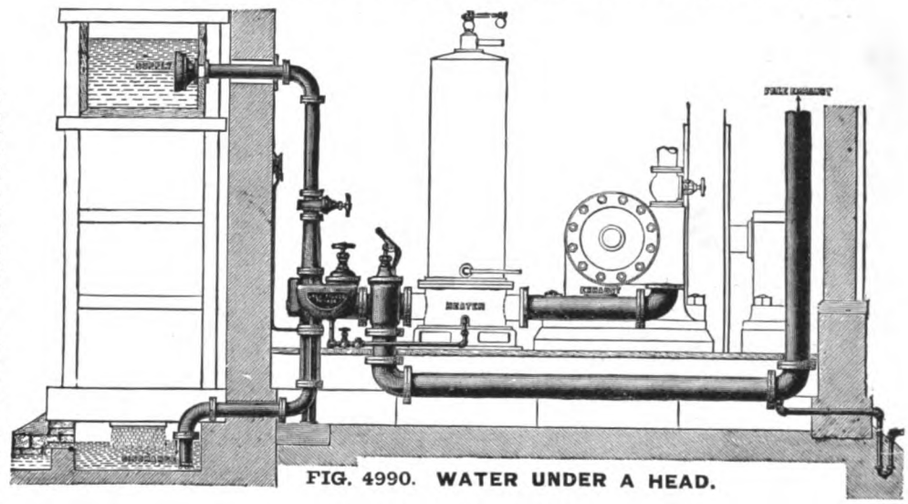


FIG. 4990. WATER UNDER A HEAD.

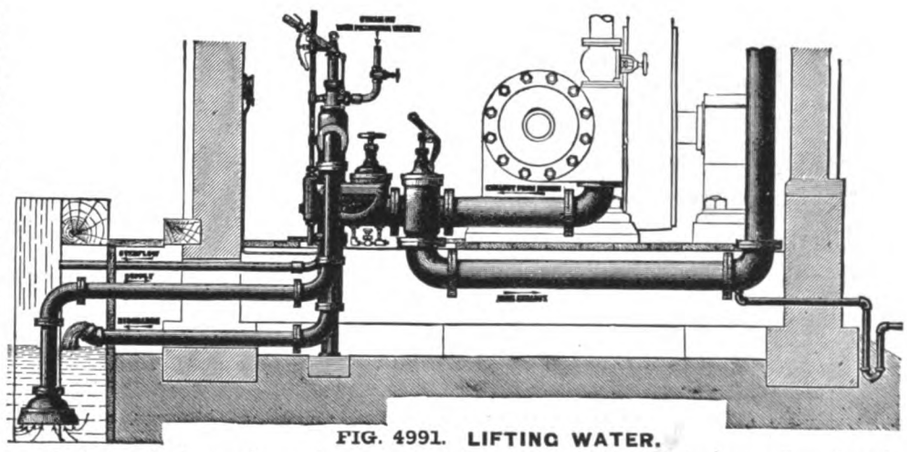


FIG. 4991. LIFTING WATER.

When inquiring for condenser please state diameter and stroke of piston, steam pressure, revolutions per minute, point of cut-off, and style of engine. If a head of water is available state height of fall; if water has to be lifted state height of lift and distance of water from engine.

PRICES ON APPLICATION.

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STEAM BLOWERS, ETC.

ARCAND STEAM BLOWER.

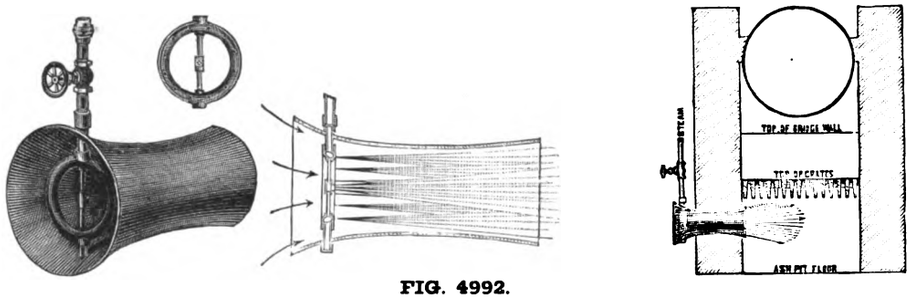


FIG. 4992.

PRICES, LARGE SIZE, $..... SMALL SIZE, $.....

PARSON'S BLOWER.

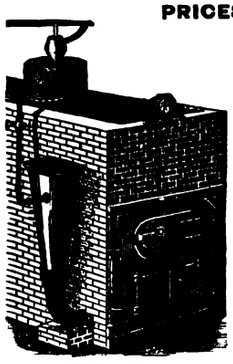


FIG. 4993.

PRICES, FIG. 4993.

No. 1.	Small size, say 1 to 20 horse boiler.....	$75.00
No. 2.	Medium size, say 20 to 70 horse boiler.....	100.00
No. 3.	Large size, say 70 to 200 horse boiler.....	125.00

This price includes elbow for casing.

DESCRIPTION, FIG. 4994.

Produces a powerful suction at base of chimney sufficient to create the highest possible draught, with very little use of steam.

We also furnish these machines made of lead to remove acid fumes.

STEAM PIT CHIMNEY, DRAUGHT IMPROVER.

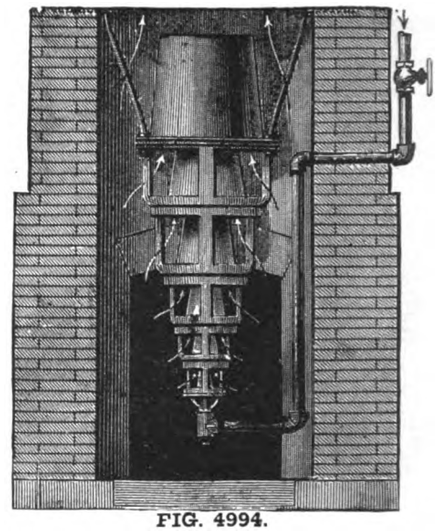


FIG. 4994.

Inside diameter of chimney suitable for	Prices.	Size of steam pipe.
6 in. chimney flue.	$15.00	¼ in.
10 in. " "	25.00	½ "
18 in. " "	40.00	¾ "
24 in. " "	60.00	¾ "
36 in. " "	90.00	1 "
60 in. " "	150.00	1 "
72 in. " "	300.00	1 "

"BAIRD'S EVAPORATOR."

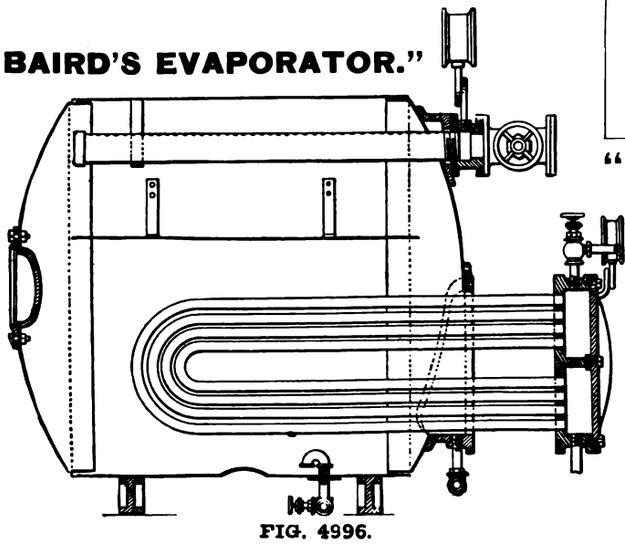


FIG. 4996.

"BAIRD'S EVAPORATOR."

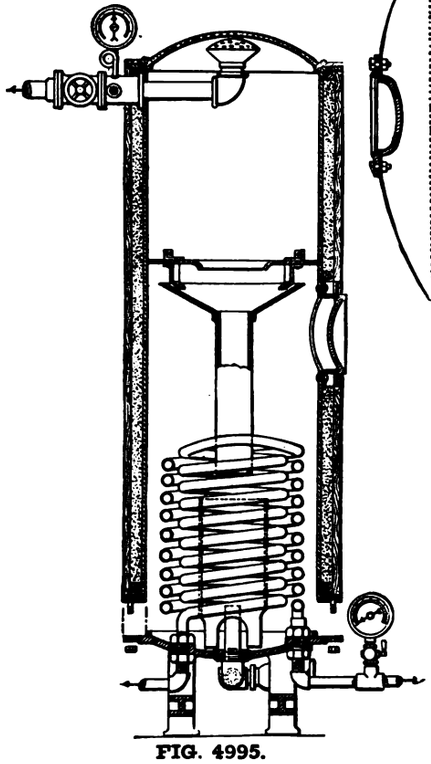


FIG. 4995.

Baird's evaporator is for making fresh water from sea water, and is used in ships, hospitals, and laboratories.

Three types are shown, and the coils are shown partly uncovered for scaling.

The external dimensions may be varied to accommodate them to varying circumstances.

"BAIRD'S EVAPORATOR."

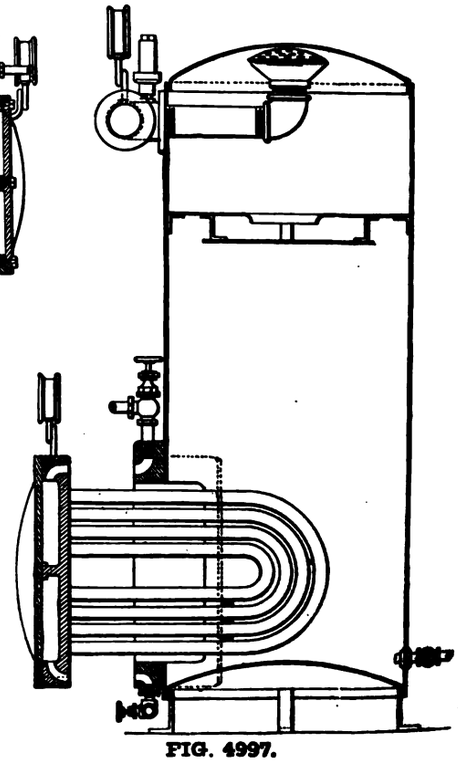


FIG. 4997.

Size number.	Capacities per day. Gallons of drinking water.	Capacities per day. Tons of feed water.	Diameter of shell. Inches. Fig. 4995.	Diameter of shell. Inches. Fig. 4996.	Diameter of shell. Inches. Fig. 4997.	Axial length. Inches. Fig. 4995.	Axial length. Inches. Fig. 4996.	Axial length. Inches. Fig. 4997.	Size number of distiller required.	Size number of (Baird) steam trap required.	Size number of (Davidson) feed pump required.	Diameter of feed.	Diameter of drain to trap.	Diameter of steam pipe to distiller.	Diameter of steam pipe to condenser.	Diameter of live steam pipe from boiler.	Prices.
½			17			70					0	½	½	¾	1½	¾	$.....
1	600	6	21		19	72		72	1	1	½	¾	¾	1	2½	¾	.....
2	1,200	12	27	36	27	72	48	72	2	1	1	1	1	1¼	2½	1	.....
3	3,000	30	33	48	34	72	60	76	3	1	1	1	1	1¼	3	1¼	.....
4	4,000	40	33	54	40	96	70	84	4	1	1	1	1	1½	3½	1½	.....
5	5,000	50	55	58	44	96	74	84	5	2	1½	1½	1¼	2	4	2½	.....
6	6,000	60	55	75	60	130	81	84	6	6	1½	1½	2	2	6	2½	.....

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BAIRD'S FRESH WATER DISTILLING APPARATUS.

PRICES, FIG. 4998.

Size.	Capacity, in gallons, per day.	Dimensions. Diameter, in inches.	Dimensions. Height, in inches.	Prices.
0	100	10	30	$.....
1½	400	16	42	.....
1	600	17	60	.....
2	1,200	22	66	.....
3	1,600	23	72	.....
3½	2,000	23	76	.....
4	2,500	26	78	.....
4½	2,500	26	80	.....
5	5,000	27	80	.....
6	5,500	30	84	.....

For steamships, ice factories, hospitals, chemical laboratories, etc. This apparatus distills, aërates and filters water, giving a chemically pure output. The coils are of copper, tin lined. Nos. 3½ and 5 have brass shells; the other sizes have iron shells.

In ordering, state style of shell, and space apparatus must be fitted into.

Prices on application.



FIG. 4998.

ASHCROFT STANDARD TEST STEAM GAUGES.

PRICES, FIG. 4999.

Brass case.

10 inch dial	$50.00
8½ " "	40.00
6¾ " "	30.00
6 " "	25.00
5½ " "	20.00
4½ " "	16.00
3½ " "	14.00
3 " "	14.00

Nickel-plating extra.

These gauges are made with great care and tested and adjusted with the utmost precision from an open mercury column, and are unequaled for delicate accuracy and elegance of workmanship.

The springs are made of solid drawn seamless tube, graduated by open mercury column and scaled in one pound marks.

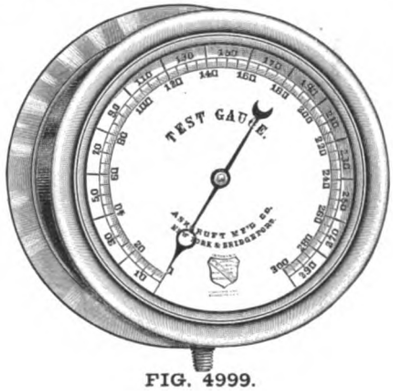


FIG. 4999.

ASHCROFT AMMONIA GAUGES.

For ammonia, acid or other liquids or gases that must be kept from brass.

PRICES, FIG. 5000.

Iron cases and rings.

8½ inch dial	$45.00
6¾ " "	40.00
6 " "	35.00

These springs are made of a special quality of steel, and are tempered by a process insuring uniformity, durability and correctness of indication.

In ordering, state whether a compound scale showing pressure and vacuum, or pressure only, is required.

If wanted with connection at back, it has to be stated in ordering.

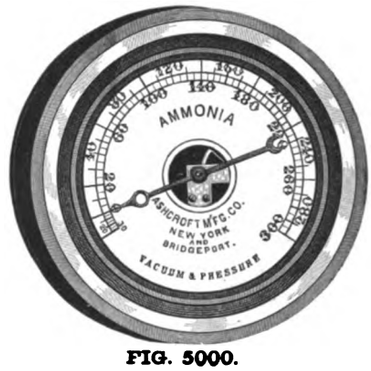


FIG. 5000.

ASHCROFT HYDRAULIC GAUGES,

WITH SPECIAL STEEL TUBE FOR HIGH PRESSURES.

PRICES.

Brass case.		Iron case, japanned.	
12 inch dial	$125.00	12 inch dial	$110.00
10 " "	100.00	10 " "	90.00
8½ " "	80.00	8½ " "	70.00
6¾ " "	60.00	6¾ " "	50.00
6 " "	40.00	6 " "	35.00

Maximum hand, extra, $5.00.

No extra charge for marking tons on dials. Nickel-plating extra. Hydraulic check valves and cocks, extra.

Hydraulic cock for gauge	$6.00
" check valve for gauge	3.50

In ordering, state maximum pressure required.

If dial is to show pressure in tons on ram, give exact diameter of ram.

With independent maximum pressure registering hand, $5.00 extra, net.

In these gauges a heavy steel tube bored from a solid bar is substituted for the seamless drawn tube, for all pressures over 800 lbs. to the square inch.

We warrant the indications of pressure on these gauges to be correct. Higher pressures, up to 20,000 lbs., we have proved to be practically correct by an expensive machine built for and in use in our own shops.



FIG. 5001.

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ASHCROFT STEAM GAUGES.

SINGLE BOURDON SPRING PRESSURE AND VACUUM GAUGES.

WITH SOLID DRAWN SEAMLESS TUBES.

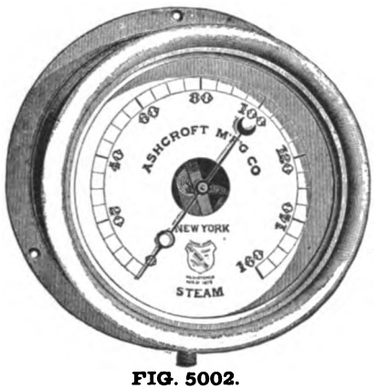
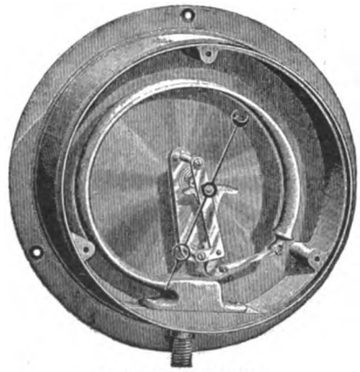


FIG. 5002.



INTERIOR VIEW.

PRICES, INCLUDING COCKS UP TO 300 LBS. PRESSURE.

Brass case.		Iron case, japanned.	
12 inch dial	$75.00	12 inch dial	$50.00
10 " "	40.00	10 " "	32.00
8½ " "	30.00	8½ " "	22.00
6¾ " "	20.00	6¾ " "	16.00
6 " "	16.00	6 " "	13.00
5½ " "	12.00	5½ " "	10.00
5 " "	11.00	5 " "	8.00
4½ " "	10.00	4½ " "	8.00
3½ " "	9.00	3½ " "	7.00
3 " " or smaller	8.00	3 " " or smaller	6.00

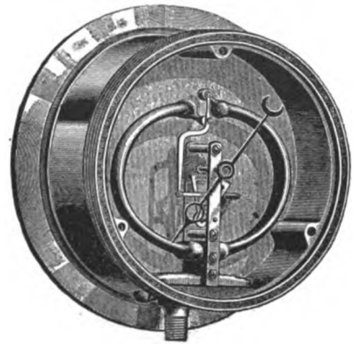
Nickel-plating extra.

No gauge warranted unless properly connected with syphon.

DOUBLE TUBE LOCOMOTIVE AND STEAM FIRE ENGINE GAUGE AND ELASTIC PACKING RING.



FIG. 5003.



INTERIOR VIEW.

PRICES, INCLUDING COCKS.

Brass case.		Iron case, japanned.	
12 inch dial	$80.00	12 inch dial	$55.00
10 " "	45.00	10 " "	37.00
8½ " "	34.00	8½ " "	25.00
6¾ " "	22.00	6¾ " "	18.00
6 " "	18.00	6 " "	15.00
5½ " "	14.00	5½ " "	12.00
5 " "	13.00	5 " "	11.00
4½ " "	12.00	4½ " "	10.00

Nickel-plating extra.

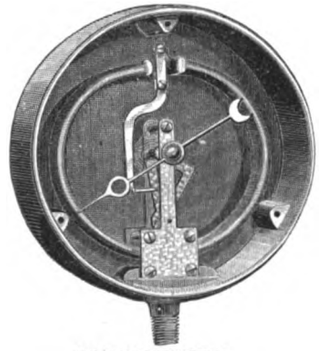
No gauge warranted unless properly connected with syphon.

This gauge is so constructed that the entire movement, movement frame and spring are removed from contact with the back of the case, thus preventing any disturbance from expansion of the case, and also prevents the liability of warping the movement when the gauge is secured to an uneven frame or support. Where the movement is attached to the back of the case all spring of the case is communicated direct to the movement. The elastic packing ring hermetically seals the case of the gauge, making it impervious to moisture from the steam of the gauge cocks, as well as dust that would injure the movement. The spring is made of a specially prepared, highly tempered, seamless drawn tube, which makes a more uniform, elastic and durable spring than is made in any other make of Bourdon gauge. The figures on the dial are large and plain. The case is heavy and substantial. All parts of the movement are absolutely interchangeable. The teeth in the segments and pinions are cut on improved gear cutters, and the face of the segment is very broad and the teeth deep, thus preventing lost motion from wear.

SPECIAL FARM AND TRACTION ENGINE STEAM GAUGE, LOCOMOTIVE STYLE.



FIG. 5004.



INTERIOR VIEW.



Every gauge stamped with trade mark.

With O. G. or close nickel ring—name on dials—with or without flange on back, and bracing attachment, as may be ordered.

PRICES.

5½ inch dial, with cock or syphon	$12.00
5 " " " "	11.00
4½ " " " "	10.00

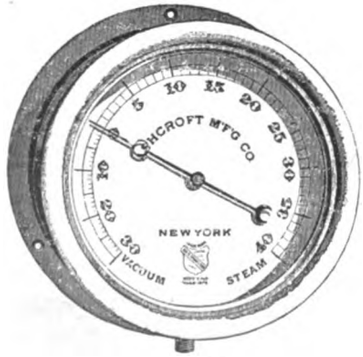


FIG. 5005.

COMPOUND PRESSURE AND VACUUM GAUGE.

PRICES, INCLUDING COCKS.

Brass case.		Iron case, japanned.	
12 inch dial	$80.00	12 inch dial	$60.00
10 " "	50.00	10 " "	40.00
8½ " "	40.00	8½ " "	30.00
6¾ " "	25.00	6¾ " "	20.00
6 " "	20.00	6 " "	16.00
5½ " "	16.00	5½ " "	14.00
4½ " "	14.00	4½ " "	12.00
3½ " "	12.00	3½ " "	10.00

Deep cases and nickel-plating extra.

A syphon must be used in connecting this gauge.

The adoption of compound engines has created a demand for a gauge showing both pressure and vacuum on the same dial. These gauges are graduated from two mercury columns, showing pressure and vacuum, and are warranted correct.

Pressure range from 30 inches to 60 lbs. of pressure.

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ASHCROFT STEAM GAUGES.
DEEP CASE STEAM VACUUM AND BACK PRESSURE GAUGES.

State, in ordering, if blind back or the usual connections are wanted.

These gauges have the same movements as those described on page 622 and are mounted in cases to correspond with those of the revolution counters, which require the deep case to give uniformity in appearance of sets of instruments.

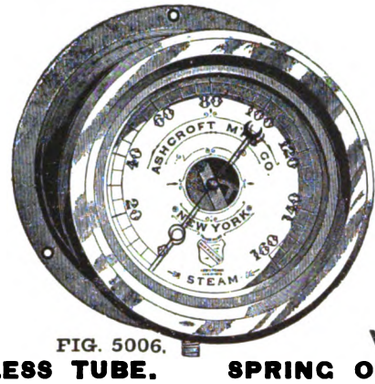


FIG. 5006.

WITH DOUBLE BOURDON SPRING OF SOLID DRAWN SEAMLESS TUBE.

PRICES, INCLUDING COCKS.

Brass case.

12	inch dial	$85.00
10	" "	49.00
8½	" "	37.50
6¾	" "	25.00

Nickel-plating extra.

WITH SINGLE BOURDON SPRING OF SOLID DRAWN SEAMLESS TUBE.

PRICES, INCLUDING COCKS.

Brass case.

12	inch dial	$80.00
10	" "	44 00
8½	" "	33.50
6¾	" "	23.00

Nickel-plating extra.

FRAMES FOR SETS OF INSTRUMENTS.

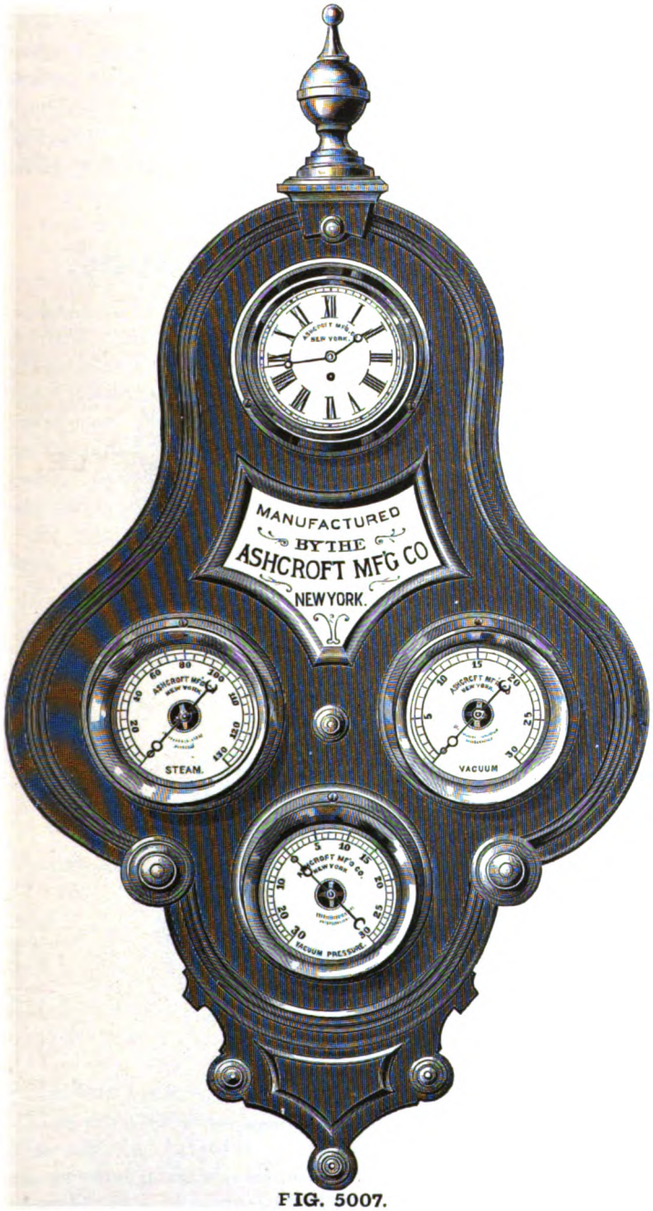


FIG. 5007.

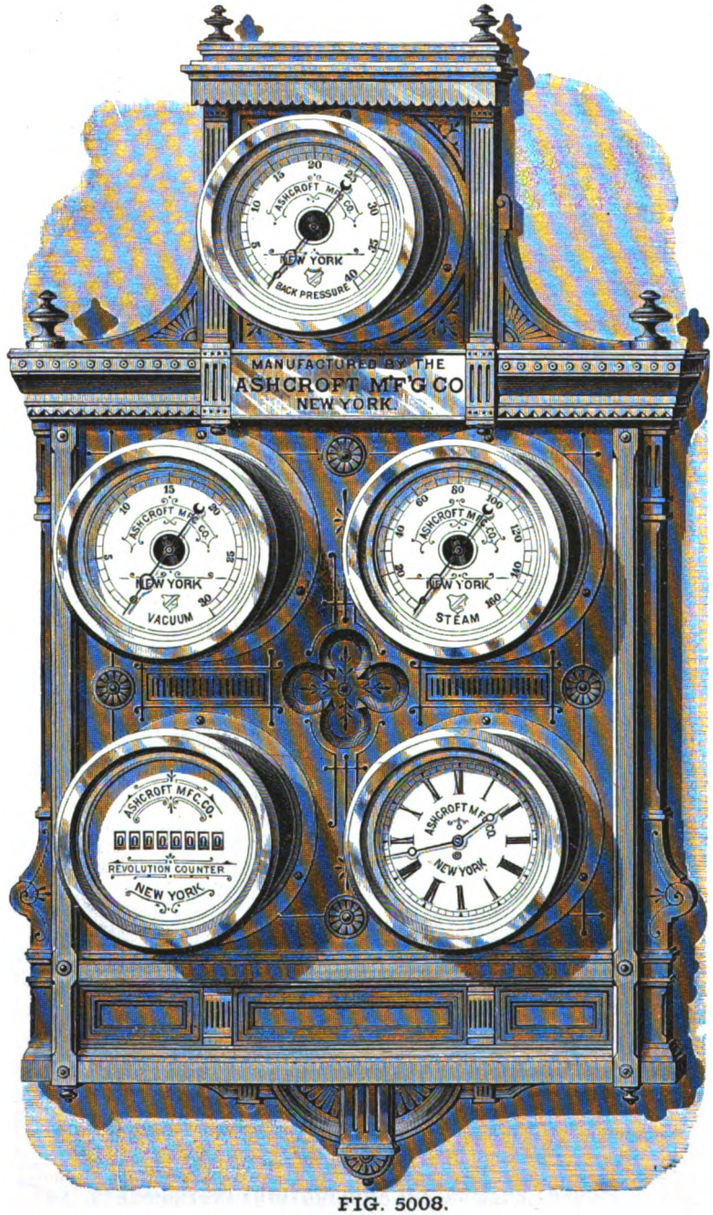


FIG. 5008.

PRICES: FRAMES, ON APPLICATION; INSTRUMENTS, AS PER RESPECTIVE LISTS.

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ASHCROFT DEEP CASE DOUBLE BOURDON SPRING MARINE GAUGES.

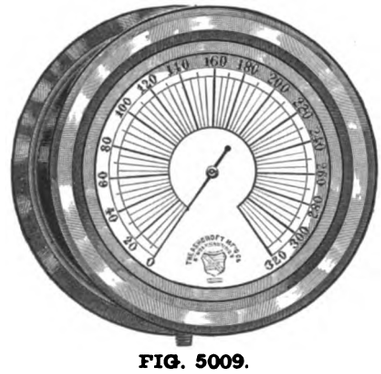


FIG. 5009.

PRICES, INCLUDING COCKS.

BRASS CASE.

12	inch double Bourdon spring		$85.00
10	" " " "		49.00
8½	" " " "		37.50
6¾	" " " "		25.00
6	inch double Bourdon spring		$20.00
5⅜	" " " "		18.00
4⅛	" " " "		14.00

IRON CASE.

12	inch double Bourdon spring		$55 00
10	" " " "		37.00
8½	" " " "		25.00
6¾	" " " "		18.00
6	inch double Bourdon spring		$15.00
5½	" " " "		12.00
4½	" " " "		10.00

The principle of the above gauge is in extending the pressure graduations on the dial nearer the center, and by using the short balanced hand to reduce the motion of the pointer to a minimum.

FRAMES FOR SETS OF INSTRUMENTS.

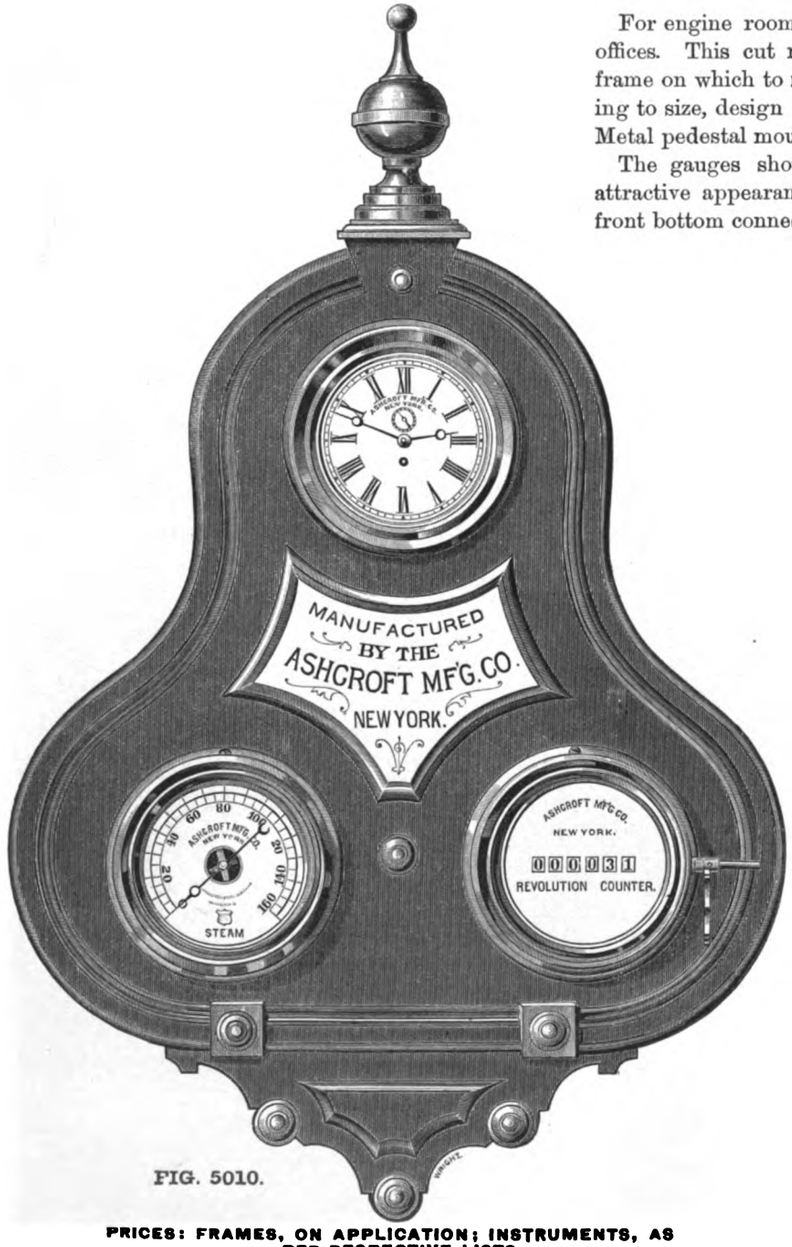


FIG. 5010.

For engine rooms of factories, corporations, mills, water-works, steamships, offices. This cut represents one of many designs of an ornamental wooden frame on which to mount instruments. They cost from $15.00 upward, according to size, design and finish. Special metal frames and name plates to order. Metal pedestal mountings, for single instrument, $5.00 and upward.

The gauges shown, having blind back connections, present a neat and attractive appearance. Orders should state whether blind back or the usual front bottom connections are wanted.

PRICES: FRAMES, ON APPLICATION; INSTRUMENTS, AS PER RESPECTIVE LISTS.

DUPLEX AIR BRAKE GAUGE.

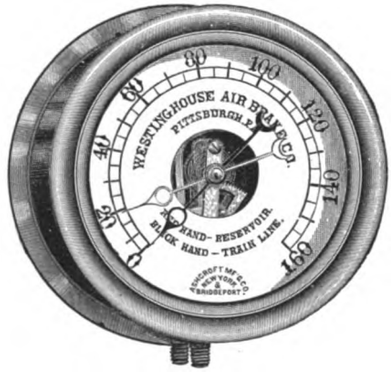
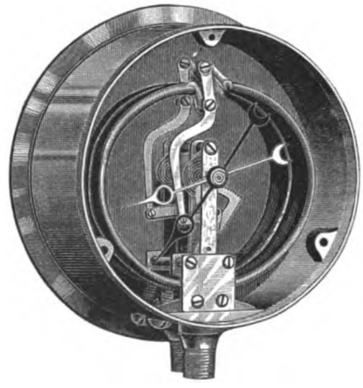


FIG. 5011.



INTERIOR VIEW.

PRICE.

5½ inch deep, brass case.....$20.00

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ASHCROFT SELF-TESTING PRESSURE OR VACUUM GAUGES.

PRICES.

A No. 1.	10 inch dial,	brass case	.....	$60.00
" 2.	8½ "	"	.....	48.00
" 3.	6¾ "	"	.....	36.00
" 4.	6 "	"	.....	30.00
" 5.	5½ "	"	.....	26.00

All these gauges have patent elastic packing rings.

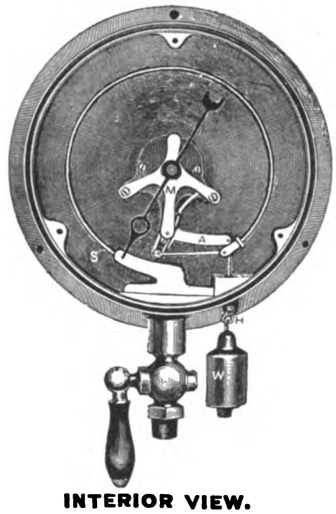
Gauges showing pressure and vacuum on one dial made to order.

Nickel-plating extra.

This gauge has two sets of graduations on dial; the outer is for working, the inner for testing.

To test.—Unscrew the small weight at top, also cap from bottom, and hang weight on hook. If on testing the indicating hand is brought back to the point that it showed pressure or vacuum on working graduation, the gauge is correct.

This is a valuable invention, putting in the hands of the operator, at any moment, a proof of the accuracy of his gauge.



INTERIOR VIEW.

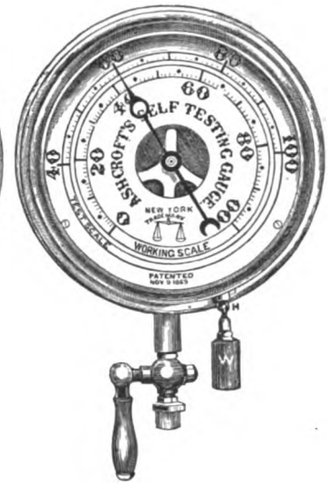


FIG. 5012.

TIME AND PRESSURE REGISTERING STEAM GAUGE.

This gauge gives an accurate record of all variations of steam pressure, with the hour of such changes. The steam gauge is made with the solid drawn Bourdon spring. The indicating hand is connected with and moves the recording pencil over the paper revolved by the clock. The clock is a special E. Howard & Co., full jeweled, chronometer movement. The whole mechanism is enclosed in a japanned and ornamented metal case. It can be placed either in the office or engine room, and, being secured by lock and key, cannot be tampered with.

In ordering, state working pressure.

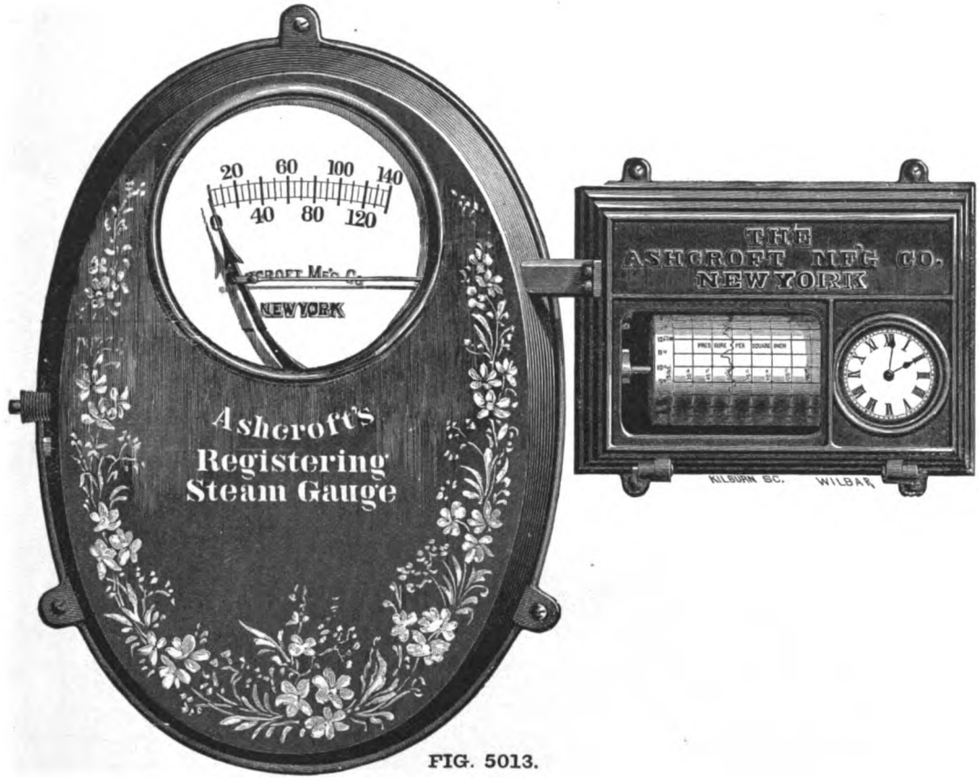


FIG. 5013.

COMBINATION WATER PRESSURE GAUGES.

Springs of solid drawn seamless tube. For water works, pumping stations, mines, etc., showing pressure and feet in column of water.

PRICES, INCLUDING COCKS.

Brass case.		Iron case, japanned.	
12 inch dial	$80.00	12 inch dial	$60.00
10 " "	50.00	10 " "	40.00
8½ " "	40.00	8½ " "	30.00
6¾ " "	25.00	6¾ " "	20.00
6 " "	20.00	6 " "	16.00
5½ " "	16.00	5½ " "	14.00

Nickel-plating extra.

State, in ordering, the highest working pressure or feet to be recorded.

This gauge has two sets of graduations, one showing pounds pressure to the square inch, the other showing height in feet of water in column.

It is used to show pressures developed by pumps, in mines, working against not only head, but resistance of friction and turns in pipes.



FIG. 5014.

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SYPHON COCKS FOR STEAM GAUGES.

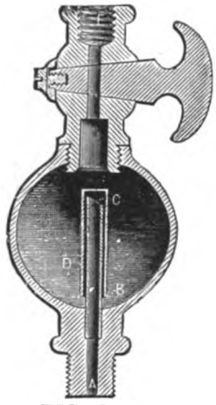


FIG. 5015.



FIG. 5016.

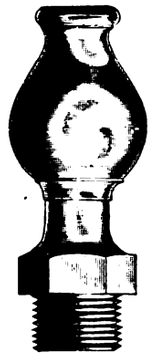


FIG. 5017.

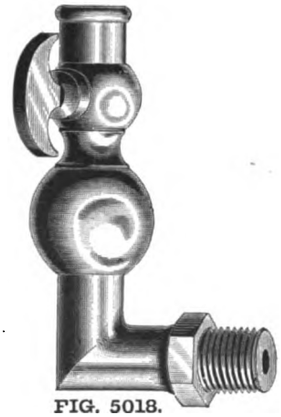


FIG. 5018.

PRICES.

Straight syphon, without cock, Fig. 5017	$1.00
" " with " " 5016	1.50
Elbow " " " " 5018	1.50
" " without "	1.25
Common iron pipe syphon, each	.25
" brass " " "	1.00

Nickel-plating extra.

Adapted for traction and portable engines. No steam gauge should be used without a syphon between gauge and the boiler to protect the movement from expansion by heat and to secure water in the spring of the gauge when in use.

The sectional cut shows a loose cap over the pipe which extends into the chamber; this deflects the entering steam which condenses in the chamber, effectually stopping live steam from reaching the spring of the gauge. The cap over pipe falls as pressure is removed, making a syphon which empties the water from the chamber, thus preventing danger of bursting from action of frost.

T HANDLE STEAM GAUGE COCK.



FIG. 5019.

PRICES.

Common T handle brass cock, for steam gauge,	$0.50
Heavy T " " " " "	1.00

UNION STEAM GAUGE COCK.

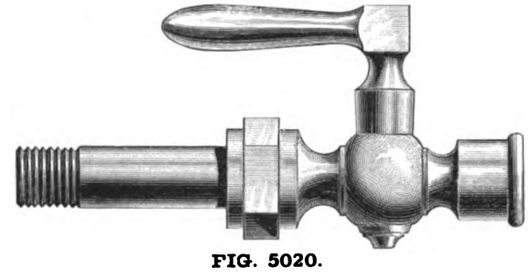


FIG. 5020.

PRICES.

Small union brass cock, for steam gauge	$1.50
Large " " " " "	2.00

ASHCROFT TEST PUMPS AND TEST GAUGES.

INSPECTORS.



FIG. 5021.

PRICE, $45.00.

This set consists of

1 Nickel-plated test pump.
1 " 3½ in. dial test gauge, 300 lbs., 1 lb. marks.
1 " union cock.
2 " ¼ hexagon couplings.
1 steam gauge hand remover.

This set in velvet-lined morocco case weighs 8 lbs.

BOILER TEST PUMP.

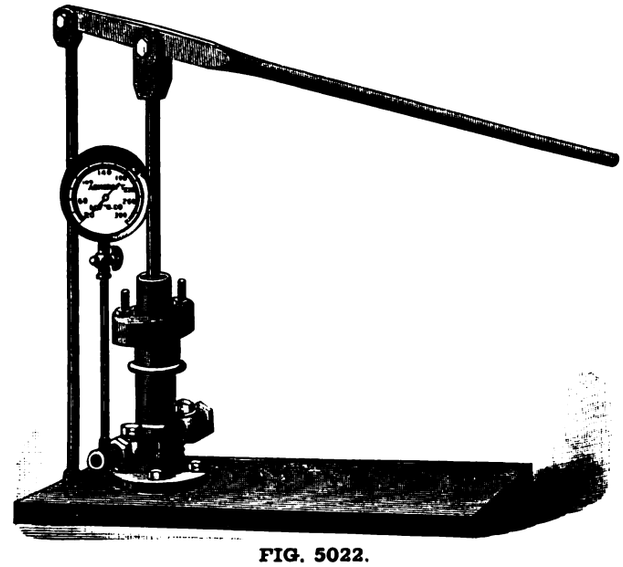


FIG. 5022.

PRICES.

Price complete, with pressure gauge	$35.00
Price, without pressure gauge	30.00

Used by boiler makers and inspectors to put cold water pressure up to 300 pounds on boilers. Plunger, 1½ inch diameter.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ASHCROFT TEST PUMPS.

SCREW TEST PUMP AND GAUGE.

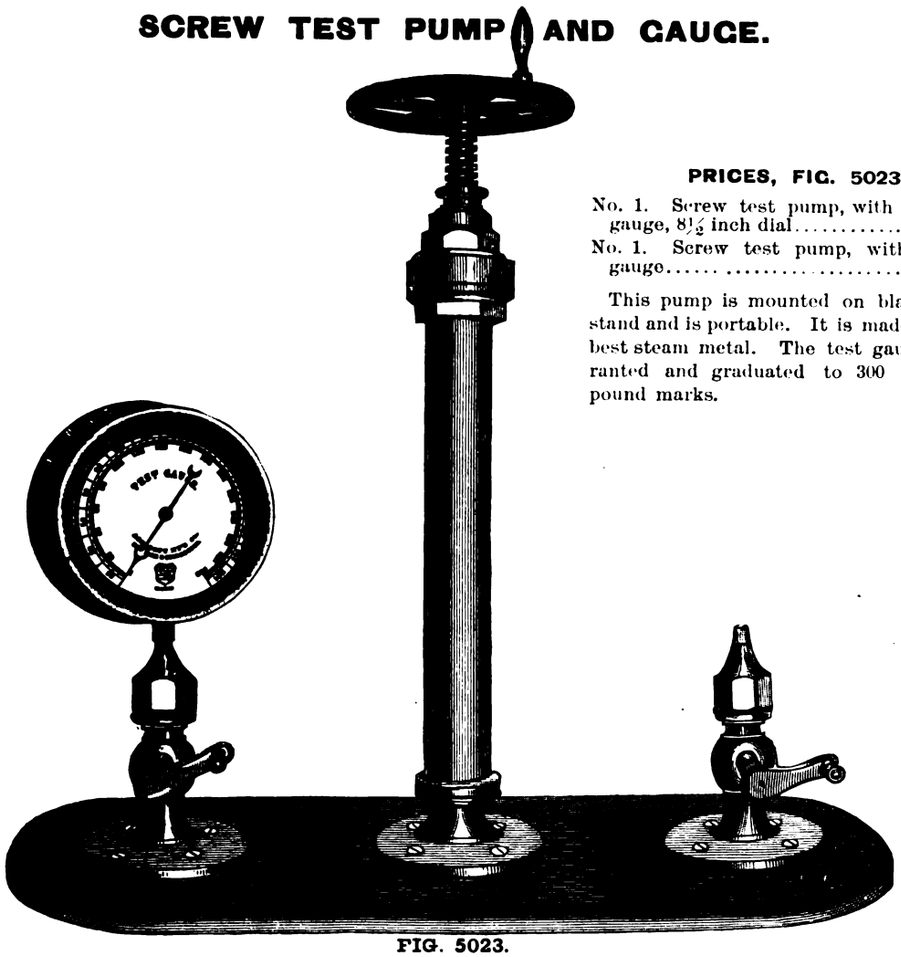


FIG. 5023.

PRICES, FIG. 5023.

No. 1. Screw test pump, with test gauge, 8½ inch dial	$75.00
No. 1. Screw test pump, without gauge	35.00

This pump is mounted on black walnut stand and is portable. It is made from the best steam metal. The test gauge is warranted and graduated to 300 pounds by pound marks.

LEVER TEST PUMP.

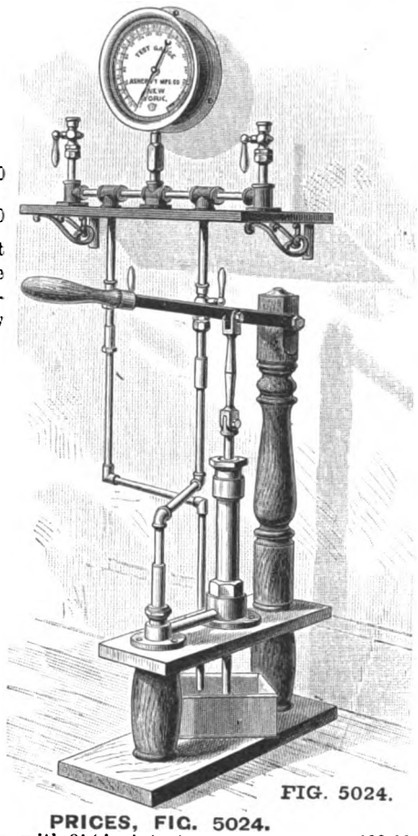


FIG. 5024.

PRICES, FIG. 5024.

Test pump, with 8½ inch test gauge	$90.00
Test pump, with 6¾ inch test gauge	80.00
Test pump only	50.00

This pump is worked with lever; all the necessary check valves, cocks, unions, fittings, pipes and copper tank are furnished, and so arranged that water can return to the tank when not in use. The test gauge has 6¾ or 8½ inch dial graduated to 300 pounds by 1 pound marks. The top table is arranged to be placed with brackets on the wall or on a table. Two gauges can be tested at once. It is a desirable instrument for all concerns having many gauges to keep in order.

ASHCROFT GAS FITTERS' PROVING PUMPS.

WITH MERCURY GAUGE.

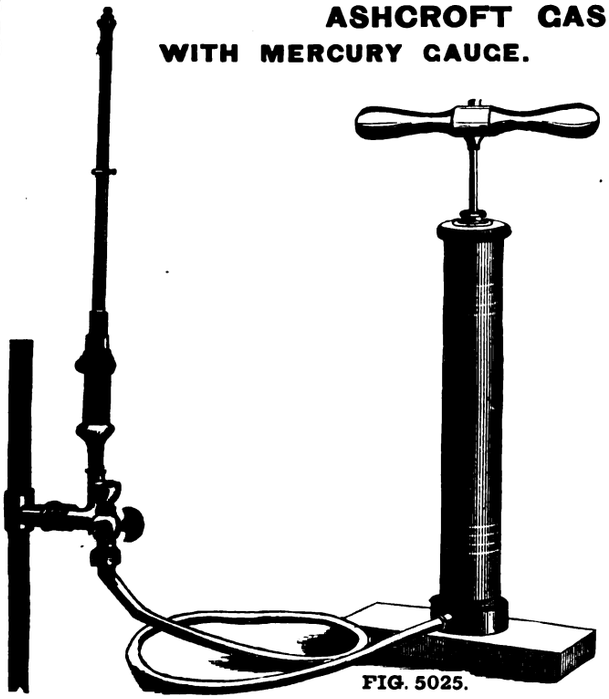


FIG. 5025.

PRICES.

Gauge, with patent cock and proving pump, complete	$16.00
Gauge only	6.00
Proving pump, with 4 feet of hose	8.00

WITH SPRING TEST GAUGE.

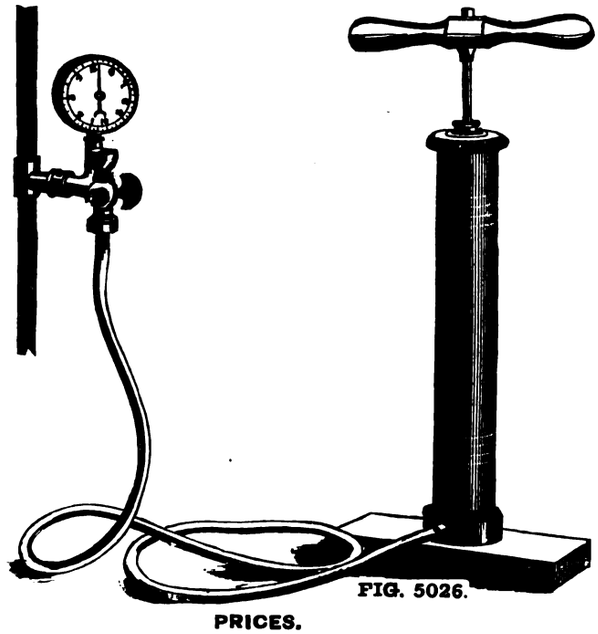


FIG. 5026.

PRICES.

Pump, complete as above	$16.00
Proving pump, with 4 feet hose	8.00
Gauge only	5.00
Patent ether cock and gauge	7.00

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RECORDING STEAM GAUGES.

EDSON GAUGE.

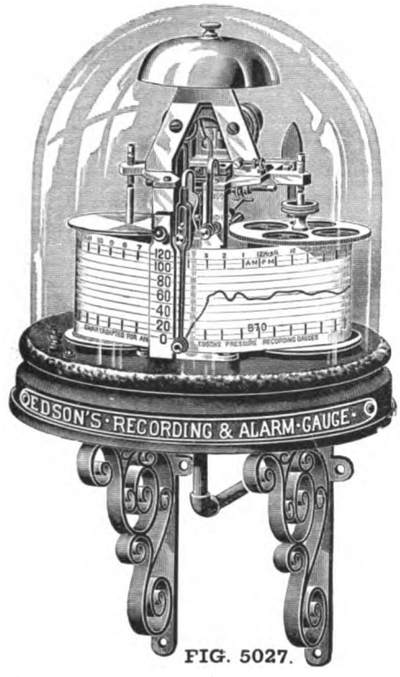


FIG. 5027.

Edson's pressure-recording gauge, for recording on a time chart all pressures of air, gas, steam, oil, water, etc.

It is without hand and dial, but has adjustable circuit closer for high pressure, operating an electric bell located on the instrument.

The price includes one year's supply of metallic surfaced charts and silver-wire marker, charts being numbered consecutively for each day in the year, and ruled to the special scale of the instrument; also one special album for filing away the charts daily as recorded upon; also, one shelf and fancy black iron brackets.

PRICE, with one year's supply of record, **$85.00.**

PEERLESS GAUGE.

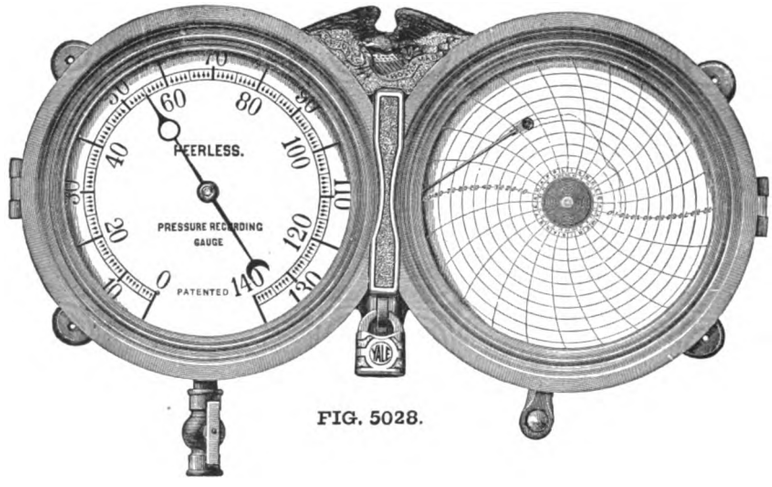


FIG. 5028.

It makes a perfect chart, showing the extent, duration and time of every variation in pressure.

Each instrument is mounted on a black walnut board.

PRICE.

Including one year's supply of dials..... .....**$100.00.**

BRISTOL RECORDING GAUGES.

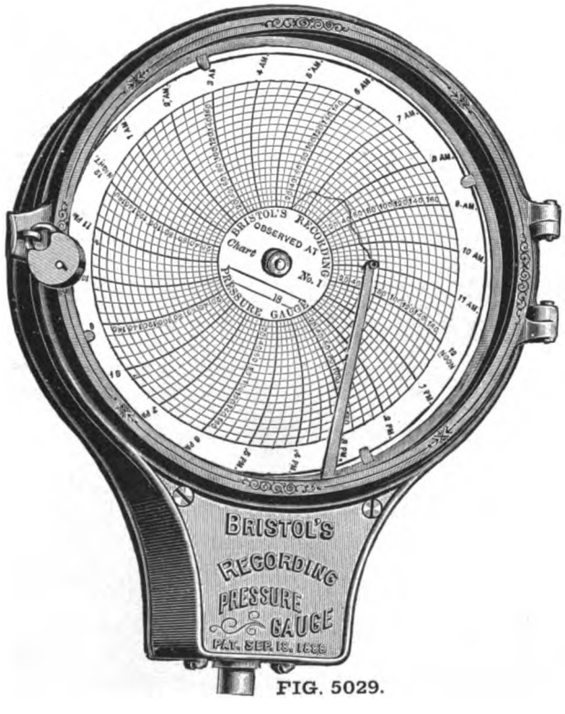


FIG. 5029.

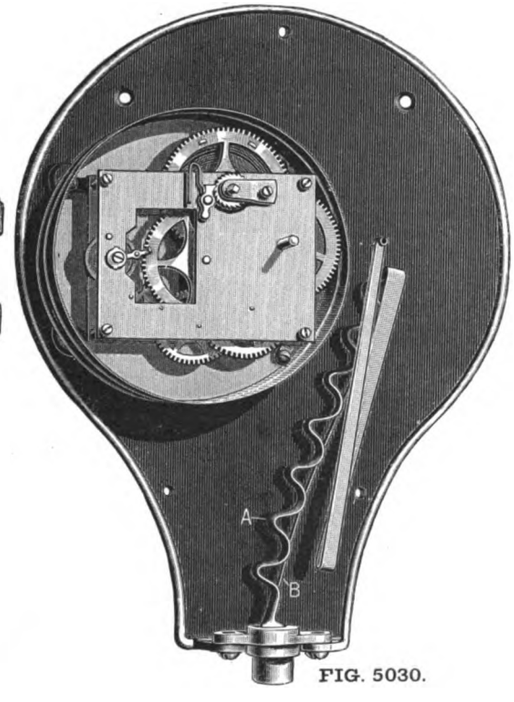


FIG. 5030.

Fig. 5029 represents the instrument ready for application. Fig. 5030 shows the pressure tube with inking pointer attached, the front of case, dial and clock cover being removed.

The operation of the instrument is as follows: Pressure entering the sinuous tube A, tends to straighten and elongate it. This tendency is resisted by the flexible strip B, which is joined to the bends of the tube A, thereby converting the tendency to elongate into a multiplied lateral motion.

The inking pointer is attached directly to the end of the pressure tube, and records the fluctuations of pressure upon a uniformly revolving chart. The chart makes one revolution every twenty-four hours, and is marked off with radial arcs and concentric circles. The divisions on the radial arcs correspond to differences in pressure, while those on the concentric circles correspond to the hours of the day.

The instrument may be placed in the office or engine room, at any desired distance from boiler or vessel of which the pressure is to be recorded.

Recording gauge F	For registering working pressure to 15 lbs., using chart No. 0.
Recording gauge G	For registering working pressure to 30 lbs., using chart No. 5. For registering height of water to 65 feet, using chart No. 12.
Recording gauge H	For registering working pressure to 65 lbs., using chart No. 3. For registering height of water to 140 feet, using chart No. 6.
Recording gauge I	For registering working pressure to 140 lbs., using chart No. 2. For registering height of water to 280 feet, using chart No. 7.
Recording gauge J	For registering working pressure to 280 lbs., using chart No. 4. For registering height of water to 560 feet.
Recording gauge K	For registering working pressure to 560 lbs., using chart No. 13. For hydraulic pressure pumps and presses.
Recording gauge L	For registering working pressure to 1,100 lbs., using chart No. 11. For hydraulic pressure pumps and presses.

PRICE, for either style, with ink and 100 charts, **$50.00.**

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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WATCHMAN'S CLOCKS.

This cut shows the clock as put up in banks, stores, offices and private residences, where the watchman has access only to a small button outside the building. When used in factories, etc., where the watchman is inside, the clocks are placed at the various stations, and operated by pushing the lever at the bottom of the clock to one side.

Mode of Operation.—The small dial in the center is removed, and upon the flange is placed a bulletin—a paper ribbon—upon which the hours are printed. This ribbon is placed so that the hours printed upon it correspond with the figures on the small dial. This dial revolves with the hour hand, and when the lever is pulled it marks the ribbon, showing the exact time at which the watchman visited the station.

Note.—In setting the clock, it will be noticed that the hour and minute hands are carried upon the post by friction. Moving the minute hand around has no effect upon the hour hand, and vice versa. First place the hour hand to its proper place and then set the minute hand. The clock runs 30 hours, and should be wound each day when the bulletin is replaced.

PRICE, $10.00.

SCHULTZ CLOCK.

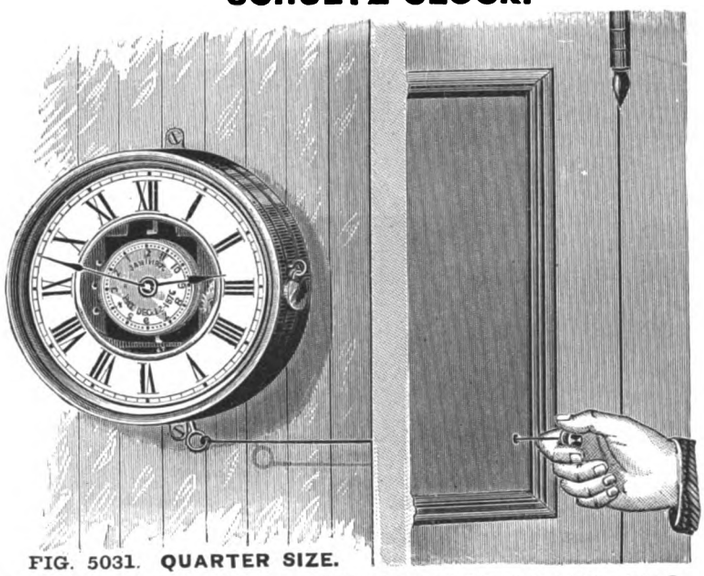


FIG. 5031. QUARTER SIZE.

COMBINATION WATCHMAN'S ELECTRIC REGISTER.

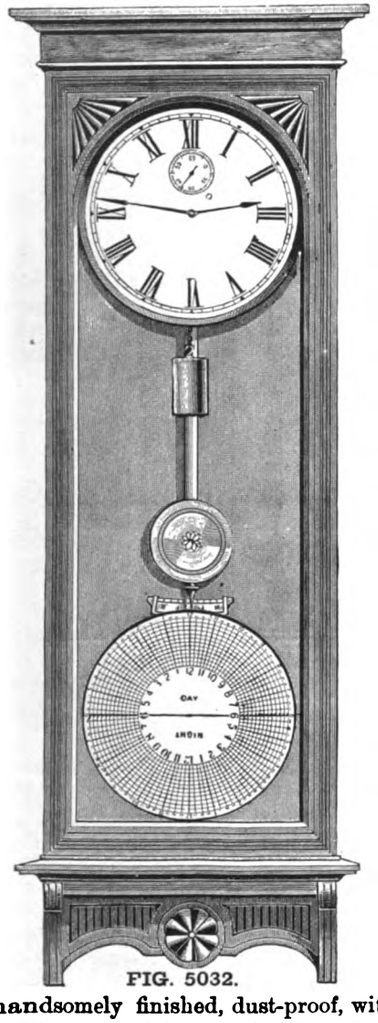


FIG. 5032.

DESCRIPTION, FIG. 5032.

This cut represents an "electric" watchman's register combined with an eight (8) day time regulator, handsomely finished, 12 inch dial, with second hand.

Height, 60 inches.

Warranted an excellent time keeper and reliable indicator of your watchman's vigilance.

PRICE, WITH 400 PAPER DIALS.

Complete, for 12 stations	.....	$125.00
" " 6 "	.....	100.00
" " 3 "	.....	85.00

The simplicity and durability of these two "electric" watchman's clocks, Figs. 5032 and 5033, render them absolutely reliable.

The dial, showing the watchman's record, has divisions for day and night service, always visible and cannot be tampered with.

THE GUARDIAN ELECTRIC REGISTER.

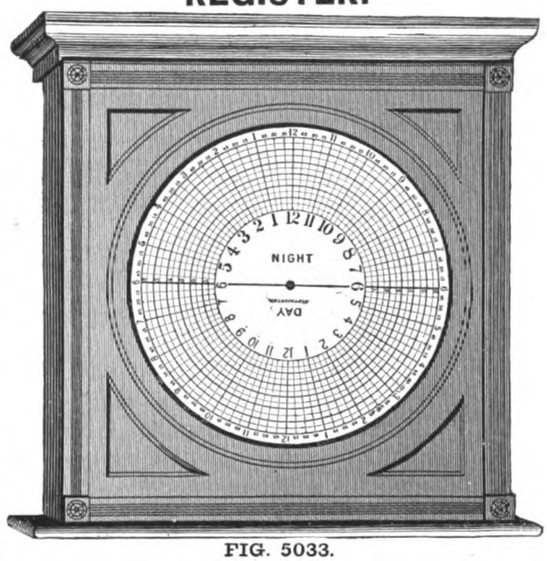


FIG. 5033.

An "electric" watchman's register without office clock.

Case of oak, 16 x 20, with very handsome finish. Dust-proof, eight (8) day movement, and requires winding up but once a week.

PRICE, WITH 400 PAPER DIALS.

Complete, for 12 stations	.....	$80.00
" " 6 "	.....	60.00
" " 3 "	.....	50.00

THE ALERT REGISTER.

DESCRIPTION, FIG. 5034.

This is a one (1) station watchman's clock. The case is of oak, with glass front, 11 x 11, handsomely finished, dust-proof, with an excellent eight (8) day movement.

With one of these "Alert" clocks on the top floor, and another on the ground floor, and requiring the watchman to "press the button" of both each time, you can ensure his making the circuit of the entire building at such intervals of time and as often as you desire.

The dial has divisions for day and night service; the record is always visible and cannot be tampered with.

PRICE, WITH 400 PAPER DIALS.

Complete $10.00

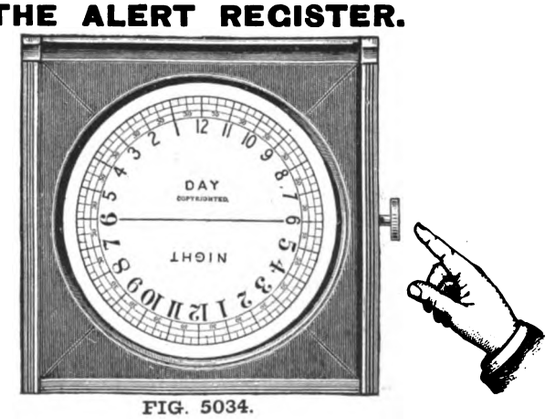


FIG. 5034.

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PORTABLE WATCHMAN'S TIME DETECTORS.

THE EXCELSIOR.



FIG. 5035.

DESCRIPTION, FIG. 5035.

This clock is carried by the watchman and the keys are attached by chains at such points in the territory as the watchman may be instructed to visit.

No watchman's clock is simpler in construction and can endure harder use than this one.

PRICE.

With pouch, box of 400 paper dials, and 12 different keys with chains for 12 stations, complete, $50.00.

DESCRIPTION, FIG. 5037.

The detector is used extensively by large manufacturing establishments, railroad companies, hotels, public buildings, asylums, hospitals and warehouses all over the world, from whom numerous testimonials have been received.

N. B.—Parties purchasing these clocks should test them sufficiently in the counting-room or office as they will not be taken back after having been injured by the watchman through carelessness.

PRICE.

With leather pouch to carry it in, twelve keys, and four hundred dials.... .....$75.00

Full directions sent with each clock.

IMHAUSER TIME DETECTOR.

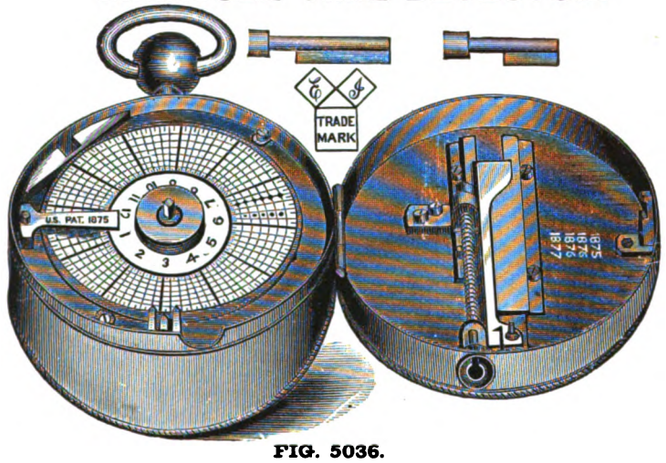


FIG. 5036.

BUERK'S TIME DETECTOR.

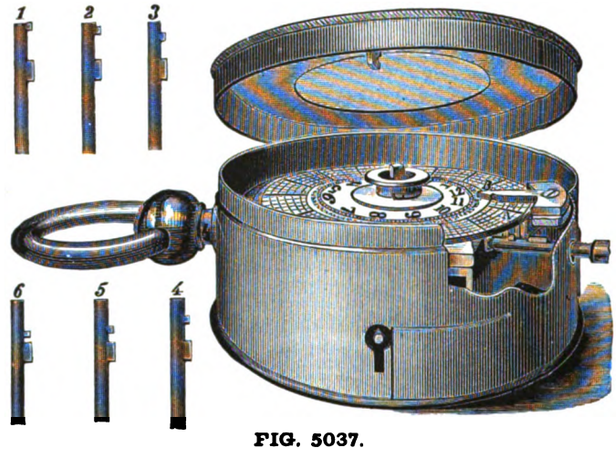


FIG. 5037.

PRICE, FIG. 5036.

With pouch, box of dials, and twelve different keys for 12 stations, complete.....$75.00

As seen in the above cut, twelve different keys are represented. Nos. 1 to 6 mark between the circles, 1, 2, 3, 4, 5, 6, on a paper disc, which is slowly revolving; the remaining six other keys, Nos. 7 to 12, make a figure on the line of the circle, so that one does not conflict with the other.

The safety lock attachment is an important recent invention, because it prevents dishonest watchmen from opening the watch with false keys and marking the dials without making their rounds. It is provided with an additional stationary marker—little knife in the cover—which marks the dial in the outside circle, showing at once any attempt of the watchman to open the watch.

NEWMAN'S WATCHMAN'S CLOCK.



FIG. 5038.
FRONT VIEW OF CLOCK, SIZE 14 x 14.

In these instruments the marking apparatus is in the cover of the case, the watch movement is separate, and, therefore, safe from dust entering the keyhole.

On the different stations of the watchman's beat keys are fastened to indicate the stations up to twelve or more.

The watchman in the evening receives the watch locked in the pouch, provided with a fresh paper dial, wound up on the arbor in the center of the disc to the right, and will run about sixty-five hours. The middle prong of the fork represents the hand. In placing the dial, it should be put as near as possible to correct time.

In making his rounds, the watchman, on arriving at the station, will insert the key through the keyhole and turn it around to the right once, and upon so doing a figure will be punched on the dial on the minute the hand on the watch indicates.

The person in charge of the watch, upon receiving it in the morning from the watchman, can see in a moment how often and when the rounds were made during the night, whether every station has been visited every time, as instructed, or not.

THE NEWMAN IMPROVED MECHANICAL OR STATIONARY WATCHMAN'S CLOCK

is an eight-day time-piece, runs fourteen days, and can be furnished in either walnut, cherry, ash or antique oak dust-proof case. Besides being a time-piece, it is a simple and effective watchman's controller that cannot be tampered with without positive detection. The registering is done on a forty-eight-hour dial and needs attention only every other day, so that it will act independent for Saturday night, Sunday and Sunday night watchmen.

PRICE, $12.00.

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OFFICE CLOCKS, REGULATORS AND CALENDARS.

CALENDAR REGULATOR.

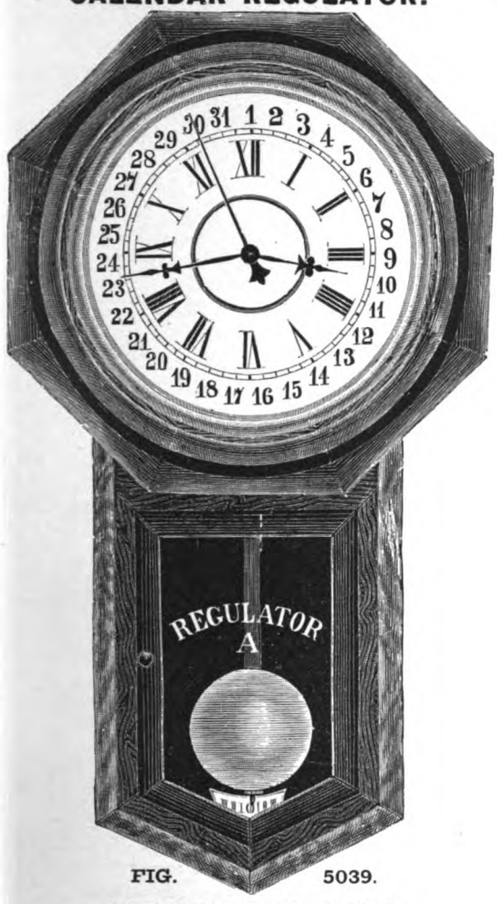


FIG. 5039.

CALENDAR CLOCK.

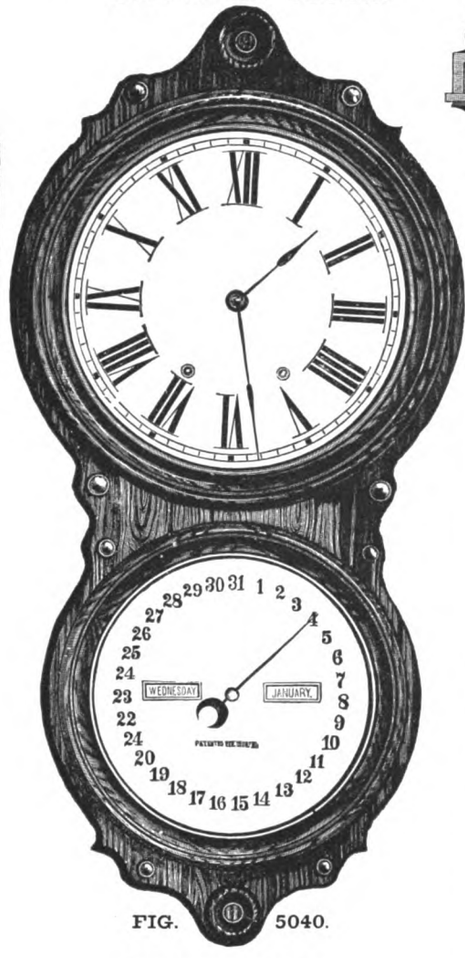


FIG. 5040.

CALENDAR REGULATOR.

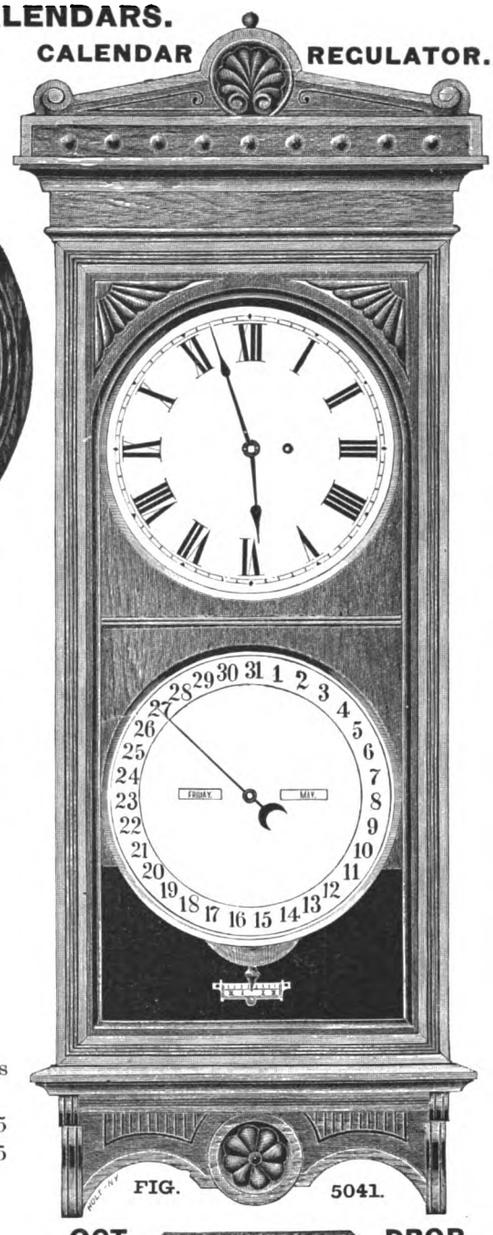


FIG. 5041.

OFFICE REGULATOR.

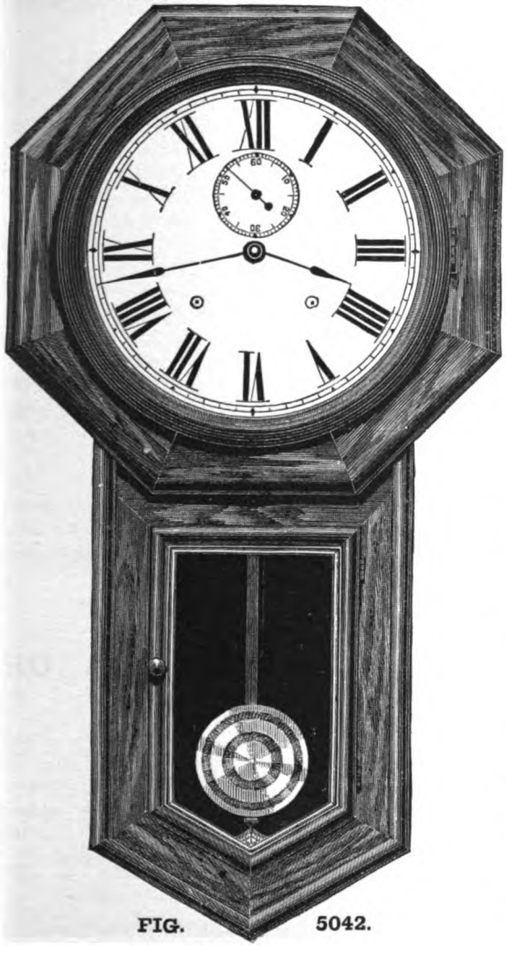


FIG. 5042.

PRICES, FIG. 5039.

Black walnut or ash case, 32 inches high ; dial 12 inches.

8 day time and calendar.....$11.35
8 day time, calendar and strike.. 12.85

PRICES, FIG. 5040.

Perpetual calendar.

Rosewood, walnut or oak case, 32 inches high ; time dial 12 inches, calendar dial 10 inches.

8 day spring, time $16.50
8 " " " strike, cup bell, 18.00

PRICES, FIG. 5041.

Perpetual calendar.

Walnut, cherry, oak and old oak case, 49 inches high ; both dials 12 inches.

8 day weight, time.....$39.00

PRICES, FIG. 5042.

Rosewood, walnut and oak case, 32 inches high ; dial 12 inches.

15 day spring, time.....$10.50

PRICES, FIG. 5043.

Black walnut or ash case, height 21½ inches ; gilt frame ; 8 inch dial.

8 day time.....$6.25
8 " " and strike 7.75

10 inch dial.

8 day time.....$6.35
8 " " and strike 7.85

OCT. DROP.

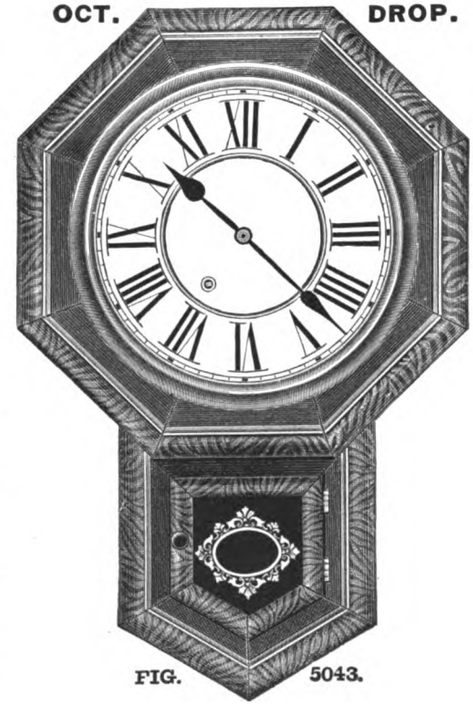


FIG. 5043.

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ASHCROFT LOCOMOTIVE AND MARINE CLOCKS.

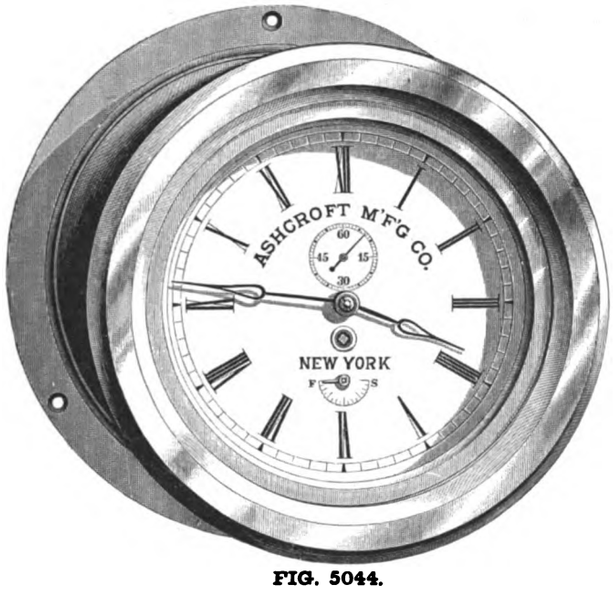


FIG. 5044.

These clocks have movements, full jewelled, with chronometer balance and patent regulator. The ring holding glass is secured by heavy hinge, lock and key. Dials are ornamented with hand engraving.

Movements carefully adjusted before sending out.

The cases of these clocks are made up to accommodate the movements, and are used in making up sets of instruments, as shown on pages 623 and 624.

PRICES, FIG. 5044.

12	inch dial,	Howard movement,	eight day		$125.00
10	" "	" "	" "		100.00
8½	" "	" "	" "		90.00
6¾	" "	" "	" "		70.00
12	" "	Seth Thomas "	" "		100.00
10	" "	" "	" "		75.00
8½	" "	" "	" "		65.00
6¾	" "	" "	thirty hour		50.00
6	" "	" "	" "		40.00
5½	" "	" "	" "		35.00
5	" "	" "	" "		32.00
8½	" "	Harvard "	eight day		65.00
6¾	" "	" "	" "		50.00
6	" "	" "	" "		40.00
5½	" "	" "	" "		38.00
5	" "	" "	" "		35.00

Nickel-plating extra.

ASHCROFT NEW CONSTRUCTION REVOLUTION COUNTER.

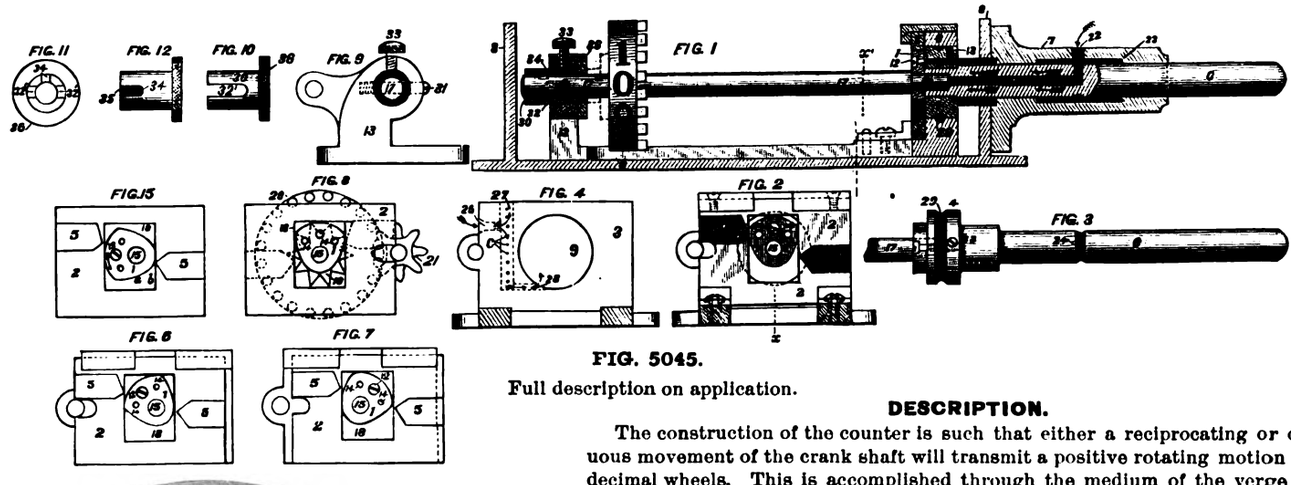


FIG. 5045.

Full description on application.

DESCRIPTION.

The construction of the counter is such that either a reciprocating or continuous movement of the crank shaft will transmit a positive rotating motion to the decimal wheels. This is accomplished through the medium of the verge movement, which consists of a verge wheel rigidly attached to the initial decimal wheel; a sliding-plate placed transversely to such verge wheel. The reciprocating movement of the sliding-plate is controlled by a cam on the crank shaft—such cam operating within a square hole in the sliding-plate; the cam is so formed that it is always in engagement with the sides of such hole; and the constant change of motion of the sliding-plate in its reciprocating action will be accomplished without jar or wear.

The lubricating facilities of the counter are such that the oil has free access to all the friction surfaces. Storage chambers are provided for the oil that when once filled will supply the different parts as fast as wanted.



FIG. 5045.

PRICES.

Round deep case, brass.

12	in. dial,	8 wheels	$110.00	10	in. dial,	6 wheels	$85.00
10	" "	8 "	95.00	8½	" "	6 "	70.00
8½	" "	8 "	80.00	6¾	" "	6 "	60.00
12	" "	6 "	100.00				

Nickel-plating extra.

REVOLUTION COUNTERS.

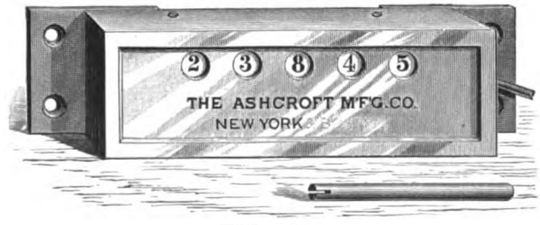


FIG. 5046.

PRICES.

Square case, brass.

4 figures, size	7 x 2½	inches	$20.00	4 figures, size	4½ x 1¾	inches	$13.50
5 " "	8 x 2½	"	24.00	5 " "	5 x 1¾	"	16.00
6 " "	9 x 2½	"	28.00	6 " "	5½ x 1¾	"	20.00
7 " "	10 x 2½	"	32.00	7 " "	6 x 1¾	"	24.00

With resetting attachment, $4.00 each extra. Nickel-plating extra.

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REVOLUTION COUNTERS.

TAYLOR'S.

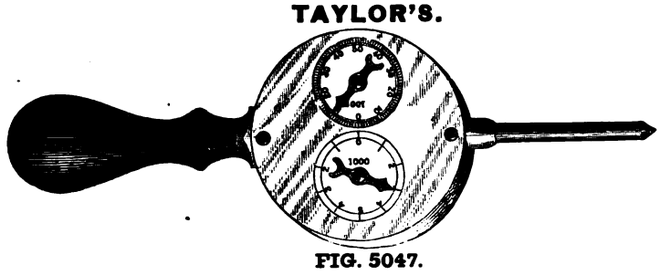


FIG. 5047.

Take the indicator by the handle in the right hand, holding your watch in the left, press the point of the spindle gently against the end and center of the shaft. To every hundred revolutions of the shaft the hundred pointer will make one revolution, while the thousand pointer will indicate one number, the dial being marked into ten parts. It may be applied to a shaft revolving either to the right or left.

PRICE, full nickeled, rosewood handle, **$6.00.**

STANDARD.

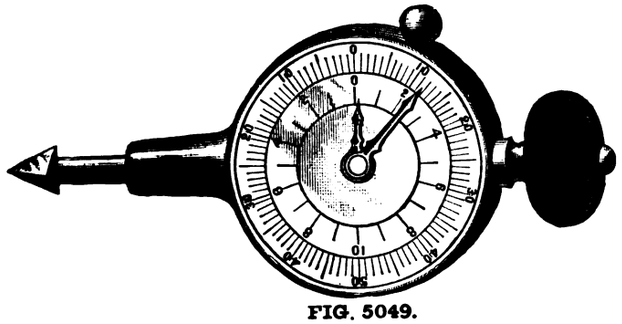


FIG. 5049.

On the principle of the stop watch. Registers 2,000 revolutions. Placed in contact with a shaft, it revolves without moving the hands on the dial, and when the second hand of your watch reaches a suitable point, connect the registering mechanism instantly, without looking from the watch, by moving the stud at the side toward the handle; at the expiration of a given time remove the counter, and the revolutions made by the shaft will be accurately registered on the dial.

PRICE, $6.00 EACH.

PRATT'S.

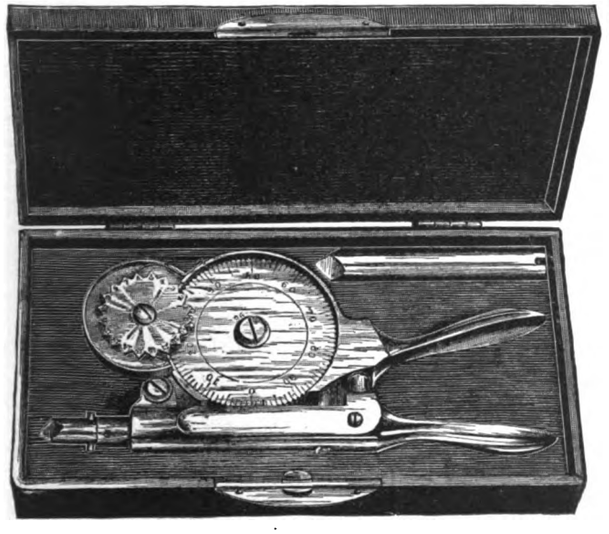


FIG. 5051.

In this speed indicator the toothed dial is carried by an arm hinged to the main frame, and within the frame is journaled a loosely turning worm spindle. The main frame and arm are provided with hand grasps. When in operation the spindle is turned loosely in its bearings by the shaft. The operator, by means of the handle of the pivoted arm, can instantly gear the indicating dial with the worm shaft at the very beginning of the period of time for which the velocity is to be determined. At the end of each period the dial is as quickly disengaged—the recoil of a spring, when the handle is released, forcing the pivoted arm at once from the spindle. A set screw governs the approach of the dial-teeth to the worm, and prevents the dial teeth from being forced or crowded in upon the spindle with so much friction as to abrade or wear off their faces. The instrument is finished in first-class style, and can be used for right or left motion. Nickeled indicator, with double dial and tip, in case, complete. **PRICE, $6.00.**

TABOR'S.

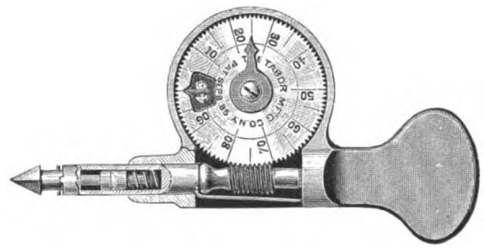


FIG. 5048.

WITH STOP MOTION.

To set to zero. Pull out the spindle until the worm touches the spring, and with the thumb and finger slip one dial over the other, until the notch on top dial is over zero on the under dial, then push the spindle back into position and slip the index pointer to the notch on top dial.

To use the counter. Hold watch in one hand, and with the other lightly touch the center of the end of shaft to be counted with the three-cornered point. When the watch indicates the proper time to begin the count, instantly press against shaft, which will engage the clutch, and the registry will begin and continue till the pressure on end of shaft is relieved.

How to read the dials. The upper dial is graduated from 0 to 100, and registers units; the lower dial is graduated from 0 to 49, and registers hundreds, making a continuous count of 4,900 possible.

The reading on the under dial is through the opening in the upper dial. The index finger indicates the count on the upper dial; for instance, if the point in the opening through the upper dial indicates 45 on the lower dial, and the index finger points to 25 on the upper dial, the reading will be 4,525 revolutions. **PRICE, $1.00 EACH.**

DOUBLE SPEED INDICATOR.

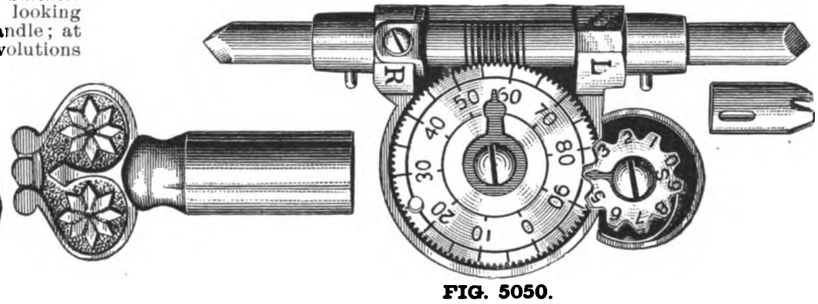


FIG. 5050.

To ascertain the number of revolutions of any shaft in a given time, place the point of the indicator in the center of the shaft, and for every hundred revolutions the dial will revolve once, while the thousand pointer will indicate one number, the dial being marked into ten parts. It may be applied to a shaft revolving either to the right or left. It is adapted to pointed or hollow centers, and has a raised sight on the dial so as to count by touch.

PRICE, nickel-plated, with split cap for pointed centers, **$1.50.**

TALLY REGISTER.

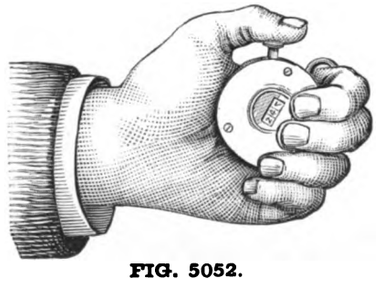


FIG. 5052.

This little register tallies from 1 to 1,000, and can be set to zero at will. It is simple in construction, can be carried in the pocket, is about the size of an ordinary watch, and weighs about six ounces. It is used by railroad, telegraph and steamboat men for checking or tallying ties, telegraph poles and passengers, and all kinds of freight; by cattle men for counting cattle and sheep, and by detectives and spotters, and at places of amusement for counting the people going in and out. In fact it can be used for any purpose where a correct count is desired to be kept. **PRICE, $2.50.**

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HEATH'S SELF-TIMING AND REGISTERING SPEED INDICATOR.

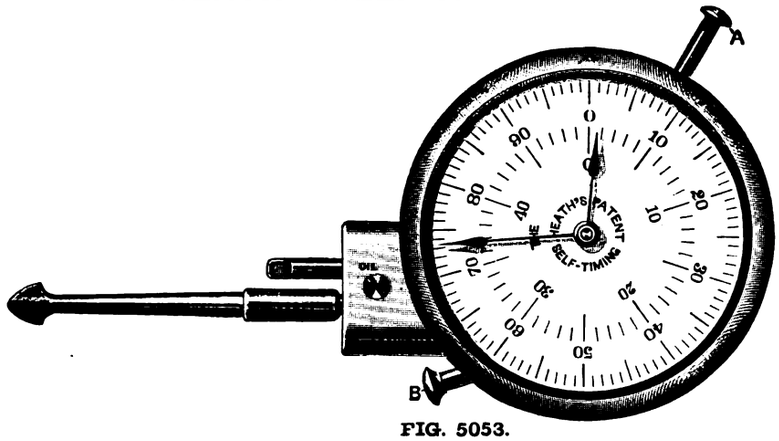


FIG. 5053.

PRICE, $20.00 EACH.

1st. The setting pin, A, should be pressed firmly inward until it stops, which will set the hands at 0 and wind the power spring.

2d. The point being attached as in the cut, or in case the shaft runs in the direction followed by the hands of a watch, to the upper pinion, is then placed in the center of the shaft to be timed, brought as nearly as possible in line with it, and held with just enough firmness to prevent slipping.

3d. The starting pin, B, should then be pressed firmly inward and released, which will start the hands, and at the same time release the time-train. The instrument must now be held steadily in place until the hands stop, when the rate of speed may be read on the dial, the outer graduated circle indicating revolutions, the inner one, hundreds of revolutions.

The time-train runs for half a minute, but the instrument registers the revolutions for a full minute.

REVOLUTION INDICATOR.

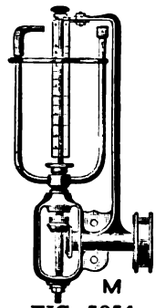


FIG. 5054.

This instrument shows at a glance, by the height of a column of mercury, the number of turns per minute made by a steam engine, without either counting or using a watch.

Constantly indicates the number of turns made by an engine per minute, without the use of a watch.

PRICE, $50.00.

This indicator is driven direct from the mainshaft or countershaft. The number of revolutions is indicated by the central open mercury column, and, having no springs about it, is absolutely correct for all time.

Parties ordering or making inquiries, should state the usual and greatest speed of engine; also size and speed of driving shaft or pulley; also send a sketch showing the position of the instrument on the engine, that the dial ay be made to face the engineer. A common plan on blowing engines is to secure it to the right or left hand column.

STATIONARY TACHOMETER.

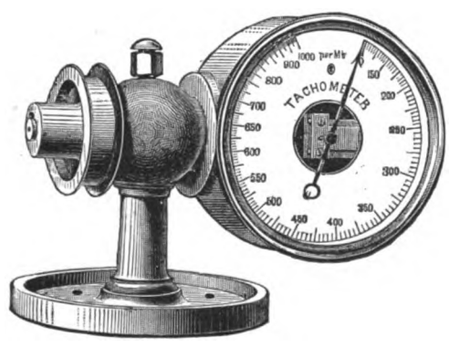


FIG. 5055.

This apparatus is designed for the purpose of ascertaining, at a glance, the number of revolutions made by rotating shafts. Its construction is based upon centrifugal power, and it consists of a case in which are mounted a pendulum ring, in connection with a fixed shaft, a sliding rod and indicating movement. The fixed shaft has a pulley by which the motion is imparted to the pendulum ring, and subsequently by the sliding rod to the indicating movement. The pointer on the dial shows the exact number of revolutions made by the pulley per minute. The diameter of driving wheel is marked on dial. The apparatus is very sensitive, and will indicate the slightest deviation in speed; it is important, however, that the driving belt should be smooth, and the joint made without lapping; an endless rubber belt answers the purpose.

All internal parts of the apparatus require no oiling, but the pulley shaft should be oiled in the usual manner, the set screws in the journal being provided with proper openings for that purpose.

The motion can be in either direction, and the apparatus may be placed in a vertical or horizontal position, or at any desirable angle between these positions.

These tachometers have been applied, with great success, to electric light engines, flour and cotton mills, and can be used with advantage on all such machinery of which it is essential to know, at all times, the exact speed at which it is moving.

The apparatus is of handsome appearance, and so arranged that it can be easily attached. We make two sizes:

Large size, with dial of 7½ inches diameter..... $60.00
Small size, with dial of 5½ inches diameter..... 55.00

In ordering, state the approximate number of revolutions to be indicated.

PORTABLE TACHOMETER.

The portable tachometer illustrated herewith is similar in construction to that of our tachometer for permanent attachment. By applying this instrument by hand to the center of rotating shafts, it will instantly and correctly indicate the number of revolutions of the shaft per minute. This instrument is arranged with a dial for 1,000 revolutions; but with it are also furnished two sets of geared wheels, in proportion of 1 to 2, by which the speed can either be reduced to 500 or increased to 2,000 revolutions. These wheels are easily attached to an arbor with locknut provided for that purpose. Instruments for speeds higher than 2,000 revolutions or lower than 500 revolutions are made to order.

On unscrewing the end of handle will be found a set screw, by means of which any lost motion may be taken up when it becomes necessary. The dimensions of the portable tachometer are:



FIG. 5056.

Diameter of dial..... 2½ inches.
Depth of case..... 3
Entire length, including handle and detachable point.....11 "
Total weight, including morocco case..... 5 lbs.

The instrument is of excellent workmanship, plated and finished. It is contained in an elegant morocco case, for easy transportation. We confidently recommend it for its adaptability in obtaining accurate indications of the variations in speed of fast-running machinery.

PRICE, $55.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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MORSE TWIST DRILL AND MACHINE COMPANY.

V THREAD OR STANDARD.

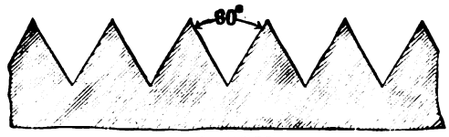


FIG. 5057.

DIAMETER OF TAP.

1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2

NO. THREADS TO INCH.

20	18	16	14	12	11	10	9	8	7	7	6	6	5	5	4½	4½

WHITWORTH STANDARD.

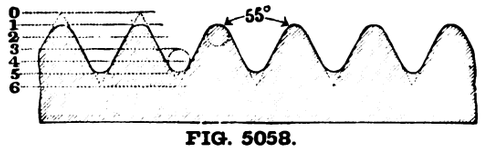


FIG. 5058.

DIAMETER OF TAP.

1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2

NO. THREADS TO INCH.

20	18	16	14	12	11	10	9	8	7	7	6	6	5	5	4½	4½

UNITED STATES OR FRANKLIN INSTITUTE STANDARD.

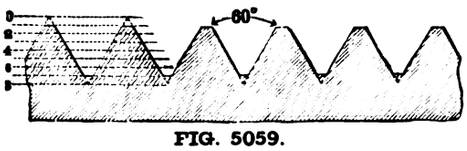


FIG. 5059.

DIAMETER OF TAP.

1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2

NO. THREADS TO INCH.

20	18	16	14	13	12	11	10	9	8	7	7	6	6	5½	5	5	4½

SETS OF MACHINISTS' HAND TAPS.

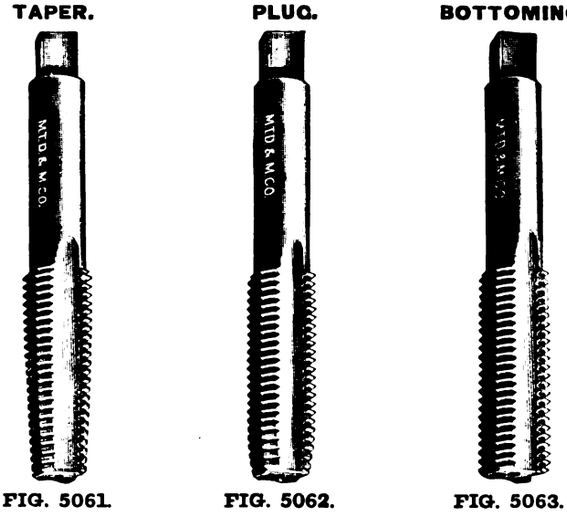


FIG. 5061. FIG. 5062. FIG. 5063.

TAPPER TAPS.



FIG. 5060.

PRICES.

Diameter, inches.	Number of threads to inch.	Length of thread, in inches.	Prices, each. Whole length. 11 inches.	12 inches.	14 inches.	15 inches.
1/4	20	1¾	$0.70	$0.75	$0.80	$0.90
5/16	18	2	.80	.85	.90	1.00
3/8	16	2	.90	.95	1.00	1.10
7/16	14	2¼	1.00	1.05	1.15	1.25
1/2	12 and 13	2¼	1.12	1.15	1.25	1.35
9/16	12	2½	1.30	1.35	1.45	1.55
5/8	11	2½	1.45	1.50	1.65	1.75
11/16	11	2½	1.62	1.70	1.80	1.95
3/4	10	2¾	1.80	1.85	2.00	2.10
13/16	10	2¾	2.05	2.10	2.25	2.35
7/8	9	3	2.35	2.45	2 60	2.75
15/16	9	3	2.70	2.75	3.00	3.15
1	8	3½	3.15	3.20	3.50	3.65
1 1/8	7	3½	3.60	3.70	3.95	4.10
1 1/4	7	3½	4.15	4.25	4.50	4.65
1 3/8	6	4	4.70	4.80	5.05	5.20
1 1/2	6	4	5.30	5.40	5.65	5.80

Prices on special length taps given on application.

V, U. S. or Whitworth shape of thread. Unless advised to the contrary, we fill orders with **V** threads.

PRICES.

Size.	Whole length.	Length thread.	No. V threads to inch.	Prices, each.	Prices, per set of 3 taps.
1/4	2 1/16	1 1/8	16, 18 & 20	$0.45	$1.35
5/16	2 7/8	1 1/4	16 & 18	.50	1.50
3/8	3 1/8	1 1/4	14, 16 & 18	.55	1.65
7/16	3 5/8	1 3/8	14 & 16	.60	1.80
1/2	4 1/8	1 3/4	12, 13 & 14	.70	2.10
9/16	4½	1 7/8	12 & 14	.80	2.40
5/8	4¾	2	10, 11 & 12	.90	2.70
11/16	5 1/8	2 1/8	11 & 12	1.05	3.15
3/4	5 5/8	2¼	10, 11 & 12	1.20	3.60
13/16	5 13/16	2 3/8	10	1.40	4.20
7/8	6	2½	9 & 10	1.60	4.80
15/16	6 1/8	2 5/8	9	1.80	5.40
1	6½	2 7/8	8	2.00	6.00
1 1/8	6 5/8	3	7 & 8	2.25	6.75
1 1/4	6 7/8	3¼	7	2.60	7.80
1 3/8	7¼	3½	6	3.00	9.00
1½	7 5/8	3¾	6	3.50	10.50
1 5/8	8 1/8	3 15/16	5 & 5½	4.20	12.60
1¾	8 11/16	4 1/8	5	5.00	15.00
1 7/8	9 1/16	4¼	4½ & 5	5.80	17.40
2	9¾	4½	4½	6.70	20.10

We keep in stock of the **V** thread the above—1/32 oversize.

Sizes over two inches and taps 1/8 1/4 or 1/100, full, made to order at special prices, according to quantity.

Left hand taps, regular sizes as above, same prices as right hand.

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MACHINE OR NUT TAPS.

NUT TAPS.

Long shank. Patent relieved.

V, U. S. or Whitworth shape of thread.

PRICES, FIGS. 5064 AND 5065.

Size.	Whole length.	Length thread.	No. V. threads to inch.	Prices.
1/4	4 1/2	1 7/8	16, 18 & 20	$0 60
5/16	5 1/8	2	16 & 18	.70
3/8	5 3/4	2 1/8	14 & 16	.80
7/16	6 3/8	2 1/2	12, 14 & 16	.90
1/2	7	2 11/16	12, 13 & 14	1.00
9/16	7 5/8	2 7/8	12 & 14	1.15
5/8	8 1/8	3 1/8	10, 11 & 12	1.30
11/16	8 7/8	3 7/16	11 & 12	1.45
3/4	9 1/2	3 3/4	10	1.60
13/16	10 1/8	3 15/16	10	1.80
7/8	11 1/16	4 3/8	9 & 10	2.10
15/16	11 11/16	4 7/16	9	2.40
1	12	4 3/4	8	2.80
1 1/8	12 5/8	5	7 & 8	3 20
1 1/4	13 1/4	5 1/8	7 & 8	3.70
1 3/8	13 7/8	5 3/4	6	4.20
1 1/2	14 1/2	6	6	4.70
1 5/8	15 1/8	6 1/8	5 & 5 1/2	5.30
1 3/4	15 3/4	6 1/2	5	6.00
1 7/8	16 3/8	6 3/4	4 1/2 & 5	6.80
2	17	7	4 1/2	7.70
2 1/8	17	8	4 1/2	9.00
2 1/4	18	8 1/2	4 1/2	10.20
2 3/8				11.50
2 1/2	19	9	4	12.50
2 5/8				
2 3/4	19 1/2	9 1/2	4	15.00
2 7/8				
3	21	10	3 1/2	18.00
3 1/8				
3 1/4	21	10 1/2	3 1/2	21.50
3 3/8				
3 1/2	21	11	3 1/4	25.50
3 5/8				
3 3/4	21	11 1/2	3	29.50
3 7/8				
4	21	12	3	33.50



FIG. 5064.



FIG. 5065.

Unless advised to the contrary, we fill orders with V threads.

We keep in stock of the V thread the above $\frac{1}{32}$ oversize for rough iron.

In ordering, always state exact diameter and thread wanted.

When exact duplicates are wanted, special orders should always be accompanied by a stub with nut fitting same.

Fig. No. 5065 represents the tap we recommend for use in cold-pressed nuts. For hot-pressed nuts we often make end of tap with a reamer for cleaning out the scale like cut No. 5064.

Hubs or master taps are 25 per cent. higher than nut taps. State, in ordering, whether for bolt cutter or screw plate dies. See cut on page 637.

MACHINE SCREW TAPS.



FIG. 5066.

PRICES.

Diameter.	Wire gauge size.	Whole length.	Length thread.	No. of threads to inch.	Prices, each.	Prices, per doz.
1/16	No. —	1 3/4	5/8	60	$0.35	$4.00
7/64	" 4	1 3/4	3/4	32 & 36	.35	4.00
9/64	" 6	1 3/4	3/4	30, 32 & 36	.35	4.00
1/8	" —	1 3/4	3/4	30, 32, 36 & 48	.35	4.00
5/32	" 8	1 7/8	3/4	30 & 32	.35	4.00
3/16	" 10	2	7/8	24, 30 & 32	.35	4.00
7/32	" 12	2 3/8	1	20, 22 & 24	.35	4.00
1/4	" 14	2 1/16	1 1/8	16, 18, 20, 22 & 24	.38	4.40
17/64	" 16	2 1/16	1 1/8	16, 18 & 20	.38	4.40
9/32	" 18	2 1/16	1 1/4	16, 18 & 20	.38	4.40
5/16	" 20	3	1 1/4	16, 18 & 20	.45	5.30
3/8	" 24	3 1/8	1 1/4	16	.45	5.30

All orders for less than half dozen of a size at single price.

We keep in stock only plugs and bottomings.

BLACKSMITH TAPER TAPS.



FIG. 5067.

PRICES.

Diameter.	Length.	No. of threads to inch.	Prices, each.
1/4	2 3/4	16, 18 & 20	$0.35
5/16	2 7/8	16 & 18	.40
3/8	3 1/2	14 & 16	.45
7/16	3 1/2	14 & 16	.50
1/2	4 5/16	12, 13 & 14	.55
9/16	4 3/4	12 & 14	.65
5/8	5 1/8	10, 11 & 12	.75
11/16	5 3/8	11 & 12	.85
3/4	5 1/8	10, 11 & 12	1.00
13/16	6	10	1.15
7/8	6 1/8	9 & 10	1.30
15/16	6 3/8	9	1.45
1	6 3/8	8	1.60
1 1/8	7 1/4	7 & 8	1 90
1 1/4	8	7 & 8	2.20

Our blacksmith taps are very carefully made, are accurate as to lead and temper, and, being relieved by our patent process, are durable, and will cut a thread with ease.

STAY BOLT TAPS FOR BOILER WORK.

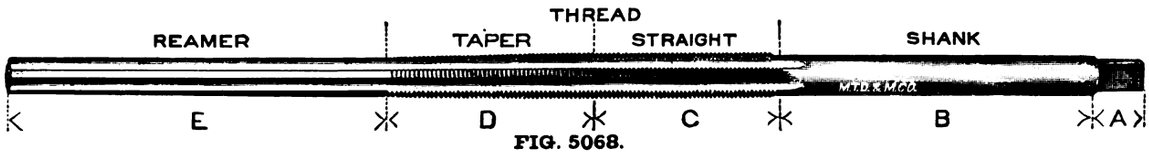


FIG. 5068.



FIG. 5069.

PRICES ON APPLICATION.

In ordering, state diameter and number of threads per inch, also lengths of parts at A, B, C, D and E. Prices given on application, and dependent on the size of order. Every tool warranted, and replaced without cost, if imperfect, on return of imperfect tool.

A..... B..... C..... D..... E.....

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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HUBS AND MASTER TAPS.

SHORT PLUG HUB TAPS.

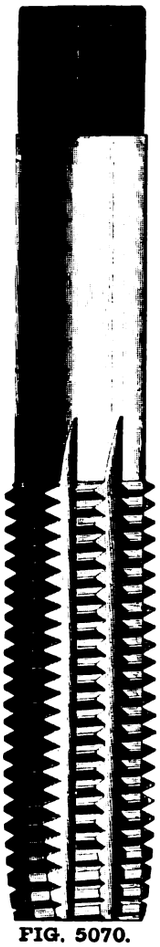


FIG. 5070.

PRICES.

Diameter.	No. threads to inch.	Prices.
¼	16, 18, 20	$0.60
5/16	16, 18	.70
⅜	14, 16	.80
7/16	12, 14, 16	.90
½	12, 13, 14	1.00
9/16	12, 14	1.15
⅝	10, 11, 12	1.30
11/16	11, 12	1.45
¾	10	1.60
13/16	10	1.80
⅞	9, 10	2.10
15/16	9	2.40
1	8	2.80
1⅛	7, 8	3.20
1¼	7, 8	3.70
1⅜	6	4.20
1½	6	4.70
1⅝	5, 5½	5.30
1¾	5	6.00
1⅞	4½, 5	6.80
2	4½	7.70

MASTER TAPS.

PRICES.

Diameter.	No. threads to inch.	Prices, each.
¼	16, 18, 20	$0.75
5/16	16, 18	.87
⅜	14, 16	1.00
7/16	12, 14, 16	1.12
½	12, 13, 14	1.25
9/16	12, 14	1.44
⅝	10, 11, 12	1.62
11/16	11, 12	1.81
¾	10	2.00
13/16	10	2.25
⅞	9, 10	2.62
15/16	9	3.00
1	8	3.50
1⅛	7, 8	4.00
1¼	7, 8	4.62
1⅜	6	5.25
1½	6	5.87
1⅝	5, 5½	6.62
1¾	5	7.50
1⅞	4½, 5	8.50
2	4½	9.62

We also make hub taps for the various bolt cutters in the market, and need a drawing with order to show exact diameter and length of thread needed. These hubs are usually made like a bottoming tap, with parallel or straight thread part—that is, without the taper, as shown in cut.

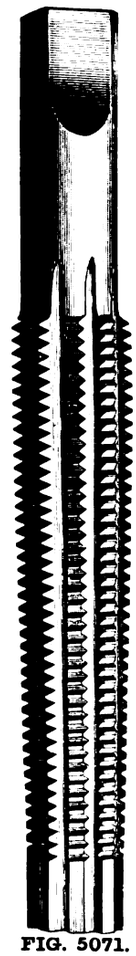


FIG. 5071.

PULLEY TAPS.



FIG. 5072.

PRICES.

Diameter.	No. of threads to inch.	Prices by lengths.						
		6 inches.	8 inches.	10 inches.	12 inches.	14 inches.	16 inches.	18 inches.
⅝	14.16	$0.80	$0.90	$1.10	$1.30			
7/16	14.16	.90	1.00	1.20	1.40	$1.60		
½	12.13		1.30	1.40	1.50	1.60	$1.80	
9/16	12.13		1.35	1.45	1.55	1.70	1.85	
⅝	10.11		1.40	1.50	1.60	1.75	1.90	
11/16	10.11		1.50	1.55	1.70	2.00	2.10	
¾	10			1.60	1.80	2.10	2.30	$2.50

We furnish the above sizes in V and United States standard threads. Other sizes and threads made to order and furnished at special prices.

STOVE-BOLT TAPS.



FIG. 5073.

Diameter. Inches.	No. of threads to inch.	Prices.	
		Each.	Per dozen.
5/32	30	$0.35	$4.00
3/16	24	.35	4.00
7/32	24	.35	4.00
¼	18	.38	4.40
5/16	18	.38	4.40
⅜	18	.45	5.30

Less than six of a size will be charged as single taps. Sizes and threads not on list will be charged at special prices.

CHASERS FOR SCREWS, V THREADS ONLY.

INSIDE.

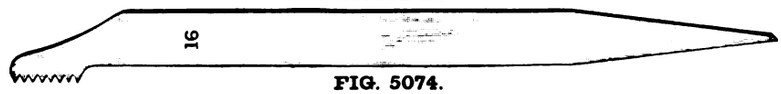


FIG. 5074.

OUTSIDE.

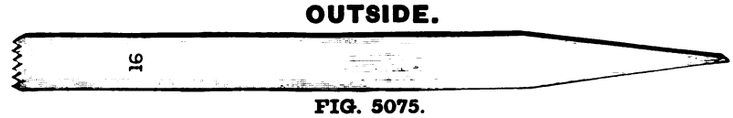


FIG. 5075.

PRICES, FIGS. 5074 AND 5075.

	Price, each.	Per pair.
Cutting 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15 and 16 threads to inch	$0.30	$0.60
Cutting 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 42, 43, 44, 45, 46, 48 and 50 threads to inch	25	.50

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ADJUSTABLE TAP WRENCHES.

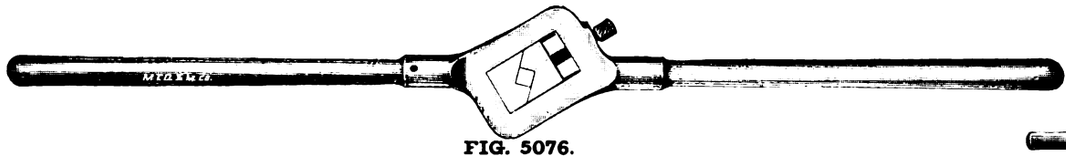


FIG. 5076.

PRICES.

A	Fitting taps from ¼ to ⅝, inclusive; entire length, 13 in. ..... Fitting reamers from ¼ to $\frac{13}{16}$, inclusive.....	$3.00
B	Fitting taps from ½ to 1, inclusive; entire length, 18 in..... Fitting reamers from ⅜ to 1, inclusive.....	4.00
C	Fitting taps from ⅞ to 1½, inclusive; entire length, 23 in..... Fitting reamers from $1\frac{1}{16}$ to $1\frac{1}{8}$, inclusive.....	5.00
D	Fitting taps from 1¼ to $2\frac{1}{16}$, inclusive; entire length, 47½ in... Fitting reamers from $1\frac{1}{16}$ to $2\frac{1}{16}$, inclusive.....	15.00

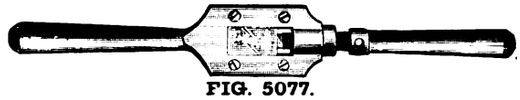


FIG. 5077.

PRICES.

No. 0 wrench, fitting taps from $\frac{1}{16}$ to ¼, inclusive; entire length, 5⅛ in., Fig. 5077..... $1.60

MACHINE SCREW TAP WRENCH.

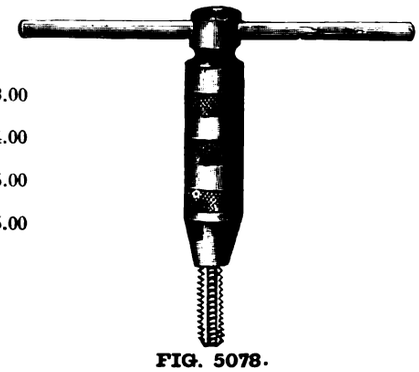


FIG. 5078.

PRICE, $1.00.

MACHINE OR SOLID BOLT DIES.

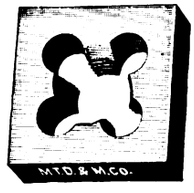
PATENT  **RELIEVED.**

FIG. 5079.

Diameter.	No. threads to inch.	Size of square.	Prices each.
¼	20	2½	$1.80
$\frac{5}{16}$	18	2½	1.80
⅜	16	2½	1.80
$\frac{7}{16}$	14	2½	1.80
½	12	2½	1.80
⅝	11	2½	2.00
¾	10	2½	2.20
⅞	9	2½	2.40
1	8	2½	2.70
1⅛	7	2½	3.00
1¼	7	2½	3.30
1⅜	6	2½	3.60
1½	6	3	3.90
1⅝	5½	3	4.20
1¾	5	3 & 1¼ thick.	5.40
1⅞	5	3½ & 1½ "	6.50
2	4½	3½ & 2 "	7.50

½ inch thick. ¾ inch thick. 1 inch thick.

The above are kept in stock—by sixteenths and thirty-seconds to 1 inch; by eighths and thirty-seconds from 1 inch to 1½ inch.

ADJUSTABLE SOLID BOLT DIES.

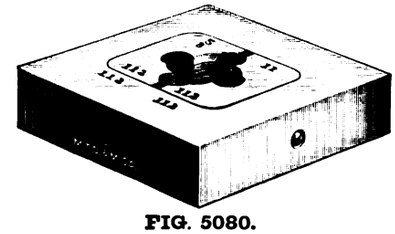


FIG. 5080.

Diameter.	Number threads to one inch.	Square and thickness, die body.	Prices, body and die complete.	Prices, extra split dies, per pair.
¼	20 threads.	2¼	$2.25	$1.25
$\frac{5}{16}$	18 "	2¼	2.25	1.25
⅜	16 "	2¼ ⅝ in.	2.25	1.25
$\frac{7}{16}$	14 "	2¼	2.25	1.25
½	12 "	2½ or 3	3.50	2.00
⅝	11 "	2½ or 3	3.50	2.00
¾	10 "	2½ or 3 ¾ in.	3.50	2.00
⅞	9 "	2½ or 3	3.50	2.00
1	8 "	3	3.50	2.00
1⅛	7 "	4	4.75	2.75
1¼	7 "	4	4.75	2.75
1⅜	6 "	4 1 in.	4.75	2.75
1½	6 "	4	4.75	2.75

NO. 1 SCREW PLATE AND DIES.



FIG. 5081.

For the use of model makers and jewelers, cutting..... $\frac{1}{8}^{48}$, $\frac{5}{32}^{40}$, $\frac{3}{16}^{32}$, $\frac{7}{32}^{24}$, $\frac{1}{4}^{20}$.

PRICES.

No. 1 screw plate, with 5 pairs of dies and 5 taps, as above.....	$4.50
Single pair of dies.....	.40
The set complete, including plate, dies, taps and adjustable wrench,	6.00
No. 1 plate, without dies or taps, entire length, 6⅝ in.....	1.60

NO. 1 SET IN MOROCCO CASE.



FIG. 5082.

The set complete, but with 6 pairs of dies and taps, in morocco case, $\frac{1}{16}$ to ¼..... $6.75

DESCRIPTION, SCREW PLATES.

No. 1, length plate, 6⅝ in.; holding dies up to ¼ threads, as on page 636
A, " " 13¾ " " " ¼ " ⅝ " " " 635
B, " " 19 " " " ¼ " ⅞ " " " 635
C, length plate, 21¼ in.; holding dies ⅜ to 1 threads, as on page 635
D, " " 28½ " " " $\frac{13}{16}$ " 1½ " " " 635
E, " " 39½ " " " 1⅜ " 2 " " " 635

Our patent screw plates are of an improved pattern and finish. They are light and durable, and have recently been so perfected as to admit of a change of die most quickly. The dies and plates are carefully finished to standard gauges, and are warranted as to accuracy of size. The dies are interchangeable. Under or over size bolts are always properly cut with standard size dies.

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SCREW PLATES.

PRICES, FIG. 5083.

Size A, with 3 pair dies, cutting $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{12}$ $5.00
" B, " 4 " " $\frac{3}{8}^{16}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$ 8.00
" C, " 4 " " $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{9}$ 10.00
" D, " 4 " " $\frac{7}{8}^{9}$, 1^{8}, $1\frac{1}{8}^{7}$, $1\frac{1}{4}^{7}$ 13.00

SIZES, A, B, C & D.

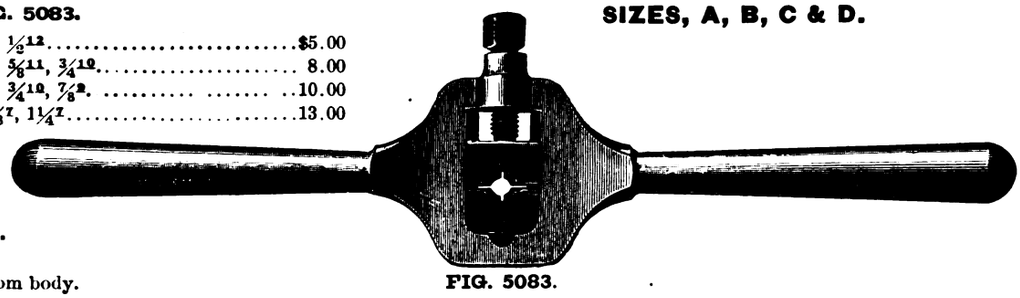


FIG. 5083.

PRICES, FIG. 5084.

Both handles screw out from body.

Size E, with 6 pair dies, cutting $1\frac{3}{8}^{6}$, $1\frac{1}{2}^{6}$, $1\frac{5}{8}^{5}$, $1\frac{3}{4}^{5}$, $1\frac{7}{8}^{4\frac{1}{2}}$, $2^{4\frac{1}{2}}$ $33.00

SIZE E.

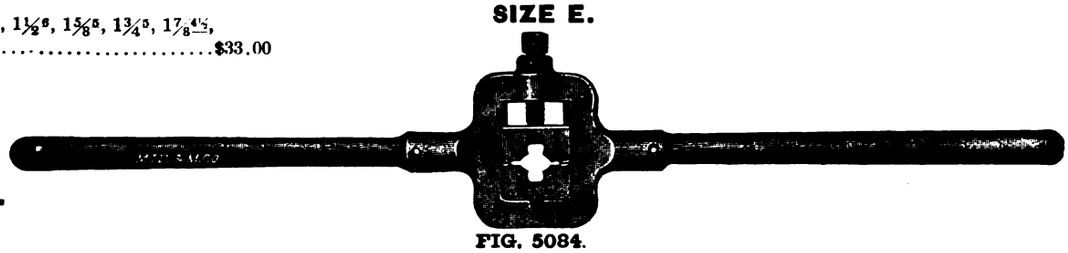


FIG. 5084.

SCREW PLATES, WITHOUT ANY DIES.

PRICES.

Size A, $3.25; B, $4.00; C, $5.00; D, $6.00; E, 16.00.

PRICES, SCREW PLATES.

With one, two or three pairs of dies.

Dies extra.

Size A, $2.50; B, $3.25; C, $4.00; D, $5.00; E, $15.00.

SPLIT DIES FOR PLATES A, B, C, D AND E.

Single pair dies, size A $1.00
" " B 1.25
" " C 1.75
" " D 2.00
" " E 3.00

Blank dies, one-half above prices.

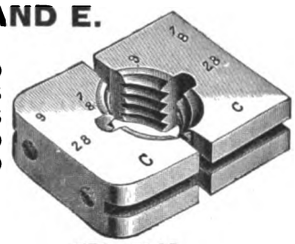


FIG. 5085.

COLLET TAP WRENCH FOR 5087.

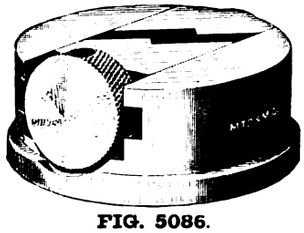


FIG. 5086.

FOR PRICES, SEE FIG. 5087.

COLLET SCREW PLATES.

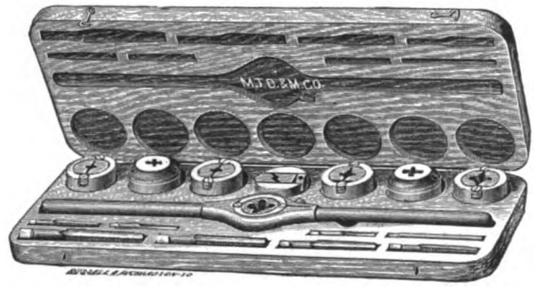


FIG. 5087.

PRICES.

No. 2. Stock, with die holder, taps and dies, without tap wrench collet, $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$ $14.25
No. 3. Stock, with die holder, taps and dies, without tap wrench collet, $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$ 25.00

PRICES FOR PARTS.

Stock, No. 2, $3.00. Collet, No. 2, 50c. Tap wrench collet, No. 2, $2.60
" No. 3, 4.00. " No. 3, 75c. " " " No. 3, 2.60

WOOD SCREW CUTTERS.

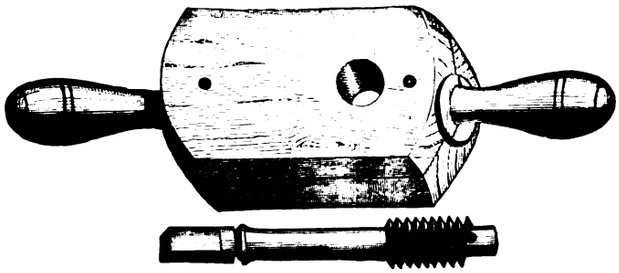


FIG. 5088.

PRICES.

Inch.	Each.	Inch.	Each.
$\frac{3}{8}$	$0.80	1	$1.30
$\frac{1}{2}$	.85	$1\frac{1}{4}$	1.75
$\frac{5}{8}$	.95	$1\frac{1}{2}$	2.50
$\frac{3}{4}$	1.05	$1\frac{3}{4}$	3.25
$\frac{7}{8}$	1.15	2	4 40

PRICES, TAPS AND DIES FOR NO. 2 AND NO. 3 SCREW PLATES.

Size.	No. threads to inch.	Hand taps, each, taper, plug and bott'g.	Dies, each, without collets.	Size.	No. threads to inch.	Hand taps, each, taper, plug and bott'g.	Dies, each, without collets.
$\frac{1}{4}$	18–20	$0.45	$1.00	$\frac{1}{2}$	12–13–14	$0.70	$1.50
$\frac{5}{16}$	16–18	.50	1.00	$\frac{5}{8}$	10–11–12	.90	1.90
$\frac{3}{8}$	14–16	.55	1.15	$\frac{3}{4}$	10	1.20	2.35
$\frac{7}{16}$	12–14–16	.60	1.30				

Left-hand taps and dies same prices as right-hand.

Taps and dies of V thread, sizes $\frac{1}{4}$ inch to $\frac{7}{16}$ inch inclusive, are furnished to exact size. Sizes of V thread, larger than $\frac{7}{16}$ inch, are furnished $\frac{1}{32}$ inch over size.

Whitworth, or Franklin Institute standard, taps and dies are furnished to exact size.

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LITTLE GIANT SCREW PLATES.

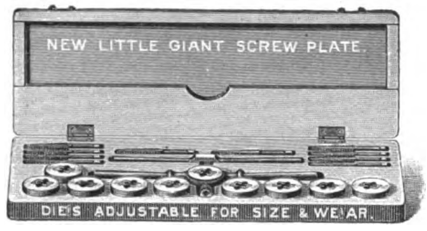


FIG. 5089.

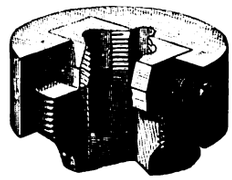


FIG. 5090.

DIE. SECTION DIE AND COLLET.







FIG. 5091.

DESCRIPTION, FIG. 5091.

The collet, or holder, is made of two pieces called a cap and a guide. The cap has a bevel slot into which the bevel of die is fitted. The guide is screwed into the cap, which throws the die into the bevel of the collet, and into line. To adjust, simply turn the screws at ends of dies in or out, as the adjustment desired requires.

Unless otherwise ordered, we furnish these plates for rough iron and of V shape of thread. Exact sizes V, United States standard or Whitworth shape of threads, furnished at the same prices. No extra charge for left-hand taps and dies. Use face side of die for cutting up to shoulder.

PRICES, FIG. 5089.

Assortment No. A 1. Has stock, tap wrench, taps, dies and collets.
Cutting $\frac{1}{8}^{40}$, $\frac{5}{32}^{32}$, $\frac{3}{16}^{24}$, $\frac{7}{32}^{24}$, $\frac{1}{4}^{20}$. Price, $6.50

No. 1 plate complete in box.
Length of stock, 14½ inches.
Cutting $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$. Price, $12.00
Adjustable tap wrench for this set. Extra, $2.00

No. 4 plate complete in box.
Length of stock, 26 inches.
Cutting $\frac{1}{2}^{12}$, $\frac{5}{8}^{10}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{9}$, 1^{8}. Price.....$17.50

No. 7 plate complete in box.
Length of stock, 26 inches. Price. $25.50
Cuts $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{10}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{9}$, 1^{8}.

No. 20 has stock 40 inches long. Price, $35.00
Cuts $\frac{5}{8}^{10}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{9}$, 1^{8}, $1\frac{1}{8}^{7}$, $1\frac{1}{4}^{7}$.

Assortment No. A 2. Cuts $\frac{7}{64}$, $\frac{1}{8}$, $\frac{9}{64}$, $\frac{5}{32}$, $\frac{3}{16}$, $\frac{7}{32}$, $\frac{1}{4}$. Price.....$8.00.

No. 2 plate complete in box.
Length of stock, 23 inches.
Cutting $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{10}$, $\frac{3}{4}^{10}$. Price.... $13.50
Price of adjustable tap wrenches, $2.00.

No. 5 plate complete in box.
Length of stock, 23 inches.
Cuts $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{10}$, $\frac{3}{4}^{10}$.
Price.....$16.00.
Adjustable tap wrench for this set, extra, $2.50.

No. 8 plate complete in box.
Has two stocks, 14½ inches long, for 4 smallest sizes, 26 inches for largest sizes. Price, $18.00
Cuts $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{10}$, $\frac{3}{4}^{10}$.

No. 25 has stock 52 inches long. Price, $45.00
Cuts $\frac{7}{8}^{9}$, 1^{8}, $1\frac{1}{8}^{7}$, $1\frac{1}{4}^{7}$, $1\frac{3}{8}^{6}$, $1\frac{1}{2}^{6}$.

Assortment No. A 3. Cuts $\frac{7}{64}$, $\frac{1}{8}$, $\frac{9}{64}$, $\frac{5}{32}$, $\frac{11}{64}$, $\frac{3}{16}$, $\frac{13}{64}$, $\frac{7}{32}$, $\frac{15}{64}$, $\frac{1}{4}$. Price, $10.50.

No. 3 plate complete in box.
Length of stock, 26 inches.
Cutting $\frac{5}{8}^{10}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{9}$, 1^{8}. Price..... $15.00

No. 6 plate complete in box.
Length of stock, 26 inches.
Cuts $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{10}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{9}$, 1^{8}. Price, $22.00

No. 9 plate complete in box.
Has stocks same as No. 8. Price.....$27.50
Cuts $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{10}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{9}$, 1^{8}.

No. 30 has stock 52 inches long. Price, $37.50
Cuts $1\frac{1}{8}^{7}$, $1\frac{1}{4}^{7}$, $1\frac{3}{8}^{6}$, $1\frac{1}{2}^{6}$.

No. 40 has two stocks, 40 inches and 23 inches long.
Cuts $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{10}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{9}$, 1^{8}, $1\frac{1}{8}^{7}$, $1\frac{1}{4}^{7}$. Price.....$40.00.

THE LIGHTNING SCREW PLATES.



FIG. 5092.

PRICES.

Set No. O, with 14 sizes, 5-64 to 9-32 in., stock, tap wrench, fitting in stock, bit brace holder, and holder for lathe use.

Usual assortments, 5-64, 3-32, 7-64, 1-8, 9-64, 5-32, 11-64, 3-16, 13-64, 7-32, 15-64, 1-4, 17-64, 9-32, or with screw gauge sizes, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16.

Price, complete, in case, either set..... $15.00
Stock 6 inches long; diameter of dies 7-8 in.

Set A, 3-16 to 7-16 in.; stock 10 inches long; and 5 sizes taps, dies and guides, 3-16, 1-4, 5-16, 3-8, 7-16 inch, or for screw gauge sizes, No. 14, 16, 18, 20 and 24.

Price, either set.. .....$9.25
Dies, $1.00 each; guides, 20 cents each.
Bit brace holder, for dies, extra..... ..$0.75
Diameter of dies in this set 1 5-16 in.
Adjustable tap wrench, size No. 2.....$2.35

Set B, 1-4 to 3-4 inch. Stock 23 inches long. 7 sizes, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4 inch.

Price, complete.....$16.00
Diameter of collets in this set 2 3-4 inch.
Adjustable tap wrench, size No. 3.....$3.00

Set D, 7-8 to 1 1-2 inch. Stock 53 inches long. 6 sizes, 7-8, 1, 1 1-8, 1 1-4, 1 3-8, 1 1-2 inch.

Price, complete.....$55.00
Diameter of collets in this set 4 1-4 inch.
Adjustable tap wrench, size No. 5.....$8.00

Set No. O1, with stock, tap wrench, fitting in stock, and 5 sizes taps, dies and guides. Usual assortments, 1-8, 5-32, 3-16, 7-32, 1-4, or screw gauge sizes, 4, 6, 8, 10, 12.

Price, complete, in case, either set.. .....$5.50
Stock 6 inches long; diameter of dies 7-8 inch.

Set A1, complete set, with taps, dies and guides, 3-16, 1-4, 5-16, 3-8, and 7-16 inch; stock, bit brace holder and nut wrenches.

Price, in case..... .....$11.25
Diameter of dies in this set 1 5-16 inch.
Adjustable tap wrench, size No. 2.....$2.25

Set C, 3-8 to 1 inch. Stock 29 inches long. 7 sizes, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1 inch.

Price, complete.....$22.00
Diameter of collets in this set 2 3-4 inch.
Adjustable tap wrench, size No. 4.....$4.00

Set K, 1-4 to 3-4 inch. 7 sizes. Two stocks, one 18 inches long, and one 23 inches long; and 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4 inch taps, dies and collets.

Price, complete..... ...$18.00
Diameter of collets in this set, 7-16 inch and under, 2 3-16 inch.
Diameter of collets in this set, 1-2 inch and over, 2 3-4 inch.
Adjustable tap wrench, size No. 3.....$3.00

Set No. O2, with stock, tap wrench, fitting in stock, and 7 sizes taps, dies and guides; usual assortments, 7-64, 1-8, 9-64, 5-32, 3-16, 7-32, 1-4, or screw gauge sizes, 4, 6, 8, 10, 12, 14, 16.
Price, complete in case, either set.....$6.75
Stock 6 inches long; diameter of dies 7-8 inch.

Set AA, 3-16 to 1-2 inch. Stock 18 inches long. 6 sizes, 3-16, 1-4, 5-16, 3-8, 7-16, 1-2 inch taps, dies and collets.
Price, complete..... $13.50
Outside diameter of collets in this set 2 3-16 inch.
Holders for dies in set AA, to use in machine or bit brace, each.....$1.50
Adjustable tap wrench, size No. 2 ..... 2.35
Will send above sets 1-32 oversize, V thread, unless otherwise ordered.

Set CC, 1-4 to 1 inch. Stock 29 inches long. 9 sizes, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1 inch.
Price, complete..... ...$25.50
Diameter of collets in this set 2 3-4 inch.
To above may be added 3-16 inch, and any intermediate sizes, or pipe dies, sizes 1-8 to 1 inch.

Set L, 1-4 to 1 inch. 9 sizes. Two stocks, one 18 inches long, and one 29 inches long, and 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1 inch taps, dies and collets.
Price, complete..... .....$27 50
Diameter of collets in this set, 7-16 inch and under, 2 3-16 inch.
Diameter of collets in this set, 1-2 inch and over, 2 3-4 inch.
Tap wrenches for this set extra, No. 2, $2.35, and No. 4, $4.00.

All dies stamped with a star (*) are 1-32 inch oversize, V form of thread. For cutting close up to a shoulder use the face side of die, after starting the thread with the other side, having guide.

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THE GREEN RIVER SCREW PLATES.

Set No. 1, 3-16 to 7-16 inch. Stock 10 inches long. With both stock and brace holder for dies. 5 sizes, 3-16, 1-4, 5-16, 3-8, 7-16 inch taps, dies and guides.
Complete, in case.....$10.50
Single dies, for this set, $1.00. Guides, 20 cents.
Diameter of dies in this set, 1 5-16 inches.
Adjustable tap wrench, size No. 2.....$2.35

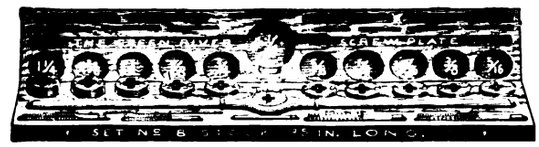


FIG. 5093.

PRICES.

Set No. 1½, 1-4 to 3-4 inch. Stock 22 inches long. 7 sizes, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4 inch taps, dies and guides.
Complete, in case.....$16.00
Diameter of dies in this set, 2 3-16 in.
Holders for dies in set No. 1 1-2, to use in machine or bit brace, each, $1.50.
Adjustable tap wrench, size No. 3.....$3.00

Set No. 4, 3-8 to 1 inch. Stock 29 inches long. 7 sizes, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1 inch taps, dies and guides.
Complete, in case.....$24.00
Diameter of dies in this set, 2 3-4 in.
Adjustable tap wrench, size No. 4.....$4.00

Set No. 7, 3-8 to 1 1-4 inch. Stock 35 inches long. 9 sizes, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1, 1 1-8, 1 1-4 inch taps, dies and guides.
Complete, in case.....$34.50
Diameter of dies in this set, 2 3-4 in.
Prices of adjustable tap wrenches, sizes No. 3, $3.00, and No. 5, $8.00.

Set No. 13, 1-4 to 1 inch. 9 sizes. Two stocks, one 22 inches, and one 29 inches long, and 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1 inch taps, dies and guides.
Complete, in case.....$29.00
Diameter of dies in this set, 7-16 in. and under 2 3-16 in.
Diameter of dies in this set, 1-2 in. and over 2 3-4 in.
Prices of adjustable tap wrenches, sizes No. 2, $2.35, and No. 4, $4.00.

Set No. 2, 1-4 to 3-4 inch. Stock 23 inches long. 7 sizes, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4 inch taps, dies and guides.
Complete, in case.....$17.50
Diameter of dies in this set, 2 3-4 in.
Adjustable tap wrench, size No. 3.....$3.00

Set No. 5, 1-4 to 1 inch. Stock 29 inches long. 9 sizes, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1 inch taps, dies and guides.
Complete, in case.....$27.00
Diameter of dies in this set, 2 3-4 in.
Prices of adjustable tap wrenches, sizes No. 2, $2.35, and No. 4, $4.00.

Set No. 8, 1-4 to 1 1-4 inch. Stock 35 inches long. 11 sizes, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1, 1 1-8, 1 1-4 inch taps, dies and guides.
Complete, in case.....$38.50
Diameter of dies in this set, 2 3-4 in.
Prices of adjustable tap wrenches, sizes No. 3, $3.00, and No. 5, $8.00.

Set No. 16, 1-4 to 1 1-4 inch, 11 sizes. Two stocks, one 22 inches long, and one 35 inches long, and 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1, 1 1-8, 1 1-4 inch taps, dies and guides.
Complete, in case.....$40.25
Diameter of dies in this set, 7-16 and under 2 3-16 in.
Diameter of dies in this set, 1-2 and over 2 3-4 in.
Prices of adjustable tap wrenches, sizes No. 3, $3.00, and No. 5, $8.00.

Set No. 3, 1-2 to 1 inch. Stock 29 inches long. Sizes, 1-2, 5-8, 3-4, 7-8, 1 inch taps, dies and guides.
Complete, in case.....$20.00
Diameter of dies in this set, 2 3-4 in.
Adjustable tap wrench, size No. 4.....$4.00

Set No. 6, 1-2 to 1 1-4 inch. Stock 35 inches long. 7 sizes, 1-2, 5-8, 3-4, 7-8, 1, 1 1-8, 1 1-4 inch taps, dies and guides.
Complete, in case.....$30.00
Diameter of dies in this set, 2 3-4 in.
Prices of adjustable tap wrenches, sizes No. 3, $3.00, and No. 5, $8.00.

Set No. 9, 7-8 to 1 1-2 inch. Stock 53 inches long. 6 sizes, 7-8, 1, 1 1-8, 1 1-4, 1 3-8, 1 1-2 inch taps, dies and guides.
Complete, in case.....$45.00
Diameter of dies in this set, 3 7-16 in.
Adjustable tap wrench, size No. 5.....$8.00

Set No. 25, 1-4 to 1 1-2 inch, 13 sizes. Two stocks, one 22 inches long, and one 53 inches long, and 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1, 1 1-8, 1 1-4, 1 3-8, 1 1-2 inch taps, dies and guides.
Complete, in case.....$61.00
Diameter of dies in this set, 3-4 in. and under 2 3-16 in.
Diameter of dies in this set, 7-8 in. and over 3 7-16 in.
Prices of adjustable tap wrenches, sizes No. 3, $3.00, and No. 5, $8.00.

ARMSTRONG'S ADJUSTABLE STOCK, NO. 1, AND DIES FOR THREADING BOLTS.

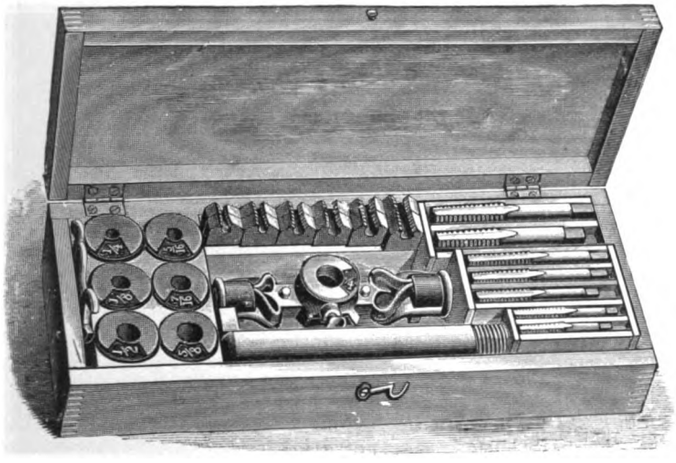


FIG. 5094.

PRICES.

No. 1 stock, 7 bolt dies, ¼ to ¾	each,	$15.00
No. 1 " 4 pipe and 7 bolt dies	"	20.00
No. 1 " 7 bolt dies and 7 taps, ¼ to ¾	"	20.00

PRICES OF PARTS.

No. 1 stock	each,	$3.00
No. 1 bolt dies, ¼, 5/16, 3/8, 7/16	"	1.50
No. 1 bolt dies, ½, ⅝, ¾	"	1.75
No. 1 bolt or pipe bushings	"	.20
No. 1 wrench	"	.25
No. 1 collar screw	"	.12
No. 1 adjusting screw	"	.10
No. 1 thumb screw	"	.10

ARMSTRONG'S ADJUSTABLE STOCK, NO. 2, AND DIES FOR THREADING BOLTS.

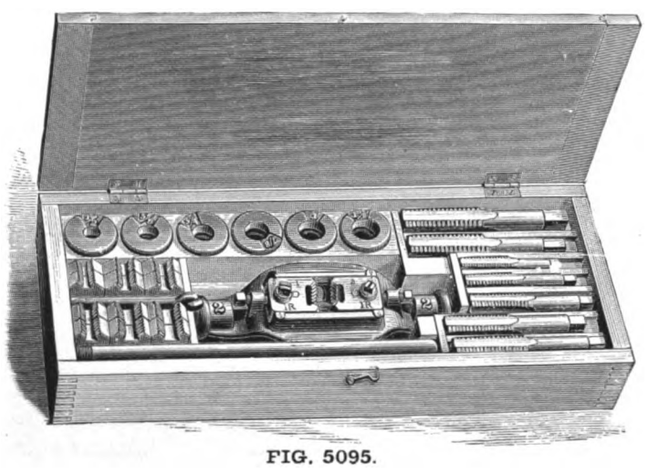


FIG. 5095.

PRICES.

No. 2 stock, 7 bolt dies, ½ to 1¼ inch		$20.00
No. 2 " 7 " " " and 5 pipe dies, ¼ to 1		30.00
No. 2 " 7 " and 7 taps, ½ to 1¼ inch		30.00

PRICES OF PARTS.

No. 2 stock	each,	$3.50
No. 2 bolt dies, ½ and ⅝ inch	"	2.00
No. 2 " ¾, ⅞ and 1 inch	"	2.25
No. 2 " 1⅛ and 1¼ inch	"	2.50
No. 2 bushings	"	.25
No. 2 wrench	"	.25
No. 2 collar screw	"	.12
No. 2 set screw	"	.10
No. 2 thumb screw	"	.10

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BLACKSMITHS' STOCKS AND DIES.

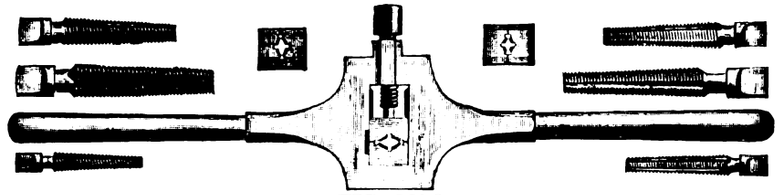


FIG. 5096.

PRICES.

No. 1.	Cuts 2 in. to 1 in., right hand, 4½ and 7 threads to the inch..... " 2 " 1 " left " 4½ and 7 " " "	8 taps and 4 pair of dies	$60.00
No. 2.	Cuts 2 in. to ⅞ in., right hand, 4½, 6, 7 and 8 threads to the inch..	8 taps and 4 pair of dies	60.00
No. 3.	Cuts 1¾ in. to ⅞ in., right hand, 6 and 8 threads to the inch..... " 1¾ " ⅞ " left " 6 and 8 " " "	8 taps and 4 pair of dies	45.00
No. 4.	Cuts 1¾ in. to ¾ in., right hand, 6, 7, 8 and 9 threads to the inch.....	8 taps and 4 pair of dies	45.00
No. 5.	Cuts 1½ in. to ¾ in., right hand, 8 and 9 threads to the inch..... " 1½ " ¾ " left " 8 and 9 " " "	8 taps and 4 pair of dies	35.00
No. 5½.	Cuts 1½ in. to ¾ in., right hand, 6, 7, 8 and 9 threads to the inch.....	8 taps and 4 pair of dies	35.00
No. 7.	Cuts 1¼ in. to ⅝ in., right hand, 8 and 10 threads to the inch..... " 1¼ " ⅞ " left " 8 " " "	6 taps and 3 pair of dies	12.00
No. 9.	Cuts 1¼ in. to ½ in., right hand, 8, 10 and 12 threads to the inch.....	6 taps and 3 pair of dies	12.00
No. 17.	Cuts 1 in. to ½ in., right hand, 9 and 12 threads to the inch..... " 1 " ¾ " left " 9 " " "	6 taps and 3 pair of dies	9.00
No. 19.	Cuts 1 in. to ⅜ in., right hand, 9, 12 and 14 threads to the inch.....	6 taps and 3 pair of dies	9.00
No. 25.	Cuts ¾ in. to ⅜ in., right hand, 10 and 12 threads to the inch..... " ¾ " ½ " left " 10 " " "	6 taps and 6 pair of dies	6.50
No. 27.	Cuts ¾ in. to ⅜ in., right hand, 10, 12 and 16 threads to the inch.....	6 taps and 3 pair of dies	6.50
No. 45.	Cuts ⅝ in. to $\frac{5}{16}$ in., right hand, 12 and 16 threads to the inch..... " ⅝ " $\frac{7}{16}$ " left " 12 " " "	6 taps and 3 pair of dies	5.50
No. 47.	Cuts ⅝ in. to ¼ in., right hand, 12, 14 and 18 threads to the inch.....	6 taps and 3 pair of dies	5.50
No. 49.	Cuts ½ in. to ¼ in., right hand, 14 and 18 threads to the inch..... " ½ " $\frac{5}{16}$ " left " 14 " " "	6 taps and 3 pair of dies	4.50
No. 51.	Cuts ½ in. to $\frac{3}{16}$ in., right hand, 14, 18 and 22 threads to the inch.....	6 taps and 3 pair of dies	4.50
No 60.	Cuts ¾ in. to ⅛ in., right hand, 10, 12, 14 and 18 threads to the inch...	6 taps and 4 pair of dies	6.50



FIG. 5097.

PRICES.

No. 6.	Cuts 1½ in. to 1 in., right hand, 8 threads to the inch ..... " 1½ " 1 " left " 8 " " "	4 taps and 2 sets of dies.	$20.00
No. 11.	Cuts 1¼ in. to ⅝ in., right hand, 8 and 10 threads to the inch ..... " 1¼ " ⅞ " left " 8 " " "	4 taps and 3 sets of dies	10.00
No. 15.	Cuts 1¼ in. to ½ in., right hand, 8, 10 and 12 threads to the inch.....	5 taps and 3 sets of dies	10.00
No. 21.	Cuts 1 in. to ½ in., right hand, 9 and 12 threads to the inch..... " 1 " ¾ " left " 9 " " "	4 taps and 3 sets of dies	6.00
No. 23.	Cuts 1 in. to ⅜ in., right hand, 9, 10 and 14 threads to the inch.....	3 taps and 3 sets of dies	5.00
No. 32.	Cuts ¾ in. to ⅜ in., right hand, 10 and 14 threads to the inch..... " ¾ " ⅜ " left " 10 and 14 " " "	4 taps and 4 sets of dies	5.00
No. 33.	Cuts ¾ in. to ½ in., right hand, 10 threads to the inch ..... " ¾ " ½ " left " 10 " " "	2 taps and 2 sets of dies	4.00
No. 34.	Cuts ¾ in. to $\frac{5}{16}$ in., right hand, 10, 12 and 16 threads to the inch.....	3 taps and 3 sets of dies	4.50
34 A.	Cuts ¾ in. to $\frac{5}{16}$ in., right hand, 10, 12 and 14 threads to the inch.....	3 taps and 3 sets of dies	4.50
34 B.	Cuts ¾ in. to $\frac{5}{16}$ in., right hand, 12, 14 and 16 threads to the inch.....	3 taps and 3 sets of dies	4.50
No. 35.	Cuts ¾ in. to ⅜ in., right hand, 10 and 14 threads to the inch.....	2 taps and 2 sets of dies	4.00
No. 37.	Cuts ⅝ in. to $\frac{3}{16}$ in., right hand, 14, 18 and 22 threads to the inch.....	6 taps and 3 sets of dies	4.25
37 A.	Cuts ⅝ in. to $\frac{3}{16}$ in., right hand, 12, 14 and 16 threads to the inch.....	6 taps and 3 sets of dies	4.25
37 B.	Cuts ⅝ in. to $\frac{3}{16}$ in., right hand, 14, 16 and 18 threads to the inch.....	6 taps and 3 sets of dies	4.25
No. 38.	Cuts ⅝ in. to $\frac{5}{16}$ in., right hand, 12 and 18 threads to the inch..... " ⅝ " $\frac{7}{16}$ " left " 12 " " "	6 taps and 3 sets of dies	4.50
No. 41.	Cuts ½ in. to ⅛ in., right hand, 16, 20 and 26 threads to the inch.....	6 taps and 3 sets of dies	3.25
41 A.	Cuts ½ in. to ⅛ in., right hand, 14, 16 and 18 threads to the inch.....	6 taps and 3 sets of dies	3.25
41 B.	Cuts ½ in. to ⅛ in., right hand, 16, 18 and 20 threads to the inch.....	6 taps and 3 sets of dies	3.25
No. 42.	Cuts ½ in. to $\frac{3}{16}$ in., right hand, 14 and 20 threads to the inch..... " ½ " $\frac{5}{16}$ " left " 14 " " "	6 taps and 3 sets of dies	3.50
No. 53.	Cuts $\frac{5}{16}$ in. to $\frac{1}{16}$ in., right hand, 16, 20, 24 and 32 threads to the inch..	4 taps and 4 sets of dies	2.75
No. 55.	Cuts $\frac{5}{16}$ in. to $\frac{1}{16}$ in., right hand, 18, 24 and 32 threads to the inch.....	4 taps and 3 sets of dies	2.50

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STUBS' NOTCHED SCREW PLATES.

STUBS' NO. 180, BRIGHT.

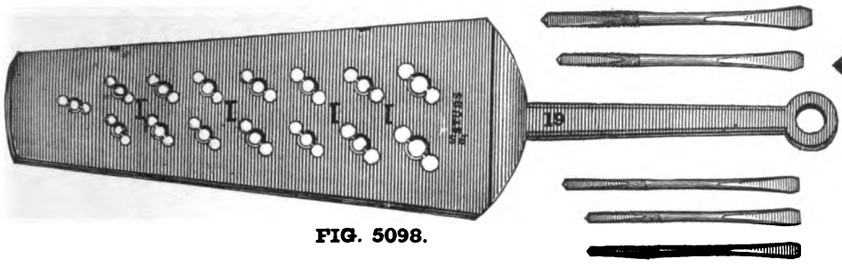


FIG. 5098.

STUBS' NO. 181A, BLACK.

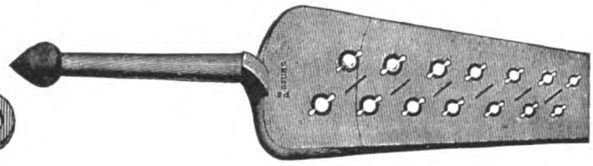


FIG. 5099.

PRICES.

No. of sizes..	5	6	7	8	10	12
Sizes cut....	7/64 to 1/16	1/8 to 1/16	9/64 to 1/16	5/32 to 1/16	11/64 to 1/16	3/16 to 1/16
Price, each..	$1.38	$1 75	$2.13	$2.50	$3.25	$4.00

PRICES.

Sizes.....	6	7	8	10	12	14
Diam. of hole,	18 to 37	15 to 37	11 to 37	2 to 37	17/64 to 37	13/64 to 37
Cuts from....	1/32 to 1/8	7/64 to 1/8	15/64 to 1/8	1/4 to 1/8	5/16 to 1/8	3/8 to 1/8
Each.....	$1.50	$1.84	$2.17	$2.84	$3.75	$4.92

1 tap is furnished for each size hole in plate.

SAFETY DRILL AND TAP HOLDER.

This tool is intended for use in the upright drill, lathe, screw machine, or any machine with a revolving spindle. It is very desirable, although not absolutely necessary, to provide reverse motion for the purpose of backing out the tap. In construction the holder is very simple; there is nothing to break or get out of order, no complicated parts, and its operation is easily understood by the most ordinary mechanic. If properly used it is impossible to break either drill or tap, and the change from one to the other can be instantly made without stopping the machine.

The holder consists of a body G screw threaded upon the outside and recessed to receive the friction socket A; has taper shank regularly made to the Morse taper, but will be turned to any desired taper.

The friction socket A receives the drill sockets E or tap socket D, and is held between two pieces of vulcanite fiber F, and is driven by the friction obtained by tightening the friction cap B, so that the friction produced will be sufficient to drive the drill or tap used, and when adjusted is held by the check nut C.

The tap socket and taps being driven through feathers, prevents all danger of stripping the thread by careless hand feeding. All holes are tapped straight, and the tap being held loosely it does not cut larger than itself. Special taps, as shown, are recommended, but special tap sockets can be furnished to take the ordinary square shank taps.

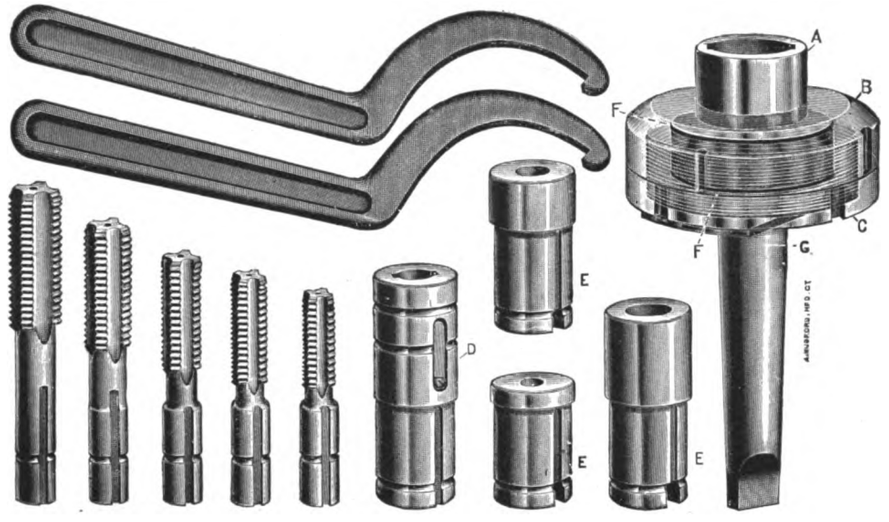


FIG. 5100.

No. 1 holder takes drills or taps 1/4, 5/16, 3/8, 7/16, 1/2, 9/16 and 5/8 inch; shank turned to No. 2 Morse taper is furnished with one No. 1 Morse taper drill socket, two tap sockets and two spanner wrenches. **PRICE, $35.00.**

No. 2 holder takes drills or taps 5/8, 11/16, 3/4, 7/8, 1 and 1 1/8 inches; shank is turned to No. 4 Morse taper, is furnished with one each No. 1, 2 and 3 Morse taper drill sockets, one tap socket and two spanner wrenches. **PRICE, $60.00.**

HURLEY TAPPING HEAD.

We claim for the tapping head:

1st—Strength and durability.
2d—Simplicity of construction and operation.
3d—Any of the standard taps in the market may be used.
4th—No skill required to operate.
5th—All parts subject to wear are tempered.
6th—Workmanship and material first-class.
7th—Will tap all holes true to spindle.
8th—As quickly put in and taken out as a drill.
9th—No delicate or intricate parts to get out of order.
10th—It will tap to a uniform depth.
11th—It is impossible for taps to go below the depth gauged.

It will tap holes with the same speed they are drilled, and without moving the work that often requires time to hold to tap by hand, insuring perfect alignment with spindle. Any depth of thread may be obtained by adjusting the gauge, which absolutely controls the tap. As fully 50 per cent. of the holes drilled are tapped, the tapping is no small item in the shop, of which fact machinery builders are aware.

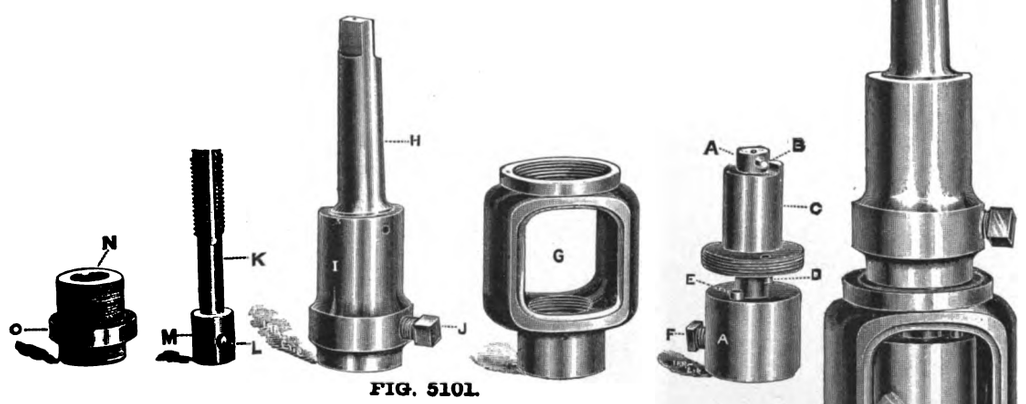


FIG. 5101.

We furnish heads with taps ready for use, or will send heads without. The purchasers can use their own or any of the taps on the market. We charge for taps fitted to heads at about manufacturers' prices. We prefer to send one tap with head to show how they should be fitted.

PRICES.

No. 0 taps,	3/8	and under	$25.00
" 1 "	3/8	to 5/8	35.00
" 2 "	5/8	" 1	45.00
" 3 "	1	" 2	60.00

DIRECTIONS FOR USING THE HEAD.

See that the pins, E D, touch each other at their faces, then adjust the gauge N the desired depth you wish to tap; place in the machine, which is provided with a backing belt, bring the spindle down to the work, which engages the driving pins, E D, and follow down the lead of the tap until the gauge N comes in contact with the work, when the pins will draw off; then reverse the machine, raise the spindle and the tap will back out.

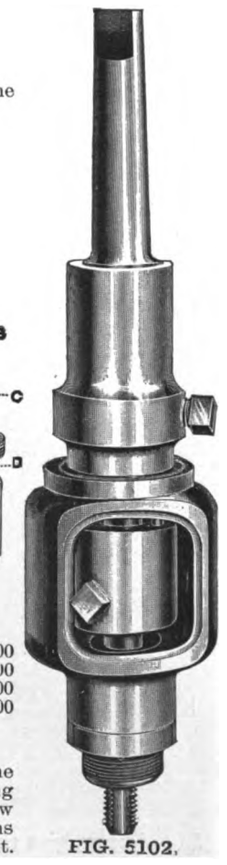


FIG. 5102.

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PEARN'S TAPPING HEAD.

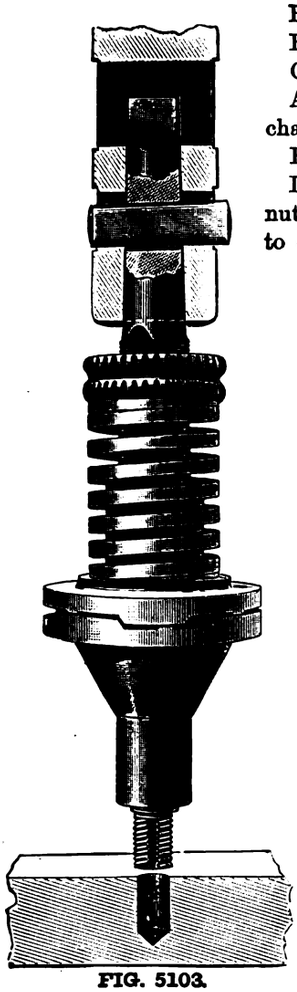


FIG. 5103.

Fig. 5103 shows position when starting to tap.

Fig. 5104 shows position when hole is tapped and the yielding coupling has slipped.

Can be used in any drilling or screwing machine, either vertical or horizontal.

All holes tapped to one depth, straight and alike. No breaking of taps. Interchangeable with ordinary drills.

Each tapper is fitted into a polished case, which is also prepared to receive the taps.

It is readily adjusted to drive the various sized taps by screwing or unscrewing the nut at the top of the spring, which gives the necessary pressure power to the spring to drive the taps, and yet leaves it free to yield before breaking the tap.

PRICES.

Size.	Will tap.	Prices.
A	$\frac{3}{8}$ $\frac{7}{16}$ $\frac{1}{2}$ $\frac{9}{16}$ $\frac{5}{8}$ $\frac{3}{4}$ in.	$.....
B	$\frac{1}{2}$ $\frac{5}{8}$ $\frac{3}{4}$ $\frac{7}{8}$ 1 $1\frac{1}{8}$ "	.....
C	1 $1\frac{1}{8}$ $1\frac{1}{4}$ $1\frac{3}{8}$ $1\frac{1}{2}$ $1\frac{3}{4}$ 2 "	.....

FOR DRIVING STUD BOLTS.

These are equally well adapted for putting studs in after the holes are tapped, a set of sockets being all that is required to enable this operation to be performed with rapidity.



FIG. 5104.

CONNELLY'S STAY BOLT HOLE DRILLING DEVICES.

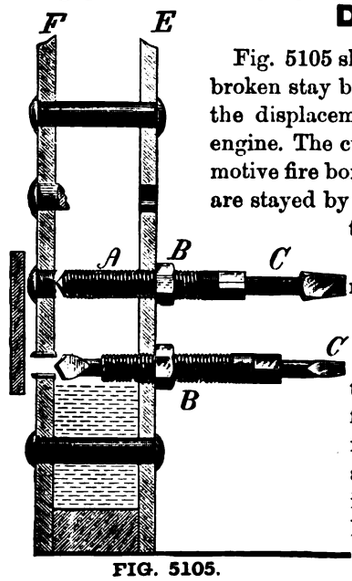


FIG. 5105.

Fig. 5105 shows method of drilling out or removing old or broken stay bolts from the fire boxes of locomotives without the displacement of any of the intervening parts of the engine. The cut shows a sectional view of a portion of a locomotive fire box, the inner and outer sheets or shells of which are stayed by the usual stay bolts, illustrating the application of the tubular drill guide.

In ordering, give diameter of guides and number of threads per inch.

PRICE, PER SET, $35.00.

Fig. 5106 shows device for tapping stay bolt holes which are behind the frames, drivers, or other parts of a locomotive; this is accomplished by first removing the old stay bolt, and then re-threading the stay bolt holes from the inside of the fire box, and by then inserting the new stay bolt, also from the inside of the fire box, which may be done quickly and effectively at comparatively little expense, and without injury to the engine, or keeping it out of service.

In ordering, give diameter of tap and number of threads per inch.

PRICE, PER SET, $35.00.

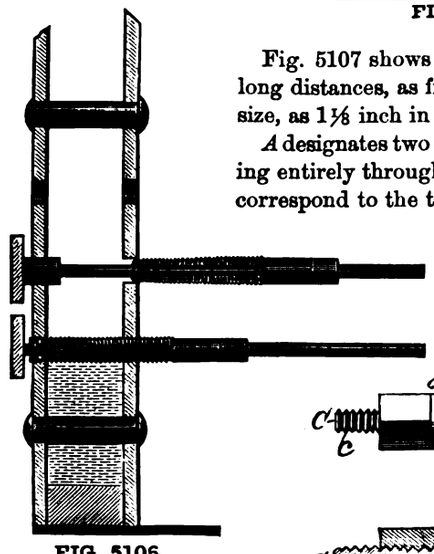


FIG. 5106.

Fig. 5107 shows radial devices for tapping stay bolt holes in locomotive boilers, especially adapted for reaching long distances, as from outer shell to crown sheet, or from side to side of shell, and are made to suit any required size, as 1⅛ inch in shell plate to 1 inch in crown sheet.

A designates two corresponding screw taps, provided with exterior threads *a* and having a central bore *B* extending entirely through the taps, this bore being threaded at *b*. *C*, the spindle which is externally threaded at *c* to correspond to the threaded bore *B* of the taps. This spindle may be made of any desired length, and upon it are mounted the screw taps *A A* as shown, the taps being thus adapted to work upon the threaded spindle toward each other, and be perfectly guided thereby. The spindle is threaded its entire length and has the same pitch of thread as the taps, whereby the spindle serves to perfectly guide the taps in a straight line and effect a perfect relative operation as the threads are cut in the respective bolt holes.

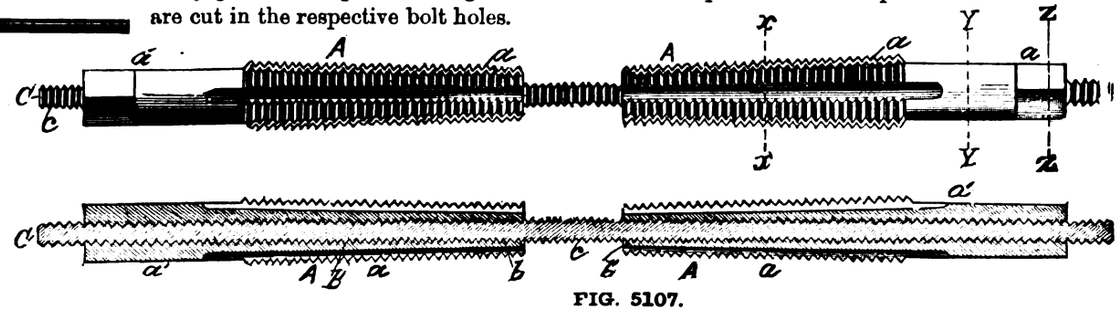


FIG. 5107.

In ordering, give the diameter of taps, number of threads per inch, and longest distance between sheets. **PRICE, PER SET, $50.00.**

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TAP DRILLS.

We append the following table, showing the different sizes of drills that should be used when a full thread is to be tapped in a hole. The sizes given are practically correct.

Diam. of tap.	No threads to inch.			Drill for V thread.			Drill for U. S. S. thread.			Drill for Whitworth thread.		
1/4	16	18	20	5/32	3/16	11/64	..	..	3/16	..	..	3/16
5/16	16	18	20	3/16	13/64	13/64	..	..	..	..	..	..
3/8	16	18	..	7/32	11/64	..	..	1/4	..	..	13/64	..
7/16	14	16	18	1/4	9/64	9/64	..	9/32	..	..	9/32	..
1/2	14	16	18	19/64	21/64	21/64	..	..	..	..	..	..
9/16	14	16	..	21/64	11/32	..	11/32	..	..	11/32	..	..
5/8	12	13	14	25/64	27/64	27/64	..	..	..	..	..	..
11/16	12	13	14	29/64	15/32	..	..	13/32	..	3/8	..	..
3/4	10	11	12	17/32	1/2	1/2	..	1/2	..	..	1/2	..
13/16	10	11	12	35/64	17/32	17/32	..	..	..	..	..	..
7/8	9	10	..	25/32	49/64	..	49/64	..	..	49/64	..	..
15/16	9	..	..	29/32	57/64	..	57/64	..	..	57/64	..	..
1	8	..	..	1 1/32	1 1/64	..	1 1/64	..	..	1 1/64	..	..
1 1/16	8	..	..	1 5/32	1 9/64	..	1 9/64	..	..	1 9/64	..	..
1 1/8	7	8	..	1 9/32	1 13/64	..	1 13/64	..	..	1 13/64	..	..
1 3/16	7	8	..	1 13/32	1 17/64	..	1 17/64	..	..	1 17/64	..	..
1 1/4	7	..	..	1 17/32	1 25/64	..	1 25/64	1 1/16	..	1 25/64	..	..
1 5/16	7	..	..	1 21/32	1 29/64	..	1 29/64	..	..	1 29/64	..	..
1 3/8	6	..	..	1 25/32	1 33/64	..	1 33/64	1 5/32	..	1 33/64	..	..
1 7/16	6	..	..	1 29/32	1 37/64	..	1 37/64	..	..	1 37/64	..	..
1 1/2	6	..	..	1 33/32	1 41/64	..	1 41/64	1 9/32	..	1 41/64	1 3/32	..
1 9/16	6	..	..	1 37/32	1 45/64	..	1 45/64	..	..	1 45/64	..	..
1 5/8	5	5 1/2	..	1 41/32	1 49/64	1 49/64	..	1 3/8	..	1 23/64	..	..
1 11/16	5	5 1/2	..	1 45/32	1 53/64	..	..	..	..	..	..	..
1 3/4	5	5 1/2	..	1 49/32	1 57/64	1 57/64	..	..	..	..	..	..
1 13/16	5	5 1/2	..	1 53/32	1 61/64	..	..	1 1/2	..	1 1/2	..	..
1 7/8	4 1/2	5	..	1 57/32	1 63/64	1 63/64	..	1 5/8	..	1 37/64	..	..
1 15/16	4 1/2	5	..	1 61/32	2	2	..	..	..	..	..	..
2	4 1/2	..	..	2 1/32	2 1/64	..	2 1/64	1 5/8	..	1 45/64	..	..

OLD RELIABLE DRILL HOLDER.

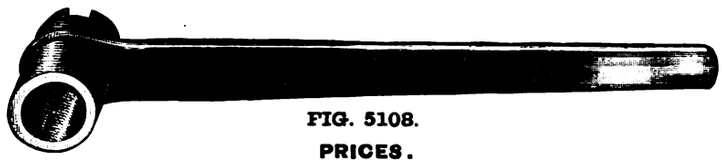


FIG. 5108.

PRICES.

Size.	Prices.	Holds drills.	Length.	Weight.
No. 1	$0.80	1/4 to 19/32	8 1/2 in.	1/2 lb.
" 2	1.00	1/2 " 25/32	10 "	1 "
" 3	1.20	5/8 " 1 1/4	11 3/4 "	2 "
" 4	1.40	1 9/32 " 2	14 1/4 "	4 "

Please note that when buying this drill holder it is not necessary to buy the shell sockets or sleeves; one price covers the tool complete, ready for use. When ordering this tool, always specify the old reliable drill holder, to distinguish it from our sleeve holder, which is much more expensive, but in some respects a superior tool.

SEE FIGS. 5109 & 5110.

LATHE DRILL HOLDERS.

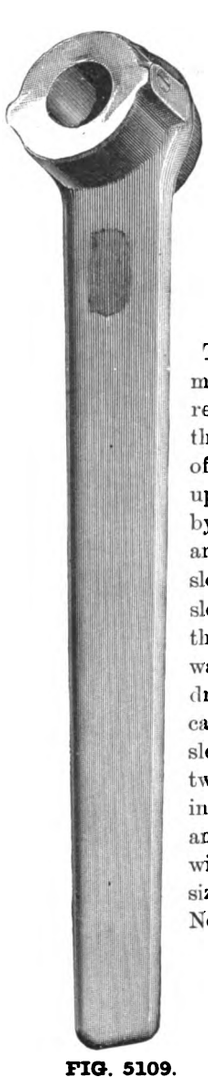


FIG. 5109.
NO. 3 SLEEVE HOLDER.

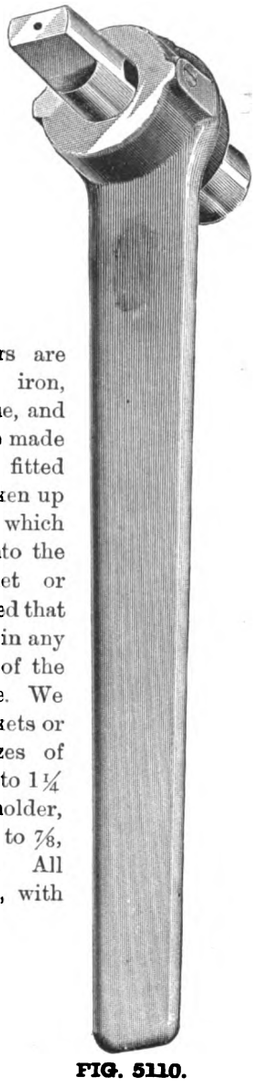


FIG. 5110.
HOLDER WITH NO. 3 SLEEVE IN PLACE.

These drill holders are made of malleable iron, reamed perfectly true, and the shell sockets are made of steel, accurately fitted up. The strain is taken up by two steel screws, which are turned to fit into the slot in shell socket or sleeve, and so arranged that they do not interfere in any way with the shank of the drill when in its place. We can furnish shell sockets or sleeves to fit all sizes of twist drills, from 1/4 to 1 1/4 inclusive, with No. 3 holder, and all sizes from 1/4 to 7/8, with No. 2 holder. All sizes from 1/4 to 5/8, with No. 1 holder.

PRICES.

No. 3 sleeve holder	$1.00
" 2 " "	.90
" 1 " "	.80
No. 1 sleeve fitted to No. 2 or 3 sleeve, or No. 1 holder	$1.80
" 2 " " to No. 3 sleeve or No. 2 holder	2.40
" 3 " " to No. 3 holder	3.00

WALKER'S TOOL HOLDER.

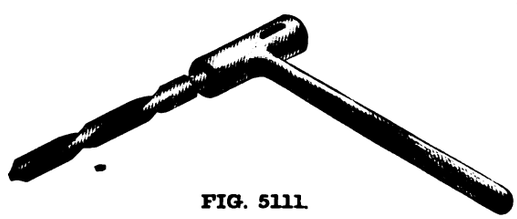


FIG. 5111.

PRICES.

No. 1 holds 1/4 to 19/32 inches, inclusive	$1.20
" 2 " 5/8 to 29/32 " "	1.80
" 3 " 15/16 to 1 1/4 " "	2.50
" 4 " 1 9/32 to 2 " "	4.00
" 5 " 2 1/16 to 2 1/2 " "	7.50

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TWIST DRILLS.

TAPER SHANK DRILLS.



FIG. 5112.

Diameter.	Length.	Price, each.	Socket for Morse taper.
1/4	6 1/8	$0.60	
9/32	6 1/4	.65	
5/16	6 3/8	.70	
11/32	6 1/2	.75	
3/8	6 3/4	.80	
13/32	7	.85	
7/16	7 1/4	.90	
15/32	7 1/2	.95	
1/2	7 3/4	1.00	No. 1, $1.20.
17/32	8	1.10	
9/16	8 1/4	1.20	
19/32	8 1/2	1.30	
5/8	8 3/4	1.40	
21/32	9	1.50	
11/16	9 1/4	1.60	
23/32	9 1/2	1.70	
3/4	9 3/4	1.85	
25/32	9 7/8	2.00	No. 2, $1.80.
13/16	10	2.15	
27/32	10 1/4	2.30	
7/8	10 1/2	2.45	
29/32	10 5/8	2.60	
15/16	10 3/4	2.75	
31/32	10 7/8	2.90	
1	11	3.00	
1 1/32	11 1/8	3.20	
1 1/16	11 1/4	3.40	
1 3/32	11 1/2	3.60	No. 3, $2.50.
1 1/8	11 3/4	3.80	
1 5/32	11 7/8	4.00	
1 3/16	12	4.20	
1 7/32	12 1/8	4.40	
1 1/4	12 1/2	4.50	
1 9/32	14 1/8	4.65	
1 5/16	14 1/4	4.80	
1 11/32	14 3/8	5.00	
1 3/8	14 1/2	5.20	
1 13/32	14 5/8	5.40	
1 7/16	14 3/4	5.60	
1 15/32	14 7/8	5.80	
1 1/2	15	6.00	
1 17/32	15 1/8	6.30	
1 9/16	15 1/4	6.60	
1 19/32	15 3/8	6.90	No. 4, $4.00.
1 5/8	15 1/2	7.20	
1 21/32	15 5/8	7.50	
1 11/16	15 3/4	7.80	
1 23/32	15 7/8	8.10	
1 3/4	16	8.40	
1 25/32	16 1/8	8.60	
1 13/16	16 1/4	8.80	
1 27/32	16 3/8	9.00	
1 7/8	16 1/2	9.20	
1 29/32	16 1/2	9.35	
1 15/16	16 1/2	9.50	
1 31/32	16 1/2	9.65	
2	16 1/2	9.80	
2 1/32	16 1/2	10.20	
2 1/16	17	10.60	
2 1/8	17	11.20	
2 3/16	17	12.00	No. 5, $7.50.
2 1/4	17 1/2	12.80	
2 5/16	17 1/2	13.60	
2 3/8	18	14.40	
2 7/16	18 1/2	15.00	
2 1/2	19	15.60	

64th SIZES FOR REAMERS.

Diameter.	Length.	Price, each.	No. of socket for Morse taper.
15/64	6 1/8	$0.60	
17/64	6 1/4	.65	
19/64	6 3/8	.70	
21/64	6 1/2	.75	
23/64	6 3/4	.80	
25/64	7	.85	
27/64	7 1/4	.90	
29/64	7 1/2	.95	
31/64	7 3/4	1.00	No. 1, $1.20.
33/64	8	1.10	
35/64	8 1/4	1.20	
37/64	8 1/2	1.30	
39/64	8 3/4	1.40	
41/64	9	1.50	
43/64	9 1/4	1.60	
45/64	9 1/2	1.70	
47/64	9 3/4	1.85	
49/64	9 7/8	2.00	No. 2, $1.80.
51/64	10	2.15	
53/64	10 1/4	2.30	
55/64	10 1/2	2.45	
57/64	10 5/8	2.60	
59/64	10 3/4	2.75	
61/64	10 7/8	2.90	
63/64	11	3.00	
1 1/64	11 1/8	3.20	
1 3/64	11 1/4	3.40	
1 5/64	11 1/2	3.60	No. 3, $2.50.
1 7/64	11 3/4	3.80	
1 9/64	11 7/8	4.00	
1 11/64	12	4.20	
1 13/64	12 1/8	4.40	
1 15/64	12 1/2	4.50	
1 17/64	14 1/8	4.65	
1 19/64	14 1/4	4.80	
1 21/64	14 3/8	5.00	
1 23/64	14 1/2	5.20	
1 25/64	14 5/8	5.40	No. 4, $4.00.
1 27/64	14 3/4	5.60	
1 29/64	14 7/8	5.80	
1 31/64	15	6.00	
1 33/64	15 1/8	6.30	
1 35/64	15 1/4	6.60	
1 37/64	15 3/8	6.90	

A SOCKETS.



FIG. 5113.

PRICES.

No. 1, with shank fitted to No. 2 or 3 socket.... $2.00
" 2, " " " " 3 " 2.50
" 3, " " " " 4 " 3.20
" 4, " " " " 5 " 4.80

B SOCKETS.



FIG. 5114.

PRICES.

No. 1 fitted to No. 2 or 3 socket..... $1.80
" 2 " " 3 " 2.40
" 3 " " 4 " 3.00
" 4 " " 5 " 4.40

STEEL SOCKETS FOR TAPER SHANK DRILLS.

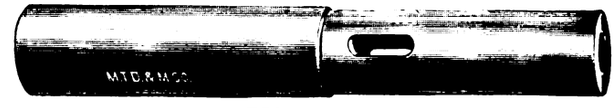


FIG. 5115.

PRICES.

MORSE TAPER SOCKET.

No. 1, holds 1/4 to 13/32 in., inclusive..... $1.20
" 2, " 5/8 to 29/32 in., " 1.80
" 3, " 15/16 to 1 1/4 in., " 2.50
" 4, " 1 9/32 to 2 in., " 4.00
" 5, " 2 1/16 to 2 1/2 in., " 7.50

AMERICAN TAPER SOCKET.

No. 1, holds 1/4 to 15/32 in., inclusive..... $1.30
" 2, " 1/2 to 21/32 in., " 1.55
" 3, " 11/16 to 7/8 in., " 2.00
" 4, " 23/32 to 1 1/4 in., " 2.50

If drills are desired of absolutely exact diameter, they should be ground on centers the entire length of the twist and shank.

Drills so ground at a reasonable advance on regular prices.

FIG. 5112. DRILLS PER SET.

No. 1. Set of taper shank drills, 1/4 to 1 in., varying by 16ths..... $20.00
" 2. " " " " 3/8 to 1 1/4 in., " " 34.50
" 3. " " " " 3/8 to 3/4 in. by 32ds, 3/4 to 1 1/4 in. by 16ths..... 42.00
" 4. " " " " 3/8 to 3/4 in. by 32ds, 3/4 to 2 in. by 16ths..... 131.00
" 11. " " " " 3/8 to 2 in. by 32ds 240.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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TWIST DRILLS.

STUBS' STEEL WIRE GAUGE DRILLS.

Numbers by gauge.	Prices, per dozen.	Prices, each.	Length.
1 to 5	$2.35	$0.22	4
6 " 10	2.25	.21	3 1/8
11 " 15	2.10	.20	3 1/2
16 " 20	1.95	.19	3 1/4
21 " 25	1.75	.17	3 1/8
26 " 30	1.55	.15	2 13/16
31 " 35	1.40	.14	2 5/8
36 " 40	1.25	.12	2 7/16
41 " 45	1.10	.10	2 1/4
46 " 60	.95	.09	2 1/16 to 1 3/4
61 " 70	.90	.08	1 1/2
71 " 80	1.00	.09	1 5/16 to 3/4

SIZES OF GAUGE IN DECIMALS.

No.	Size of number.	No.	Size of number.
1	.2280	31	.1200
2	.2210	32	.1160
3	.2130	33	.1130
4	.2090	34	.1110
5	.2055	35	.1100
6	.2040	36	.1065
7	.2010	37	.1040
8	.1990	38	.1015
9	.1960	39	.0995
10	.1935	40	.0980
11	.1910	41	.0960
12	.1890	42	.0935
13	.1850	43	.0890
14	.1820	44	.0860
15	.1800	45	.0820
16	.1770	46	.0810
17	.1730	47	.0785
18	.1695	48	.0760
19	.1660	49	.0730
20	.1610	50	.0700
21	.1590	51	.0670
22	.1570	52	.0635
23	.1540	53	.0595
24	.1520	54	.0550
25	.1495	55	.0520
26	.1470	56	.0465
27	.1440	57	.0430
28	.1405	58	.0420
29	.1360	59	.0410
30	.1285	60	.0400

STRAIGHT SHANK DRILLS.

JOBBERS' AND MACHINISTS'.

Diameter.	Prices, per dozen.	Prices, each.	Length.
1/16	$1.00	$0.09	2 1/2
5/64	1.10	.10	2 3/8
3/32	1.20	.11	2 3/4
7/64	1.30	.12	2 7/8
1/8	1.45	13	3
9/64	1.60	.15	3 1/8
5/32	1.80	.16	3 1/4
11/64	2.00	.18	3 3/8
3/16	2.20	.20	3 1/2
13/64	2.40	.21	3 5/8
7/32	2.65	.23	3 3/4
15/64	2.90	.26	3 7/8
1/4	3.15	.28	4
17/64	3.40	.30	4 1/8
9/32	3.65	.32	4 1/4
19/64	3.90	.35	4 3/8
5/16	4 20	.37	4 1/2
21/64	4.50	.40	4 5/8
11/32	4.80	.42	4 3/4
23/64	5.10	.45	4 7/8
3/8	5.40	.48	5
25/64	5.70	.50	5 1/8
13/32	6.00	.53	5 1/4
27/64	6.40	.55	5 3/8
7/16	6.80	.59	5 1/2
29/64	7.20	.63	5 5/8
15/32	7.50	.65	5 3/4
31/64	7.75	.67	5 7/8
1/2	8.00	.70	6

LETTER SIZES.

Diameter.	Prices, per dozen.	Prices, each.	Decimals of 1 inch.	Length.
A 15/64 in.	$2.90	$0.26	.234	3 1/8
B	3.00	.27	.238	3 1/8
C	3.10	.28	.242	3 1/8
D	3.20	.29	.246	3 1/8
E 1/4 in.	3.30	.30	.250	3 1/8
F	3.40	.30	.257	4 1/4
G	3.50	.31	.261	4 1/4
H 17/64 in.	3.60	.32	.266	4 1/4
I	3.70	.33	.272	4 1/4
J	3.80	.34	.277	4 1/4
K 9/32 in	3.90	.35	.281	4 1/4
L	4.00	.36	.290	4 1/4
M 19/64 in.	4.10	.36	.295	4 1/4
N	4 20	.37	.302	4 1/4
O 5/16 in.	4.30	.38	.316	4 1/4
P 21/64 in.	4.40	.39	.323	4 5/8
Q	4.60	.40	.332	4 3/4
R 11/32 in.	4.80	.42	.339	4 3/4
S	5.00	.44	.348	4 7/8
T 23/64 in.	5.20	.45	.358	4 7/8
U	5.40	.47	.368	5
V 3/8 in.	5.60	.49	.377	5
W 25/64 in.	5.80	.51	.386	5 1/8
X	6 00	.53	.397	5 1/4
Y 13/32 in.	6.40	.55	.404	5 1/4
Z	6.80	.59	.413	5 3/8

For very exact work, a gauge plainly marked should accompany an order.



FIG. 5116.

PRICES OF DRILLS, PER SET.

No. 5. Set drills, straight shanks, 1/16 to 1/2 in. by 64ths, mounted $10 00
No. 6. Set drills, straight shanks, 1/16 to 1/2 in. by 32ds, mounted 5.40
No. 7. Set drills, from 60 to 3/8 in., mounted 9.90
No. 8. Set drills, steel wire gauge, from No. 1 to 60, mounted 8.10
No. 9. Half set drills, alternate Nos. from 1 to 59, mounted 4.30
No. 10. Jewelers' set of 36 drills, No. 30 (1/8 in.) to No. 65, steel wire gauge, mounted in a mahogany case with cap 4.25

Drills of any size or length, with straight or taper shanks, made to order, and to fit any socket desired.

For very exact work, a gauge plainly marked should accompany an order.

Drills of taper length, with 1/2 inch straight shank, same price as taper drills.

The patent grinding line is only applied to patent increase twist drills, sizes 3/8 in. diameter and larger. Parties ordering will please state whether they would have the grinding line applied or not.

JOBBERS' DRILL GAUGE.

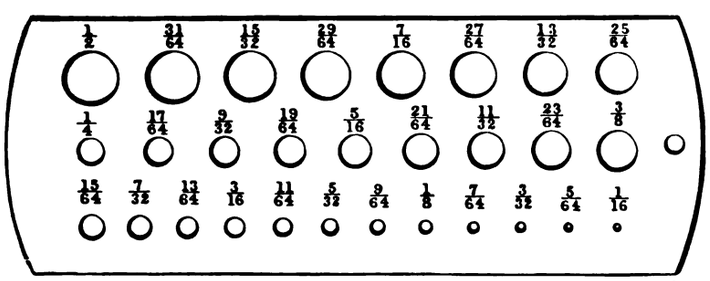


FIG. 5117.

PRICE, $2.50.

MORSE DRILL GAUGE.

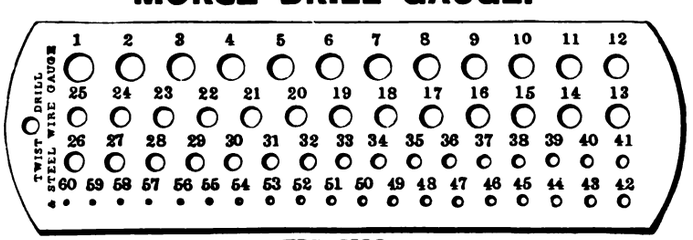


FIG. 5118.

PRICE, $1.50.

STUBS' STEEL WIRE GAUGES.

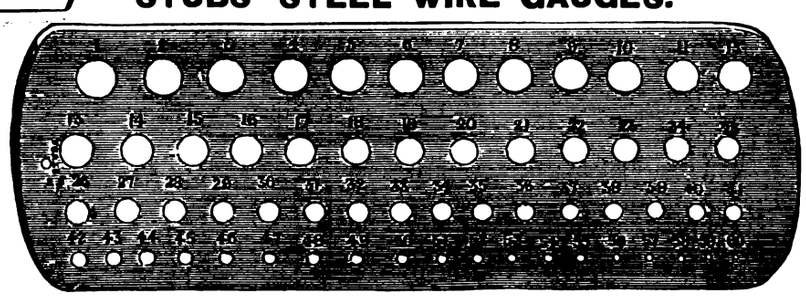


FIG. 5119.

The steel wire gauges are used exclusively for gauging Stubs' bright steel wire, twist drills, pinion wire, curriers' steels, etc.

Nos. 1 to 60 ..... each, $2.50
" 1 to 70 ..... " 3.00
Nos. 1 to 80 ..... each, $4.25
A to Z ..... " 2.50

SIZES OF GAUGE IN DECIMALS.

Size.	Decimal.	Size.	Decimal.	Size.	Decimal.
1/16	.0625	7/16	.21875	3/8	.375
5/64	.07812	15/64	.23437	25/64	.39062
3/32	.09375	1/4	.25	13/32	.40625
7/64	.10937	17/64	.26562	27/64	.42187
1/8	.125	9/32	.28125	7/16	.4375
9/64	.14062	19/64	.29687	29/64	.45312
5/32	.15625	5/16	.3125	15/32	.46875
11/64	.17187	21/64	.32812	31/64	.48437
3/16	.1875	11/32	.34375	1/2	.50
13/64	.20312	23/64	.35937		

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STRAIGHT SHANK DRILLS FOR BLACKSMITHS' DRILL PRESSES.

SHANKS, 1-2 IN. DIAM. BY 2 1-2 IN. LONG.



FIG. 5120.

Diameter.	Prices, each.	Length.	Diameter.	Prices, each.	Length.
1/8	$0.45	5 1/8 in.	7/16	$0.90	7 1/4 in.
6/32	.45	5 3/8 "	15/32	.95	7 1/2 "
3/16	.50	5 5/8 "	1/2	1.00	7 3/4 "
7/32	.55	5 7/8 "	17/32	1.10	8 "
1/4	.60	6 1/8 "	9/16	1.20	8 1/4 "
9/32	.65	6 1/4 "	19/32	1.30	8 1/2 "
5/16	.70	6 3/8 "	5/8	1.40	8 3/4 "
11/32	.75	6 1/2 "	21/32	1.50	9 "
3/8	.80	6 3/4 "	11/16	1.60	9 1/4 "
13/32	.85	7 "	3/4	1.85	9 3/4 "

SHANKS, 1-2 IN. DIAM. BY 2 1-2 IN. LONG.



FIG. 5121.

Diameter.	Prices, each.	Length.	Diameter.	Prices, each.	Length.
1/8	$0.45	5 1/8 in.	7/16	$0.80	6 in.
6/32	.45	5 3/8 "	15/32	.83	6 "
3/16	.50	5 5/8 "	1/2	.85	6 "
7/32	.55	5 7/8 "	17/32	.88	6 "
1/4	.60	6 "	9/16	.90	6 "
9/32	.65	6 "	19/32	1.00	6 "
5/16	.70	6 "	5/8	1.05	6 "
11/32	.73	6 "	21/32	1.10	6 "
3/8	.75	6 "	11/16	1.15	6 "
13/32	.78	6 "	3/4	1.25	6 "

SHANKS, 41-64 IN. DIAM. BY 2 1-4 IN. LONG.



FIG. 5122.

Diameter.	Prices, each.	Length.	Diameter.	Prices, each.	Length.	Diameter.	Prices, each.	Length.
1/8	$0.55	4 7/8 in.	17/32	$0.98	6 in.	15/16	$1.60	6 in.
6/32	.58	5 5/8 "	9/16	1.00	6 "	31/32	1.70	6 "
3/16	.60	6 "	19/32	1.03	6 "	1	1.80	6 "
7/32	.65	6 "	5/8	1.05	6 "	1 1/32	1.90	6 "
1/4	.70	6 "	21/32	1.10	6 "	1 1/16	2.00	6 "
9/32	.73	6 "	11/16	1.15	6 "	1 3/32	2.10	6 "
5/16	.75	6 "	23/32	1.20	6 "	1 1/8	2.20	6 "
11/32	.80	6 "	3/4	1.25	6 "	1 5/32	2.25	6 "
3/8	.85	6 "	25/32	1.30	6 "	1 3/16	2.30	6 "
13/32	.88	6 "	13/16	1.35	6 "	1 7/32	2.35	6 "
7/16	.90	6 "	27/32	1.40	6 "	1 1/4	2.40	6 "
15/32	.93	6 "	7/8	1.45	6 "			
1/2	.95	6 "	29/32	1.55	6 "			

SIZES, SHANKS VARIOUS DRILL PRESSES.

Boynton & Plumer's Nos. 1, 1 1/2, 2, 6 and 7 shanks..... 1/2 x 2 1/2 inches.
Boynton & Plumer's No. 3..... 41/64 x 2 1/4 inches.
All Silver Manufacturing Co.'s drill presses, 1/2 x 2 1/2 inches.
All Coe's drill presses..... 1/2 x 2 1/2 inches.

TAPERED SQUARE SHANK DRILLS FOR RATCHETS.



FIG. 5123.

PRICES,

With shanks 5/16 in. by 3/8 in. and 1 1/2 in. long, and shanks 3/4 in. by 1/2 in. and 1 3/4 in. long.

Diameter.	Prices.	Length.	Diameter.	Prices.	Length.	Diameter.	Prices.	Length.
1/4 in.	$1.00	5 in.	7/16 in.	$1.25	6 1/4 in.	3/4 in.	$1.55	6 1/2 in.
9/32 "	1.05	5 "	15/32 "	1.30	6 1/4 "	13/16 "	1.75	7 "
5/16 "	1.10	5 "	1/2 "	1.30	6 1/2 "	7/8 "	2.05	7 1/2 "
11/32 "	1.15	5 "	9/16 "	1.35	6 1/2 "	15/16 "	2.30	8 "
3/8 "	1.20	6 "	5/8 "	1.40	6 1/2 "	1 "	2.55	8 1/2 "
13/32 "	1.25	6 1/4 "	11/16 "	1.45	6 1/2 "	1 1/8 "	3.10	9 "

Parties ordering taper square shank drills will please furnish drawings showing the square of the shank and its length, and the full length of the drills.



FIG. 5124.

STRAIGHT SHANK MACHINE BITS FOR WOOD ONLY.

PRICES, FIG. 5124.

Diameter.	Prices, each.	Length.
1/8	$0.20	3 in.
6/32	.25	3 1/4 "
9/32	.30	3 1/2 "
7/32	.35	3 3/4 "
1/4	.40	4 "
9/32	.45	4 1/4 "
5/16	.50	4 1/2 "
11/32	.55	4 3/4 "
3/8	.65	5 "
13/32	.70	5 1/4 "
7/16	.75	5 1/2 "
15/32	.80	5 3/4 "
1/2	.85	6 "
17/32	.95	6 1/8 "
9/16	1.00	6 1/4 "
5/8	1.15	6 1/2 "
11/16	1.35	7 "
3/4	1.65	7 1/2 "

Parties ordering machine bits will please state whether with drill or bit point.

Price, per set, with bit point 1/8 to 1/2 inch, mounted, varying by 32ds.....$7.00

BIT STOCK DRILLS FOR METAL OR WOOD.



FIG. 5125.

Diameter.	Prices, per dozen.	Prices, each.	Whole length.	Length from shank to point.	Diameter.	Prices, per dozen.	Prices, each.	Whole length.	Length from shank to point.	Diameter.	Prices, per dozen.	Prices, each.	Whole length.	Length from shank to point.
2/32	$1.50	$0.14	3 3/8 in.	1 1/2 in.	10/32	$5.40	$0.48	5 1/2 in.	4 3/8 in.	9/16	.....	$1.20	7 1/2 in.	5 5/8 in.
3/32	1.65	.16	3 3/4 "	1 7/8 "	11/32	6.30	.54	5 7/8 "	4 3/4 "	5/8	.....	1.35	7 1/2 "	5 5/8 "
4/32	2.10	.20	4 1/8 "	2 1/16 "	12/32	7.20	.62	5 7/8 "	4 7/8 "	11/16	.....	1.50	7 1/2 "	5 5/8 "
5/32	2.60	.24	4 1/2 "	2 5/8 "	13/32	8.00	.68	5 7/8 "	4 7/8 "	3/4	.....	1.65	7 1/2 "	5 5/8 "
6/32	3.10	.29	4 3/4 "	2 7/8 "	14/32	8.80	.75	6 1/4 "	5 "	13/16	.....	1.80	7 1/2 "	5 5/8 "
7/32	3.60	.33	5 1/4 "	3 1/8 "	15/32	9.60	.82	6 5/8 "	5 1/4 "	7/8	.....	1.95	7 1/2 "	5 5/8 "
8/32	4.10	.38	5 3/16 "	4 1/16 "	16/32	10.30	.87	6 3/4 "	5 1/2 "	15/16	.....	2.15	7 1/2 "	5 5/8 "
9/32	4.70	.43	5 3/8 "	4 1/4 "	17/32	11.00	.92	7 1/2 "	5 5/8 "	1	.....	2.35	7 1/2 "	5 5/8 "

No. 13. Set bit stock drills, 1/16 to 1/4 by 32ds, 5/16 to 3/8 by 16ths, boxed, $2.60.

Our bit stock drills will fit any brace in the market, and will drill steel, iron, or other metals, as well as wood. They are not injured by contact with screws or nails, and will bore straight any kind of wood without splitting it.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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STRAIGHT WAY DRILLS.

STRAIGHT SHANK DRILLS.

PRICES, FIG. 5126.

Jobbers' and machinists' sets.							
Diameter.	Prices, per doz.	Prices, each.	Length.	Diameter.	Prices, per doz.	Prices, each.	Length.
1/16	$1.00	$0.09	2½	12/64	$3.90	$0.35	4⅜
5/64	1.10	.10	2⅝	5/16	4.20	.37	4½
3/32	1.20	.11	2¾	21/64	4.50	.40	4⅝
7/64	1.30	.12	2⅞	11/32	4.80	.42	4¾
1/8	1.45	.13	3	23/64	5.10	.45	4⅞
9/64	1.60	.15	3⅛	3/8	5.40	.48	5
5/32	1.80	.16	3¼	25/64	5.70	.50	5⅛
11/64	2.00	.18	3⅜	13/32	6.00	.53	5¼
3/16	2.20	.20	3½	27/64	6.40	.55	5⅜
13/64	2.40	.21	3⅝	7/16	6.80	.59	5½
7/32	2.65	.23	3¾	29/64	7.20	.63	5⅝
15/64	2.90	.26	3⅞	15/32	7.50	.65	5¾
1/4	3.15	.28	4	31/64	7.75	.67	5⅞
17/64	3.40	.30	4⅛	1/2	8.00	.70	6
9/32	3.65	.32	4¼				



FIG. 5126.

COUNTERSINK AND DRILL COMBINED.

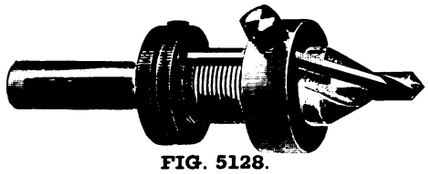


FIG. 5128.

Hole clear through, exact size of drill. Drill may be set according to depth wanted. The countersink following the drill, the job is finished at one operation, saving the adjusting of tools and work twice. The countersinking cutter is readily taken out to be ground, and is of ample length for wear.

Each tool carries only one size of drill. Supplied with shanks ½ in. diameter, for sizes ⅛ to 9/32; with shanks 4/64 in. diameter, for sizes ⅜ to 11/32 in.

PRICE of tools, without drills, each.....$1.50
Extra countersinking cutters..... .20

CENTER REAMER.

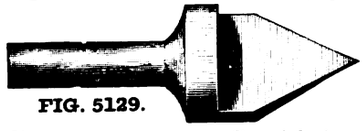


FIG. 5129.

Shanks 5/16 inch diameter. Special sizes made to order.

PRICE, EACH, 50 CENTS.

FLUTED CHUCKING REAMERS.

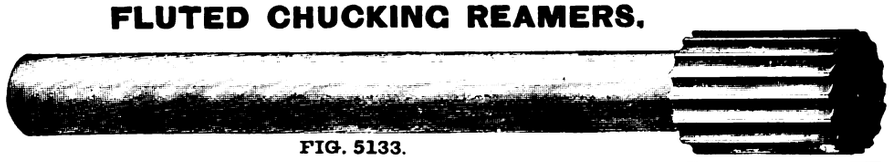


FIG. 5133.

Diameter.	Prices, each.	Full length.	Length of flute.	Diameter.	Prices, each.	Full length.	Length of flute.
¼ less .005	$0.90	6 in.	⅞ in.	1 5/16 less .005	$3.05	11½ in.	1⅞ in.
5/16 " .005	1.00	6 "	⅞ "	1⅜ " .005	3.20	12 "	2 "
⅜ " .005	1.10	7 "	1 "	1 7/16 " .005	3.35	12 "	2 "
7/16 " .005	1.20	7 "	1 "	1½ " .005	3.50	12½ "	2⅛ "
½ " .005	1.30	8 "	1⅛ "	1 9/16 " .005	3.65	12½ "	2⅛ "
9/16 " .005	1.40	8 "	1⅛ "	1⅝ " .005	3.80	13 "	2¼ "
⅝ " .005	1.50	9 "	1¼ "	1 11/16 " .005	4.00	13 "	2¼ "
11/16 " .005	1.60	9 "	1¼ "	1¾ " .005	4.20	13½ "	2⅜ "
¾ " .005	1.70	9½ "	1⅜ "	1 13/16 " .005	4.40	13½ "	2⅜ "
13/16 " .005	1.85	9½ "	1⅜ "	1⅞ " .005	4.60	14 "	2½ "
⅞ " .005	2.00	10 "	1½ "	1 15/16 " .005	4.80	14 "	2½ "
15/16 " .005	2.15	10 "	1½ "	2 " .005	5.00	14 "	2½ "
1 " .005	2.30	10½ "	1⅝ "				
1 1/16 " .005	2.45	10½ "	1⅝ "				
1⅛ " .005	2.60	11 "	1¾ "				
1 3/16 " .005	2.75	11 "	1¾ "				
1¼ " .005	2.90	11½ "	1⅞ "				

The above reamers are finished 1-200 of an inch smaller than Whitworth's standard gauges.

STRAIGHT OR TAPER SHANKS.

PRICES, FIG. 5127.

Diameter.	Prices, each.	Length.	Socket for Morse taper.	Diameter.	Prices, each.	Length.	Socket for Morse taper.
¼	$0.60	6⅛	No. 1, $1.20.	¾	$1.85	9¾	No. 2, $1.80.
9/32	.65	6¼		25/32	2.00	9⅞	
5/16	.70	6⅜		13/16	2.15	10	
11/32	.75	6½		27/32	2.30	10¼	
⅜	.80	6¾		⅞	2.45	10½	
13/32	.85	7		29/32	2.60	10⅝	
7/16	.90	7¼	No. 2, $1.80.	15/16	2.75	10¾	
15/32	.95	7½		31/32	2.90	10⅞	
½	1.00	7¾		1	3.00	11	No. 3, $2.50.
17/32	1.10	8		1 1/32	3.20	11⅛	
9/16	1.20	8¼		1 1/16	3.40	11¼	
19/32	1.30	8½		1 3/32	3.60	11½	
⅝	1.40	8¾		1⅛	3.80	11¾	
21/32	1.50	9		1 5/32	4.00	11⅞	
11/16	1.60	9¼		1 3/16	4.20	12	
23/32	1.70	9½		1¼	4.50	12½	

We furnish the above by 64ths, if ordered.



FIG. 5127.

CENTER REAMER.



FIG. 5130. **PRICE, 30 CENTS.**

COUNTERSINKS.



FIG. 5131.

For use in drilling machines. Size of shank, ½ inch, or 4/64 diameter.

PRICE, 50 CENTS EACH.



FIG. 5132.

For use in bit brace. **PRICE, 50 CENTS EACH.**

These countersinks are ⅝ inch diameter, are easily sharpened, and very durable, being made in the most careful manner from the best material.

We keep in stock, at factory, screw bolt, sleigh shoe and tire bolt tapers. When ordering, state what taper is wanted.

ROSE CHUCKING REAMER.

PRICES, FIG. 5134.

Diameter.	Prices, each.	Full length.
¼	$0.80	6 in.
5/16	.90	6 "
⅜	1.00	7 "
7/16	1.10	7 "
½	1.20	8 "
9/16	1.30	8 "
⅝	1.40	9 "
11/16	1.50	9 "
¾	1.60	9½ "
13/16	1.70	9½ "
⅞	1.80	10 "
15/16	1.95	10 "
1	2.10	10½ "
1 1/16	2.25	10½ "
1⅛	2.40	11 "
1 3/16	2.55	11 "
1¼	2.70	11½ "
1 5/16	2.85	11½ "
1⅜	3.00	12 "
1 7/16	3.15	12 "
1½	3.30	12½ "
1 9/16	3.45	12½ "
1⅝	3.60	13 "
1 11/16	3.75	13 "
1¾	3.90	13½ "
1 13/16	4.05	13½ "
1⅞	4.20	14 "
1 15/16	4.40	14 "
2	4.60	14 "



FIG. 5134.

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SOLID REAMERS.

JOBBERS' SETS.

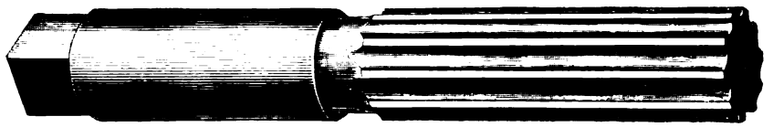


FIG. 5135.

Diameter.	Prices, each.	Full length.	Length of flute.	Diameter.	Prices, each.	Full length.	Length of flute.
1/8	$1.00	3	1 1/2	1 1/8	$4.30	11 5/8	5 13/16
5/32	1.10	3 1/4	1 5/8	1 5/32	4.45	11 13/16	5 29/32
3/16	1.20	3 1/2	1 3/4	1 3/16	4.60	12	6
7/32	1.30	3 3/4	1 7/8	1 7/32	4.75	12 1/8	6 1/16
1/4	1.40	4	2	1 1/4	4.90	12 1/4	6 1/8
9/32	1.45	4 1/4	2 1/8	1 9/32	5.05	12 11/32	6 11/64
5/16	1.50	4 1/2	2 1/4	1 5/16	5.20	12 7/16	6 3/16
11/32	1.55	4 3/4	2 3/8	1 11/32	5.40	12 17/32	6 17/64
3/8	1.60	5	2 1/2	1 3/8	5.60	12 5/8	6 5/16
13/32	1.70	5 1/4	2 5/8	1 13/32	5.80	12 23/32	6 23/64
7/16	1.75	5 1/2	2 3/4	1 7/16	6.00	12 1/8	6 3/8
15/32	1.85	5 3/4	2 7/8	1 15/32	6.20	12 29/32	6 29/64
1/2	1.90	6	3	1 1/2	6.40	13	6 1/2
17/32	1.95	6 1/4	3 1/8	1 17/32	6.60	13	6 1/2
9/16	2.00	6 1/2	3 1/4	1 9/16	6.80	13	6 1/2
19/32	2.10	6 3/4	3 3/8	1 19/32	7.00	13	6 1/2
5/8	2.20	7	3 1/2	1 5/8	7.20	13	6 1/2
21/32	2.30	7 11/32	3 23/32	1 21/32	7.40	13 1/2	6 3/4
11/16	2.40	7 11/16	3 13/16	1 11/16	7.60	13 1/2	6 3/4
23/32	2.50	8 1/8	4 1/16	1 23/32	7.80	13 1/2	6 3/4
3/4	2.60	8 3/8	4 3/16	1 3/4	8.00	13 1/2	6 3/4
25/32	2.70	8 23/32	4 23/64	1 25/32	8.20	13 1/2	6 3/4
13/16	2.80	9 1/16	4 1/2	1 13/16	8.40	13 1/2	6 3/4
27/32	2.95	9 3/8	4 11/16	1 27/32	8.60	13 1/2	6 3/4
7/8	3.10	9 11/16	4 13/16	1 7/8	8.80	14	7
29/32	3.25	10 3/32	5 3/64	1 29/32	9.00	14	7
15/16	3.40	10 1/4	5 1/16	1 15/16	9.20	14	7
31/32	3.55	10 11/16	5 11/64	1 31/32	9.40	14	7
1	3.70	10 7/8	5 7/16	2	9.60	14	7
1 1/32	3.85	11 1/16	5 17/64				
1 1/16	4.00	11 1/4	5 5/8				
1 3/32	4.15	11 7/16	5 23/64				

Reamers of any style, size or length made to order. If for brass, please so advise. Flutes straight or spiral, as desired.

PRICES OF JOBBERS' REAMERS, PER SET.

Set, 1/4 to 1 in. diam., by 16ths, $30.00
" 1/4 " 1 1/4 " " " 16ths, 48.00
" 1/4 " 1 1/2 " " " 16ths, 70.00
" 1/4 " 2 " " " 16ths, 135.00

Set, 1/4 to 1 in. diam., by 32ds, $57.50
" 1/4 " 1 1/4 " " " 32ds, 92.00
" 1/4 " 1 1/2 " " " 32ds, 137.00
" 1/4 " 2 " " " 32ds, 265.00

Black walnut cases for sets as above. Prices, each, net, $3.75, $4.25 and $4.50.

SHORT LENGTHS SETS.



FIG. 5137.

Diameter.	Prices, each.	Full length.	Length of flute.	Diameter.	Prices, each.	Full length.	Length of flute.
1/4	$1.30	3 3/4	2 3/16	1 3/16	$3.50	8 1/4	4 1/4
5/16	1.40	4	2 1/4	1 1/4	3.70	8 5/8	4 1/2
3/8	1.50	4 1/4	2 3/8	1 5/16	3.90	9	4 3/4
7/16	1.60	4 1/2	2 7/16	1 3/8	4.10	9 3/8	5
1/2	1.70	4 3/4	2 1/16	1 7/16	4.35	9 1/4	5 1/4
9/16	1.80	5	2 5/8	1 1/2	4.70	10	5 1/8
5/8	1.90	5 1/4	2 3/4	1 9/16	5.20	10 1/4	5 3/8
11/16	2.05	5 1/2	2 3/4	1 5/8	5.70	10 1/2	5 3/4
3/4	2.20	5 3/4	3	1 11/16	6.20	10 3/4	5 7/8
13/16	2.35	6	3 1/8	1 3/4	6.70	11	6
7/8	2.50	6 3/8	3 1/4	1 13/16	7.10	11 1/4	6 1/8
15/16	2.70	6 3/4	3 7/16	1 7/8	7.50	11 1/2	6 1/4
1	2.90	7 1/8	3 5/8	1 15/16	7.90	11 3/4	6 3/8
1 1/16	3.10	7 1/2	3 3/4	2	8.30	12	6 1/2
1 1/8	3.30	7 7/8	4				

PRICES OF SOLID REAMERS, PER SET.

Set, 1/4 to 1 in. diam., by 16ths, $25.50
" 1/4 " 1 1/4 " " " 16ths, 39.00

Set, 1/4 to 1 1/8 in. diam., by 16ths, $56.00

Black walnut cases for sets as above Prices, each, net, $3.75, $4.25 and $4.50.

SPIRAL FLUTED REAMERS.



FIG. 5136.

PRICES, FIG. 5136.

Sizes.	Prices, each.	Full length.	Length of flute.	Sizes.	Prices, each.	Full length.	Length of flute.
1/8	$1.00	3 in.	1 1/2 in.	1 2/16	$6.80	13 in.	6 1/2 in.
5/32	1.10	3 "	1 1/2 "	1 5/8	7.20	13 "	6 1/2 "
3/16	1.20	3 "	1 1/2 "	1 11/16	7.60	13 "	6 1/2 "
7/32	1.30	3 1/4 "	1 1/2 "	1 3/4	8.00	13 "	6 1/2 "
1/4	1.40	3 1/2 "	1 3/4 "	1 13/16	8.40	13 "	6 1/2 "
5/16	1.50	4 "	2 "	1 7/8	8.80	13 "	6 1/2 "
3/8	1.60	4 1/2 "	2 1/4 "	1 15/16	9.20	13 "	6 1/2 "
7/16	1.75	5 "	2 1/2 "	2	9.60	13 "	6 1/2 "
1/2	1.90	5 1/2 "	2 3/4 "	2 1/16	9.80	13 "	6 1/2 "
9/16	2.00	6 "	3 "	2 1/8	10.00	13 "	6 1/2 "
5/8	2.20	6 1/2 "	3 1/4 "	2 3/16	10.50	13 "	6 1/2 "
11/16	2.40	7 "	3 1/2 "	2 1/4	11.00	13 "	6 1/2 "
3/4	2.60	7 1/2 "	3 3/4 "	2 5/16	11.60	13 "	6 1/2 "
13/16	2.80	8 "	4 "	2 3/8	12.20	13 "	6 1/2 "
7/8	3.10	8 1/2 "	4 1/4 "	2 7/16	12.85	13 "	7 "
15/16	3.40	9 "	4 1/2 "	2 1/2	13.50	14 "	7 "
1	3.70	9 1/2 "	4 3/4 "	2 9/16	14.15	14 "	7 "
1 1/16	4.00	10 "	5 "	2 5/8	14.85	14 "	7 "
1 1/8	4.30	10 1/2 "	5 1/4 "	2 11/16	15.55	14 "	7 "
1 3/16	4.60	11 "	5 1/2 "	2 3/4	16.25	14 "	7 "
1 1/4	4.90	11 1/2 "	5 3/4 "	2 13/16	17.00	14 "	7 "
1 5/16	5.20	12 "	6 "	2 7/8	17.75	14 "	7 "
1 3/8	5.60	12 1/2 "	6 1/4 "	2 15/16	18.50	14 "	7 "
1 7/16	6.00	13 "	6 1/2 "	3	19 25	14 "	7 "
1 1/2	6.40	13 "	6 1/2 "				

THREE GROOVE CHUCKING REAMER.

PRICES, FIG. 5138.

Diameter.	Prices.	Length.	Length flutes.	Socket for Morse taper.
5/8	$2.60	13 in.	9 in.	
11/16	2.75	13 "	9 "	
3/4	2.90	13 "	9 "	No. 2.
13/16	3.05	13 "	9 "	
7/8	3.20	13 "	9 "	
15/16	3.40	13 "	9 "	
1	3.60	13 "	9 "	
1 1/16	3.80	13 "	9 "	No. 3.
1 1/8	4.00	13 "	9 "	
1 3/16	4.50	16 "	10 1/2	
1 1/4	4.80	16 "	10 1/2	
1 5/16	5.20	16 "	10 1/2	
1 3/8	5.60	16 "	10 1/2	
1 7/16	6.00	16 "	10 1/2	
1 1/2	6.40	16 "	10 1/2	No. 4.
1 9/16	6.90	16 "	10 1/2	
1 5/8	7.40	16 "	10 1/2	
1 11/16	7.90	16 "	10 1/2	
1 3/4	8.40	16 "	10	
1 13/16	8.80	16 "	10	
1 7/8	9.20	16 "	10	No. 5.
1 15/16	9.50	16 "	10	
2	9.80	16 "	10	



FIG. 5138.

The chucking reamers are furnished with taper or straight shanks, and are 1/64 in. under size, unless differently ordered. Special lengths made to order.

BIT STOCK COUNTERSINK.



FIG. 5139.

Diameter.	Prices.	Full length.	Diameter.	Prices.	Full length.
3/8 in.	$0.50	4 1/4 in.	3/4 in.	$0.90	5 in.
1/2 "	.60	4 1/4 "	7/8 "	1.05	5 "
5/8 "	.75	4 1/4 "	1 "	1.20	5 "

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SHELL REAMERS.

SPIRAL FLUTED.

ROSE SHELL REAMER.



FIG. 5140.

SHELL REAMER.

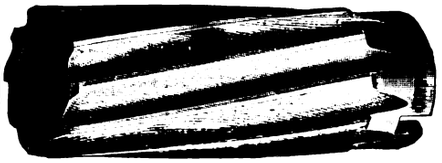


FIG. 5141.

These reamers will not draw themselves into the work, will not chatter, cannot cut under the true surface, cannot be forced, must always make a perfect hole, and, unlike other reamers, do not have to be ground specially for brass or other soft metals. The following table gives prices and dimensions for both styles.

PRICES, FIGS. 5140 AND 5141.

Diameter.	Prices, each.	Length.	Size hole.	Diameter.	Prices, each.	Length.	Size hole.
¼ in.	$1.10	1½ in.	⅛ in.	1 1/16 in.	$3.80	3½ in.	1 in.
5/16 "	1.10	1½ "	⅛ "	1¼ "	4.10	3½ "	1 "
⅜ "	1.20	1¾ "	3/16 "	1 3/16 "	4.40	3½ "	1 "
7/16 "	1.30	1¾ "	3/16 "	1⅜ "	4.70	3½ "	1 "
½ "	1.40	2 "	¼ "	1 5/16 "	5.00	3½ "	1 "
9/16 "	1.50	2 "	¼ "	2 "	5.20	3½ "	1 "
⅝ "	1.60	2¼ "	⅜ "	2 1/16 "	5.40	3¾ "	1¼ "
11/16 "	1.60	2¼ "	⅜ "	2⅛ "	5.60	3¾ "	1¼ "
¾ "	1.60	2½ "	½ "	2 3/16 "	5.80	3¾ "	1¼ "
13/16 "	1.60	2½ "	½ "	2¼ "	6.00	3¾ "	1¼ "
⅞ "	1.70	2½ "	½ "	2 5/16 "	6.20	3¾ "	1¼ "
15/16 "	1.70	2½ "	½ "	2⅜ "	6.40	3¾ "	1¼ "
1 "	1.80	2¾ "	⅝ "	2 7/16 "	6.60	3¾ "	1¼ "
1 1/16 "	1.80	2¾ "	⅝ "	2½ "	6.80	3¾ "	1¼ "
1⅛ "	1.90	2¾ "	⅝ "	2 9/16 "	7.00	4 "	1½ "
1 3/16 "	2.00	2¾ "	⅝ "	2⅝ "	7.30	4 "	1½ "
1¼ "	2.20	2¾ "	⅝ "	2 11/16 "	7.60	4 "	1½ "
1 5/16 "	2.40	3 "	¾ "	2¾ "	8.00	4 "	1½ "
1⅜ "	2.60	3 "	¾ "	2 13/16 "	8.40	4 "	1½ "
1 7/16 "	2.80	3 "	¾ "	2⅞ "	8.80	4 "	1½ "
1½ "	3.00	3 "	¾ "	2 15/16 "	9.20	4 "	1½ "
1 9/16 "	3.20	3 "	¾ "	3 "	9.60	4 "	1½ "
1⅝ "	3.50	3 "	¾ "				

Shell reamers of any size or length made to order.
Prices for special sizes furnished on application.

ADJUSTABLE BLADE SHELL REAMER.



FIG. 5144.

The shell is made of steel, and the blades of the best tool steel. From six to ten cutters are inserted in each reamer, and unevenly spaced; they are fitted into dovetailed slots, the bottoms of which are inclined planes. By driving the blades toward the shank, the cutting diameter can be expended to the amount of wear taken place. Straight or taper holes as may be required. Reamers larger than 4 inches made to order.

PRICES, FIG. 5144.

Diameter.	Length.	Hole.	Prices, each.	Diameter.	Length.	Hole.	Prices, each.
2 in.	4¼ in.	1 in.	$8.75	3 1/16 in.	4½ in.	1¼ in.	$15.50
2 1/16 "	4¼ "	1 "	9.00	3⅛ "	4½ "	1¼ "	15.50
2⅛ "	4¼ "	1 "	9.25	3 3/16 "	4½ "	1¼ "	16.00
2 3/16 "	4¼ "	1 "	9.50	3¼ "	4⅝ "	1½ "	16.50
2¼ "	4¼ "	1 "	9.75	3 5/16 "	4⅝ "	1½ "	17.00
2 5/16 "	4¼ "	1 "	10.00	3⅜ "	4⅝ "	1½ "	17.50
2⅜ "	4¼ "	1 "	10.25	3 7/16 "	4⅝ "	1½ "	18.00
2 7/16 "	4⅜ "	1 "	10.50	3½ "	4⅝ "	1½ "	18.50
2½ "	4⅜ "	1¼ "	10.75	3 9/16 "	4⅝ "	1½ "	19.00
2 9/16 "	4⅜ "	1¼ "	11.00	3⅝ "	4⅝ "	1½ "	19.50
2⅝ "	4⅜ "	1¼ "	11.50	3 11/16 "	4⅝ "	1½ "	20.00
2 11/16 "	4½ "	1¼ "	12.00	3¾ "	4⅝ "	1½ "	20.50
2¾ "	4½ "	1¼ "	12.50	3 13/16 "	4⅝ "	1½ "	21.00
2 13/16 "	4½ "	1¼ "	13.00	3⅞ "	4⅝ "	1½ "	21.50
2⅞ "	4½ "	1¼ "	13.50	3 15/16 "	4⅝ "	1½ "	22.00
2 15/16 "	4½ "	1¼ "	14.00	4 "	4⅝ "	1½ "	22.50
3 "	4½ "	1¼ "	14.50				

FOR ARBORS SEE NEXT PAGE.

SHELL REAMER.

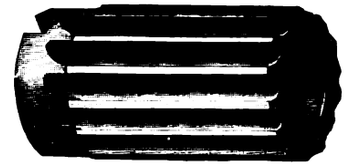


FIG. 5142.

ROSE SHELL.

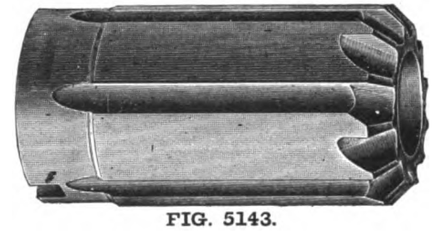


FIG. 5143.

PRICES, FIGS. 5142 AND 5143.

Diameter.	Prices, each.	Length.	Size hole.
¼ in.	$1.10	1½ in.	⅛ in.
5/16 "	1.10	1½ "	⅛ "
⅜ "	1.20	1¾ "	3/16 "
7/16 "	1.30	1¾ "	3/16 "
½ "	1.40	2 "	¼ "
9/16 "	1.50	2 "	¼ "
⅝ "	1.60	2¼ "	⅜ "
11/16 "	1.60	2¼ "	⅜ "
¾ "	1.60	2½ "	½ "
13/16 "	1.60	2½ "	½ "
⅞ "	1.70	2½ "	½ "
15/16 "	1.70	2½ "	½ "
1 "	1 80	2¾ "	⅝ "
1 1/16 "	1.80	2¾ "	⅝ "
1⅛ "	1.90	2¾ "	⅝ "
1 3/16 "	2.00	2¾ "	⅝ "
1¼ "	2.20	2¾ "	⅝ "
1 5/16 "	2.40	3 "	¾ "
1⅜ "	2.60	3 "	¾ "
1 7/16 "	2.80	3 "	¾ "
1½ "	3.00	3 "	¾ "
1 9/16 "	3.20	3 "	¾ "
1⅝ "	3.50	3 "	¾ "
1 11/16 "	3.80	3½ "	1 "
1¾ "	4.10	3½ "	1 "
1 13/16 "	4.40	3½ "	1 "
1⅞ "	4.70	3½ "	1 "
1 15/16 "	5.00	3½ "	1 "
2 "	5.20	3½ "	1 "
2 1/16 "	5.40	3¾ "	1¼ "
2⅛ "	5.60	3¾ "	1¼ "
2 3/16 "	5.80	3¾ "	1¼ "
2¼ "	6.00	3¾ "	1¼ "
2 5/16 "	6.20	3¾ "	1¼ "
2⅜ "	6.40	3¾ "	1¼ "
2 7/16 "	6.60	3¾ "	1¼ "
2½ "	6.80	3¾ "	1¼ "
2 9/16 "	7.00	4 "	1½ "
2⅝ "	7.30	4 "	1½ "
2 11/16 "	7.60	4 "	1½ "
2¾ "	8.00	4 "	1½ "
2 13/16 "	8.40	4 "	1½ "
2⅞ "	8.80	4 "	1½ "
2 15/16 "	9.20	4 "	1½ "
3 "	9.60	4 "	1½ "
3 1/16 "	9.90	4½ "	1¾ "
3⅛ "	10.20	4½ "	1¾ "
3 3/16 "	10.60	4½ "	1¾ "
3¼ "	11.00	4½ "	1¾ "
3 5/16 "	11.50	4½ "	1¾ "
3⅜ "	12.00	4½ "	1¾ "
3 7/16 "	12.50	4½ "	1¾ "
3½ "	13.00	4½ "	1¾ "
3 9/16 "	13.50	5 "	2 "
3⅝ "	14.00	5 "	2 "
3 11/16 "	14.50	5 "	2 "
3¾ "	15.00	5 "	2 "
3 13/16 "	15.50	5 "	2 "
3⅞ "	16.00	5 "	2 "
3 15/16 "	17.00	5 "	2 "
4 "	18.00	5 "	2 "

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ARBORS, COUNTERBORES AND TAPER REAMERS.

ARBORS FOR SHELL REAMERS.

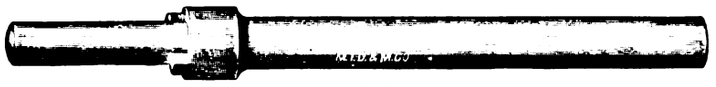


FIG. 5145.

No.	Prices, each.	Fitting sizes.	Full length.	No.	Prices, each.	Fitting sizes.	Full length.
1	$1.20	¼ to 5/16 in.	6 in.	8	$2.70	1 1/16 to 2 in.	12 in.
2	1.40	3/8 " 7/16 "	7 "	9	3.00	2 1/16 " 2½ "	13 "
3	1.60	½ " 9/16 "	8 "	10	3.40	2 9/16 " 3 "	14 "
4	1.80	5/8 " 11/16 "	9 "	11		3 1/16 " 3½ "	15 "
5	2.00	¾ " 13/16 "	9½ "	12		3 9/16 " 4 "	16 "
6	2.20	1 " 1¼ "	10 "	13		4 1/16 " 4½ "	17 "
7	2.40	1 5/16 " 1⅝ "	11 "	14		4 9/16 " 5 "	18 "

TAPER SHANK COUNTERBORE.



FIG. 5147.

The counterbores are furnished to the diameters of the heads of the cap screws in use, and the guide bushings to the diameters of the body size of the screws corresponding.

PRICE OF COUNTERBORE COMPLETE.

Dia. counterbore.	Dia. guide.	Taper.	Prices.	Full length.
3/8 in.	¼ in.	No. 1, Morse taper.	$1.40	4 9/16 in.
7/16 "	5/16 "	" 1, " "	1.40	4 9/16 "
½ "	3/8 "	" 1, " "	1.40	4 13/16 "
9/16 "	3/8 "	" 1, " "	1.40	4 13/16 "
5/8 "	7/16 "	" 1, " "	1.40	4 13/16 "
11/16 "	7/16 "	" 1, " "	1.50	5 3/16 "
¾ "	½ "	" 1, " "	1.50	5 3/16 "
13/16 "	½ "	" 1, " "	1.50	5 3/16 "
⅞ "	9/16 "	" 2, " "	1.80	6 1/16 "
15/16 "	5/8 "	" 2, " "	1.80	6 1/16 "
1 "	¾ "	" 2, " "	1.80	6 1/16 "
1 1/16 "	¾ "	" 2, " "	1.80	6 5/16 "
1⅛ "	13/16 "	" 2, " "	2.00	6 5/16 "
1 3/16 "	13/16 "	" 2, " "	2.00	6 5/16 "
1¼ "	⅞ "	" 2, " "	2.00	6 5/16 "
1 5/16 "	⅞ "	" 3, " "	2.20	7 1/16 "
1⅜ "	15/16 "	" 3, " "	2.40	7 1/16 "
1 7/16 "	15/16 "	" 3, " "	2.60	7 1/16 "
1½ "	1 "	" 3, " "	2.80	7 1/16 "

STANDARD TAPER REAMERS FOR LOCOMOTIVE WORK.



FIG. 5149.

The following list embraces reamers tapering 3/32 inch per foot.

Diameter at end.	Prices, each.	Length of flute.	Total length.	Diameter at end.	Prices, each.	Length of flute.	Total length.
¼ in.	$2.20	4 in.	5 5/16 in.	1 3/16 in.	$4.50	9 in.	11¼ in.
9/32 "	2.20	4 "	5 5/16 "	⅞ "	4.80	9 "	11¼ "
5/16 "	2.25	4 "	5 5/16 "	15/16 "	5.10	9 "	11¼ "
11/32 "	2.25	4 "	5 5/16 "	1 "	5.40	9 "	11¼ "
3/8 "	2.30	5 "	6 5/16 "	1 1/16 "	5.70	9 "	11¼ "
13/32 "	2.40	5 "	6 5/16 "	1⅛ "	6.20	10 "	12¼ "
7/16 "	2.55	6 "	7 5/16 "	1 3/16 "	6.60	10 "	12¼ "
15/32 "	2.70	6 "	7 5/16 "	1¼ "	7.00	10 "	12¼ "
½ "	3.00	7 "	8 5/8 "	1 5/16 "	7.60	12 "	14½ "
9/16 "	3.20	8 "	9 5/8 "	1⅜ "	8.00	12 "	14½ "
5/8 "	3.50	8 "	9 7/8 "	1 7/16 "	8.50	12 "	14½ "
11/16 "	3.80	8 "	9 7/8 "	1½ "	9.00	12 "	14½ "
¾ "	4.10	8 "	9 7/8 "				

Reamers of other taper per foot than as specified above, furnished as desired.

TAPER REAMERS.

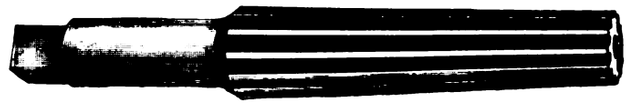


FIG. 5146.

PRICES.

For reamer, taper of Morse drill socket No. 1 ..... $2.00
For reamer, taper of Morse drill socket No. 2 ..... 2.60
For reamer, taper of Morse drill socket No. 3 ..... 3.40
For reamer, taper of Morse drill socket No. 4 ..... 4.20
For reamer, taper of Morse drill socket No. 5 ..... 6.60

DIMENSIONS OF MORSE TAPER REAMERS.

No. of reamer.	Full length.	Length of flute.	Taper.
Taper No. 1,	5⅞ in.	3½ in.	.5415 by .365
Taper No. 2,	7½ "	4½ "	.797 " .572
Taper No. 3,	8¼ "	5 "	1.025 " .775
Taper No. 4,	9 "	5½ "	1.303 " 1.021
Taper No. 5,	9⅞ "	5⅞ "	1.786 " 1.480
Taper No. 6,	12 "	9 "	2.597 " 2.129

STANDARD TAPER-PIN REAMERS.



FIG. 5148.

Taper ¼ inch per foot.

Size No.	Prices, each.	Diameter at small end.	Length of flute.	Total length.
0	$1.00	0.125 in.	1½ in.	2¼ in.
1	1.00	0.146 "	1¾ "	2½ "
2	1.25	0.162 "	2 "	3 "
3	1.50	0.183 "	2¼ "	3½ "
4	1.75	0.208 "	2½ "	4 "
5	2.00	0.240 "	3 "	4½ "
6	2.25	0.279 "	3⅝ "	5 "
7	2.50	0.331 "	4½ "	6 "
8	3.00	0.398 "	5¼ "	6¾ "
9	3.50	0.482 "	6⅛ "	8 "
10	4.00	0.581 "	7 "	9 "

These reamers have the same taper, and each will overlay in convenient measure the size next smaller. Special sizes made to order.

STANDARD TAPER REAMERS FOR BRIDGE BUILDERS.



FIG. 5150.

Diameter.	Prices, each.	Length of flute.	Length of end tapered.	Full length.
9/16 — 15/32 — 5/16 in.	$2.80	7 in.	2 in.	9½ in.
5/8 — 17/32 — 3/8 "	2.90	7 "	2 "	9½ "
11/16 — 19/32 — 7/16 "	3.00	7 "	2 "	9½ "
¾ — 21/32 — ½ "	3.10	7 "	2 "	9½ "
13/16 — 23/32 — 9/16 "	3.30	7 "	2 "	9½ "
⅞ — 25/32 — 5/8 "	3.50	7 "	2 "	9½ "
15/16 — 27/32 — 11/16 "	3.70	7 "	2 "	9½ "
1 — 29/32 — ¾ "	3.90	7 "	2 "	9½ "
1 1/16 — 31/32 — 13/16 "	4.00	7 "	2 "	9½ "

Special sizes made to order.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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TAPER AND ADJUSTABLE REAMERS.

TAPER REAMERS.



FIG. 5151.

Fig. 5151 is for use with bit brace.
Fig. 5152 is for use in a chuck.
For reaming out and making true, smooth holes in wood or iron. Each reamer tapers 1/8 of an inch, and follow, from the smallest to the largest.

FIG. 5151 PUT UP IN SETS.

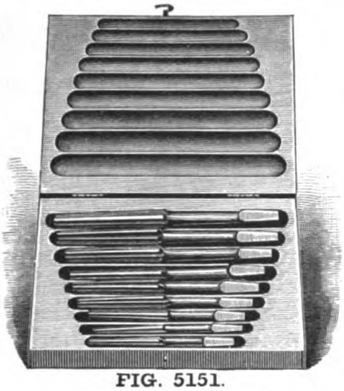


FIG. 5151.

PRICES, FIG. 5151.

Price.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4
Per doz...	$2.40	$3.00	$3.60	$4.20	$4.80	$6.00	$7.20	$8.40	$9.60
Each.....	.20	.25	.30	.35	.40	.50	.60	.70	.80

Set of five, 1/4 to 1/2 inclusive, in case as above..... $1.70
Set of five, 1/4 to 1/2 inclusive, without case..... 1.50
Set of nine, 1/4 to 3/4 inclusive, in case as above..... 4.40
Set of nine, 1/4 to 3/4 inclusive, without case..... 4.10

TAPER REAMERS.

With shanks 1/2 and 11/64 inch diameter.



FIG. 5152. TAPER 1-8 IN. TO THE FOOT.

Sizes,	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16
Prices,	$0.45	$0.50	$0.55	$0.60	$0.70	$0.80	$0.90	$1.05
Sizes,	3/4	13/16	7/8	15/16	1	1 1/8	1 1/4	
Prices,	$1.20	$1.40	$1.60	$1.80	$2.00	$2.25	$2.60	

TAPER ROUGHING AND FINISHING REAMERS.

ROUGHING REAMER.

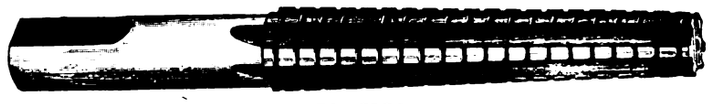


FIG. 5153.

FINISHING REAMER.

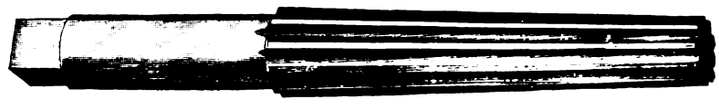


FIG. 5154.

These reamers are usually required of special dimensions. Prices furnished on application.

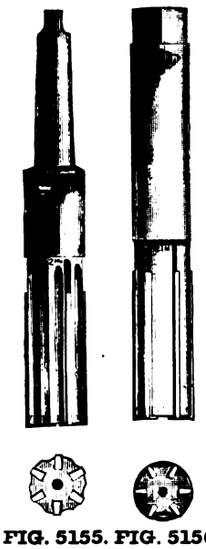


FIG. 5155.

FIG. 5156.

ADJUSTABLE BLADE REAMERS.

Where fixed gauges are systematically used with hardened steel mandrels, reamers with adjustable blades are necessary to finish the holes. Solid reamers are of no practical use for accurate sizes after finishing a few holes. Aside from the claim of adjusting to size, special attention is called to the fact that the shanks are ground to serve as a limit gauge, so that holes below standard size cannot be made. The blades are made from the finest grade of steel, and hardened with special care. They are fitted into dovetailed slots, the bottoms of which are inclined planes. By driving the blades toward the shank the cutting edges can be expended to the amount of wear taken place. The blades being interchangeable, they can be renewed when worn to the limits of end adjustment, and new ones inserted.

PRICES, FIGS. 5155 AND 5156.

Diameter.	Total length.	Prices.	Diameter.	Total length.	Prices.	Diameter.	Total length.	Prices.
1/2	6 5/8	$3.30	1 3/16	9 5/8	$6.04	1 7/8	13 3/8	$11.59
9/16	6 5/8	3.30	1 1/4	11 1/8	6.43	1 15/16	13 3/8	12.12
5/8	6 5/8	3.30	1 5/16	11 1/8	6.82	2	14 1/8	12.65
11/16	6 5/8	3.30	1 3/8	11 1/8	7.35	2 1/16	14 1/2	13.18
3/4	8 1/8	3.43	1 7/16	11 1/8	7.88	2 1/8	14 1/8	13.71
13/16	8 1/8	3.70	1 1/2	12 3/8	8.41	2 3/16	14 1/8	14.24
7/8	8 1/8	4.09	1 9/16	12 3/8	8.94	2 1/4	14 3/8	14.77
15/16	8 1/8	4.48	1 5/8	12 3/8	9.47	2 5/16	14 3/8	15.30
1	9 5/8	4.87	1 11/16	12 3/8	10.00	2 3/8	14 3/8	15.83
1 1/16	9 5/8	5.26	1 3/4	13 3/8	10.53	2 7/16	14 3/8	16.36
1 1/8	9 5/8	5.65	1 13/16	13 3/8	11.06	2 1/2	14 3/8	16.89

Total cost of set of reamers, 1/2 in. to 2 1/2 in., inclusive, by 16ths, $294.25. If for reaming brass, please advise us.

CRITCHLEY EXPANDING REAMER.

For a repair shop, where there are so many different sized holes, it will prove indispensable in saving a great deal of time and vexation in making fits where the holes are a little small, and no ready facilities for making them larger.

The body, A, has five grooves fitted with cutters, B; a screw thread is cut on the body of the tool, and a portion of it is left in the center, as at C, to strengthen and prevent springing; the cutters, B, are beveled at each end and confined in their places by nuts, D D, so that it is only necessary to slacken them off and slide the cutters up or down in the tapered grooves to expand or contract their outside diameters, and thus adapt them to all kinds of work.

PRICES, FIG. 5157.

No.	Diameter.	Length cutter.	Full length.	Prices.
0	Begins at 5/8 and expands to 3/4	2 1/2	6 1/2	$7.25
1	" " 3/4 " " " 27/32	2 5/8	7	7.50
2	" " 27/32 " " " 31/32	2 3/4	8	7.75
3	" " 31/32 " " " 1 1/8	3	9	8.25
4	" " 1 1/8 " " " 1 9/32	3 1/4	10	9.25
5	" " 1 9/32 " " " 1 15/32	3 3/4	11	10.50
6	" " 1 15/32 " " " 1 11/16	4	12	12.00
7	" " 1 11/16 " " " 1 15/16	4 1/4	14	13.75
8	" " 1 15/16 " " " 2 1/4	4 3/4	16	16.00
9	" " 2 1/4 " " " 2 5/8	5 1/4	18	18.50
10	" " 2 5/8 " " " 3 1/16	6 1/4	20	21.50
11	" " 3 1/16 " " " 3 9/16	7	22	25.20
12	" " 3 9/16 " " " 4 1/8	7 3/4	24	29.00

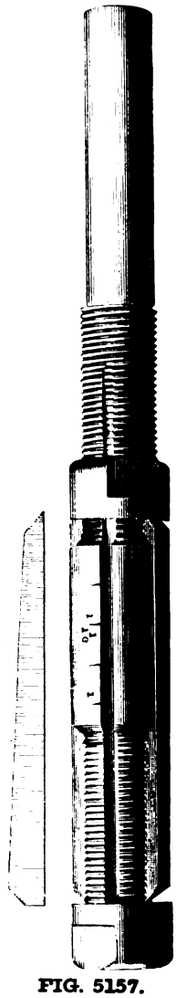


FIG. 5157.

PRICES, WHOLE SET, $175.00.

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ADJUSTABLE REAMERS.

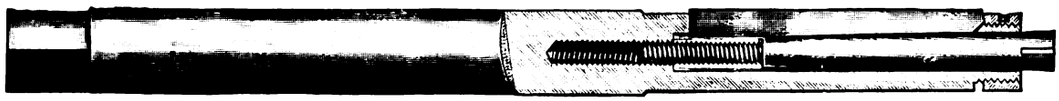


FIG. 5158.



END VIEW.

PRICES.

Diameter.	Prices, each.	Full length.	Diameter.	Prices, each.	Full length.
3/4 in.	$4.60	9 in.	1 7/16 in.	$8.20	12 1/4 in.
13/16 "	5.00	10 3/4 "	1 1/2 "	8.60	12 1/4 "
7/8 "	5.30	10 3/4 "	1 9/16 "	9.00	12 1/4 "
15/16 "	5.60	10 3/4 "	1 5/8 "	9.30	12 1/4 "
1 "	5.90	10 3/4 "	1 11/16 "	9.60	12 1/4 "
1 1/16 "	6.20	11 5/8 "	1 3/4 "	9.90	12 1/4 "
1 1/8 "	6.50	11 5/8 "	1 13/16 "	10.20	13 7/8 "
1 3/16 "	6.80	11 5/8 "	1 7/8 "	10.40	13 7/8 "
1 1/4 "	7.10	11 5/8 "	1 15/16 "	10.60	13 7/8 "
1 5/16 "	7.40	11 5/8 "	2 "	10.80	13 7/8 "
1 3/8 "	7.80	11 5/8 "			

HARDENED AND GROUND STEEL MANDRELS.

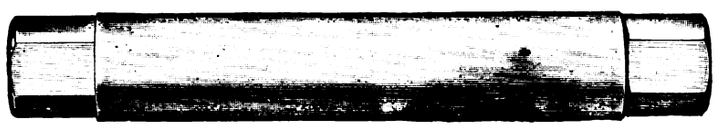


FIG. 5160.

The mandrels are slightly tapered, and correspond in size to reamers, Fig. 5146, and will fit holes reamed by them.

Diameter.	Prices, each.	Length.	Diameter.	Prices, each.	Length.
1/4 in.	$0.65	3 3/4 in.	2 3/16 in.	$6.00	12 in.
5/16 "	.75	4 "	2 1/4 "	6.50	12 "
3/8 "	.85	4 1/4 "	2 5/16 "	6.90	12 "
7/16 "	.95	4 1/2 "	2 3/8 "	7.40	12 "
1/2 "	1.05	5 "	2 7/16 "	7.90	12 1/2 "
9/16 "	1.15	5 1/4 "	2 1/2 "	8.40	12 1/2 "
5/8 "	1.25	5 1/2 "	2 9/16 "	8.90	12 1/2 "
11/16 "	1.35	5 3/4 "	2 5/8 "	9.40	12 1/2 "
3/4 "	1.45	6 "	2 11/16 "	9.90	13 "
13/16 "	1.55	6 1/4 "	2 3/4 "	10.50	13 "
7/8 "	1.70	6 1/2 "	2 13/16 "	11.00	13 "
15/16 "	1.85	6 3/4 "	2 7/8 "	11.50	13 "
1 "	2.00	7 "	2 15/16 "	12.00	13 "
1 1/16 "	2.10	7 1/4 "	3 "	12.50	13 "
1 1/8 "	2.20	7 1/2 "	3 1/16 "	13.00	14 "
1 3/16 "	2.30	7 3/4 "	3 1/8 "	13.40	14 "
1 1/4 "	2.45	8 "	3 3/16 "	13.80	14 "
1 5/16 "	2.60	8 1/4 "	3 1/4 "	14.10	14 "
1 3/8 "	2.75	8 1/2 "	3 5/16 "	14.40	15 "
1 7/16 "	2.90	8 3/4 "	3 3/8 "	14.70	15 "
1 1/2 "	3.10	9 "	3 7/16 "	15.00	15 "
1 9/16 "	3.30	9 1/4 "	3 1/2 "	15.30	15 "
1 5/8 "	3.50	9 1/2 "	3 9/16 "	15.60	16 "
1 11/16 "	3.70	9 3/4 "	3 5/8 "	15.90	16 "
1 3/4 "	3.90	10 "	3 11/16 "	16.20	16 "
1 13/16 "	4.10	10 1/4 "	3 3/4 "	16.50	16 "
1 7/8 "	4.35	10 1/2 "	3 13/16 "	16.80	17 "
1 15/16 "	4.60	10 3/4 "	3 7/8 "	17.20	17 "
2 "	4.80	11 "	3 15/16 "	17.60	17 "
2 1/16 "	5.15	11 1/2 "	4 "	18.00	17 "
2 1/8 "	5.60	11 1/2 "			

The construction of the reamer is shown by the accompanying cut. A ground tapered plug, acting upon the chasers, adjusts the reamer to the size desired.

To operate the plug, the head nut A should be loosened, the plug then turned until the size desired is obtained. The head nut should then be tightened.

The reamer is well and accurately made, and will be found a serviceable tool, readily adjusted to compensate for wear, and meeting cases in which a limited variation in size is desired, or a definite size of hole maintained.

STANDARD CYLINDRICAL GAUGES.

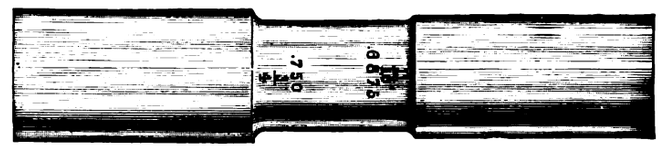


FIG. 5159.

These standards are invaluable as a means of developing greater uniformity in the measurements used in workshops.

They are made of the best cast steel, hardened and ground, with the dimensions marked on each, in sixteenths, and also in decimals of an inch. Each set is neatly arranged in a box, and contains sizes from three-sixteenths to two inches in diameter, varying by sixteenths.

PRICE, $75.00 PER SET.

Larger or special sizes made to order.

Our standard sizes are inexpensive, and can be readily replaced, thus allowing of constant use by the workmen, and thereby avoiding the necessity of supplemental standards, as would be the case in order to preserve a more valuable set of external and internal gauges.

STANDARD INTERNAL AND EXTERNAL CYLINDRICAL GAUGES.



FIG. 5161.

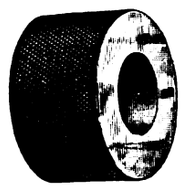


FIG. 5162.

Each set is arranged in a box, and contains sizes from one-quarter to two inches, varying by sixteenths of inches. Special sizes made to order.

PRICE PER SET, FIGS. 5161 AND 5162, $325.00.

STANDARD PLUG AND RING CYLINDRICAL GAUGES.



FIG. 5163.



FIG. 5164.

The company is prepared to furnish hardened plug and ring standard gauges as ordered, finished to the Whitworth English standard.

PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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STANDARD REFERENCE DISKS.

Single disks from 60c. to $1.50. Handles, 45c. to 60c.

The disks are used, generally without handles, for setting calipers, testing measuring tools, and reference for sizes in shop practice.

With handles, they are used in place of standard cylindrical gauges, but are not recommended for constant use as substitutes for these. They are designed to serve principally as reference, not as working gauges.

These disks are made of steel, hardened, and accurately ground to size. A complete set consists of 45 disks, varying by 16ths of an inch, from 1/4 to 3 in. diameter, and six handles. Disks 1/4 and 5/16 in. in diameter have handles attached. The other handles are used, respectively, with the disks varying in diameter from 3/8 to 9/16 in., 5/8 to 1 1/16 in., 1 1/8 to 1 3/4 in., and from 1 5/16 to 3 in. A suitable box is furnished with each complete set of disks and handles.

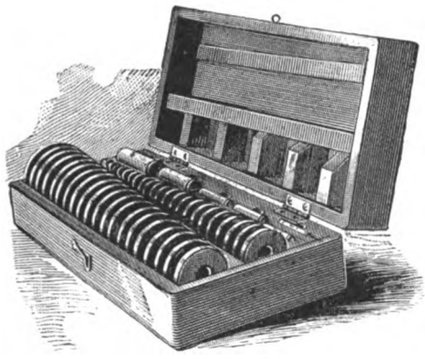


FIG. 5165.

PRICE, PER SET, $35.00.

Any size from 3/8 to 6 in. can be furnished. The 1/4 and 5/16 in. are made either on a screw or handle. The width of the disks increases with their diameter.



FIG. 5166.

PRICES.

1/4 in.	up to 2 in.,	inclusive,	each disk	..		$1.20
Above 2 in.	and up to 3	in.,	"	..		1.60
" 3	" " 4	"	"	..		2.10
" 4	" " 4 1/2	"	"	..		2.80
" 4 1/2	" " 5	"	"	..		3.60
" 5	" " 5 1/2	"	"	..		4.80
" 5 1/2	" " 6	"	"	..		6.00

Limit gauges made to order.

CORRECTIVE GAUGE STANDARDS.

These disks are employed for testing and correcting fixed gauges, for setting calipers, and also as a reference in any case to prove dimensions within their range. Each disk is separate, ground independently to size. Any combination of sizes, from 1/4 to 6 in., can be furnished.

PRICES, FIG. 5167.

Standard corrective gauge, 49 sizes, 1/4 to 2 1/2 in. by 16ths, 2 5/8 to 4 in. by 8ths	$84.00
Standard corrective gauge, 61 sizes, 1/4 to 4 in., inclusive, by 16ths	107.00
Standard corrective gauge, 93 sizes, 1/4 to 6 in., inclusive, by 16ths	260.00

Walnut cases, extra.

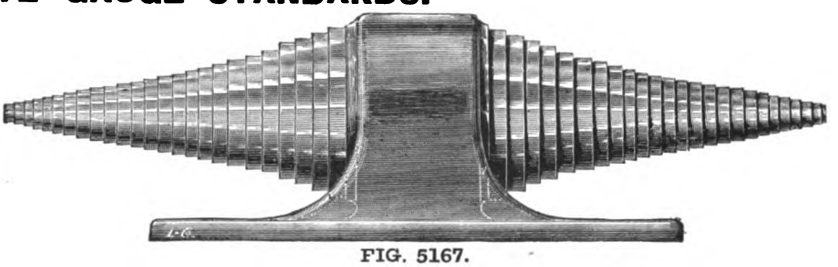


FIG. 5167.



FIG. 5168.

PRICES.

1/4 to 1 in.,	inclusive,	by 16ths,	13 sizes	.....		$18.50
1/4 " 2 "	"	"	" 29	"	.....	37.50

IN AND OUTSIDE FIXED CALIPER GAUGES.

These gauges have the points and heels carefully hardened. They are guaranteed accurate to subdivisions of the British imperial yard, within a limit of error of 1/10000 of an inch for Class B, and 1/5000 of an inch for Class C.

Limit gauges made to order.

FLAT BAR PATTERN.

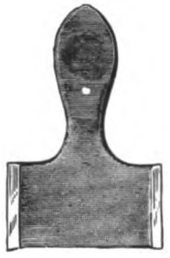


FIG. 5169.

CRESCENT PATTERN.



FIG. 5170.

Prices for two gauges, one of each pattern. When only one pattern is desired, the price is one-half of this list.

PRICES, FIGS. 5169 AND 5170.

Size.	Class B.	Class C.	Size.	Class B.	Class C.	Size.	Class B.	Class C.	Size.	Class B.	Class C.	Size.	Class B.	Class C.	Size.	Class B.	Class C.
1/4	$1.80	$1.44	1 1/16	$2.88	$2.31	1 7/8	$4.26	$3.41	2 1/16	$5.53	$4.43	3 1/2	$6.71	$5.37	4 5/8	$7.76	$6.21
5/16	1.80	1.44	1 1/8	3.00	2.40	1 15/16	4.36	3.49	2 1/8	5.62	4.50	3 9/16	6.80	5.44	4 3/4	7.82	6.26
3/8	1.80	1.44	1 3/16	3.12	2.50	2	4.46	3.57	2 3/16	5.71	4.57	3 5/8	6.89	5.51	4 7/8	7.89	6.31
7/16	1.80	1.44	1 1/4	3.24	2.60	2 1/16	4.56	3.65	2 7/8	5.80	4.64	3 11/16	6.98	5.59	5	7.95	6.36
1/2	1.80	1.44	1 5/16	3.36	2.69	2 1/8	4.66	3.73	2 15/16	5.89	4.71	3 3/4	7.07	5.66	5 1/8	8.02	6.42
9/16	1.92	1.54	1 3/8	3.46	2.77	2 3/16	4.76	3.81	3	5.98	4.78	3 13/16	7.16	5.73	5 1/4	8.08	6.47
5/8	2.04	1.64	1 7/16	3.56	2.85	2 1/4	4.86	3.89	3 1/16	6.08	4.86	3 7/8	7.25	5.80	5 3/8	8.15	6.52
11/16	2.16	1.73	1 1/2	3.66	2.93	2 5/16	4.96	3.97	3 1/8	6.17	4.94	3 15/16	7.34	5.88	5 1/2	8.21	6.57
3/4	2.28	1.83	1 9/16	3.76	3.01	2 3/8	5.06	4.05	3 3/16	6.26	5.01	4	7.43	5.95	5 5/8	8.28	6.62
13/16	2.40	1.92	1 5/8	3.86	3.09	2 7/16	5.16	4.13	3 1/4	6.35	5.08	4 1/8	7.50	6.00	5 3/4	8.34	6.67
7/8	2.52	2.02	1 11/16	3.96	3.17	2 1/2	5.26	4.21	3 5/16	6.44	5.16	4 1/4	7.56	6.05	5 7/8	8.41	6.72
15/16	2.64	2.11	1 3/4	4.06	3.25	2 9/16	5.35	4.28	3 3/8	6.53	5.23	4 3/8	7.63	6.10	6	8.47	6.77
1	2.76	2.21	1 13/16	4.16	3.33	2 5/8	5.44	4.35	3 7/16	6.62	5.30	4 1/2	7.69	6.15			

Total cost of both sets of gauges, 1/4 to 4 in., as per list, Class B	$279.56
" " " " 1/4 " 4 " " " C	223.78
" " " " 1/4 " 6 " " " B	407.32
" " " " 1/4 " 6 " " " C	325.98

When ordering, please state clearly how sizes are to vary, whether by 16ths, 8ths or 4ths of inches, also what class of gauge is wanted. When not otherwise stated, Class B will be sent.

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IN AND OUTSIDE FIXED CALIPER GAUGES.



FIG. 5171.

PRICES.

Size.	Class B.	Class C.	Size.	Class B.	Class C.	Size.	Class B.	Class C.	Size.	Class B.	Class C.	Size.	Class B.	Class C.
1/4	$1.44	$1.15	1 1/4	$2.52	$2.02	2 1/4	$3.81	$3.05	3 1/4	$5.03	$4.03	4 1/2	$6.41	$5.13
5/16	1.44	1.15	1 5/16	2.61	2.09	2 5/16	3.89	3.11	3 5/16	5.11	4.09	4 5/8	6.53	5.23
3/8	1.44	1.15	1 3/8	2.69	2.16	2 3/8	3.97	3.18	3 3/8	5.18	4.15	4 3/4	6.65	5.32
7/16	1.44	1.15	1 7/16	2.77	2.23	2 7/16	4.05	3.24	3 7/16	5.26	4.21	4 7/8	6.77	5.42
1/2	1.44	1.15	1 1/2	2.85	2 29	2 1/2	4.13	3.31	3 1/2	5.33	4.27	5	6.89	5.51
9/16	1.53	1.23	1 9/16	2.93	2.35	2 9/16	4.21	3.37	3 9/16	5.41	4.33	5 1/8	7.01	5.61
5/8	1.62	1.30	1 5/8	3.01	2.41	2 5/8	4.28	3.43	3 5/8	5.48	4.39	5 1/4	7.13	5.71
11/16	1.71	1.37	1 11/16	3.09	2.47	2 11/16	4.36	3.49	3 11/16	5.56	4.45	5 3/8	7.25	5.81
3/4	1.80	1.44	1 3/4	3.17	2.54	2 3/4	4.43	3.55	3 3/4	5.63	4.51	5 1/2	7.37	5.90
13/16	1.89	1.52	1 13/16	3.25	2.60	2 13/16	4.51	3.61	3 13/16	5.71	4.57	5 5/8	7.49	6.00
7/8	1.98	1.59	1 7/8	3.33	2.67	2 7/8	4.58	3.67	3 7/8	5.78	4.63	5 3/4	7.61	6.09
15/16	2 07	1.67	1 15/16	3.41	2.73	2 15/16	4.66	3.73	3 15/16	5.86	4.69	5 7/8	7.73	6.19
1	2.16	1.74	2	3.49	2.79	3	4.73	3.79	4	5.93	4.75	6	7.85	6.28
1 1/16	2.25	1.81	2 1/16	3.57	2.86	3 1/16	4.81	3.85	4 1/8	6.05	4.85			
1 1/8	2.34	1.88	2 1/8	3.65	2.92	3 1/8	4.88	3.91	4 1/4	6.17	4.94			
1 3/16	2.43	1.95	2 3/16	3.73	2.98	3 3/16	4.96	3.97	4 3/8	6.29	5.04			

Total cost of a set of gauges, 1/4 to 4 in., as per list, class B. $220.50
" " " " 1/4 to 4 " " " " C. 176.69
" " " " 1/4 to 6 " " " " B 331.78
" " " " 1/4 to 6 " " " " C. 265.72

When ordering, please state clearly how sizes are to vary, whether by 16ths, 8ths or 4ths of inches; also what class of gauge is wanted. When not otherwise stated, class B will be sent.

LIMIT GAUGES MADE TO ORDER.

24, 12 AND 4 INCH MEASURING MACHINES.

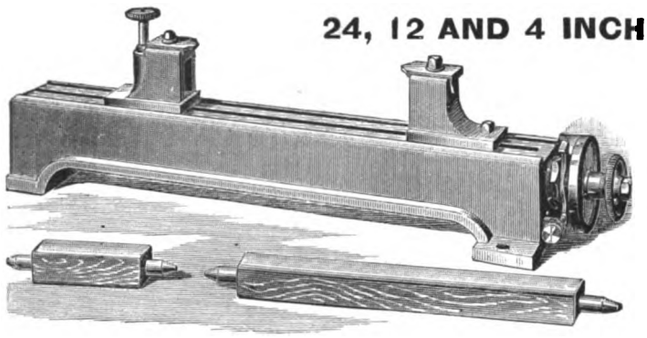


FIG. 5172.

This is a standard form of measuring machine, for use in the tool room in preparing templets, reamers, mandrels, etc., etc. They will measure differences of the $\frac{1}{10000}$ of an inch. Adjustments in the machine provide for the measuring points wearing. The error of the screw is corrected. These machines, by means of a vernier attachment, will indicate variations of $\frac{1}{20000}$ of an inch, but measuring and indicating are very different things.

PRICES, FIG. 5172.

Machine to measure 0 to 4 in., without test bars $60.00
" " 0 to 12 " with 2 " " 120.00
" " 0 to 24 " " 3 " " 150.00

WALNUT CASES EXTRA.

6 INCH CALIPERING MACHINE.

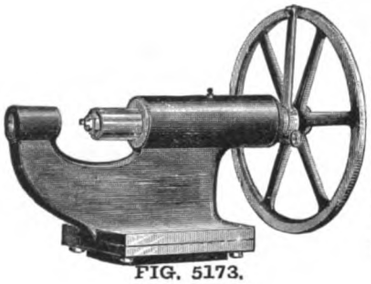


FIG. 5173.

Calipering machines are used to transmit sizes, and differ from fixed calipers, because they record as the size is approached, and show how much a piece is to be reduced. Machines of this kind are used in connection with standard sizes as an accurate pair of calipers, and have the features of a measuring machine, in so far that they will measure accurately above and below a certain size after having been adjusted and the index set for a standard size. The machine shown will caliper to 6 inches. The index wheel is divided to read to $\frac{1}{10000}$ of an inch.

PRICE, COMPLETE, FIG. 5173, $175.00.

SHEET METAL GAUGE.

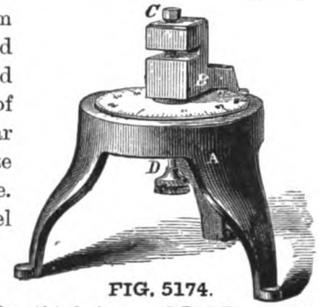
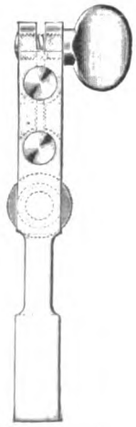
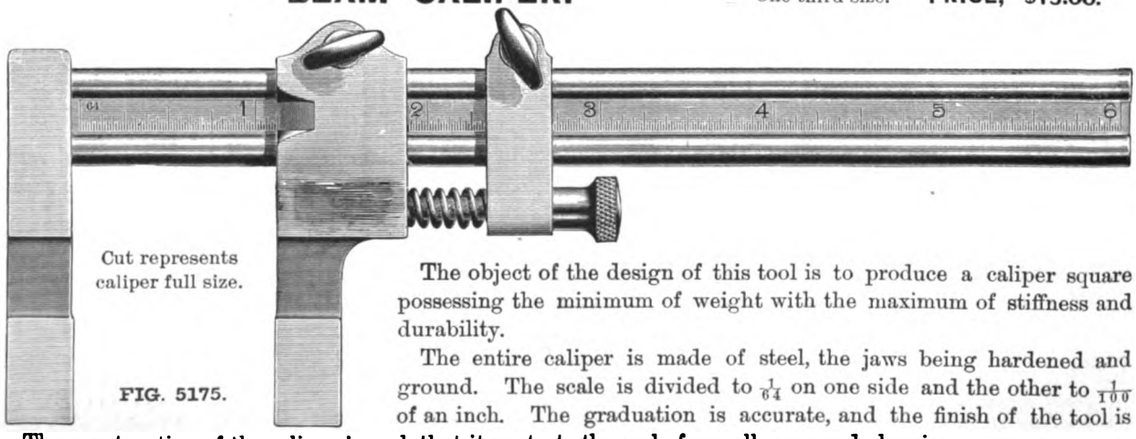


FIG. 5174.

One-third size. **PRICE, $15.00.**

BEAM CALIPER.





Cut represents caliper full size.

FIG. 5175.

The object of the design of this tool is to produce a caliper square possessing the minimum of weight with the maximum of stiffness and durability.

The entire caliper is made of steel, the jaws being hardened and ground. The scale is divided to $\frac{1}{64}$ on one side and the other to $\frac{1}{100}$ of an inch. The graduation is accurate, and the finish of the tool is first-class in every respect. The construction of the caliper is such that it protects the scale from all wear and abrasion. **PRICE, $6.00.**

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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MICROMETER CALIPERS.

NO. 2 ENGLISH OR METRIC MEASURE.

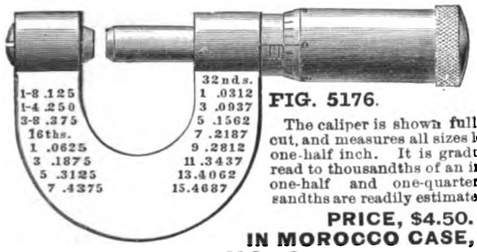


FIG. 5176.

The caliper is shown full size in cut, and measures all sizes less than one-half inch. It is graduated to read to thousandths of an inch, but one-half and one-quarter thousandths are readily estimated.

PRICE, $4.50.

IN MOROCCO CASE, $5.00.

NO. 3.

This caliper differs from micrometer caliper No. 2 only in being graduated to read to ten-thousandths, as well as thousandths of an inch. The decimal equivalents stamped on frame are very convenient, and render possible the immediate expression of readings, in 8ths, 16ths, 32ds and 64ths. This instrument is also graduated to hundredths of a millimeter, metric measure. When so graduated, the table of decimal equivalents is omitted.

PRICE, $5.50. **IN MOROCCO CASE, $6.00.**

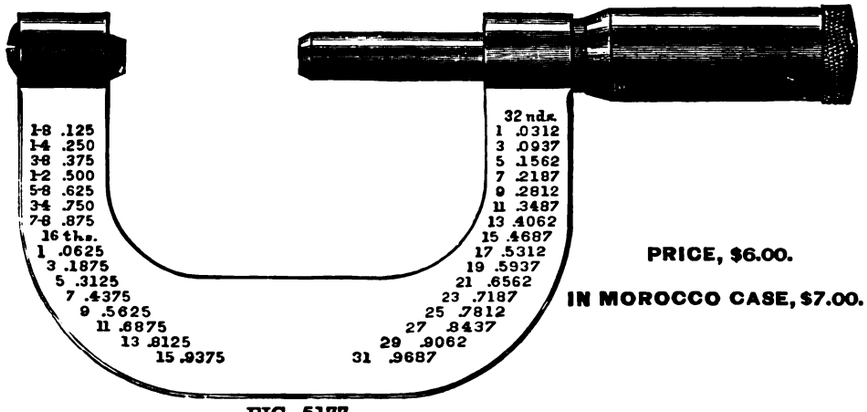


FIG. 5177.

PRICE, $6.00.

IN MOROCCO CASE, $7.00.

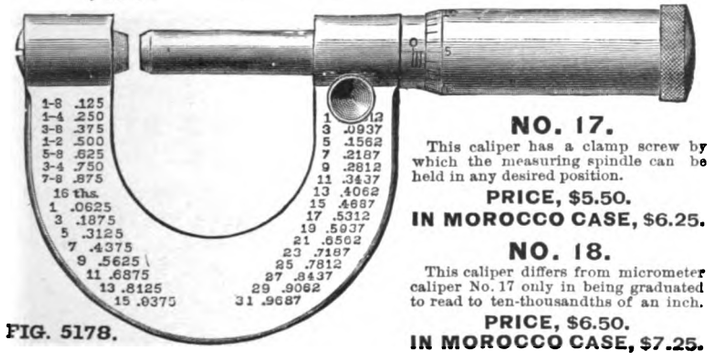


FIG. 5178.

NO. 17.

This caliper has a clamp screw by which the measuring spindle can be held in any desired position.

PRICE, $5.50.

IN MOROCCO CASE, $6.25.

NO. 18.

This caliper differs from micrometer caliper No. 17 only in being graduated to read to ten-thousandths of an inch.

PRICE, $6.50.

IN MOROCCO CASE, $7.25.

English or metric measure, with clamp screw to hold spindle in any desired position. The caliper is shown full size in cut, and measures all sizes less than one-half inch. It is graduated to read to thousandths of an inch, but one-half and one-quarter thousandths are readily estimated. The outer end of the frame is the same size as the gauge screw spindle, and the edges of the measuring surfaces are not beveled but are left square. It is more convenient for measuring certain classes of work. It will gauge under a shoulder, or measure a small projection on a plain surface. Tool-makers and watch-makers will especially appreciate micrometers of this form.

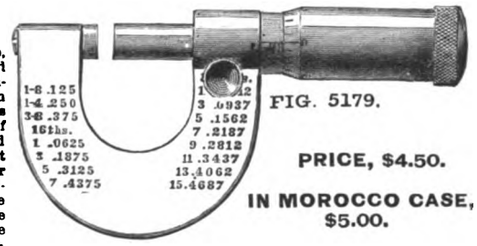


FIG. 5179.

PRICE, $4.50.

IN MOROCCO CASE, $5.00.

DEPTH GAUGE.

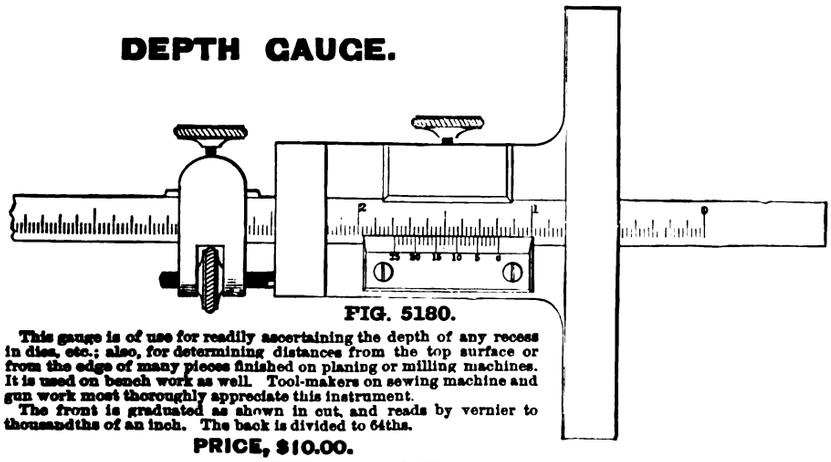


FIG. 5180.

This gauge is of use for readily ascertaining the depth of any recess in dies, etc.; also, for determining distances from the top surface or from the edge of many pieces finished on planing or milling machines. It is used on bench work as well. Tool-makers on sewing machine and gun work most thoroughly appreciate this instrument.

The front is graduated as shown in cut, and reads by vernier to thousandths of an inch. The back is divided to 64ths.

PRICE, $10.00.

MICROMETER CALIPER NO. 1.

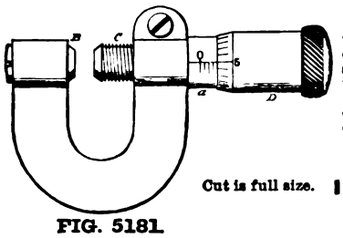


FIG. 5181.

These gauges will measure the thickness of sheet metal, or other material, by thousandths of an inch up to three-tenths of an inch at any point within half an inch of the edge, and can be applied as easily as the common gauge.

PRICE, $4.00.

Cut is full size. **IN MOROCCO CASE, $4.50.**

IMPROVED VERNIER CALIPER.

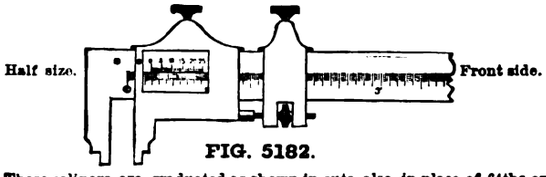


FIG. 5182.

These calipers are graduated as shown in cuts, also, in place of 64ths on the back side, some are divided to read with vernier to 50ths of a millimeter. An explanation of the vernier accompanies each instrument.

The jaws of the 6 in., 12 in. and 24 in. calipers are respectively 1¼ in. long, ¼ in. wide, when closed; ⅞ in. and 2¼ in. long, 3-10 in. wide; and ⅝ in. long, 3-10 in. wide. They are hardened and ground. The instruments are all ⅛ in. thick, and are made of steel. They can be used for either inside or outside calipers, and have points by which dividers can be set to transfer distances.

PRICES, IN MOROCCO CASE.

6 in.,	12 in.,	12 in., with long jaw,	24 in.,
$15.00.	$20.00.	$25.00.	$25.00.

A standard is made for testing the accuracy of the adjustment of the caliper. Price, $3.00.

HEIGHT GAUGE.

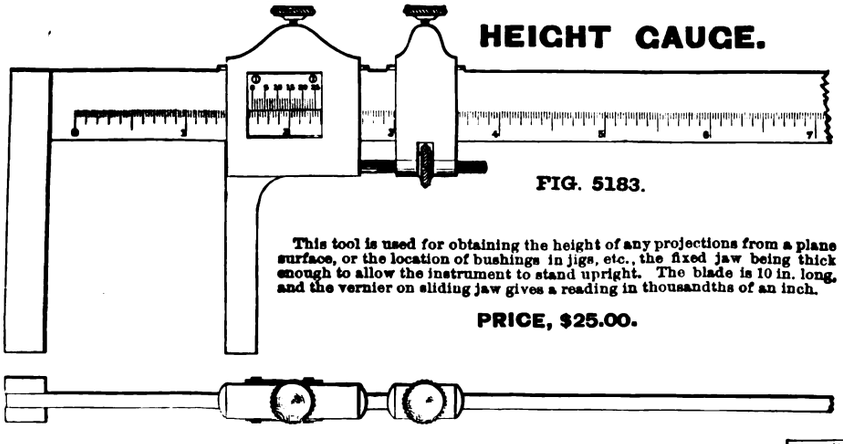


FIG. 5183.

This tool is used for obtaining the height of any projections from a plane surface, or the location of bushings in jigs, etc., the fixed jaw being thick enough to allow the instrument to stand upright. The blade is 10 in. long, and the vernier on sliding jaw gives a reading in thousandths of an inch.

PRICE, $25.00.

STEEL CALIPER RULES.

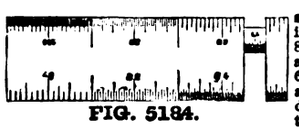


FIG. 5184.

This cut is a fac-simile of one side of these rules; the other side is divided to 12ths, 24ths, 48ths, 8ths, 14ths and 28ths, on the outside and upon the slide to 32ds and 64ths of inches. When closed they are 3 in. long. The caliper can be drawn out to measure 2½ in. The thickness of the rule is ⅛ in.

POCKET VERNIER CALIPERS.

The cut is a fac-simile of one side of our hardened cast steel improved vernier caliper, a light, convenient and valuable instrument for machinists' and tool-makers' use in obtaining correct measurements. The side represented above is graduated upon the bar to inches and fiftieths of an inch, and by the aid of a vernier is read to one-thousandths of an inch. The opposite side is graduated to inches and sixty-fourths of an inch. The outside of the jaws are of suitable form for taking inside measurements, and when the jaws are closed measure 250 one-thousandths of an inch in diameter. This caliper will measure one inch and eleven-sixteenths, outside diameter, when the jaws are opened full size.

PRICE, $10.00. **IN MOROCCO CASE, $10.50.**

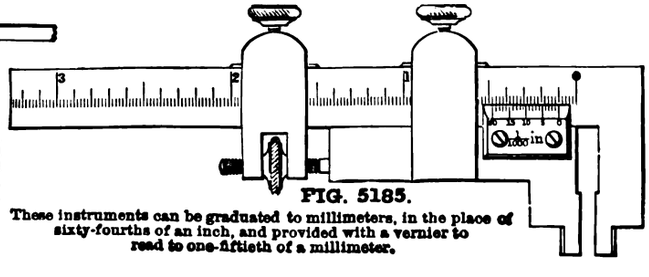


FIG. 5185.

These instruments can be graduated to millimeters, in the place of sixty-fourths of an inch, and provided with a vernier to read to one-fiftieth of a millimeter.

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WIRE GAUGE AND CALIPER.

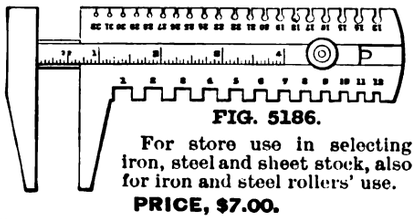


FIG. 5186.

For store use in selecting iron, steel and sheet stock, also for iron and steel rollers' use.

PRICE, $7.00.

The wire gauge sizes are from Nos. 1 to 32 inclusive, old standard. The caliper tongue is graduated to inches and 32ds, and will measure 4-inch flat, round or square stock. The jaws and wire gauge are hardened.

ROLLING MILL GAUGES.

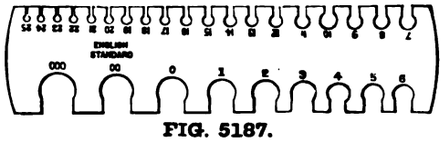


FIG. 5187.

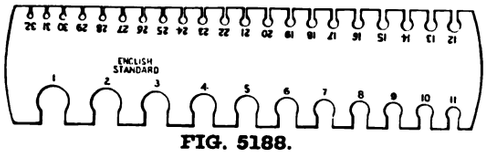


FIG. 5188.

PRICES, FIGS. 5187 AND 5188.

000 to 25.....$2.50 each.
1 to 32..... 3.00 "

POCKET SCREW AND WIRE GAUGE.

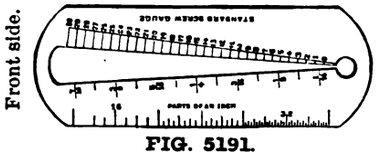


FIG. 5191.

Cuts one-half size.

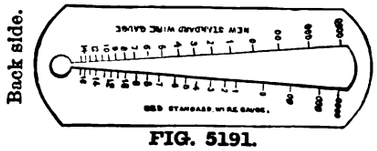


FIG. 5191.

PRICE, $2.50.

LARGE SCREW AND WIRE GAUGE.

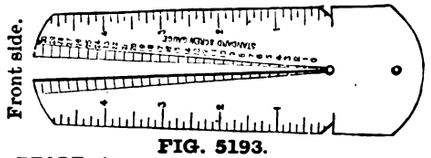


FIG. 5193.

PRICE, $3.50. EXTRA THICK, $4.50.

Cuts one-third size.

ANGULAR WIRE GAUGES.

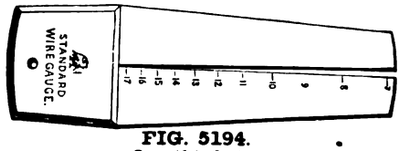


FIG. 5194.

One-third size.

000 to 9.....$6.00 15 to 28.....$6.00
7 to 17..... 6.00 25 to 40..... 6.00
Divided with both old and new standard.....10.00

WIRE GAUGES.

THE AMERICAN STANDARD WIRE GAUGE.

Adopted by the Brass Manufacturers, Jan., 1858.

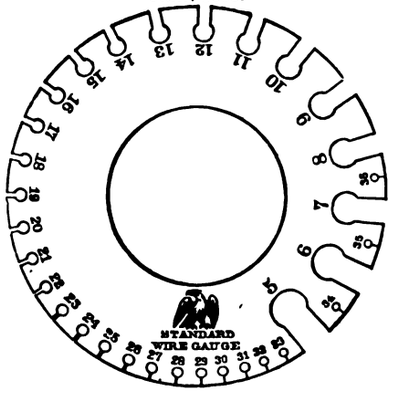


FIG. 5189. Full size.

These gauges are made from the best steel and are tempered, adjusted and warranted accurate.

None genuine unless stamped as in the engraving with our trade-marks.

PRICES.

Round gauges, sizes 0 to 36.....$3.50
" " " 5 to 36..... 2.50

STEEL MUSIC WIRE GAUGE.

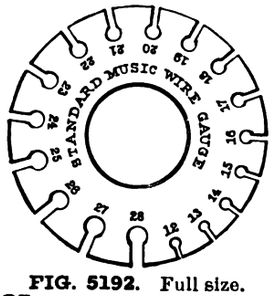


FIG. 5192. Full size.

PRICE.....$1.50.

ROUND STUBS' WIRE GAUGES.

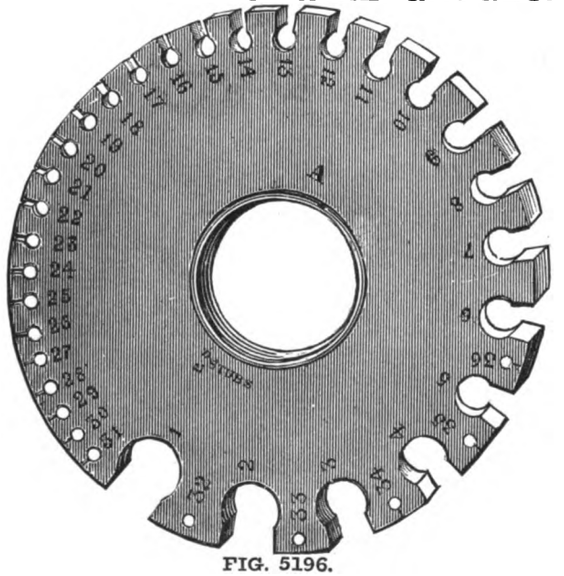


FIG. 5196.

PRICES, FIGS. 5195, 5196 AND 5197.

Sizes.....	1 to 26	0 to 26	1 to 36	0 to 36	00 to 36	000 to 26
Each.....	$2.75	$2.88	$3.50	$3.75	$3.88	$3.38

Small oblong pocket gauge, 1 to 26.....each, $2.75
" double, round pocket gauge, 1 to 36..... " 3.75
" " oblong " " 1 to 36..... " 3.75

The circular style are made all sizes, except 1 to 26. The oblong are only made Nos. 1 to 26 and 0 to 36.

THE ENGLISH STANDARD WIRE GAUGE.

The same as "Stubs'" or Birmingham gauge.

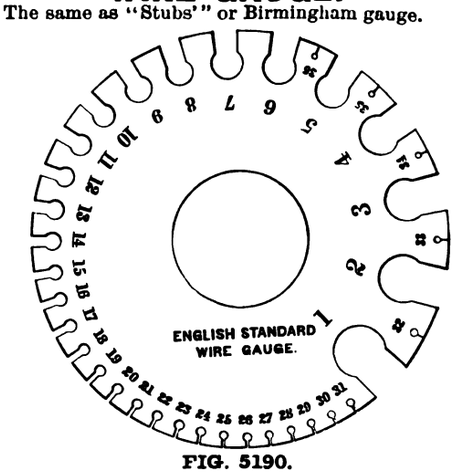


FIG. 5190.

PRICES.

Round gauges, sizes 1 to 36.....$2.00
" " " 6 to 36..... 1.50

DOUBLE ROUND STUBS' GAUGES.

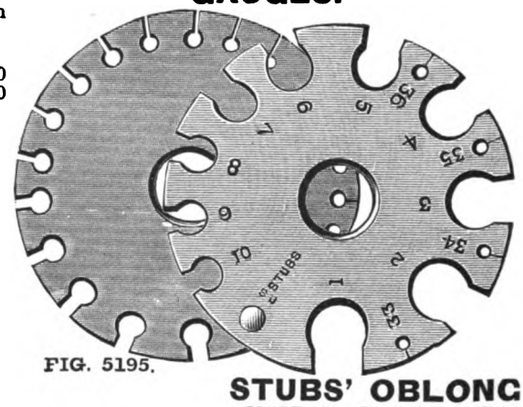


FIG. 5195.

STUBS' OBLONG WIRE GAUGES.

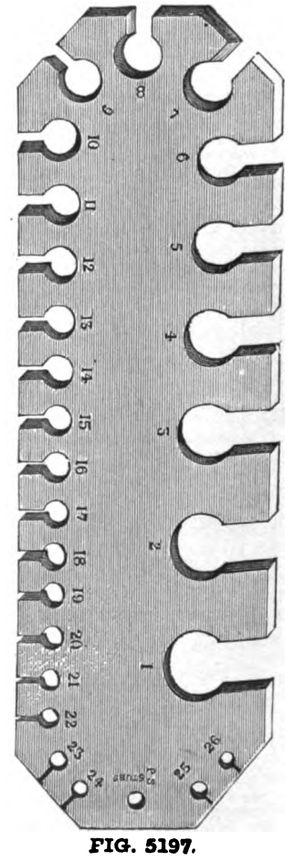


FIG. 5197.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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WIRE, NUT AND THREAD GAUGES.

JEWELER'S WIRE GAUGE.

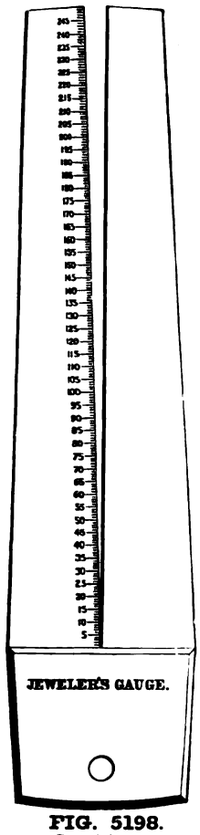


FIG. 5198.
Cut ⅛ size.
PRICE, $5.00.

NUT AND WASHER GAUGE.

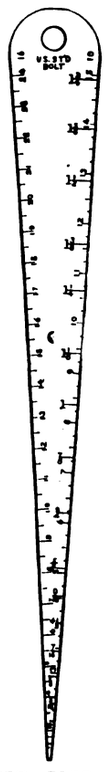


FIG. 5199.
Cut ¼ size.
PRICE, $6.00.

HOLE GAUGE.

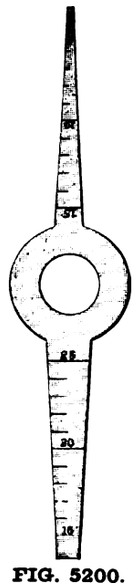


FIG. 5200.
PRICE, $2.00.

STANDARD SCREW THREAD GAUGE.

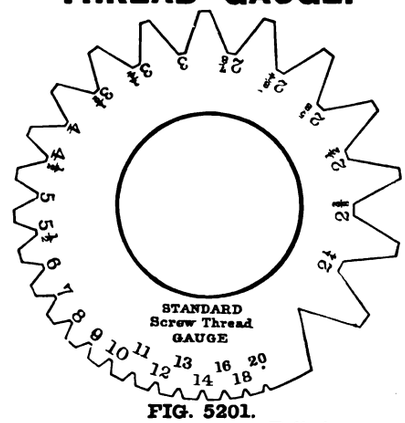


FIG. 5201.
PRICE, $2.00. Full size.

This gauge is intended to be used as a standard for grinding tools to cut threads according to the U. S. standard.

The angles are 60 degrees, and the flat surfaces at top and bottom of threads are equal to ⅛ of the pitch.

WORM THREAD TOOL GAUGE.

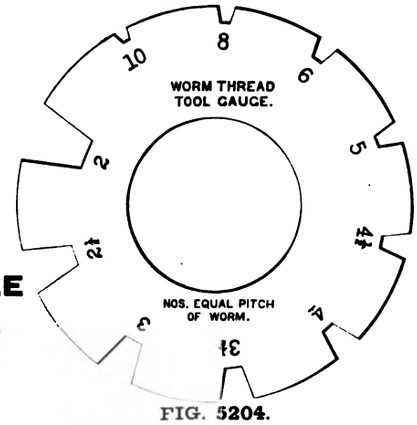


FIG. 5204.
PRICE, $2.50. Full size.

This gauge furnishes the correct form for tools used in turning the threads of worms, when the worm wheels are cut with involute cutters. The figures on the gauge correspond to the number of threads per inch of the worm. The slots in the gauge are also of the proper depth for their respective threads.

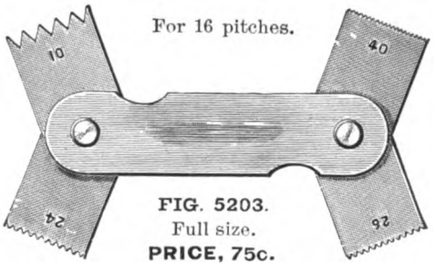
SCREW PITCH GAUGE.



For 25 pitches.
U. S. standard thread.

FIG. 5202.
Two-thirds size.
PRICE, $1.75.

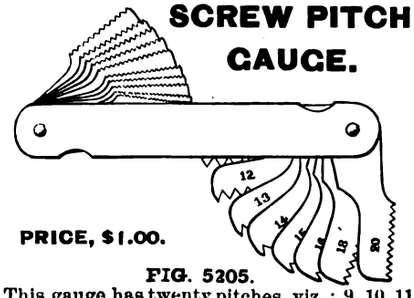
SCREW PITCH GAUGE.



For 16 pitches.

FIG. 5203.
Full size.
PRICE, 75c.

SCREW PITCH GAUGE.



PRICE, $1.00.

FIG. 5205.

This gauge has twenty pitches, viz.: 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40. This is the only gauge made that can be used inside a nut as well as on the outside of a screw or bolt.

For pipe and brass work, pitches 8, 11½, 27 are substituted in place of 36, 38, 40, but only when especially ordered, which should be done by calling for gauge No. 11½. Price same as above.

KEY SEAT RULE.

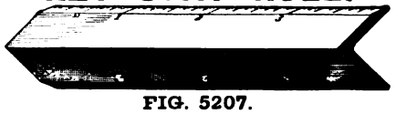


FIG. 5207.

PRICES.

4 in., $2.50. 6 in., $3.00. 8 in., $3.75.

With this rule parallel lines on shafts for key seats, mortises, etc., can be readily and accurately drawn. Its uses are so obvious to machinists as to need no further description.

KEY SEAT RULE.



FIG. 5208.

The improved feature in this rule consists of a device for holding two straight edges in the form of a box square, or key-seat rule, securely together. One of said straight edges is a spring-tempered scale, graduated in 8ths, 16ths, 32ds and 64ths; the other a plain straight edge with two or three clamps, according to its length, which are operated by knurled eccentrics clamping corner and edge of straight edge and scale together, thus not only allowing the scale to be used as such independently from the other part, but being in two straight pieces admits of being made from spring, tempered stock and accurately ground, also of inserting, in place of the regular width rule, a narrow auxiliary one, adapting it for use on very small shafts, etc. This narrow auxiliary straight edge is either plain or graduated in 32ds and 64ths, and sent when ordered.

PRICES.

6 in	$2.25
6 " with auxiliary straight edge, plain	2.75
6 " " " " " graduated	3.00
9 "	3.00
9 " with auxiliary straight edge, plain	3.75
9 " " " " " graduated	4.25

SCREW CUTTING, DEPTH ANGLE AND TWIST DRILL GAUGE.

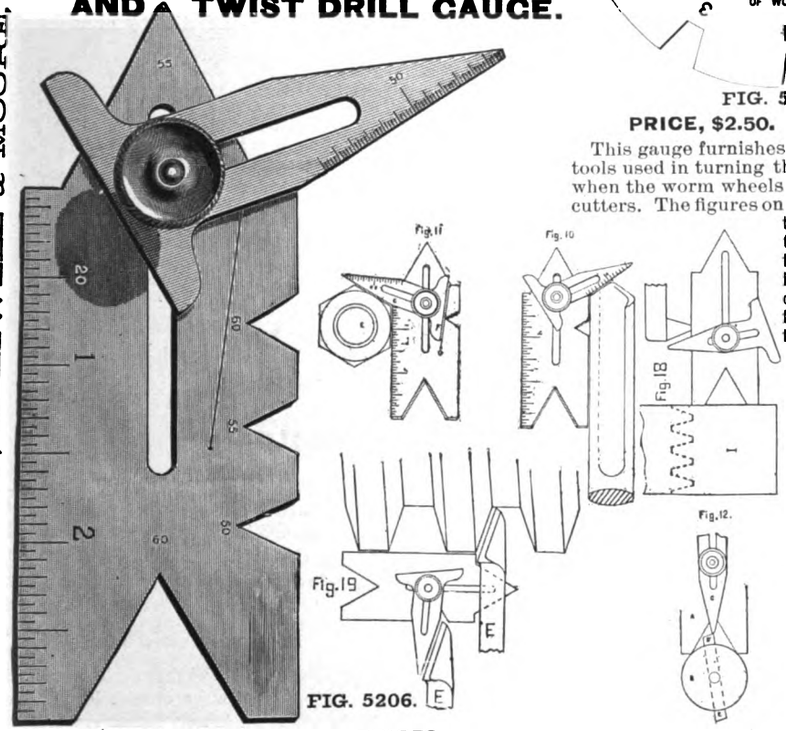


FIG. 5206.

PRICES.

No. 1, U. S. standard, angle 60 degrees	$0.75
No. 1, " Whitworth " or English standard, angles 55 and 60 degrees	1.00
No. 2, U. S. standard, angle 60 degrees	1.50
No. 2, " Whitworth " or English standard, angles 50, 55 and 60 degrees	1.75

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THREAD GAUGE, STRAIGHT EDGES AND SURFACE PLATES, ETC.

CENTER GAUGE

AND GAUGE FOR GRINDING AND SETTING SCREW TOOLS.

PRICE, 25 CENTS.

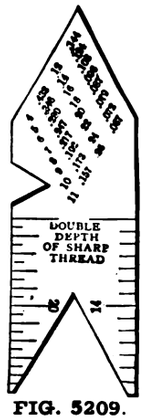


FIG. 5209. FULL SIZE.

Patent applied for.

The angles used in this gauge are 60 degrees. The four divisions upon the gauge of 14, 20, 24 and 32 parts to the inch, are very useful in measuring the number of threads to the inch of taps and screws. The following parts to the inch can be determined by them, viz.: 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 20, 24 and 32.

The table on the gauge is used in determining the size of tap drills. The decimals represent the double depth of thread of the various pitches. To obtain the diameter of a tap drill, say 4 pitch, subtract the decimal .433, which is opposite the 4 on the table, from the size of tap, say 1 inch, and the result, .567 in this instance, will be the size of drill to be used.

Also on hand, center gauges of the Whitworth or English standard, 55 degrees.

CAST IRON STRAIGHT EDGE.



FIG. 5211.

Size.	Weight.	Prices.	Size.	Weight.	Prices.
18 in. x 1½ in.	7 lbs.	$7.00	60 in. x 2⅛ in.	51 lbs.	26.50
24 " x 1⅝ "	10 "	9.50	72 " x 2¼ "	78 "	33.00
30 " x 1¾ "	16 "	12.00	96 " x 2½ "	153 "	39.00
36 " x 1⅞ "	19 "	15.00	120 " x 2⅝ "	175 "	45.00
48 " x 2 "	36 "	20.50			

STANDARD SURFACE PLATES.

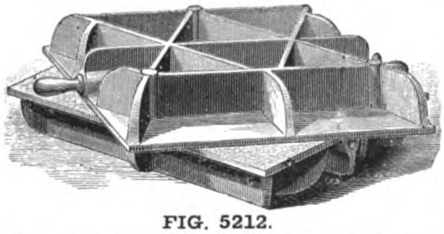


FIG. 5212.

Surface plates are as indispensable in obtaining correct surfaces, as standard cylindrical gauges are for sizes of holes.

We have on hand a variety of patterns, to which we frequently make additions, all of which are uniform in style, and of such construction as to prevent changes in form from flexure, etc.

These plates are usually sold singly, not in pairs as shown in cut. Unless otherwise specified, price is quoted for a single plate, with box and cover.

PRICES.

3½ x 12	in.,	weight, 11 lbs.	$6.00	12 x 24	in.,	weight, 100 lbs.	$43.00
4¼ x 6	"	" 5 "	4.00	14 x 14	"	" 47 "	27.00
6 x 6	"	" 7 "	5.00	14 x 18	"	" 62 "	33.00
6 x 12	"	" 19 "	10.00	15 x 30	"	" 139 "	58.00
6 x 50	"	" 120 "	40.00	16 x 16	"	" 62 "	36.00
6½ x 18	"	" 30 "	16.00	18 x 18	"	" 65 "	43.00
7 x 7⅛	"	" 11 "	7.00	18 x 24	"	" 128 "	58.00
7 x 10	"	" 15 "	10.00	18 x 36	"	" 228 "	88.00
8 x 12	"	" 21 "	10.00	20 x 30	"	" 178 "	85.00
9 x 9	"	" 16 "	11.00	22 x 80	"	" 752 "	235.00
9 x 14	"	" 27 "	17.00	24 x 24	"	" 164 "	79.00
10 x 15	"	" 35 "	22.00	24 x 36	"	" 298 "	112.00
10 x 30	"	" 99 "	40.00	24 x 48	"	" 442 "	153.00
12 x 12	"	" 29 "	20.00	24 x 60	"	" 666 "	190.00
12 x 18	"	" 53 "	29.00	36 x 68	"	" 1,024 "	335.00

Other sizes made to order.

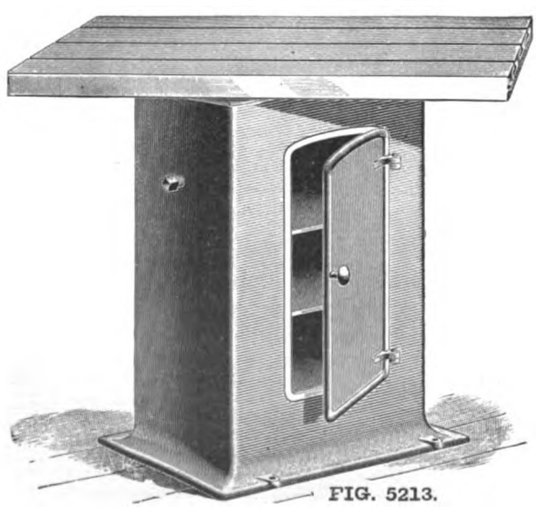


FIG. 5213.

STANDARD "KNIFE EDGE" STRAIGHT EDGES.

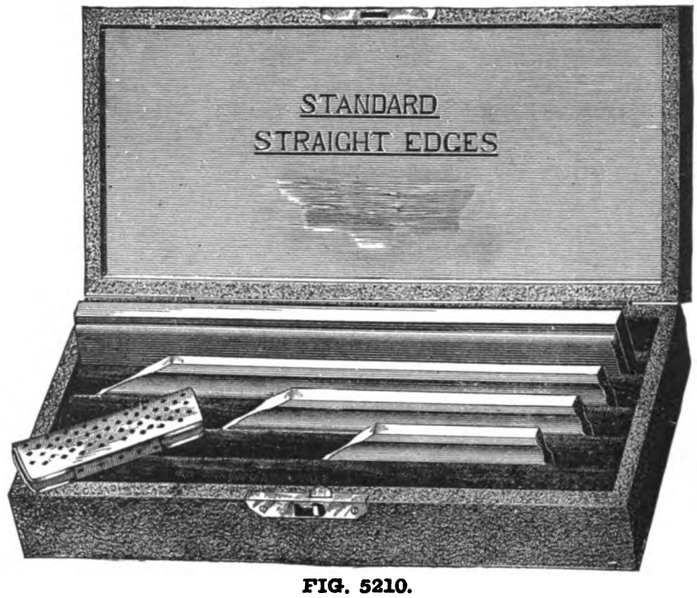


FIG. 5210.

The cut represents a set, consisting of a 7 inch test bar and three straight edges, 6½ inches, 4½ inches and 3¼ inches long, respectively, with non-conductor.

The test bars are made of glass, cased in felt and leather, as a protection against accidents and changes of temperature caused by handling. The straight edges are made of tool steel, in shape most convenient for use, combining strength with lightness, and hardened at the straight edge only.

A non-conducting handle, fitting all three sizes of straight edges, will be furnished if desired, and is essential when these tools are used on work requiring great accuracy.

They are finished at a temperature not lower than 75 degrees or higher than 85 degrees, Fahr., and will be found most accurate within that limit.

Glass is adopted for the test bars, as it is less affected by changes of temperature than any other available material.

PRICES.

Set, in velvet-lined case, consisting of test bar and three straight edges; weight, 20 oz.	$12.00
Test bar, 7 inches long, in cloth-covered box	5.50
No. 1 straight edge, 3¼ inches long, in cloth-covered box	1.50
No. 2 straight edge, 4½ inches long, in cloth-covered box	2.00
No. 3 straight edge, 6½ inches long, in cloth-covered box	2.75
Non-conducting handle for straight edges; weight, 8½ oz.	.50
Velvet-lined case for set complete; weight, 8½ oz.	1.00
Cloth-covered boxes for test bar	.20
Cloth-covered boxes for straight edges	each, .15

Weight, straight edges: No. 1, 1 oz.; No. 2, 1½ oz.; No. 3, 3 oz.
Weight, cloth-lined boxes: No. 1, ½ oz.; No. 2, ¾ oz.; No. 3, 1¼ oz.
Weight, glass test bar, 6¼ oz.

SCRAPER'S BENCH.

This cut shows a bench designed for holding work while it is being hand scraped. It is made with a substantial upright stand, with a door and shelves for the safe-keeping of tools, upon which is mounted a swivel table, which can be turned to suit the convenience of the workman, and held in position by a set screw shown on the side.

These benches take up no more room than is necessary for handling the work. They can be set up or moved to any convenient place, which saves time and expense of carrying parts of machinery being fitted up from machines in process of erection to the regular shop bench, usually located at the sides of the room.

Another great advantage in using these is, they do not sag by the weight of the parts of machinery while they are being scraped. The ordinary bench is always out of level, and sags more or less when used for this purpose, which makes much unnecessary work in finishing parts to the surface plates.

Table is 20 inches wide and 36 inches long.

WEIGHT, 600 LBS.
PRICE, $63.00.

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STEEL RULES.

SQUARE STEEL RULES.

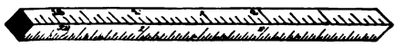


FIG. 5214.

3 in.	4 in.	6 in.
45c.	60c.	90c.

Graduations.

8, 16, 32, 64 to the inch, whole length.
16, 32, 64, 100 " " " "
16, 64, 50, 100 " " " "

TRIANGULAR STEEL RULES.

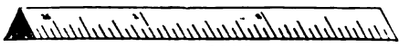


FIG. 5215.

3 in.	4 in.	6 in.	12 in.
50c.	70c.	$1.00.	$2.50.

Graduations.

16, 64, 100 to the inch, whole length.
16, 32, 64 " " " "
20, 50, 100,—12, 24, 48,—16, 32, 64 to the inch.

The 12 in. are divided only as follows: 8, 10, 12, 14, 16, 20, 24, 28, 48, 50, 64, 100 to the inch.

STANDARD STEEL STRAIGHT EDGES.

Of same width and thickness as standard rules.

6 in. long,	1 in. wide,	1/10 in.	thick	$0.60
9 in. "	1 1/8 in. "	1/10 in.	"	.90
12 in. "	1 1/4 in. "	1/10 in.	"	1.20
18 in. "	1 3/8 in. "	1/8 in.	"	1.80
24 in. "	2 in. "	1/8 in.	"	2.40
36 in. "	2 3/4 in. "	1/4 in.	"	6.00
48 in. "	3 in. "	1/4 in.	"	9.00

PATENT RULES, WITH END GRADUATIONS.

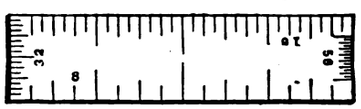


FIG. 5216.

These rules are made to specific widths.

2 in. rules are 1/4 in. wide.	6 in. rules are 1 in. wide.
3 in. " " 3/8 in. "	9 in. " " 1 in. "
4 in. " " 1/2 in. "	12 in. " " 1 in. "

The ends are graduated on one side to 48ths and 100ths, and on the other side, as shown in cut, to 56ths and 32ds. This last graduation extends entirely across the rule.

The No. 4 longitudinal graduation is used, and the prices are the same as those of standard steel rules.

The 3 in. rules are graduated to 200ths in place of 100ths on end.

Prices same as standard steel rules above.

STANDARD STEEL RULES.

1 in.	2 in.	3 in.	4 in.	6 in.	9 in.
20c.	30c.	40c.	50c.	75c.	$1.12

12 in.	18 in.	24 in.	36 in.	48 in.
$1.50	$2.25	$3.00	$7.00	$10.00

The rules in this list are divided seven ways in parts of inches, as follows:

No. 1 graduations.	No. 2 graduations.
1st cor. 10, 20, 50, 100.	10, 20, 50, 100.
2d cor. 12, 24, 48.	12, 24, 48.
3d cor. 16, 32, 64.	16, 32, 64.
4th cor. 14, 28.	8.

No. 4 graduations.	No. 6 graduations.	No. 7 graduations.
1st cor. 64.	1st cor. 32, whole length.	1st cor. 64.
2d cor. 32.	2d cor. 48 " "	2d cor. 32.
3d cor. 16.	3d cor. 50 " "	3d cor. 16.
4th cor. 8.	4th cor. 64 " "	4th cor. 100.

12 in. steel rule, of No. 5 graduation.....$3.00
24 in. " " " " " " 6.00

No. 5 graduations.

1st cor. 16, 32, 64.
2d cor. 11, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25.
3d cor. 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38.
4th cor. 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 100.

Rules longer than 12 in., No. 6 or 7 graduations, are not kept in stock, but are made to order at special prices.

GEAR RULES.

No. 61, $3.00. 12 in. steel rule divided to 18, 20, 22, 24, 26, 28, 30 and 32 parts of an inch, whole length.

No. 78, $3.00. 12 in. steel rule divided to 6, 7, 8, 9, 10, 11, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38 parts of an inch. One inch of each division.

The rules of No. 5 graduation can also be used for sizing gears.

SHRINK RULES.

$5.00, 24 1/4 in. steel rule shrink on one side and standard on the other. Divided on each side to 10, 20, 50, 100, 12, 24, 48, 16, 32, 64 parts of an inch.

$5.00, 24 1/4 in. steel rule shrink on both sides, No. 1 graduation.

$3.00, 24 1/4 in. boxwood rule shrink on both sides, No. 1 graduation.

STANDARD STEEL YARD MEASURES.

Divided on one side to inches and eighths, and on the other side to 1/16, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4 and 7/8 of a yard.
Size, 1 in. wide, 1/4 in. thick.

PRICE, $3.00.

TRIANGULAR BOXWOOD SCALES.



FIG. 5217.

Nos. 63, 64 and 65, for architects and mechanical draughtsmen.

PRICES.

No. 63, $5.00. 24 in. triangular boxwood rule, divided to scales of 1/8, 1/4, 3/8, 1/2, 1, 1 1/2, 3, 2, and 4 in. to the foot and 16ths of an inch.
No. 64, $2.00. 12 in. triangular boxwood rule, ditto, with 1/8 and 3/4, instead of 2 and 4 in to the foot.
No. 65, $1.50. 6 in. triangular boxwood rule, ditto.
No. 72, $5.00. 24 in. triangular boxwood rule, on one edge to 10ths, 20ths, 30ths, 40ths, 50ths, 60ths of an inch.
No. 73, $2.00. 12 in. triangular boxwood rule, ditto.
No. 75, $1.50. 6 in. triangular boxwood rule, ditto.
Nos. 72 and 73 are divided either 10 to 60 or 20 to 80.
Nos. 72, 73 and 75, for railroad engineers and land surveyors.

BEVELED STEEL STRAIGHT EDGES.

12 in. long,	1 3/4 in. wide,	3/16 in.	thick	$2.00
18 in. "	1 3/4 in. "	1/4 in.	"	3.00
24 in. "	2 in. "	1/4 in.	"	4.00
36 in. "	3 in. "	1/4 in.	"	9.00
48 in. "	3 in. "	1/4 in.	"	12.00

The beveled edges are 1/16 in. thick. Only one edge is beveled.

HARDENED STEEL STRAIGHT EDGES.

3 7/8 in. long,	7/8 in. wide,	1/8 in.	thick	$0.60
5 1/8 in. "	1 1/8 in. "	1/8 in.	"	1.00
7 in. "	1 1/8 in. "	1/8 in.	"	1.25
10 3/4 in. "	1 5/8 in. "	1/8 in.	"	2.00
14 in. "	2 in. "	1/8 in.	"	3.00
17 in. "	2 1/4 in. "	1/8 in.	"	3.50
20 in. "	2 3/4 in. "	1/8 in.	"	4.50
27 in. "	3 in. "	1/8 in.	"	7.00
33 in. "	3 in. "	1/8 in.	"	9.00
39 in. "	3 1/8 in. "	1/8 in.	"	12.00

These straight edges are the tongues of the hardened cast steel try squares, and are hardened on the edges only.

STEEL STRAIGHT EDGES.

For draughtsmen.

15 in. long,	1 1/4 in. wide,	1/10 in.	thick	$0.90
18 in. "	1 1/2 in. "	1/10 in.	"	1.00
24 in. "	1 5/8 in. "	1/10 in.	"	1.50
30 in. "	1 3/4 in. "	1/10 in.	"	2.25
36 in. "	2 in. "	1/10 in.	"	3.00
42 in. "	2 1/4 in. "	1/10 in.	"	4.00
48 in. "	2 1/2 in. "	1/10 in.	"	6.00
60 in. "	2 3/4 in. "	1/10 in.	"	8.00

STANDARD STEEL RULES, FRENCH MEASURE.

1/10 metre.	1/5 m.	1/2 m.	3/5 m.	1/2 m.	1 m.
45c.	85c.	$1.75.	$2.50.	$4.00.	$10.00.

METALLIC TRIANGULAR SCALES.



FIG. 5218.

We desire to call the attention of draughtsmen to our patent metallic triangular scales, which are of the exact size and shape of the common 12 inch triangular boxwood scales. They are made from brass tubing with the ends closed, nickeled with a dull finish, and weigh less than 3 1/2 ounces.

The liability of the wood scales to crack, warp or twist, the chipping of their edges, and their variation from standard measurement, are well known to all who have used them. These objections we have overcome in the new scales. The ends of these scales are covered with hardened steel plates, which slightly raise the scales from the paper.

PRICES.

No. 64, $3.00. 12 inch, divided to scales of 1/16, 3/32, 1/8, 1/4, 3/8, 3/4, 1, 1 1/2, and 3 inches to the foot, and 16ths of inches.
No. 73, $3.00. 12 inch, divided on one edge each to 10ths, 20ths, 30ths, 40ths, 50ths and 60ths of inches; or to 20ths, 30ths, 40ths, 50ths, 60ths and 80ths of inches.

In ordering No. 73, please state whether the divisions 10 to 60 or 20 to 80 are wanted.

FLEXIBLE RULES.



FIG. 5219.

Fig. 5219 represents a very thin watch spring tempered rule, nicely graduated on one side only, in either 32ds and 64ths, 64ths and 100ths, or 50ths and 100ths, whole length. Those from 1 inch to 12 inches are 1/2 inch wide, and will easily conform to a 2 inch circle. Those from 18 inches to 24 inches are 3/4 inch wide, and are made from a trifle heavier stock.

These rules are highly prized by watchmakers and all fine mechanics for measuring irregular surfaces.

32-64 graduation will be sent unless otherwise ordered.

PRICES.

1 inch	$0.20	3 inch	$0.35	6 inch	$0.65	12 inch	$1.25	24 inch	$2.50
2 "	.25	4 "	.45	9 "	1.00	18 "	2.00	36 "	4.00

PRICES, FIG. 5220.

No.							Rules only, per doz.	Rules, with leather cases, per doz.
31—1	ft.,	3/8	in. x 26	gauge,	3	in. joints, 4 fold	$4.00	$5.50
31—2	"	"	"	3	"	8 "	8.00	10.00
41—1	"	"	"	4	"	3 "	4.00	5.50
41—2	"	"	"	4	"	6 "	7.50	9.50
41—3	"	"	"	4	"	9 "	11.00	13.50
41—4	"	"	"	4	"	12 "	14.50	17.00
46—2	"	"	25 gauge,	6	"	4 "	7.50	10.00
46—3	"	"	"	6	"	6 "	11.00	14.00
46—4	"	"	"	6	"	8 "	14.50	17.50
70—2	ft., folding pocket, 3/4 in. x 21 gauge, 6 in. joints, 4 fold, 8ths of inches on one side, 16ths on other.						14.00	18.00
75—2	ft., folding pocket, 3/4 in. x 21 gauge, 8 in. joints, 3 fold, 8ths of inches on one side, 16ths on other.						12.00	16.00
76—2	ft., folding pocket, 3/4 in. x 21 gauge, 8 in. joints, 3 fold, 16ths of inches on one side, circumference inches on other side.						17.00	21.00
80—2	ft., folding, 3/4 in. x 21 gauge, 12 in. joints, 2 fold, 16ths of inches on one side, 8ths on other.						10.00	
81—2	ft., folding, 3/4 in. x 21 gauge, 12 in. joints, 2 fold, 16ths one side, circumference inches on other.						15.00	
83—2	ft., folding, 3/4 in. x 21 gauge, 12 in. joints, 2 fold, 16ths of inches one side, board measure, 12 ft. to 18 ft. lengths on other.						15.00	

HARDENED STEEL FOLDING RULES.

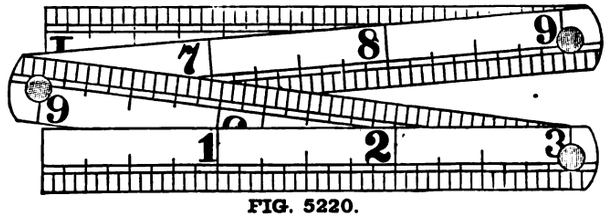


FIG. 5220.

REPRESENTS NO. 31, FULL WIDTH.

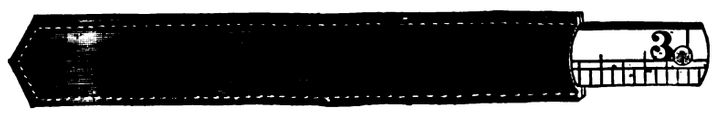


FIG. 5220 1-2.

REPRESENTS RULE IN LEATHER CASE.

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BOXWOOD AND IVORY RULES.

BOXWOOD TWO FOOT, FOUR FOLD, RULES.

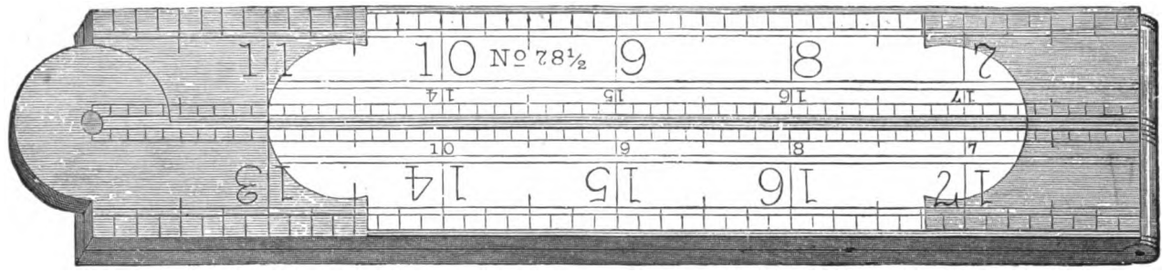


FIG. 5221. REPRESENTS BROAD.

PRICES, FIG. 5221, NARROW.

No.			Per doz.
68.	Round joint, middle plates, 8ths and 16ths of inches	1 in. wide,	$4.00
61.	Square joint, middle plates, 8ths and 16ths of inches	1 "	5.00
63.	Square joint, edge plates, 8ths, 10ths, 12ths and 16ths of inches, drafting scales	1 "	7.00
84.	Square joint, half bound, 8ths, 10ths, 12ths and 16ths of inches, drafting scales	1 "	12.00
62.	Square joint, bound, 8ths, 10ths, 12ths and 16ths of inches, drafting scales	1 "	15.00
51.	Arch joint, middle plates, 8ths, 10ths, 12ths and 16ths of inches, drafting scales	1 "	6.00
53.	Arch joint, edge plates, 8ths, 10ths, 12ths and 16ths of inches, drafting scales	1 "	8.00
53½.	Arch joint, edge plates, 8ths, 10ths, 12ths and 16ths of inches, with inside beveled edges and architect's drafting scales	1 "	15.00
52.	Arch joint, half bound, 8ths, 10ths, 12ths and 16ths of inches, drafting scales	1 "	13.00
54.	Arch joint, bound, 8ths, 10ths, 12ths and 16ths of inches, drafting scales	1 "	16.00
59.	Double arch joint, bitted, 8ths, 10ths, 12ths and 16ths of inches, drafting scales	1 "	9.00
60.	Double arch joint, bound, 8ths, 10ths, 12ths and 16ths of inches, drafting scales	1 "	21.00

BOXWOOD ONE FOOT, FOUR FOLD, NARROW.

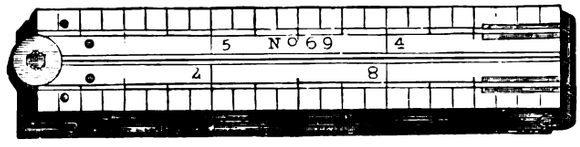


FIG. 5222.

No.			Per doz.
69.	Round joint, middle plates, 8ths and 16ths of inches	⅝ in. wide,	$3.00

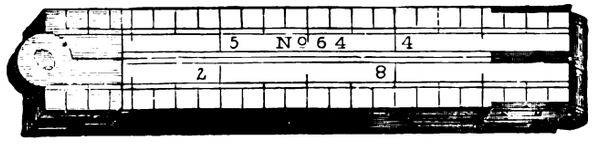


FIG. 5223.

65.	Square joint, middle plates, 8ths and 16ths of inches	⅝ in. wide,	$3.50
64.	Square joint, edge plates, 8ths and 16ths of inches	⅝ "	5.00
65½.	Square joint, bound, 8ths and 16ths of inches	⅝ "	11.00

PRICES, FIG. 5221, BROAD.

No.			Per doz.
67.	Round joint, middle plates, 8ths and 16ths of inches	1⅜ in. wide,	$5.00
70.	Square joint, middle plates, 8ths and 16ths of inches, drafting scales	1⅜ "	7.00
72.	Square joint, edge plates, 8ths, 10ths and 16ths of inches, drafting scales	1⅜ "	9.00
72½.	Square joint, bound, 8ths, 10ths and 16ths of inches, drafting scales	1⅜ "	18.00
73.	Arch joint, middle plates, 8ths, 10ths and 16ths of inches, drafting scales	1⅜ "	9.00
75.	Arch joint, edge plates, 8ths, 10ths and 16ths of inches, drafting scales	1⅜ "	11.00
76.	Arch joint, bound, 8ths, 10ths and 16ths of inches, drafting scales	1⅜ "	20.00
77.	Double arch joint, bitted, 8ths, 10ths and 16ths of inches, drafting scales	1⅜ "	12.00
78.	Double arch joint, half bound, 8ths, 10ths and 16ths of inches, drafting scales	1⅜ "	20.00
78½.	Double arch joint, bound, 8ths, 10ths and 16ths of inches, drafting scales	1⅜ "	24.00
83.	Arch joint, edge plates, slide, 8ths, 12ths and 16ths of inches, 100ths of a foot, and octagonal scales	1⅜ "	14.00

BOXWOOD ONE FOOT, FOUR FOLD, NARROW.

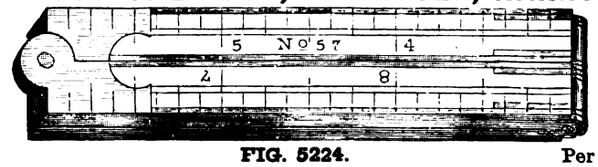


FIG. 5224.

No.			Per doz.
55.	Arch joint, middle plates, 8ths and 16ths of inches	⅝ in. wide,	$4.00
56.	Arch joint, edge plates, 8ths and 16ths of inches	⅝ "	6.00
57.	Arch joint, bound, 8ths and 16ths of inches	⅝ "	12.00

BOXWOOD CALIPER, ONE FOOT, FOUR FOLD.

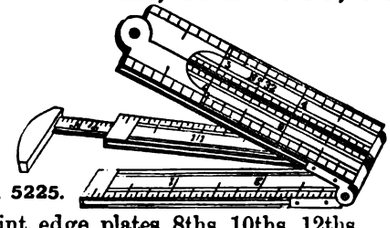


FIG. 5225.

No.			Per doz.
32.	Arch joint, edge plates, 8ths, 10ths, 12ths and 16ths of inches	1 in. wide,	$12.00
32½.	Arch joint, bound, 8ths, 10ths, 12ths and 16ths of inches	1 "	20.00

IVORY CALIPER, ONE FOOT, FOUR FOLD.

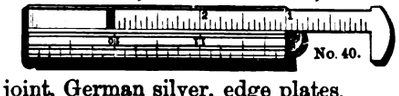


FIG. 5226.

39.	Square joint, German silver, edge plates, 8ths, 10ths, 12ths and 16ths of inches	⅞ in. wide,	$38.00
40.	Square joint, German silver, bound, 8ths and 16ths of inches	⅝ "	44.00

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STEEL SQUARES AND BEVELS.

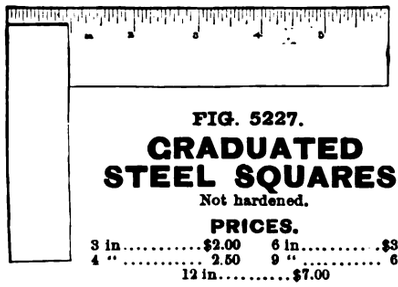


FIG. 5227.

GRADUATED STEEL SQUARES.

Not hardened.

PRICES.

3 in	$2.00	6 in	$3.50
4 "	2.50	9 "	6.00
12 in	$7.00		

DRAUGHTSMEN'S T SQUARES.

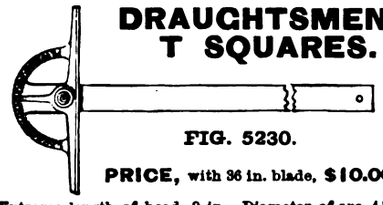


FIG. 5230.

PRICE, with 36 in. blade, **$10.00.**

Extreme length of head, 9 in. Diameter of arc, 4½ in. Divided to half degrees. Blade, 1¼ in. wide, $\frac{3}{16}$ in. thick. The heads are made of bronze, and the blades of steel.

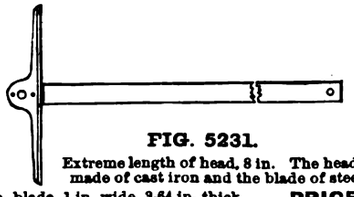


FIG. 5231.

Extreme length of head, 8 in. The head is made of cast iron and the blade of steel.

20 in. blade,	1 in. wide,	3-64 in. thick	PRICE, $5.00
24 " "	1 " "	3-64 " "	" 6.00
36 " "	1¼ in. wide,	3-64 in. thick	" 7.00
With 10 in. head and 36 in. blade,	1¼ in. wide,	3-64 in. thick	" 9.00

UNIVERSAL BEVEL.

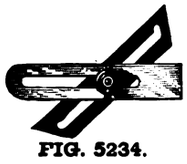


FIG. 5234.

Large size, **PRICE, $2.00.** The head and tongue are each 3 inches long, and ⅝ inch wide. Thickness of head, ⅛ inch, and of tongue, $\frac{3}{16}$ inch.

Small size, **PRICE, $1.50.** The head and tongue are each 1¼ inches long, and ¼ inch wide. Thickness of head, $\frac{3}{16}$ inch, and of tongue, $\frac{1}{16}$ inch.

UNIVERSAL OR CENTER SQUARES.

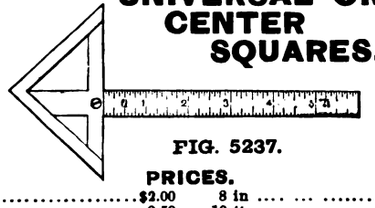


FIG. 5237.

PRICES.

4 in	$2.00	8 in	$3.50
6 "	2.50	10 "	5.00
12 in	$6.00		

HARDENED CAST STEEL T SQUARE AND UNIVERSAL BEVEL.

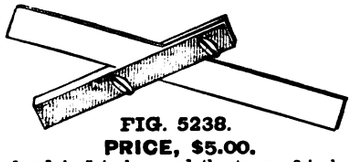


FIG. 5238.

PRICE, $5.00.

The head is 5 inches, and the tongue 8 inches long. Both parts are hardened, and ground straight and square. The tongue may be used at the extreme end of the beam. The wide side of the three-cornered washer should always be placed next to the blade.

BEVEL PROTRACTOR.

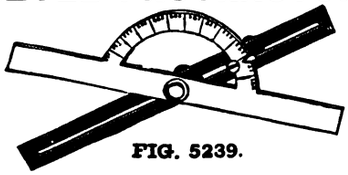


FIG. 5239.

With sliding arm, and half circle divided to degrees.

PRICE, with 6 in. sliding arm $6.50
" " 10 " " " 7.00

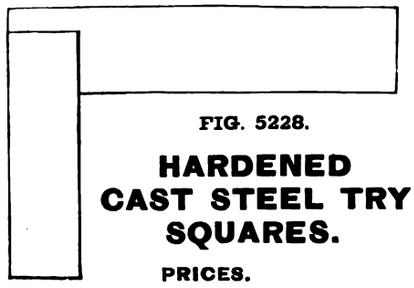


FIG. 5228.

HARDENED CAST STEEL TRY SQUARES.

PRICES.

1½ in	$2.00	9 in	$7.00
3 "	3.00	12 "	10.00
4½ "	4.00	15 "	15.00
6 "	5.00	18 "	18.00

CALIPER SQUARES.

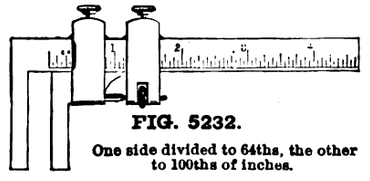


FIG. 5232.

One side divided to 64ths, the other to 100ths of inches.

2 in., without adjusting screw, jaws ⅜ in. long $2.25
4 " " " " " 1⅛ " " 3.50
6 " " " " " 2 " " hardened and ground 5.50
9 in., without adjusting screw, jaws 3¼ in. long, hardened and ground 9.00
2 in., with adjusting screw like cut, jaws ⅜ in. long ... 3.50
4 " " " " " " 1½ " " ... 4.50
6 " " " " " " " 2 " " hardened and ground 7.50
9 in., with adjusting screw like cut, jaws 3¼ in. long, hardened and ground 11.00

The 6 in. caliper square is arranged for making inside measurements.

DOUBLE STEEL SQUARE.

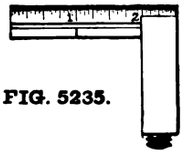


FIG. 5235.

It has a double solid steel square, with 2½ inch sliding scale, and is especially designed for fine tool-makers. The rule being narrow and instantly adjusted to any length, however short, allows it to be used where it would be impossible to use any square with a fixed blade.

Fitted to go with this stock, is made not only a bevel blade, but a very narrow straight one, about $\frac{1}{16}$ inch wide, highly prized by die makers for squaring small holes, both of which blades will be sent with the square unless otherwise ordered.

PRICE of square $2.00
" with either bevel or narrow blade... 2.30
" complete 2.60

COMBINATION SQUARE.

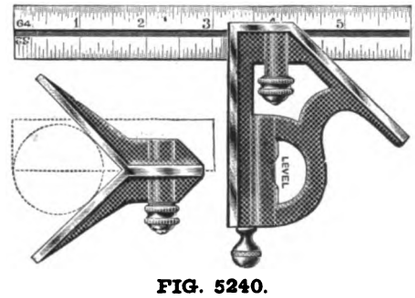


FIG. 5240.

With the adjustable scale, this forms a most convenient and useful tool. One is a complete substitute for a whole set of common try squares, and is one of the best gauges ever made for transferring exact measurements or laying out work. It is also convenient for a depth gauge, or to square in a mortise. For a miter it is perfect, while with the auxiliary center head it forms a centering square, both inside and outside.

PRICES.

4 in., without center head or level			$1.00
6 " with center head	$2.00,	without,	1.50
9 " " " "	2.50,	"	1.75
12 " " " "	3.00,	"	2.00
18 " " " "	3.50,	"	2.50
24 " " " "	4.50,	"	3.50

The 6, 9, 12, 18 and 24 inch have levels and center heads, and will be sent complete unless otherwise ordered. The 18 and 24 inch have same stock as 12 inch.

STEEL SQUARES FOR MILLWRIGHTS.

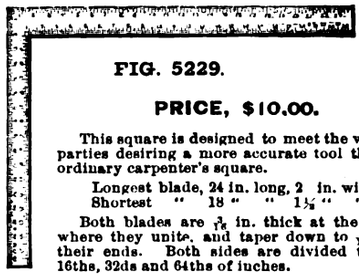


FIG. 5229.

PRICE, $10.00.

This square is designed to meet the wants of parties desiring a more accurate tool than the ordinary carpenter's square.

Longest blade, 24 in. long, 2 in. wide.
Shortest " 18 " " 1½ " "

Both blades are $\frac{3}{16}$ in. thick at the corner where they unite, and taper down to $\frac{1}{16}$ in. at their ends. Both sides are divided to 8ths, 16ths, 32ds and 64ths of inches.

THIN STEEL SQUARES.

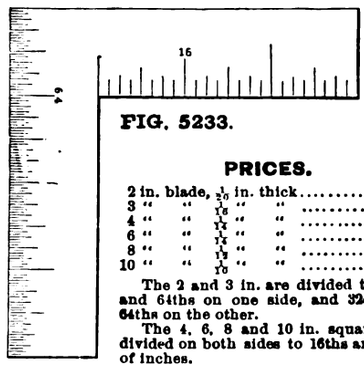


FIG. 5233.

PRICES.

2 in. blade,	$\frac{1}{20}$	in.	thick	$1.00
3 " "	$\frac{1}{16}$	"	"	1.50
4 " "	$\frac{1}{12}$	"	"	2.00
6 " "	$\frac{1}{12}$	"	"	3.00
8 " "	$\frac{1}{10}$	"	"	4.00
10 " "	$\frac{1}{10}$	"	"	5.00

The 2 and 3 in. are divided to 16ths and 64ths on one side, and 32ds and 64ths on the other.

The 4, 6, 8 and 10 in. squares are divided on both sides to 16ths and 32ds of inches.

STARRETT'S PATENT DOUBLE SQUARE.

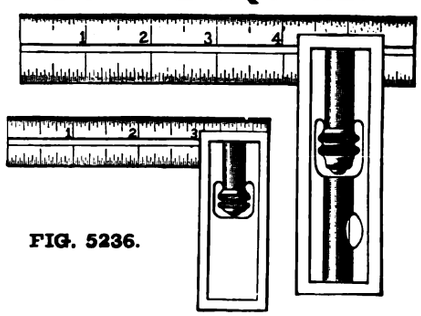


FIG. 5236.

The sliding scale, shortened or extended full length, makes it more valuable than a full set of the common kind, while with the extra bevel blade we have both the hexagon and octagon angles.

PRICE, 4 in. ..... $1.25, with both blades $1.75
" 6 " ..... 2.00, " " " 2.50
" 9 " 3.00
" 12 " 4.00

Both blades with 4 and 6 in. always sent unless otherwise ordered.

IMPROVED BEVEL.

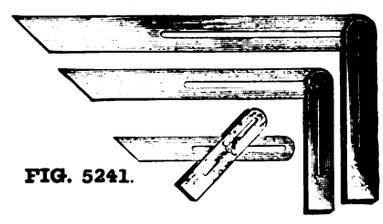


FIG. 5241.

The blade is slotted and the stock as well, thus admitting adjustments that cannot be obtained with a common bevel. The clamping screw head, which the cut does not show, is let into a rabbet flush with the surface of the stock, which will lie flat on the work. The blade is marked, also, showing lines by which they may be set to form with the edge of the stock a right, miter, hexagon or octagon angle.

PRICES.

6 in	$1.25
9 "	1.50
12 "	1.75

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BEVEL PROTRACTOR.

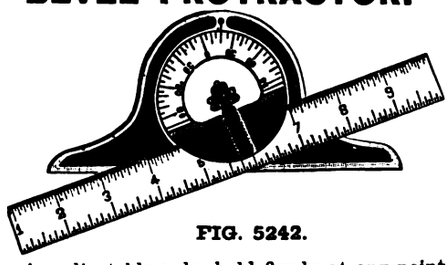


FIG. 5242.

An adjustable rule, held firmly at any point by a thumb nut, passes through a revolving turret which is graduated in degrees from 0 to 90, both right and left, and can be accurately adjusted to show any angle.

We also furnish a small lever to be attached in place of the rule removed, forming an adjustable level to show any degree, thus greatly increasing the usefulness of the instrument.

PRICES.

Protractor head only.....$2.00
" " with 12 in. blade..... 3.00
" " " 18 in. " 3.75
" " " 24 in. " 4.75

5 in. protractor head with 9 in. blade, ⅝ in. wide. Price, $2.50.

GRADUATED SCRATCH GAUGE.

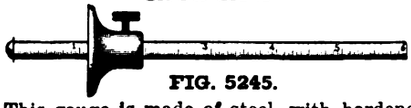


FIG. 5245.

This gauge is made of steel, with hardened cast steel head. Through it is a split bushing, against which the set screw acts to hold it firm. The beam is graduated in either 50ths or 64ths of an inch. The marker is a thin square piece of tempered steel, which is firmly held against the end of beam, presenting four marking points.

		Graduated.	Not graduated.
PRICE,	5 in., beam $\frac{15}{64}$ in.	$1.00	$0.65
"	6 in., " $\frac{5}{16}$ in.	1.25	.75

Unless otherwise ordered, we shall send those graduated in 64ths.

Two extra cutters will be sent with each gauge, fastened to the case.

SCRIBER.



FIG. 5248.

It is made in three pieces, the center piece being heavily knurled, into which are screwed the two points, which are made of fine steel well tempered.

These parts are all interchangeable.

PRICE,
7 in. long,
40 CTS. EACH.

PROTRACTORS, BEVELS, ETC.

COMBINATION SET.

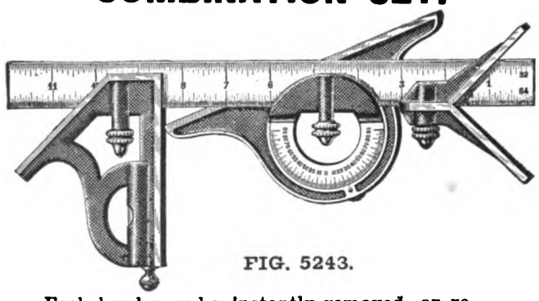


FIG. 5243.

Each head may be instantly removed, or replaced and used interchangeably with the scale.

PRICES.

9 in. set, complete.....$4.50
12 in. " " 5.00
18 in. " " 5.50
24 in. " " 6.50

DEPTH GAUGE.

NO. 45.

This gauge is held to a groove by a friction spring inside the nut while adjusting, and may be used close to the end, as well as in the middle of the straight edge.

By loosening the nut the gauge may be neatly folded.

NO. 46.

Has in place of the round wire to slide in the groove, as shown in cut, a 4 in. scale, $\frac{5}{16}$ in. wide, graduated in either 32ds and 64ths, or 50ths and 100ths, indicating exact measurements, and may be used separately from the gauge.

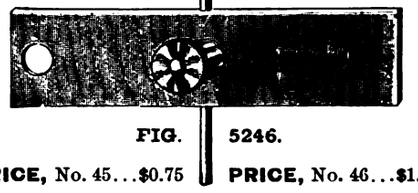


FIG. 5246.

PRICE, No. 45...$0.75 **PRICE,** No. 46...$1.25

MICROMETER SURFACE GAUGE.

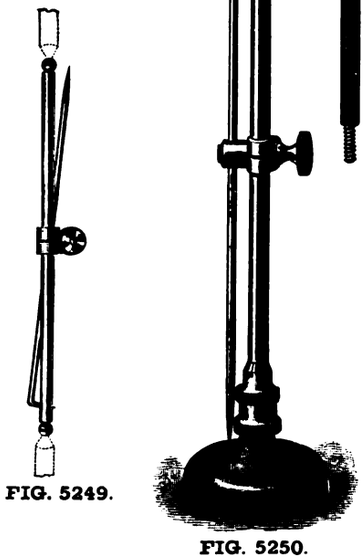


FIG. 5250.

DESCRIPTION, FIG. 5250.

This gauge has a turned and polished base, a micrometer adjusting nut reading 1000, and a 6 in. extension for the spindle. By means of springs and taper fitting parts of the sleeve—not shown in cut—the scriber is held by slight friction in any position while adjustments are made, and firmly held by a turn of the nut. A knurled cam on the base releases and locks the spindle for adjusting.

PRICES.

8 in., without extension.....$2.50
12 in., " " 3.50
12 in., with " 4.00

FIG. 5249.

DESCRIPTION, FIG. 5249.

The cut shows a surface gauge attachment to be used between the centers of a lathe to adjust, locate and lay out work secured to the face plate. An auxiliary arbor is supplied, size of Fig. 5250, surface gauge spindle, the sleeve fitting both spindle and arbor.

Those having the surface gauge will need the arbor only.

PRICE of the auxiliary arbor, 50 cents. Complete, $1.50.

INCLINOMETER.



FIG. 5244.

It consists of a cast steel stock and disc, both slotted to receive the blade, which folds in the stock. The blade attached to the graduated rotary disc may be secured at any angle from 0 to 90 degrees, and by loosening the clamp screw it may be shortened or extended full length or removed for a straight edge.

The working face of the stock, extending both sides of the blade, admits of its being reversed, so that the same angle may be laid off, in opposite directions, without changing the angle in the tool, thus requiring but ¼ of a graduated circle to obtain all angles both ways.

At 90 degrees the blade brings up against a case-hardened screw, accurately adjusted, thus forming a try square; by holding the blade perpendicular, the level in the stock being at right angles, a plumb; by folding the tool, a level, length of blade.

Open it to any degree and work may be leveled to that incline.

PRICES.

With 12 in. blade.....$5.00
" 18 in. " 6.00
" 24 in. " 7.00

COMBINED GAUGE AND CALIPER.

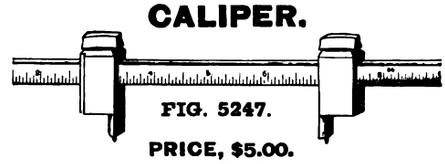


FIG. 5247.

PRICE, $5.00.

This tool combines dividers, inside and outside calipers, and a graduated double scratch gauge. It will caliper a round bar 2 in. in diameter. The beam is 12 in. long, ½ in. wide, ⅜ in. thick, and is graduated to 16ths, 32ds and 64ths of an inch.

SURFACE GAUGE.

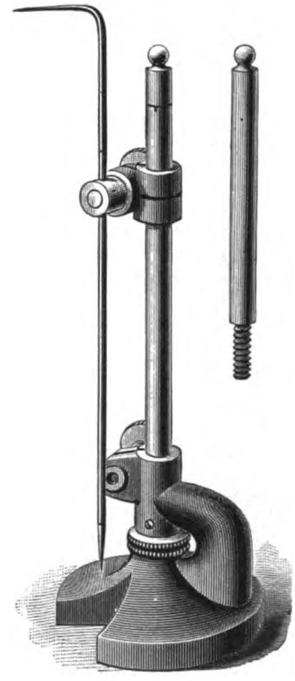


FIG. 5251.

PRICES.

No. 1. 8 in.....$2.00
No. 2. 12 in..... 2.75
No. 3. 12 in., with 6 in. extension..... 3.25

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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SURFACE GAUGES AND DIVIDERS.

COMBINATION GAUGE.

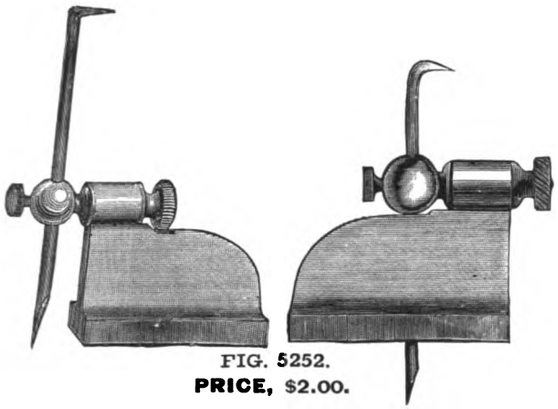


FIG. 5252.
PRICE, $2.00.

PARALLEL DIVIDERS.

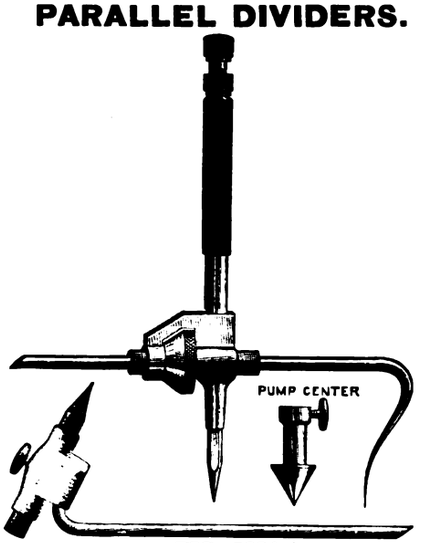


FIG. 5254.
PRICE, $1.50.
Long bar, 24 inch circle, 50c. Pump center, 25c. Lead pencil holder, 50c.

SPRING DIVIDERS.

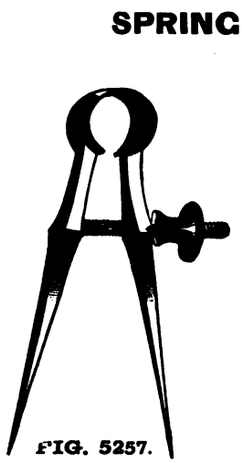


FIG. 5257.

PRICES.

2 in.	$1.00	5 in.	$1.25
3½ "	1.00	6 "	1.50
4 "	1.25		

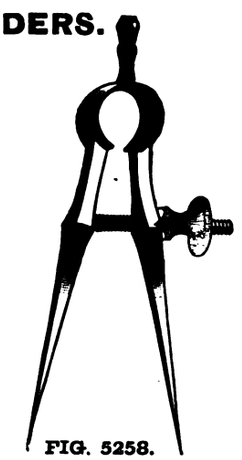


FIG. 5258.

PRICES.

2 in.	$1.15	5 in.	$1.50
3½ "	1.15	6 "	1.75
4 "	1.40		

SURFACE GAUGES.

DESCRIPTION, FIG. 5253.

Small size.—The base is round, and turned true with the upright spindle. The total height is 8 inches, and will scratch 8 inches sideways and 13 inches high. The cast steel needle is pointed on each end, one of which ends is bent to a right angle. All parts are polished and accurately fitted. It is used by machinists in setting up work level and true on the planer, and also in connection with a surface plate to scribe lines at parallel heights on regular and irregular castings, patterns, etc. Total weight, 12 ounces.

PRICE, 8 INCH, $2.00.

Large size.—Same as cut, weight 2 lbs., and arm will scratch 10½ inches sideways and 18 inches high.

PRICE, 12 INCH, $2.75; 18 INCH, $3.50.

RELIABLE DIVIDERS.

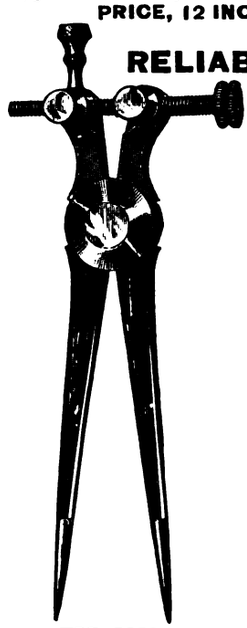


FIG. 5255.
PRICE, 5 INCH, $1.75.

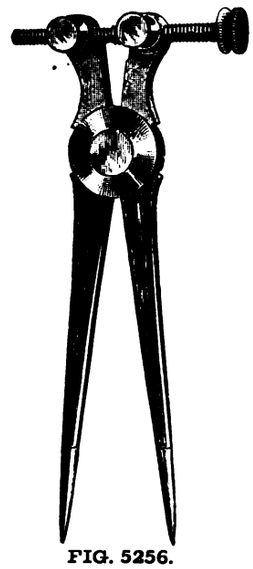


FIG. 5256.
PRICE, 5 INCH, $1.50.

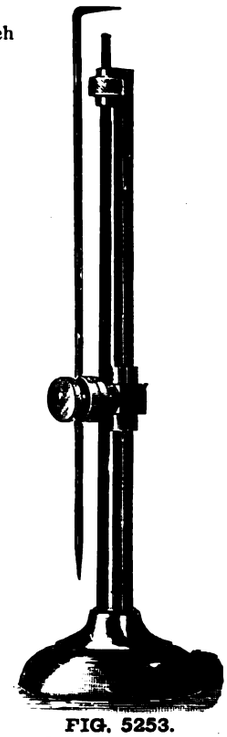


FIG. 5253.

SPRING DIVIDERS.

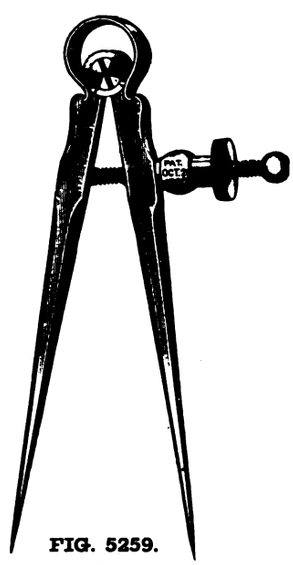


FIG. 5259.

PRICES.

3 in.	$1.00	5 in.	$1.25
4 "	1.25	6 "	1.50

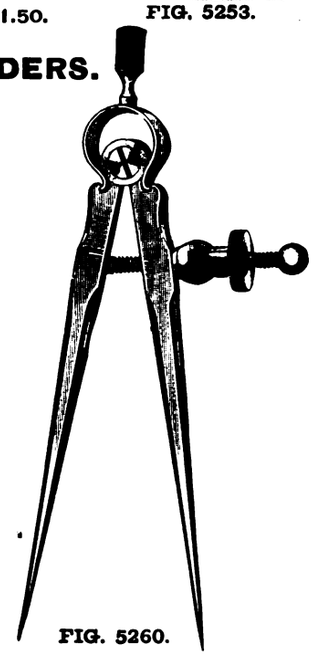


FIG. 5260.

PRICES.

3 in.	$1.15	5 in.	$1.50
4 "	1.40	6 "	1.75

FINE POLISHED CAST STEEL DIVIDERS.

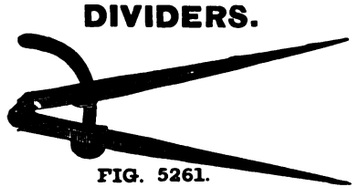


FIG. 5261.

PRICES.

5	6	7	8	9	10	12	15	18	21	24	30	inches.
$7.00	7.50	9.00	10.25	12.50	13.75	16.50	27.50	41.25	46.75	56.00	65.00	per dozen.

FINE POLISHED CAST STEEL COMPASSES.

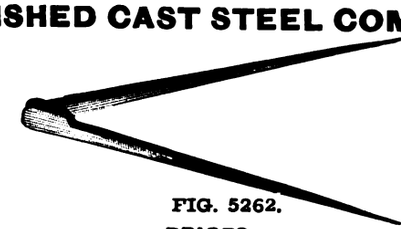


FIG. 5262.

PRICES.

3	3½	4	4½	5	6	7	8	9	10	12	inches.
$4.25	4.35	4.50	4.60	4.80	5.50	6.25	7.50	9.00	10.30	11.00	per doz.

Assorted, 5, 6 and 7 inch, $5.50 per doz.

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SPRING DIVIDERS AND CALIPERS.

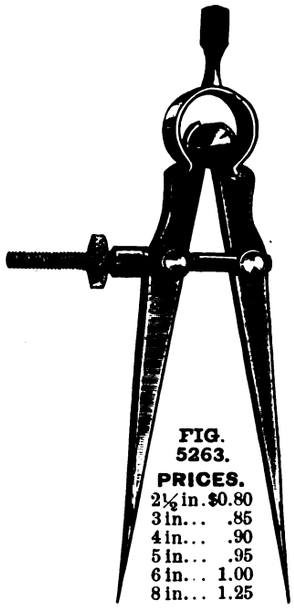


FIG. 5263.

PRICES.

2½ in.	$0.80
3 in...	.85
4 in...	.90
5 in...	.95
6 in...	1.00
8 in...	1.25

SPRING CALIPERS.

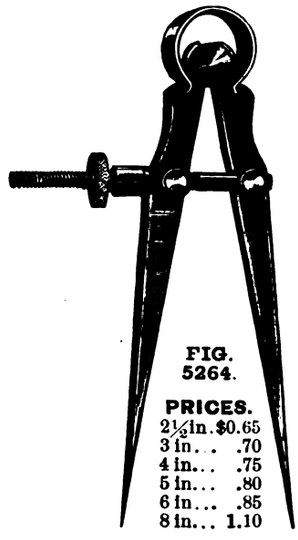


FIG. 5264.

PRICES.

2½ in.	$0.65
3 in...	.70
4 in...	.75
5 in...	.80
6 in...	.85
8 in...	1.10

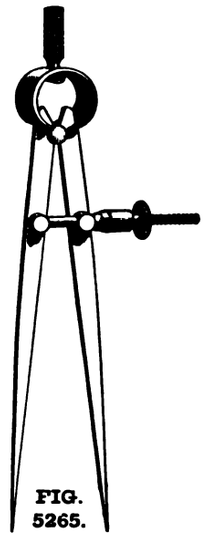


FIG. 5265.

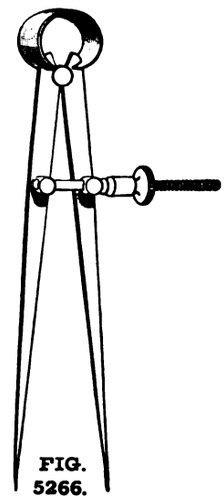


FIG. 5266.

PRICES, FIGS. 5265 AND 5266.

2½	inch...each,	$0.65,	with thumb attachment...		$0.80
3	" ... "	.70,	" " "	...	.85
4	" ... "	.75,	" " "	...	.90
5	" ... "	.80,	" " "	...	.95
6	" ... "	.85,	" " "	...	1.00
8	" ... "	1.00,	" " "	...	1.25

SPRING DIVIDERS.

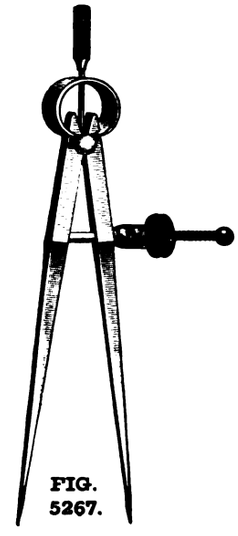


FIG. 5267.

PRICES, FIG. 5267.

2½	inch, each.....	with solid nut,	$1.00
3	" "	" " "	1.00
4	" "	with spring nut,	$1.40	" " "	1.25
5	" " " "	1.40	" " "	1.25
6	" " " "	1.75	" " "	1.50

COMBINED IN AND OUTSIDE CALIPERS AND DIVIDERS.

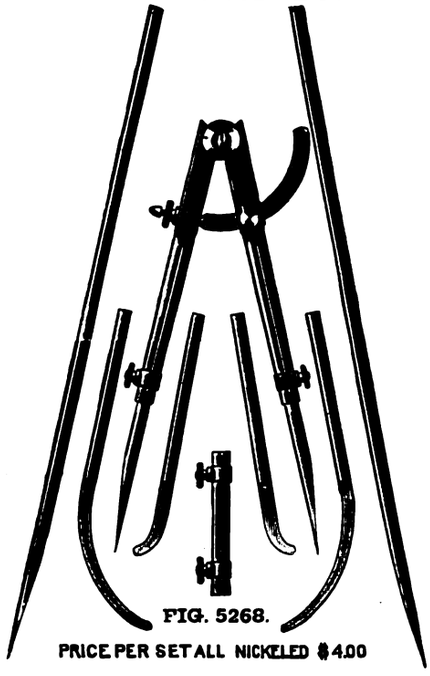


FIG. 5268.

PRICE PER SET ALL NICKELED $4.00



FIG. 5269.

DESCRIPTION, FIG. 5269.

This divider has auxiliary caliper legs, which, together with a pencil, form convenient combinations. After the fine adjustment is made, the nut may be turned back, locking spring and arms firmly, thus remedying the weak point which renders the common wing divider only as stiff as the adjusting spring. A full threaded nut on the stud, through which the quadrant passes, is a more durable fastener than two or three threads tapped in the arm to hold the wing of the old style. The head and arms of this tool are made from best malleable iron, the rest of steel. The points are hardened. The smallest size is 7 inches long; by adjustment of points becomes 9 inches, and will scribe a 22 inch circle; will caliper 11 inches outside and 13 inches inside. The second size is 9 inches; by adjustment of points becomes 12 inches, and will scribe a 30 inch circle and caliper 14 inches outside and 16 inches inside.

PRICES, FIG. 5269.

7	inch, with divider legs only.....	$1.25
9	" " " " "	1.50
7	" complete.....	2.25
9	" "	2.50

HERMAPHRODITE CALIPERS.

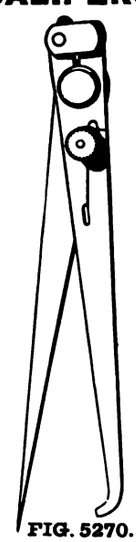


FIG. 5270.

With lock joint and sensitive adjustment.

PRICE, 6 inch...$1.00
" 10 " ... 1.50

LOCK JOINT TRANSFER CALIPERS.

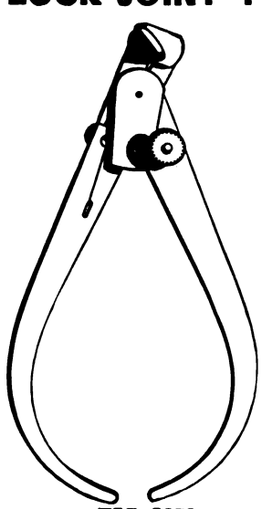


FIG. 5271.

PRICES, FIGS. 5271 AND 5272.

In and out.

4	inch....	$1.25
6	"	1.50
8	"	1.75
10	"	2.00
12	"	2.25

Out only.

14	inch....	$2.50
16	"	2.75
18	"	3.00
20	"	3.50
24	"	4.25

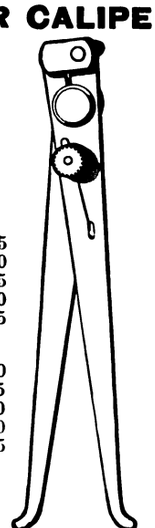


FIG. 5272.

LOCK JOINT CALIPERS.

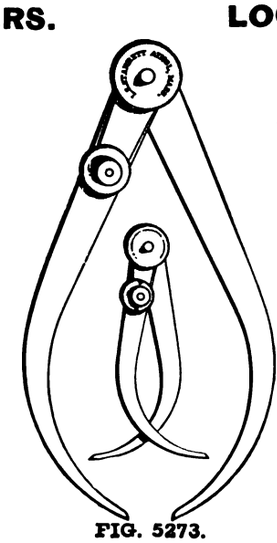


FIG. 5273.

PRICES, FIGS. 5273 AND 5274.

In and out.

4	inch....	$0.90
6	"	1.00
8	"	1.25
10	"	1.50
12	"	1.75

Out only.

14	inch....	$2.00
16	"	2.25
18	"	2.50
20	"	2.75
24	"	3.50

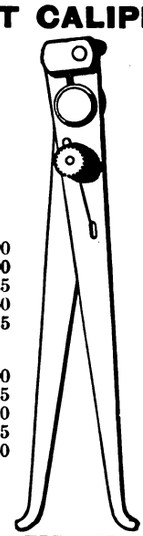


FIG. 5274.

PRICES, FIG. 5275.

With lock joint attachment. It is light and stiff with large capacity, instantly opened, closed and locked. The points are tempered.

5	inch.....	$0.60
6	"	.65

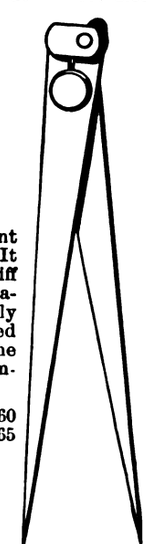
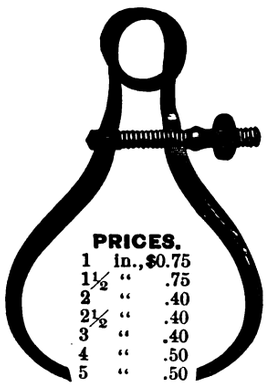


FIG. 5275.

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SPRING CALIPERS.

HELICAL COIL.

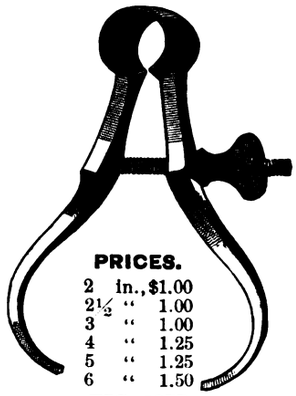


PRICES.

1 in.,	$0.75
1½ "	.75
2 "	.40
2½ "	.40
3 "	.40
4 "	.50
5 "	.50

FIG. 5276.

PATENT WASHER.

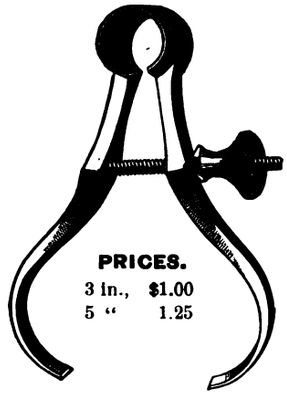


PRICES.

2 in.,	$1.00
2½ "	1.00
3 "	1.00
4 "	1.25
5 "	1.25
6 "	1.50

FIG. 5277.

SCREW THREADS.



PRICES.

3 in.,	$1.00
5 "	1.25

FIG. 5278.

SCREW THREADS.

PRICES, FIG. 5279.

3 in., with solid nut, $0.75
4 " " " " .90
with spring nut, 1.05
5 in., with solid nut, 1.00
with spring nut, 1.25

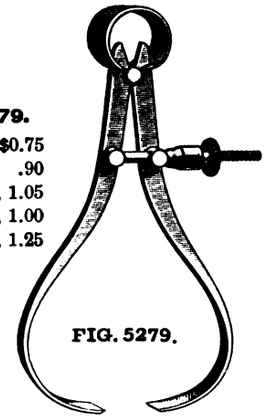
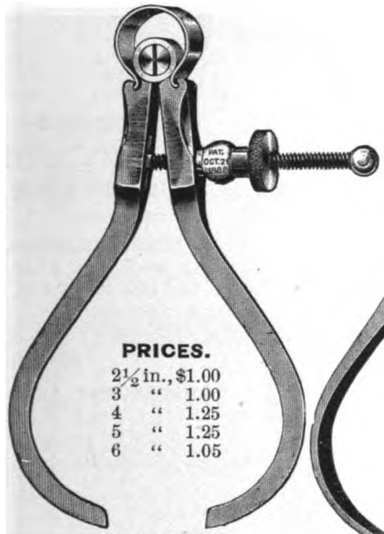


FIG. 5279.

SPRING CALIPERS.

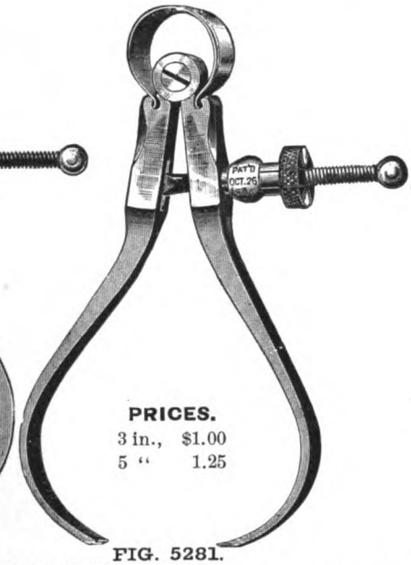


PRICES.

2½ in.,	$1.00
3 "	1.00
4 "	1.25
5 "	1.25
6 "	1.05

FIG. 5280.

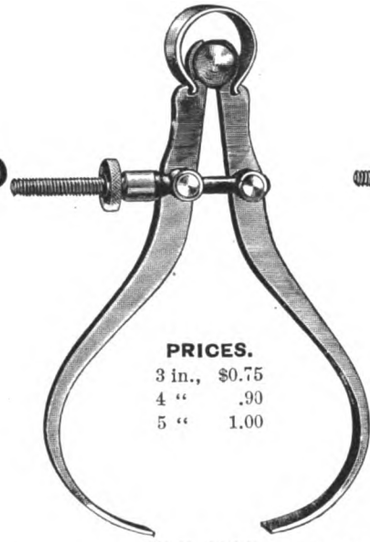
SCREW THREAD CALIPERS.



PRICES.

3 in.,	$1.00
5 "	1.25

FIG. 5281.

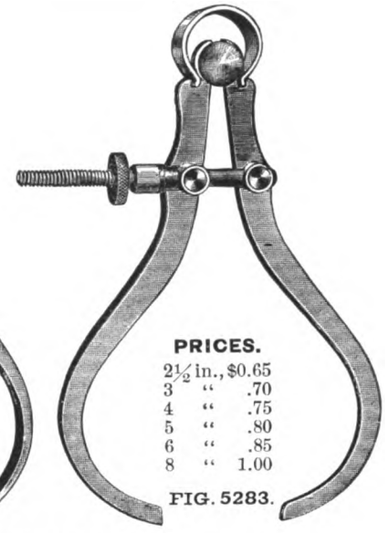


PRICES.

3 in.,	$0.75
4 "	.90
5 "	1.00

FIG. 5282.

SPRING CALIPERS.



PRICES.

2½ in.,	$0.65
3 "	.70
4 "	.75
5 "	.80
6 "	.85
8 "	1.00

FIG. 5283.

OUTSIDE AND INSIDE CALIPERS.

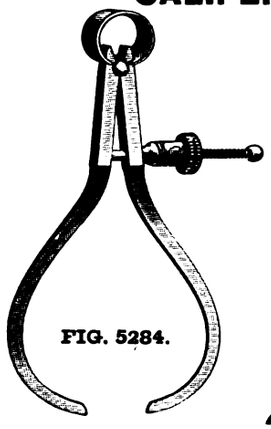


FIG. 5284.

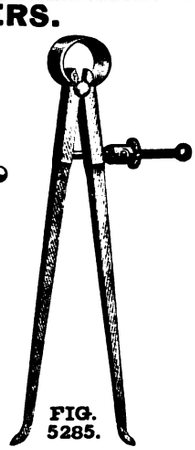


FIG. 5285.

With spring nut.

Fig. 5285 represents an inside transfer caliper, with either solid or spring nut. The bow is stiff, making the caliper reliable. After calipering inside a chambered cavity, by pressing the legs together they may be withdrawn, and as they spring back will show the exact size calipered.

PRICES, FIGS. 5284 AND 5285.

Outside.	Solid nut.	Spring nut.	Inside.	Solid nut.	Spring nut.
2½ in.,	$1.00		3 in.,	$1.00	
3 "	1.00		4 "	1.10	$1.25
4 "	1.10	$1.25	5 "	1.10	1.25
5 "	1.10	1.25	6 "	1.35	1.50
6 "	1.35	1.50			

The 4, 5 and 6 in. will be sent with spring nut unless otherwise ordered.

THREAD AND INSIDE CALIPERS.

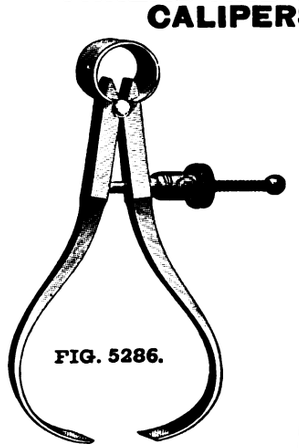


FIG. 5286.

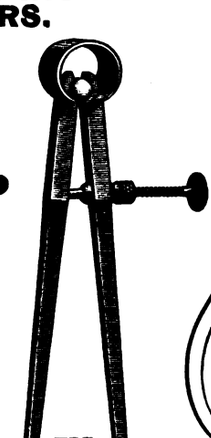


FIG. 5287.

PRICES.

Thread.	Solid nut.	Spring nut.	Inside.	Solid nut.
3 in.,	$1.00			
4 "	1.10	$1.25	4 in.,	$1.10
5 "	1.10	1.25	5 "	1.10

The inside calipers are not made to receive the spring nut.

Duplicate parts for either style and size of calipers or dividers will be forwarded to any address, postpaid, at the following

PRICES, FIGS. 5286 AND 5287.

Screw and ball...	$0.15	Leg.....	$0.35
Thumb attachm't,	.15	Spring.....	.25
Solid nut.....	.10	Jam washer.....	.10
Spring nut.....	.25	Fulcrum stud....	.10

OUTSIDE AND INSIDE CALIPERS.

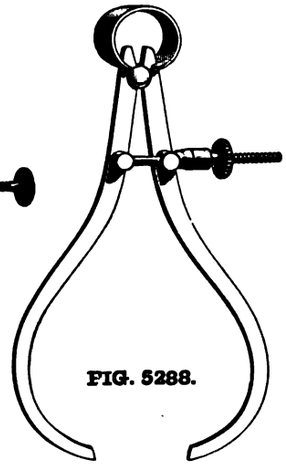


FIG. 5288.

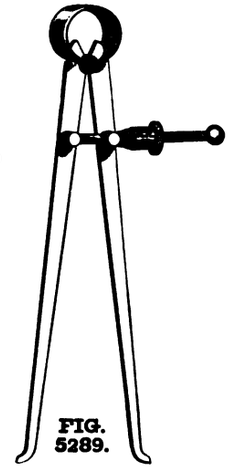


FIG. 5289.

They are supplied with either solid or quick-adjusting nut.

Fig. 5289 represents a new inside transfer caliper with either spring or solid nut. The bow is stiff making the caliper reliable. After calipering inside of chambered cavity by springing in the legs they may be withdrawn, and as they spring back will show the exact size calipered.

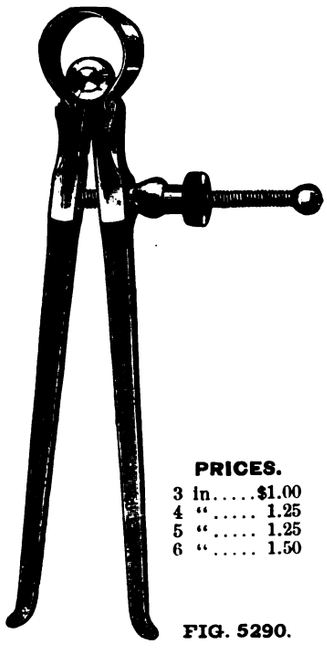
PRICES, FIGS. 5288 AND 5289.

With solid nut.		With spring nut.	
2½ inch. ..each,	$0.65	4 inch.....each,	$1.00
3 " ... "	.70	5 " ..... "	1.05
4 " .... "	.75	6 " ..... "	1.10
5 " .... "	.80	8 " ..... "	1.25
6 " .... "	.85		
8 " .... "	1.00		

Sent with solid nut unless otherwise ordered

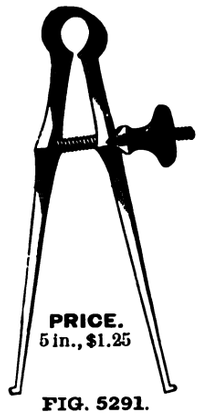
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INSIDE CALIPERS.



PRICES.
3 in.....$1.00
4 " 1.25
5 " 1.25
6 " 1.50

FIG. 5290.



PRICE.
5 in., $1.25

FIG. 5291.

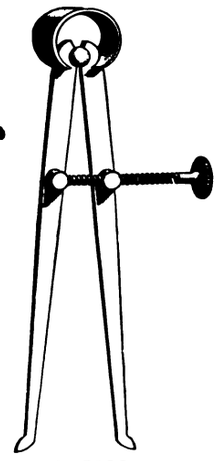


FIG. 5292.

PRICES, FIG. 5292.
4 in., with solid nut..each, $0.75
5 " " " " .. " .80
6 " " " " .. " .85



FIG. 5293.

PRICE.
5 in., $1.25.

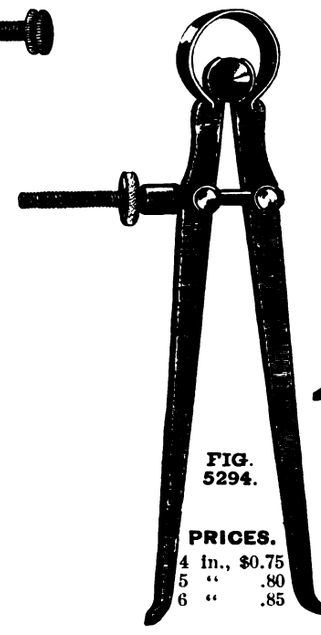


FIG. 5294.

PRICES.
4 in., $0.75
5 " .80
6 " .85

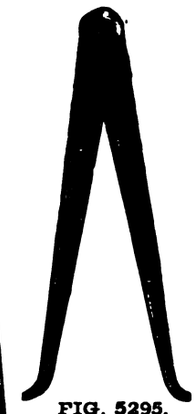
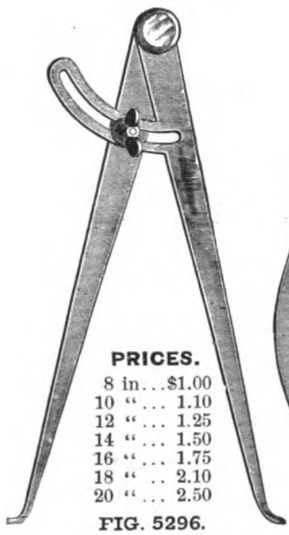


FIG. 5295.

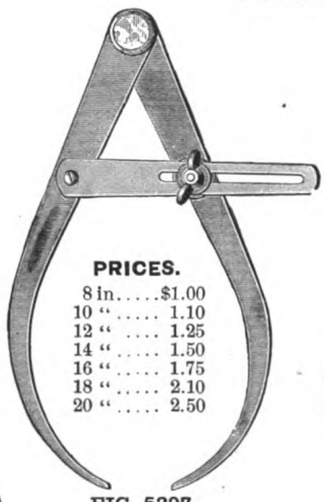
PRICES.
3 in.....$0.35
4 " ..... .45
5 " ..... .55
6 " ..... .65
8 " ..... .75
10 " ..... .85
12 " 1.00

FIRM JOINT CALIPERS.



PRICES.
8 in...$1.00
10 " ... 1.10
12 " ... 1.25
14 " ... 1.50
16 " ... 1.75
18 " .. 2.10
20 " ... 2.50

FIG. 5296.



PRICES.
8 in.....$1.00
10 " 1.10
12 " 1.25
14 " 1.50
16 " 1.75
18 " 2.10
20 " 2.50

FIG. 5297.



FIG. 5298.

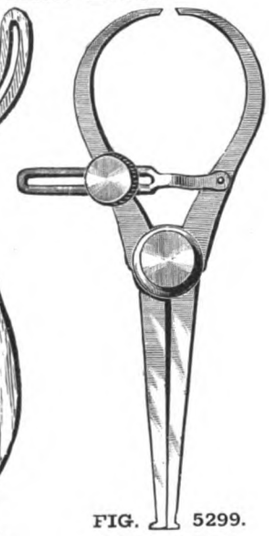


FIG. 5299.

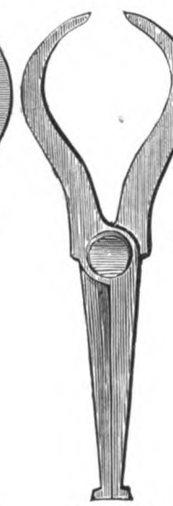


FIG. 5300.

PRICES, FIG. 5298.
4 in., $6.00; 6 in., $7.50;
8 in., $10.50 per doz.
½ dozen in box.

PRICES, FIG. 5299.
5 in., $6.75;
6 in., $7.75 per doz.
½ dozen in box.

PRICES, FIG. 5300.
3 in., $3.40; 4 in., $4.75;
5 in., $5.50;
6 in., $6.50 per dozen.
½ dozen in box.

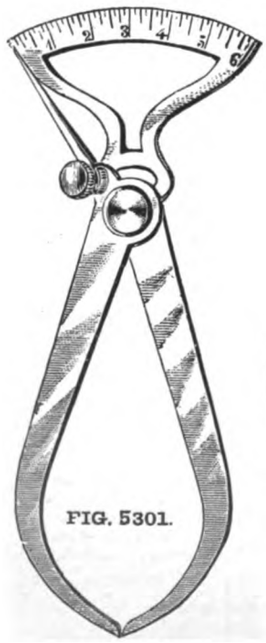
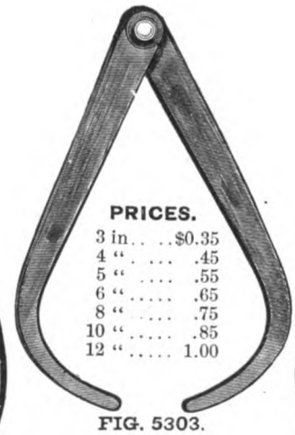


FIG. 5301.



FIG. 5302.

PRICES.
½ doz. in box.
3 in., per doz.....$8.25
5 " " 9.75



PRICES.
3 in.....$0.35
4 " ..... .45
5 " ..... .55
6 " ..... .65
8 " ..... .75
10 " ..... .85
12 " 1.00

FIG. 5303.

PRICES, FIG. 5304.
5 in.....$6.00 per doz.
7 " ..... 7.50 "
½ dozen in box.

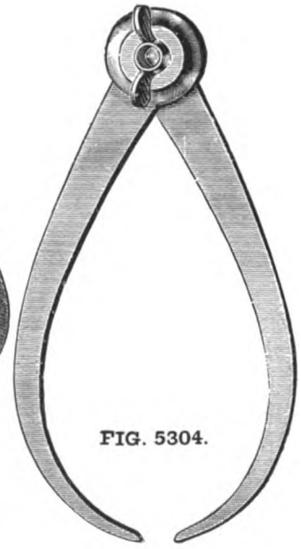


FIG. 5304.



FIG. 5305.

PRICES, FIG. 5301.
For outside measurement, with set screw, nickel-plated, cast steel.
6 inch, $12.00; 8 inch, $15.00 per doz. ½ dozen in box.

PRICES, FIG. 5305.
½ doz. in box.
2 inch, $3.30; 3 inch, $3.75; 4 inch, $5.20 per doz.

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STUBS' HACK SAWS AND FRAMES.

PRICES, FIG. 5306.

Length of blade,	3	in.....	per doz.,	$12.00
" "	3½	"	"	13.50
" "	4	"	"	15.00
" "	5	"	"	18.00
" "	6	"	"	21.00
" "	7	"	"	24.00
" "	8	"	"	27.00
" "	10	"	"	33.00
" "	12	"	"	39.00

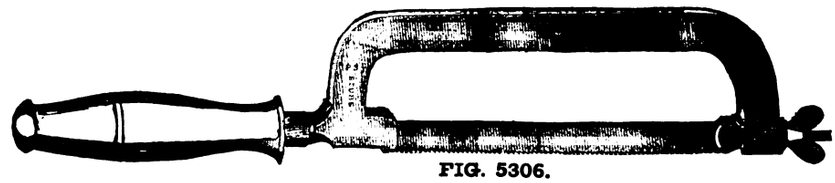


FIG. 5306.

STUBS' HACK SAW BLADES.

Length from hole to hole, inches,	3	3½	4	5	6	7	8	9	10	11	12	13	14	16
Per dozen.....	$1.50	$1.50	$1.50	$1.75	$2.00	$2.50	$3.00	$3.50	$4.00	$4.50	$5.00	$5.50	$6.00	$8.00

STUBS' PATTERN HACK SAWS.



FIG 5307.

Length, in inches,	8	10	12
Prices, per dozen,	$15.00	$16.00	$17.00

RICHARDSON'S BLADES.

Extra cast steel hack saw blades.

Length, inches,	6	7	8	9	10	11	12	13	14	16
Prices, per doz.,	$1.90	$2.35	$2.80	$3.25	$3.75	$4.25	$4.75	$5.25	$5.75	$6.75

STAR BLADES.

Length of blade,	6	7	8	9	10
Prices, per dozen,	$0.55	$0.60	$0.65	$0.70	$0.85

Length of blade,	11	12	assorted 6 to 9
Prices, per dozen,	$0.95	$1.05	$0.65

Made with 14 or 23 teeth to the inch. Orders filled with 14 teeth, unless otherwise stated.

Length measured from hole to hole.

STAR HACK SAW, NO. 2.

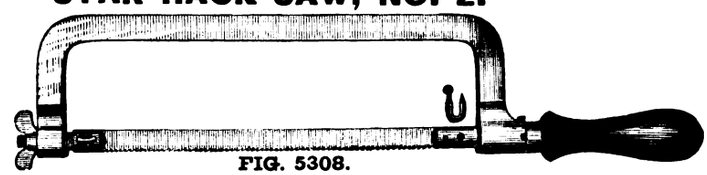


FIG. 5308.

No. 2, solid frame, to hold 8 inch blades only, and face them in four directions. Polished and nickel-plated. **PRICE, PER DOZ., $8.40.**

EXTENSION HACK SAW FRAME, NO. 9.



FIG. 5310.

This frame holds blades from 8 to 12 inches in length. It is nickel-plated. Blades may face in either direction.

PRICE, PER DOZ., $12.00.

CRIFFIN'S HACK SAWS.



FIG. 5309.

PRICES.

Frames complete, with one dozen blades.

Inch,	6	7	8	9	10	12
Per dozen,	$14.00	$15.00	$16.00	$17.00	$18.00	$20.00

PRICES FOR EXTRA BLADES.

Inch,	6	7	8	9	10	12
Per gross,	$9.25	$10.00	$10.50	$11.25	$12.00	$13.25

EXTENSION HACK SAW FRAME.

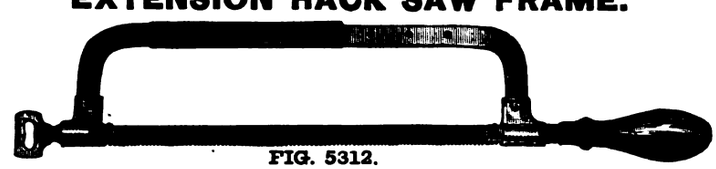


FIG. 5312.

These frames are made of steel and will hold blades of the following lengths, 8, 9, 10 and 12 inches. The blades can be turned to face in four different directions and firmly held by knurled head screw pins.

PRICE, PER DOZ., $15.00.

STAR HACK SAW, NO. 4.

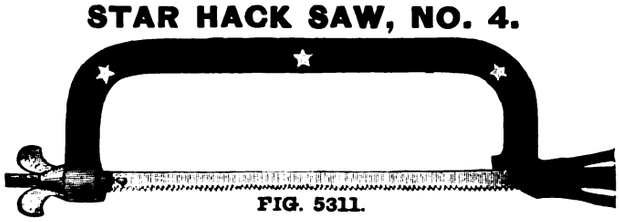


FIG. 5311.

This No. 4 is a patent cast iron frame, carrying a 9 inch blade, and so constructed as to face it in four different directions. The pins which hold the blade are fast in the frame and cannot drop out.

It is a very stiff and desirable frame with Japan finish.

Per dozen $3.00

THE CRESCENT FRAME.

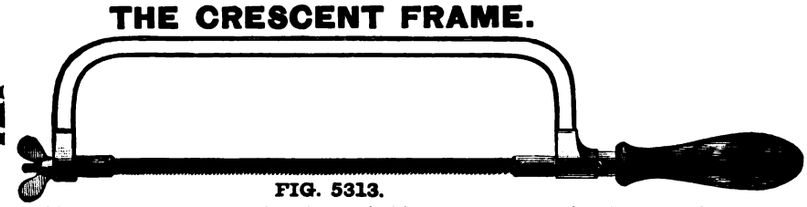


FIG. 5313.

Made in one length only, viz., to hold 8 inch blade. Steel back, all nickeled; black wooden handle; fine finish.

PRICE, without blade, 70c. each; per dozen, $8.40.
" with one blade, 75c. " " " 9.00.

EUREKA BRAND, IMPROVED "FLEXIBLE BACK" BLADES, AND "CRESCENT" BRAND, IMPROVED "ALL HARD" BLADES.

Made in two styles, coarse and fine teeth. Packed in half-gross boxes.

PRICES.

Length of blade, inches,	6	7	8	9
Prices, per dozen,	$0.55	$0.60	$0.65	$0.70
Length of blade, inches,	10	11	12	14
Prices, per dozen,	$0.85	$0.95	$1.05	$1.25

Length measured from hole to hole.

THE EUREKA FRAME.

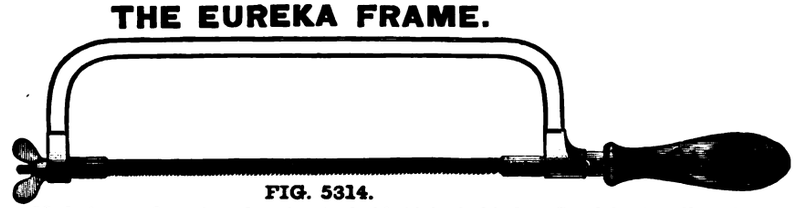


FIG. 5314.

Made in one length only, viz., to hold 14 inch blade. Steel back, all nickeled; black wooden handle; fine finish.

PRICE, with one blade, $1.50 each; per dozen, $18.00.

This frame has a blade 5/8 inch wide, 20 gauge, and is intended for cutting heavy brass work. Specially adapted for railroad and brass foundries.

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SOFT FACED HAMMERS.

SOFT METAL HAMMERS.

With malleable iron handles and molds.



FIG. 5315.

The above cuts show the form of the hammers when filled (3); the malleable iron handles before filling (2); and the molds for filling (1). These hammers for the past ten years have proved to be a very convenient and necessary tool on every machinist's bench, and every locomotive or stationary engine, etc., for driving keys, bolts, arbors, or other finished work, and have the advantage over ordinary copper or lead hammers, in that they are so readily refilled when battered up. The hammer being placed in a ladle to melt out the metal, and the eye of the handle is placed in the molds, and being secured in a vise, can be refilled instantly.

No. 1 Babbitt metal is best for filling, though lead, zinc or other soft metal may be used.

No.	Handles.	Molds, per pair.	Hammers, filled.	Weight.
0	$0.35	$0.50	$0.50	½ lb.
1	.40	.75	.75	1 "
2	.50	1.00	1.00	2 "
3	.60	1.50	1.50	3 "
4	.75	1.75	2.00	4½ "
5	1.00	2.00	2.50	6 "

COPPER TIPPED.

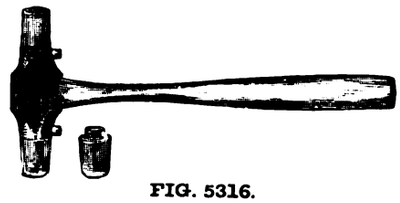


FIG. 5316.

COPPER HAMMERS.

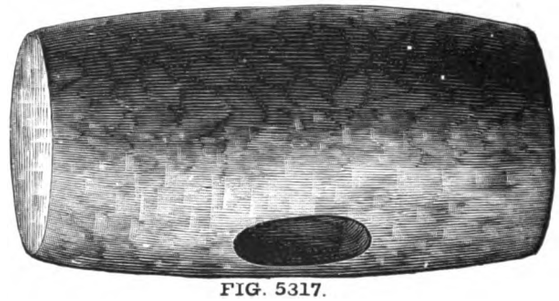


FIG. 5317.

Weights of heads, 1 to 10 lbs. Per lb.....50 cents.

The hammer-head is made of malleable iron, the ends of which are provided with a socket into which the copper tips are fitted and held in position by a set-screw. In case one corner of the tip becomes battered more than the other, it may be rotated by loosening the set-screw until the whole tip has been battered, when it can be removed, hammered into shape and re-adjusted. The tips are made of solid bar pure copper, not cast. Extra tips furnished at a slight additional cost. A wrought-iron button in the head makes a solid foundation, and prevents driving tip through.

PRICES, HAMMER COMPLETE WITH HANDLE AND TIPS.

No.	1	2	3
Weight	12½ oz.	15½ oz.	24 oz.
Black	$18.00	$20.40	$24.00 per doz.
Nickel	24.00	26.40	30.00 "

COPPER TIPS, EXTRA.

No.	1	2	3
Per doz. pairs	$6.00	$7.20	$8.40 "

HIDE FACED HAMMERS.

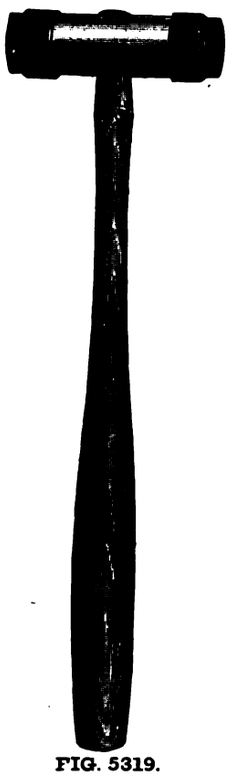


FIG. 5319.

PRICES, FIG. 5319.

5 oz. single, by mail, $0.55
10 " " " .60
5 or 10 oz., per doz., 6.00
Extra faces, per doz. pairs..... .60

These hammers take the place of the mallet without being bulky, and will be found very useful to any metal worker, as a hard elastic blow can be given without injury to the work. The rawhide faces, held by the screw rings, can be quickly replaced, when worn by use.

RAWHIDE MALLETS.

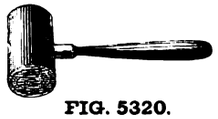


FIG. 5320.

PRICES, FIG. 5320.

No.	Diameter.	Length.	Weight.	Each.
0	1 in.	2⅛ in.	1½ oz.	$0.20
1	1¼ "	2¾ "	3½ "	.25
2	1½ "	3 "	6 "	.30
3	1¾ "	3⅛ "	7½ "	.35
4	2 "	3¼ "	10 "	.45
5	2¼ "	4¼ "	21 "	1.00
6	2¾ "	4¾ "	23 "	1.25

These are light mallets, made entirely of hide, except the handle.

HIDE FACED HAMMERS.

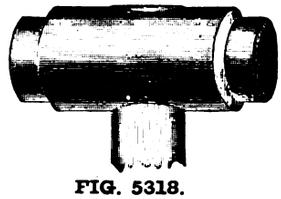


FIG. 5318.

DESCRIPTION, FIG. 5318.

One pair of extra faces is sold with each hammer, and when worn out they can be renewed at slight cost, the old ones being easily removed by fastening the hammer in a vise, when a few blows on the side of the face will usually knock it out. If worn down very much a cold chisel may be necessary. The new faces need no fastening except a tight fitting in the shell.

PRICES, FIG. 5318.

No.	Weight.	Diam. of face.	Prices, each.	Extra faces, per pair.
1	1 lb.	1¼ in.	$0.75	$0.16
2	1½ "	1½ "	.95	.20
3	2 "	1¾ "	1.15	.25
4	4 "	2 "	1.65	.35
5	5½ "	2¾ "	2.35	.50

PATENT RAWHIDE MALLETS.

LOADED.

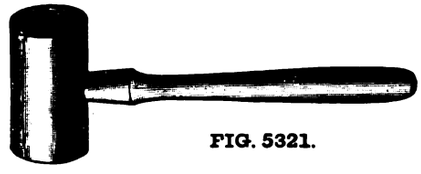


FIG. 5321.

These mallets are of same size as our ordinary rawhide mallets, Nos. 1 to 5 inclusive, but having a central strip of soft metal rolled up with the hide, the weight is doubled without increasing the size. They are numbered 7 to 11 to avoid confusion.

No.	Diameter.	Length.	Weight.	Each.
7	1¼ in.	2¾ in.	7 oz.	$0.30
8	1½ "	3 "	12 "	.35
9	1¾ "	3⅛ "	15 "	.40
10	2 "	3¼ "	20 "	.50
11	2¼ "	4¼ "	42 "	1.00

HIDE MAULS.

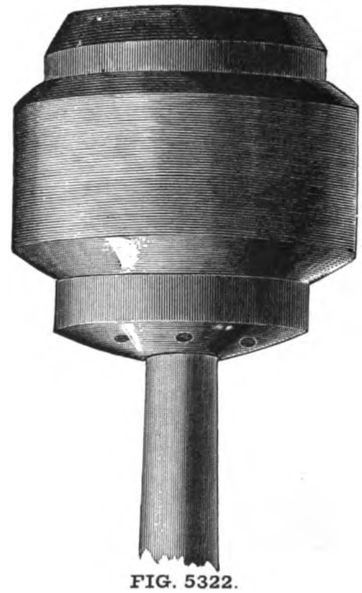


FIG. 5322.

No.	Weight.	Price, each.
1	3 lbs.	$1.50
2	4 "	1.75
3	6 "	2.00
4	8 "	2.25
5	10 "	2.50
6	12 "	2.75

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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IRON AND BRASS UPSET HEAD MACHINE SCREWS.

FLAT HEAD.



FIG. 5323.

ROUND HEAD.



FIG. 5324.

FILLISTER HEAD.



FIG. 5325.

PRICES, PER GROSS, IRON, EITHER STYLE.

	Threads per inch.																	
	56	48	32, 36, 40		30, 32			24, 30, 32		20, 24		16, 18, 20	16, 18			14, 16		
No.	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	24	26	28	30
Inch.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
3/16	55	55	55	55	55														
1/4	55	55	55	55	55	65	65	75	75										
5/16	55	55	55	55	55	65	65	75	75										
3/8	55	55	55	55	55	65	65	75	75	85	95	105							
7/16	55	55	55	55	55	65	65	75	75	85	95	105							
1/2	55	55	55	55	55	65	65	75	75	85	95	105	115	120	135	150			
5/8		60	60	60	60	65	65	75	75	85	95	105	115	120	135	150			
3/4			65	65	65	65	65	75	75	85	95	105	120	125	140	150	160		
7/8				75	75	75	75	85	85	95	105	110	125	130	150	160	170	190	
1					85	85	85	95	95	95	110	115	130	135	160	170	190	210	235
1 1/8						95	95	100	115	120	130	140	170	180	200	220	250	270	300
1 1/4						100	100	100	120	125	135	145	180	190	200	230	260	290	320
1 3/8						110	110	120	125	130	140	150	190	200	210	240	270	300	330
1 1/2							110	120	130	135	145	160	190	200	215	245	275	310	340
1 3/4								130	140	150	160	170	200	215	230	260	290	330	360
2									150	160	170	190	215	230	245	275	310	350	390
2 1/4										175	190	200	220	245	260	290	340	380	420
2 1/2											200	215	240	260	275	310	380	420	460
2 3/4												230	250	275	290	340	420	460	500
3													275	290	310	380	460	500	540

PRICES, PER GROSS, BRASS, EITHER STYLE.

	Threads per inch.																	
	56	48	32, 36, 40		30, 32			24, 30, 32		20, 24		16, 18, 20	16, 18			14, 16		
No.	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	24	26	28	30
Inch.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
3/16	70	70	70	80	80														
1/4	70	70	70	80	80	100	110	125	145										
5/16	70	70	70	80	80	100	110	125	145										
3/8	70	70	70	80	80	100	110	125	145	170	200	230							
7/16	70	70	70	80	80	105	115	125	145	170	200	230							
1/2	70	70	70	80	80	105	115	125	145	170	200	230	330	370	420	470			
5/8		90	90	90	90	110	120	140	155	180	220	250	330	370	450	550			
3/4			110	110	110	120	125	160	165	195	240	270	360	400	550	630	660		
7/8				130	130	140	150	160	175	210	255	295	390	440	600	630	700	780	
1					150	150	170	180	190	230	275	320	415	470	650	680	780	805	940
1 1/8						180	180	200	220	250	300	350	450	510	675	730	790	870	1010
1 1/4							200	225	250	270	325	375	480	550	700	780	805	940	1080
1 3/8								250	270	325	350	410	520	590	725	790	870	1010	1150
1 1/2									325	350	370	430	545	630	750	805	940	1080	1220
1 3/4										375	425	500	625	680	780	870	1010	1150	1300
2											500	575	675	780	860	940	1080	1220	1400
2 1/4												650	775	805	910	1010	1150	1300	1520
2 1/2													800	870	980	1080	1220	1400	1650
2 3/4														940	1050	1150	1300	1520	1800
3															1100	1220	1400	1650	2000

On machine screws made to order differing in length, size, thread, or head, from our regular standard flat and round head machine screws, special prices will be given on application, and also on fillister head machine screws when ordered in less quantity than ten gross of a kind.

DROP FORGED STEEL THUMB SCREWS, BLANK AND THREADED.

WING PATTERN.



FIG. 5326.

These blanks are forged from an excellent quality of steel, which will harden slightly in water. All sizes are regular and uniform. Plain and shoulder blanks are sold from same list. Please state when ordering which are desired, as unless shoulder blanks are specified we will send plain ones.

PLAIN.

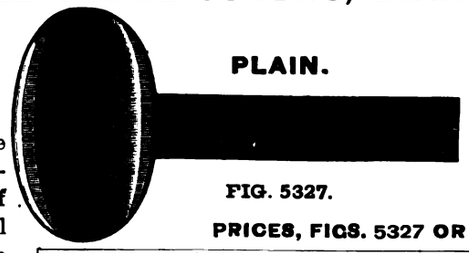


FIG. 5327.

SHOULDER.

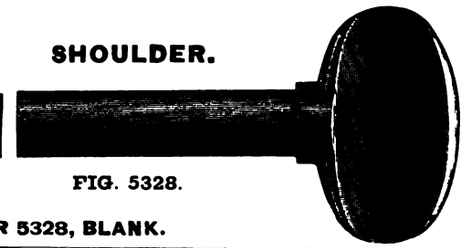


FIG. 5328.

PRICES, FIGS. 5327 OR 5328, BLANK.

Length under head.	Diameter.								
	1/8 in.	3/16 in.	1/4 in.	5/16 in.	3/8 in.	7/16 in.	1/2 in.	9/16 in.	5/8 in.
1/4 in.	$1.40	$2.00	$2.50	$2.75	$3.00	$4.00	$5.00		
1/2 "	1.50	2.10	2.60	2.90	3.25	4.25	5.25		
3/4 "	1.60	2.20	2.70	3.05	3.50	4.50	5.50		
1 "	1.70	2.30	2.80	3.20	3.75	4.75	5.75	$6.75	$7.75
1 1/4 "	1.80	2.40	2.90	3.35	4.00	5.00	6.00	7.00	8.00
1 1/2 "	1.90	2.50	3.00	3.50	4.25	5.25	6.25	7.25	8.25
1 3/4 "		2.60	3.10	3.65	4.50	5.50	6.50	7.50	8.50
2 "		2.70	3.20	3.80	4.75	5.75	6.75	7.75	8.75
2 1/4 "			3.30	3.95	5.00	6.00	7.00	8.00	9.00
2 1/2 "			3.40	4.10	5.25	6.25	7.25	8.25	9.50
2 3/4 "				4.25	5.50	6.50	7.50	8.50	9.75
3 "				4.40	5.75	6.75	7.75	8.75	10.00
3 1/4 "				4.55	6.00	7.00	8.00	9.00	10.25
3 1/2 "				4.70	6.25	7.25	8.25	9.25	10.50
3 3/4 "				4.85	6.50	7.50	8.50	9.50	10.75
4 "				5.00	6.75	7.75	8.75	9.75	11.00
4 1/2 "					7.25	8.25	9.25	10.25	11.50
5 "					7.75	8.75	9.75	10.75	12.00
5 1/2 "							10.25	11.25	12.50
6 "							10.75	11.75	13.00

PRICES, PER 100, BLANK.

Length, inches, under head.	Diameter.			
	7/16	1/2	9/16	5/8
1	$7.25	$9.25	$11.20	
1 1/4	7.50	9.50	11.50	
1 1/2	7.75	9.75	11.80	
1 3/4	8.00	10.00	12.00	
2	8.25	10.25	12 30	
2 1/4	8.50	10 50	12.60	
2 1/2	8.75	10.75	12.90	$15.40
2 3/4	9.00	11.00	13.20	15.80
3	9.25	11.25	13.50	16.20
3 1/4	9.50	11.50	13.80	16.60
3 1/2	9.75	11.75	14.10	17.00
3 3/4	10.00	12.00	14.40	17.40
4	10.25	12.25	14.70	17.80
4 1/4	10.50	12.50	15.00	18.20
4 1/2	10.75	12.75	15.30	18.60
4 3/4	11.00	13.00	15.60	19.00
5	11.25	13.25	15.90	19.40

PRICES, FIGS. 5326, 5327 AND 5328, THREADED.

Length, inches, under head.	Diameter.								
	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8
1/4 in.	$2.80	$4.00	$5.00	$5.20	$6.50				
1/2 "	3.00	4.20	5.20	5.50	7.00				
3/4 "	3.20	4.40	5.40	6.00	7.50				
1 "	3.40	4.60	5.60	6.50	8.00	$10.00	$12.00	$14.00	$16.00
1 1/4 "	3.60	4.80	5.80	7.00	8.50	10.50	12.50	14.50	16.50
1 1/2 "	3.80	5.00	6.00	7.50	9.00	11.00	13.00	15.00	17.00
1 3/4 "	4.00	5.20	6.20	8.00	9.50	11.50	13.50	15.50	17.50
2 "		5.40	6.40	8.50	10.00	12.00	14.00	16.00	18.00
2 1/4 "				9.00	10.50	12.50	14.50	16.50	18.50
2 1/2 "				9.50	11.00	13.00	15.00	17.00	19.00
2 3/4 "				10.00	11.50	13.50	15.50	17 50	19.50
3 "				10.50	12.00	14.00	16.00	18.00	20.00
3 1/4 "				11.00	12.50	14.50	16.50	18.50	20.50
3 1/2 "				11.50	13.00	15.00	17.00	19.00	21.00
3 3/4 "				12.00	13.50	15.50	17.50	19.50	21.50
4 "				12.50	14.00	16.00	18.00	20.00	22.00
4 1/4 "				13.00	14.50	16.50	18.50	20.50	22.50
4 1/2 "				13.50	15.00	17.00	19.00	21.00	23.00
4 3/4 "				14.00	15.50	17.50	19.50	21.50	23.50
5 "				14.50	16.00	18.00	20.00	22.00	24.00

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MILLED STUD BOLTS AND TAPER PINS, ETC.

STUD BOLTS.

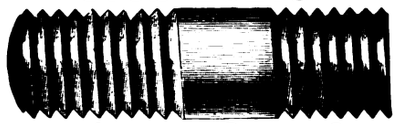


FIG. 5329.

PRICES, PER 100.

Diameter.	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4
Length of studs. 1 1/4	$3.35	$4.05	$4.40	$5.10						
1 1/2	3.50	4.20	4.60	5.30	$6.10					
1 3/4	3.65	4.35	4.80	5.50	6.30					
2	3.80	4.50	5.00	5.70	6.50	$8.80				
2 1/4	3.95	4.65	5.20	5.90	6.70	9.10				
2 1/2	4.10	4.80	5.40	6.10	6.90	9.40	$12.00			
2 3/4	4.25	4.95	5.60	6.30	7.10	9.70	12.50			
3	4.40	5.10	5.80	6.50	7.30	10.00	13.00	$17.00	$21.00	
3 1/4		5.25	6.00	6.70	7.50	10.30	13.50	17.75	22.00	
3 1/2		5.40	6.20	6.90	7.70	10.60	14.00	18.50	23.00	$27.00
3 3/4		5.55	6.40	7.10	7.90	10.90	14.50	19.25	24.00	28.00
4			6.60	7.30	8.10	11.20	15.00	20.00	25.00	29.00
4 1/4			6.70	7.40	8.25	11.45	15.40	20.50	25.75	29.75
4 1/2			6.80	7.50	8.40	11.65	15.75	21.00	26.50	30.50
4 3/4				7.60	8.55	11.90	16.15	21.50	27.25	31.25
5				7.70	8.70	12.10	16.50	22.00	28.00	32.00
5 1/4				7.80	8.85	12.35	16.90	22.50	28.75	32.75
5 1/2					9.00	12.55	17.25	23.00	29.50	33.50
5 3/4					9.15	12.80	17.65	23.50	30.25	34.25
6					9.30	13.00	18.00	24.00	31.00	35.00
Threads to inch.	16	14	12	12	11	10	9	8	7	7
Add for each 1/4 inch.	$0.15	$0.20	$0.20	$0.20	$0.25	$0.30	$0.40	$0.60	$0.75	$1.00

In ordering bolts, give total length, and length of A and C, as lettered above, and unless otherwise instructed, A end will be tight fit, C end regular. State what finish required at B, rough turned or finished.

SPECIAL STUD BOLT.

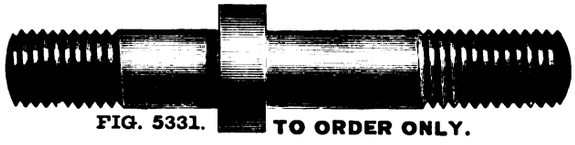


FIG. 5331. TO ORDER ONLY.

PLANER HEAD BOLTS ALL MILLED.



FIG. 5333. SQUARE HEAD.



FIG. 5334. HEXAGON HEAD.

PRICES, PER 100, WITHOUT NUTS.

Diameter of head	7/8	1	1 1/8	1 1/8	1 1/4
Length of head	5/16	5/16	3/8	3/8	7/16
Diameter of screw	1/2	9/16	5/8	11/16	3/4
Length under head to extreme point. 1	$10.00				
1 1/4	10.50	$12.00	$13.30	$13.00	$17.00
1 1/2	10.50	12.25	14.00	14.00	17.50
1 3/4		12.45	14.80	14.00	18.00
2		13.75	15.70	15.00	19.00
Finished, case hardened hexagon nuts for above	10.00	12.00	15.00	16.00	18.00

STEEL TAPER PINS.

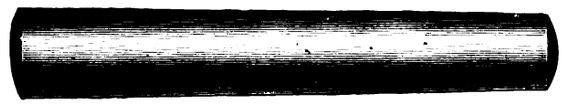


FIG. 5330.

Taper one-quarter inch to the foot.

PRICES, PER 100.

Number.	0	1	2	3	4	5	6	7	8	9	10
Diameter at large end.	.156	.172	193	.219	.250	.289	.341	.409	.492	.591	.706
Approximate fractional sizes.	5/32	11/64	3/16	7/32	1/4	19/64	11/32	13/32	1/2	19/32	23/32
Longest limit of length.	1	1 1/4	1 1/2	1 3/4	2	2 1/4	3 1/4	3 3/4	4 1/2	5 1/4	6
From 3/4	$1.80	$2.00	$2.10	$2.30	$2.50	$2.75	$3.00				
1	2.05	2.25	2.35	2.55	2.75	3.00	3.25	$3.75			
1 1/4		2.50	2.60	2.80	3.00	3.25	3.50	4.00	$4.65		
1 1/2			2.85	3.05	3.25	3.50	3.75	4.25	5.00	$7.00	$9.00
1 3/4				3.30	3.50	3.75	4.00	4.50	5.40	7.50	9.50
2					3.75	4.05	4.35	4.75	5.80	8.00	10.00
2 1/4						4.40	4 75	5.25	6.25	8.60	10.75
2 1/2							5.20	5.75	6.75	9.20	11.50
2 3/4							5.70	6.25	7.25	9.80	12.25
3							6.25	6.75	7.80	10.50	13.25
3 1/4							6.75	7.25	8.40	11.20	14.25
3 1/2								7.75	9.00	11.90	15.25
3 3/4								8.25	9.60	12.60	16 25
4									10.20	13.30	17.25
4 1/4									10.80	14.00	18.25
4 1/2									11.40	14.70	19.25
4 3/4										15.40	20.25
5										16.10	21.25
5 1/4										16.80	22.25
5 1/2											23.25
5 3/4											24.25
6											25.25

SPECIAL STUD BOLT.

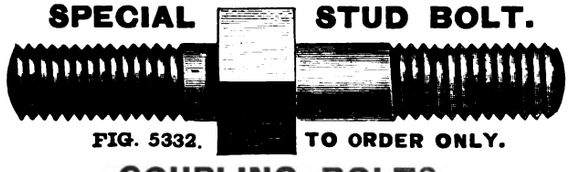


FIG. 5332. TO ORDER ONLY.

COUPLING BOLTS.

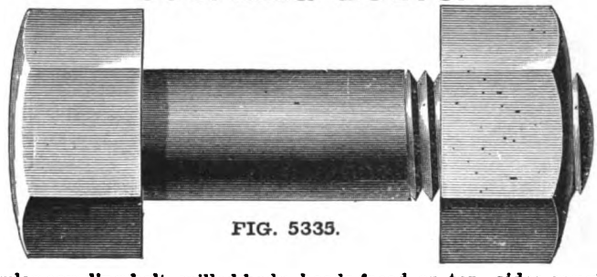


FIG. 5335.

Regular coupling bolt, milled body, heads faced on top, sides rough, nut tapped and faced on the bottom. Extra finish to order.

PRICES, PER 100.

Diameter of head.	7/8	1 1/16	1 1/4	1 7/16	1 5/8	1 13/16	2
Length of head.	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4
Diameter of bolt.	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4
Length under head to extreme point. 2	$20.00	$25 00					
2 1/4	20.50	25.75	$32.00				
2 1/2	21.00	26.50	32.00	$38.75			
2 3/4	21.50	27.25	33.00	39.75	$56.00		
3	22.00	28.00	34.00	40.75	56.00	$70.00	
3 1/4	22.50	28.75	35.00	41.75	57.00	71.50	$100.00
3 1/2	23.00	29.50	36.00	42.75	58.00	73.00	100.00
3 3/4	23.50	30.25	37.00	43.75	59.00	74.50	102.50
4	24.00	31.00	38.00	44.75	60.00	76.00	105.00
4 1/4	24.50	31.75	39.00	45.75	61.00	77.50	107.50
4 1/2	25.00	32.50	40.00	46.75	62.00	79.00	110.00
4 3/4	25 50	33.25	41.00	47.75	63.00	80.50	112.50
5		34.00	42.00	48.75	64.00	82.00	115.00
5 1/4			43.00	49.75	65.00	83.50	117.50
5 1/2				50.75	66.00	85.00	120.00
5 3/4					67.00	86.50	122.50
6						88.00	125.00
Thickness of nut.	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4
Short diameter of nut.	7/8	1 1/16	1 1/4	1 7/16	1 5/8	1 13/16	2

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MILLED COLLAR SCREWS.

PRICES, FIG. 5336, PER 100.

Diameter of collar.	¼	11/32	7/16	½	5/8	11/16	13/16	15/16	1	1¼
Diameter of screw.	1/8	3/16	¼	5/16	3/8	7/16	½	9/16	5/8	¾
Length under head to extreme point. ¾	2.50	2.80	3.10	3.75	4.40	5.00	6.25			
1	2.80	3.10	3.40	4.05	4.70	5.30	6.60	8.25		
1¼	3.10	3.40	3.70	4.35	5.00	5.60	7.00	8.60	11.25	
1½	3.40	3.70	4.00	4.70	5.30	5.95	7.40	9.00	11.90	15.00
1¾	3.70	4.05	4.35	5.05	5.65	6.35	7.80	9.45	12.60	15.60
2		4.40	4.70	5.45	6.25	6.85	8.40	10.00	13.35	16.25
2¼			5.05	5.95	6.85	7.40	9.00	10.60	14.15	17.10
2½			5.45	6.45	7.55	8.05	9.60	11.25	15.00	18.00
2¾				6.95	8.20	8.75	10.30	11.90	15.90	19.00
3				7.50	8.85	9.50	11.00	12.60	16.85	20.00
3¼					9.50	10.30	11.80	13.40	17.95	21.20
3½					10.20	11.10	12.60	14.30	19.10	22.60
3¾						11.95	13.50	15.30	20.40	24.20
4						12.80	14.40	16.30	21.70	25.80
4¼							15.40	17.50	23.20	27.70
4½							16.40	18.70	24.70	29.60
4¾								20.10	26.50	31.80
5								21.50	28.30	34.00
Threads to inch.	.40	.24	.20	.18	.16	.14	.12	.12	.11	.10
Add for each ¼ inch.	.30	.40	.50	.60	.80	1.00	1.30	1.60	2.00	2.40

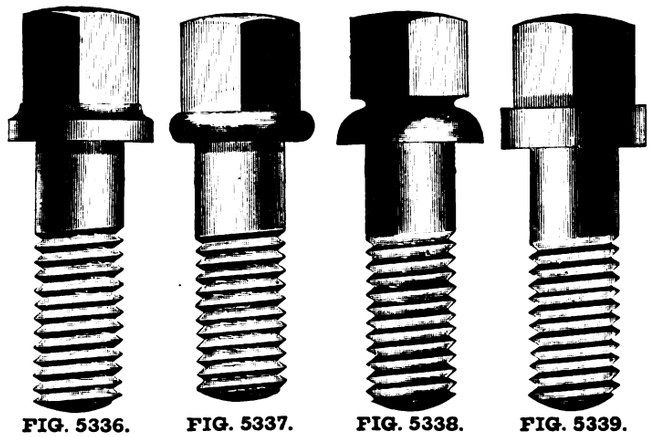


FIG. 5336. FIG. 5337. FIG. 5338. FIG. 5339.

These screws are threaded for three-quarters of the length of the body. The three styles, Figs. 5337, 5338 and 5339, are special.

PRICES ON APPLICATION.

MILLED CAP SCREWS.

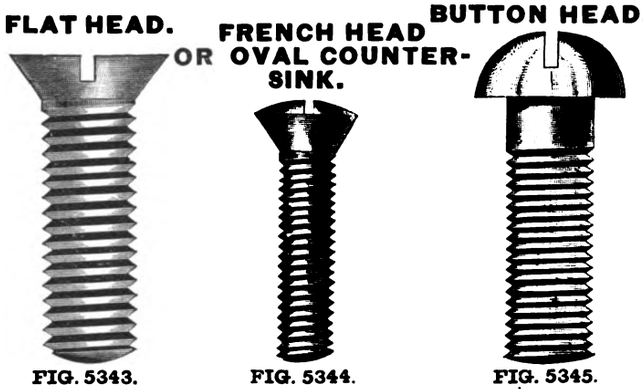


FIG. 5343. FIG. 5344. FIG. 5345.

BOILER PATCH BOLTS.

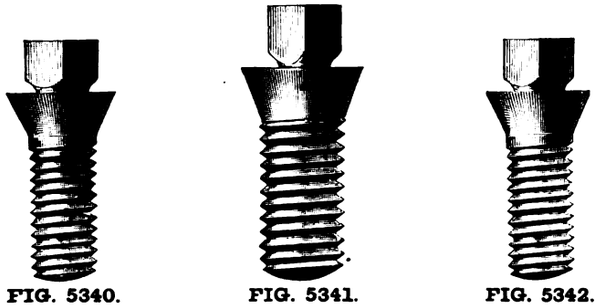


FIG. 5340. FIG. 5341. FIG. 5342.

Heads and bevels milled, special prices.
All threads 12 to the inch.

PRICES PER 100, EITHER STYLE, TURNED AND THREADED.

Diameter.		½	5/8	¾	7/8	1
Length from largest diameter of bevel to point.	¾	3.75	4.25			
	7/8	4.00	4.50	6.00		
	1	4.25	4.80	6.50	9.50	13.50
	1⅛		5.10	6.80	9.85	14.00
	1¼		5.50	7.25	10.25	14.75
Threads to inch.		.14	.12	.12	.12	.12

PRICES, FIGS. 5343 AND 5344, PER 100.

Diameter of head.	¼	3/8	15/32	5/8	¾	13/16	7/8	1	1⅛	1⅜
Diameter of screw.	1/8	3/16	¼	5/16	3/8	7/16	½	9/16	5/8	¾
Length over all. ¾	2.25	2.50	3.10	4.00	5.00					
1	2.50	2.75	3.35	4.25	5.30	6.60				
1¼	2.75	3.00	3.60	4.50	5.60	6.90	9.00			
1½	3.00	3.25	3.85	4.75	5.90	7.20	9.50	12.00		
1¾	3.25	3.50	4.10	5.00	6.20	7.50	10.00	12.50	14.50	
2		3.75	4.35	5.50	6.75	8.00	10.75	13.00	15.25	19.20
2¼			4.75	6.00	7.25	8.50	11.50	13.75	16.00	20.20
2½				6.50	7.75	9.00	12.00	14.50	16.75	21.25
2¾				7.00	8.25	9.50	12.75	15.25	17.50	22.40
3					8.75	10.00	13.50	16.00	18.30	23.60
Threads to inch.	.40	.24	.20	.18	.16	.14	.12	.12	.11	.10
Add for each ¼ inch.	.25	.25	.40	.50	.50	.50	.50	.75	1.00	1.25

PRICES, FIG. 5345, PER 100.

Diameter of head.	*7/32 Full.	5/16	7/16	9/16	5/8	¾	13/16	15/16	1	1¼
Diameter of body.	1/8	3/16	¼	5/16	3/8	7/16	½	9/16	5/8	¾
Length under head to extreme point. ¾	2.25	2.50	3.00	3.50	4.00	5.00				
1	2.50	2.75	3.25	3.75	4.25	5.30	6.60			
1¼	2.75	3.00	3.50	4.00	4.50	5.60	6.90	9.00		
1½	3.00	3.25	3.75	4.25	4.75	5.90	7.20	9.50	12.00	
1¾	3.25	3.50	4.00	4.50	5.00	6.20	7.50	10.00	12.50	18.20
2		3.75	4.35	5.00	5.50	6.75	8.00	10.75	13.00	19.20
2¼			4.75	5.50	6.00	7.25	8.50	11.50	13.75	20.20
2½				6.00	6.50	7.75	9.00	12.00	14.50	21.25
2¾					7.00	8.25	9.50	12.75	15.25	22.40
3						8.75	10.00	13.50	16.00	23.60
Threads to inch.	.40	.24	.20	.18	.16	.14	.12	.12	.11	.10
Add for each ¼ inch.	.25	.25	.40	.50	.50	.50	.50	.75	.75	1.15

* No. 4 wire.

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MILLED SET AND CAP SCREWS.

CASE HARDENED IRON SET, CUPPED OR OVAL POINT.



FIG. 5347. CUPPED POINT.

PRICES, EITHER STYLE POINT, PER 100, HARDENED OR SOFT.

Diameter of screw.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4
Length under head to extreme point. 3/4	2.00	2.20	2.50	2.90	3.40	4.25	5.00					
1	2.15	2.35	2.65	3.10	3.60	4.25	5 00	7.00				
1 1/4	2.30	2.50	2.80	3.30	3.80	4.50	5.25	7.00	11.30			
1 1/2	2.45	2.65	2.95	3.50	4.00	4.75	5.50	7.50	11.30	14.90		
1 3/4	2.60	2.80	3.10	3.70	4.20	5.00	5.75	8.00	12.00	15.90	19.50	
2	2.80	3.00	3.30	3.95	4.45	5.30	6.05	8.60	12.90	17.00	21.10	25.30
2 1/4	3.05	3.25	3.55	4.25	4.75	5.65	6.40	9.30	13.80	18.40	22.90	27.40
2 1/2	3.30	3.55	3.85	4.60	5.10	6.05	6 80	10.00	14.80	19.80	24.70	29.60
2 3/4	3.55	3.85	4.20	5.00	5.50	6.50	7.25	10.80	15.90	21.40	26.70	32.00
3	3.80	4.15	4.55	5.45	5.95	7.00	7.75	11.70	17.10	23.00	28.80	34.60
3 1/4		4.45	4.90	5.90	6.45	7.55	8.35	12 70	18.40	24.70	31.00	37.40
3 1/2			5.25	6.35	6.95	8.10	8.95	13.70	19.70	26.40	33.20	40.20
3 3/4				6.80	7.45	8.65	9.55	14.70	21.00	28.10	35.40	43.00
4					7.95	9.20	10.15	15.70	22.30	29.80	37.60	45.80
4 1/4						9.75	10.75	16.70	23.60	31.50	39.80	48.60
4 1/2							11.35	17.70	24.90	33.20	42.00	51.40
4 3/4								18.70	26.20	34.90	44.20	54.20
5									27.50	36.60	46.40	57.00
Threads to inch.	20	18	16	14	12	12	11	10	9	8	7	7
Add for each 1/4 inch.	.25	.30	.35	.45	.50	.55	.60	1.00	1.30	1.70	2.20	2.80

STEEL SET, CUPPED OR OVAL POINT.



FIG. 5348. OVAL POINT.

PRICES, EITHER STYLE POINT, PER 100.

Diameter of screw.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4
Length under head to extreme point. 3/4	3.00	3.30	3.75	4.35	5.10	6.40	7.50					
1	3.25	3.55	4.00	4.65	5.40	6.40	7.50	10.50				
1 1/4	3.45	3.75	4.20	4.95	5.70	6.75	7.90	10.50	16.95			
1 1/2	3.70	4.00	4.45	5.25	6.00	7.15	8.25	11.25	16.95	22.35		
1 3/4	3.90	4.20	4.65	5.55	6.30	7.50	8.65	12.00	18 00	23.85	29.25	
2	4.20	4.50	4.95	5.95	6.70	7.95	9.10	12.90	19.35	25.50	31.65	37.95
2 1/4	4.60	4.90	5.35	6.40	7 15	8.50	9.60	13.95	20.70	27.60	34.35	41.10
2 1/2	4.95	5.35	5.80	6.90	7.65	9.10	10.20	15.00	22.20	29.70	37.05	44.40
2 3/4	5.35	5.80	6.30	7.50	8.25	9.75	10.90	16.20	23.85	32.10	40 05	48.00
3	5.70	6.25	6.85	8.20	8.95	10.50	11.65	17.55	25.65	34.50	43.20	51.90
3 1/4		6.70	7.35	8.85	9.70	11.35	12.55	19.05	27.60	37.05	46.50	56.10
3 1/2			7.90	9.55	10.45	12.15	13.45	20.55	29.55	39.60	49.80	60.30
3 3/4				10.20	11.20	13.00	14.35	22.05	31.50	42.15	53.10	64.50
4					11.95	13.80	15.25	23.55	33.45	44.70	56.40	68.70
4 1/4						14.65	16.15	25.05	35.40	47.25	59.70	72.90
4 1/2							17.05	26.55	37.35	49.80	63.00	77.10
4 3/4								28.05	39.30	52.35	66.30	81.30
5									41.25	54.90	69.60	85.50
Threads to inch.	20	18	16	14	12	12	11	10	9	8	7	7
Add for each 1/4 inch	.40	.45	.55	.70	.75	.85	.90	1.50	2.00	2.55	3.30	4.20

SPECIAL MILLED SET SCREWS.

FLAT POINT.



FIG. 5349.

HEADLESS ROUND POINT.



FIG. 5350.

CONE POINT.



FIG. 5351.

FLAT PIVOT POINT.



FIG. 5352.

ROUND PIVOT POINT.



FIG. 5353.

NECKED UNDER HEAD.



FIG. 5354.

No charge made for necking screws.

Oval and cup point set screws are regular; all other kinds are special, and, when ordered in lots of less than 500 of one diameter, will be charged at 10 per cent. less discount.

Set screw prices shall apply to headless set screws, threaded over all or nearly so; slotted, and burrs removed from head and slot.

Set screws, with ground or polished heads, 10 per cent. less discount. Set screws, with heads polished after hardening, 20 per cent. less discount.

No screw which has a head more than 1/16 of an inch larger than the body shall be classed as a set screw.

A rough screw, requiring oversize stock, shall take the same price as a soft set screw, with head of same size, limited by the article preceding.

TAP BOLT OR SQUARE CAP SCREW, THREADED TO THE HEAD.



FIG. 5356.

PRICES, SAME AS FIG. 5355.

DESCRIPTION, FIG. 5355.

Regular cap screws are soft, and have ground heads. Black heads, 5 per cent. extra discount; extra finished, 10 per cent. less discount; case hardened and extra finished heads, 15 per cent. less discount; case hardened, 5 per cent. less discount.

Cap screws with oversized heads take the list of regular cap screws with the same sized head.

SQUARE HEAD CAP SCREW, IRON.

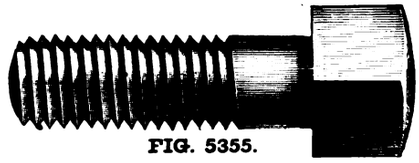


FIG. 5355.

PRICES PER 100.

Diameter of head.	3/8	7/16	1/2	9/16	5/8	11/16	3/4	7/8	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8
Length of head.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8
Diameter of screw.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8
Length under head to extreme point. 3/4	2.40	2.75	3.20	3.80	4.40	5.75							
1	2.60	2.95	3.40	4.00	4.70	5.75	7.70						
1 1/4	2.75	3.10	3.65	4.20	4 95	6.06	7.70	10.50					
1 1/2	2.90	3.30	3.85	4.45	5.25	6.35	8 25	10.50	14 00				
1 3/4	3.05	3.50	4.10	4.70	5.55	6.65	8.80	11.10	14.80	18.00			
2	3.25	3.70	4.35	4.95	5.90	7.05	9.40	11.80	15.70	19.00	22.50		
2 1/4	3.50	4.00	4.65	5.25	6.30	7.55	10.10	12.60	16.70	20.20	24.00	30.00	
2 1/2	3.75	4.35	5.00	5.60	6.75	8.15	10.90	13.50	17.80	21.50	25.80	32.00	39.00
2 3/4	4.00	4.70	5.45	6.00	7.25	8.85	11.80	14 60	19.10	23.10	27.90	34.20	41.50
3	4.25	5.05	5.90	6.55	7.80	9.65	12.80	15.90	20.60	25.00	30.50	37.00	45.00
3 1/4		5.40	6.35	7.10	8.45	10.55	14.00	17.40	22.40	27.30	33.50	40.50	49.00
3 1/2			6.80	7.65	9.10	11.45	15.20	18.90	24.20	29.60	36.50	44.00	53.00
3 3/4				8.20	9.75	12.35	16.40	20.40	26.00	31.90	39.50	47.50	57.00
4					10.40	13.25	17.60	21.90	27.80	34.20	42.50	51.00	61.00
4 1/4						14.15	18.80	23.40	29.60	36.50	45.50	54.50	65.00
4 1/2							20.00	24.90	31.40	38.80	48.50	58.00	69.00
4 3/4								26.40	33.20	41.10	51.50	61.50	73.00
5									35.00	43.40	54.50	65.00	77.00
Threads to inch.	20	18	16	14	12	12	11	10	9	8	7	7	6
Add for each 1/4 inch	.25	.35	.45	.55	.65	.90	1.20	1.50	1.80	2.30	3.00	3.50	4.00

Steel screws 50 per cent. above the prices of iron.

REGULAR SQUARE HEAD CAP SCREW.

On all screws of 1 inch and less in diameter, and less than 4 inches long, threads are cut 3/4 of the length. Beyond 4 inches, threads are cut 1/2 of the length.

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MILLED CAP SCREWS.

FILLISTER HEADS.

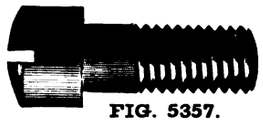


FIG. 5357.

ROUND HEADS.



FIG. 5358.

HEXAGON HEADS.



FIG. 5359.

PRICES, EITHER STYLE, PER 100.

Diameter of head.	5/16	1/4	3/8	7/16	9/16	5/8	3/4	13/16	7/8	1	1 1/8	1 1/4
Length of head.	1/8	5/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
Diameter of screw.	1/8	5/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
Length under head to extreme point. 3/4	2.00	2.25	2.50	3.00	3.50	4.00	5.00					
1	2.25	2.50	2.75	3.25	3.75	4.25	5.30	6.60				
1 1/4	2.50	2.75	3.00	3.50	4.00	4.50	5.60	6.90	9.00			
1 1/2	2.75	3.00	3.25	3.75	4.25	4.75	5.90	7.20	9.50	12.00		
1 3/4	3.00	3.25	3.50	4.00	4.50	5.00	6.20	7.50	10.00	12.50	15.25	
2	3.25	3.50	3.75	4.35	5.00	5.50	6.75	8.00	10.75	13.00	16.00	19.20
2 1/4	3.50	3.75	4.00	4.75	5.50	6.00	7.25	8.50	11.50	13.75	16.75	20.20
2 1/2	3.75	4.00	4.25	5.15	6.00	6.50	7.75	9.00	12.00	14.50	17.50	21.25
2 3/4		4.25	4.50	5.55	6.50	7.00	8.25	9.50	12.75	15.25	18.30	22.40
3			4.75	5.95	7.00	7.50	8.75	10.00	13.50	16.00	19.10	23.60
3 1/4				6 35	7.50	8.00	9.25	10.50	14.25	16.75	20.00	24.85
3 1/2					8.00	8.50	9.75	11.00	15.00	17.50	21.00	26.10
3 3/4						9.00	10.25	11.50	15.75	18.25	22.00	27.35
4							10.75	12.00	16.50	19.00	23.00	28.60
4 1/4								12.50	17.25	19.75	24.00	29.85
4 1/2									18.00	20.50	25.00	31.10
4 3/4										21.25	26.00	32.35
5											27.00	33.60
Threads to inch.	40	24	20	18	16	14	12	12	11	10	9	8
Add for each 1/4 inch.	.25	.25	.25	.40	.50	.50	.50	.50	.75	.75	1.00	1.25

Threaded two-thirds of the length.

PRICES, PER 100.

Diameter of head.	7/16	1/2	9/16	5/8	3/4	13/16	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
Length of head.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4
Diameter of screw.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4
Length under head to extreme point. 3/4	3.00	3.25	3.75	4.40	5.50	7.00						
1	3.25	3.50	4.00	4.70	5.70	7.00	9.50					
1 1/4	3.50	3.75	4.25	5.00	6.00	7.50	9.50	12.20				
1 1/2	3.75	4.00	4.50	5.30	6.30	8.00	10.00	12.20				
1 3/4	4.00	4.25	4.75	5.60	6.60	8.50	10.60	12.80	16.60	21.20		
2	4.25	4.60	5.05	5.95	7.00	9.10	11.20	13.40	17.20	22.30	29.00	37.50
2 1/4	4.55	5.00	5.40	6.35	7.50	9.70	11.90	14.10	17.90	23.60	30.50	39.30
2 1/2	4.85	5.40	5.80	6.80	8.00	10.40	12.70	14.90	18.80	25.10	32.30	41.40
2 3/4	5.15	5.80	6.30	7.30	8.60	11.20	13.60	15.90	20.00	26.90	34.40	44.00
3	5.45	6.20	6.80	7.90	9.30	12.10	14.70	17.00	21.80	29 00	37.00	47.50
3 1/4		6.60	7.30	8.50	10.10	13.10	16.00	18.60	23.80	31.40	40.00	51.50
3 1/2			7.80	9.10	10.90	14.10	17.30	20.20	25.80	33.80	43.00	55.50
3 3/4				9.70	11.70	15.10	18.60	21.80	27.80	36.20	46.00	59.50
4					12.50	16.10	19.90	23.40	29.80	38.60	49.00	63.50
4 1/4						17.10	21.20	25.00	31.80	41.00	52.00	67.50
4 1/2							22.50	26.60	33.80	43.40	55.00	71.50
4 3/4								28.20	35.80	45.80	58.00	75.50
5									37.80	48.20	61.00	79.50
Threads to inch.	20	18	16	14	12	12	11	10	9	8	7	7
Add for each 1/4 inch.	.30	.40	.50	.60	.80	1.00	1.30	1.60	2.00	2 40	3.00	4.00

On all screws of 1 inch and less in diameter, and less than 4 inches long, threads are cut 3/4 of the length. Beyond 4 inches, threads are cut half of the length.

Regular cap screws are soft and have ground heads. Black heads, 5 per cent. extra discount. Extra finished, 10 per cent. less discount. Case hardened and extra finished heads, 15 per cent. less discount. Case hardened, 5 per cent. less discount.

Cap screws with oversized heads take the list of regular cap screws with the same sized heads.

Price of steel screws will be 50 per cent. above the price of iron.

MILLED TAP BOLT OR HEX. CAP, THREADED TO THE HEAD.

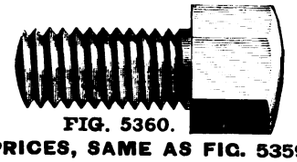


FIG. 5360.

PRICES, SAME AS FIG. 5359.

FORCED SET SCREWS AND TAP BOLTS.

FORCED SET SCREWS.

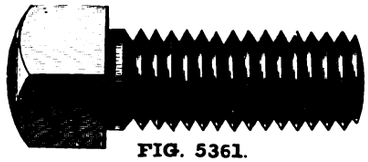


FIG. 5361.

PRICES, PER 100.

Heads, height and width.	5/16	3/8	7/16	1/2	9/16	5/8	11/16	13/16	1	1 1/8
Diam. of screw.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
Length. 1 1/2 in.	2.50	2.80	3.30	3.90	4.90	7.40	7.40	10.40	15.00	23.20
1 3/4 "	2.60	2.90	3.40	4.00	5.10	7.70	7.70	10.80	15.50	23.90
2 "	2.70	3.00	3 50	4.10	5.30	8.00	8.00	11.20	16.00	24.60
2 1/4 "	2.80	3.10	3.60	4.20	5.50	8.30	8.30	11.60	16.50	25.30
2 1/2 "	2.90	3.20	3.70	4.30	5.70	8.60	8.60	12.00	17.00	26.00
2 3/4 "	3.00	3.30	3.80	4.40	5.90	8.90	8.90	12.40	17.50	26.70
3 "	3.10	3.40	3.90	4.50	6.10	9.20	9.20	12.80	18.00	27.40
3 1/2 "		3.70	4.10	4.85	6.50	9.80	9.80	13.60	19.00	28.80
4 "			4.40	5.25	6.90	10.40	10.40	14.40	20.00	30.20
Threads to inch.	20	18	16	14	13 or 12	12	11	10	9	8
Add for each 1/4 inch.	.40	.50	.60	.80	1.00	1.30	1.30	1.60	2.20	2.80

Heads differing from standard sizes, charged at an advanced price, and special threads at our discretion.

SQUARE AND HEXAGON HEAD TAP BOLTS.



FIG. 5362.

REPRESENTS HEXAGON HEAD.

PRICES, PER 100, FOR SQUARE HEADS.

Length under head.	Diameter of bolts. 1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
1 1/2 in.	2.50	2.80	3.30	3.90	4.90	7.40	7.40	10.40	15 00	23.20
1 3/4 "	2.60	2.90	3.40	4.00	5.10	7.70	7.70	10.80	15.50	23.90
2 "	2.70	3.00	3.50	4.10	5.30	8.00	8.00	11.20	16.00	24.60
2 1/4 "	2.80	3.10	3.60	4.20	5.50	8.30	8.30	11.60	16.50	25.30
2 1/2 "	2.90	3.20	3.70	4.30	5.70	8 60	8 60	12.00	17.00	26.00
2 3/4 "	3.00	3.30	3.80	4.40	5.90	8.90	8.90	12.40	17.50	26.70
3 "	3.10	3.40	3.90	4.50	6.10	9.20	9.20	12.80	18.00	27.40
3 1/2 "		3.70	4.10	4.85	6.50	9.80	9.80	13.60	19.00	28.80
4 "			4.40	5.25	6.90	10.40	10.40	14.40	20.00	30.20
Threads to inch.	20	18	16	14	13 or 12	12	11	10	9	8
Add for each 1/4 inch.	.40	.50	.60	.80	1.00	1.30	1.30	1.60	2.20	2.80

Hexagon heads, 10 per cent. extra.

Heads differing from standard sizes, charged at an advanced price, and special threads at our discretion.

Cut to head, 10 per cent. advance; in lots of 200 or more, 5 per cent.

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SQUARE HEAD AND NUT.

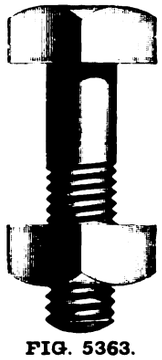


FIG. 5363.

Points finished.
Chamfered nuts.

SQUARE HEAD MACHINE BOLTS.

PRICES, FIGS. 5363 AND 5364, PER 100.

Length under head.	1/4	5/16	3/8	7/16	1/2	9/16 & 5/8	3/4	7/8	1
1½ inches.....	$2.80	$3.20	$3.60	$4.60	$6.00	$9.00	$12.70	$18.80	$27.50
2 "	2.90	3.35	3.80	4.90	6.35	9.55	13.45	19.80	28.80
2½ "	3.00	3.50	4.00	5.20	6.70	10.10	14.20	20.80	30.10
3 "	3.10	3.65	4.20	5.50	7.05	10.65	14 95	21.80	31.40
3½ "	3.20	3.80	4.40	5.80	7.40	11.20	15.70	22.80	32.70
4 "	3.30	3.95	4.60	6.10	7.75	11.75	16.45	23.80	34.00
4½ "	3.40	4.10	4.80	6.40	8.10	12 30	17.20	24.80	35.30
5 "	3.50	4.25	5.00	6.70	8.45	12.85	17.95	25.80	36.60
5½ "	3.60	4.40	5.20	7.00	8.80	13 40	18.70	26.80	37.90
6 "	3.70	4.55	5.40	7.30	9.15	13.95	19.45	27.80	39.20
6½ "	3.80	4.70	5.60	7.60	9.50	14.50	20.20	28.80	40.50
7 "	3.90	4.85	5.80	7.90	9.85	15.05	20.95	29.80	41.80
7½ "	4.00	5.00	6.00	8.20	10.20	15.60	21.70	30.80	43.10
8 "	4.10	5.15	6.20	8.50	10.60	16.20	22.50	31.80	44.40
9 "	....	....	6.60	9.10	11.30	17.30	24.00	33.80	47.00
10 "	....	....	7.00	9.70	12.00	18.40	25.50	35.80	49.60
11 "	....	....	7.40	10.30	12.70	19.50	27.00	37.80	52.20
12 "	....	....	7.80	10 90	13.40	20.60	28.50	39.80	54.80
13 "	....	....	....	....	14.10	21.70	30.00	41.80	57.40
14 "	....	....	....	....	14.80	22.80	31.50	43.80	60.00
15 "	....	....	....	....	15.50	23.90	33.00	45.80	62.60
16 "	....	....	....	....	16.20	25.00	34.50	47.80	65.20
17 "	....	....	....	....	16.90	26.10	36.00	49.80	67.80
18 "	....	....	....	....	17.60	27.20	37.50	51.80	70.40
19 "	....	....	....	....	18.30	28.30	39.00	53.80	73.00
20 "	....	....	....	....	19.00	29.40	40.50	55.80	75.60

Hexagon heads or hexagon nuts, 10 per cent. extra. With both hexagon heads and nuts, 20 per cent. extra.

HEXAGON HEAD AND NUT.

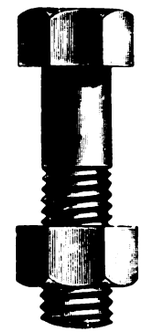


FIG. 5364.

Points finished.
Chamfered nuts.

SQUARE UNDER HEAD.

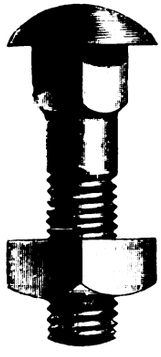


FIG. 5365.

Points finished.
Chamfered nuts.

The lengths of the square under the head are limited to the scant diameter of the bolts; longer squares at advanced rates.

ROUND HEAD MACHINE BOLTS.

PRICES, FIGS. 5365 AND 5366, PER 100.

Length under head.	1/4	5/16	3/8	7/16	1/2	9/16 & 5/8	3/4
1½ inches.....	$3.70	$4.20	$5.00	$6.20	$7.80	$11.20	$15.80
2 "	3.80	4.35	5.20	6.50	8.10	11.70	16.50
2½ "	3.90	4.50	5.40	6.80	8.40	12.20	17.20
3 "	4.00	4.65	5.60	7.10	8.70	12.70	17.90
3½ "	4.15	4.80	5.80	7.40	9.00	13.20	18.60
4 "	4.30	5.00	6.00	7.70	9.30	13.70	19.30
4½ "	4.45	5.20	6.20	8.00	9.60	14.20	20.00
5 "	4.60	5.45	6.50	8.30	9.90	14.70	20.70
5½ "	4.80	5.70	6.80	8.60	10.20	15.20	21.40
6 "	5.00	6.00	7.10	8.90	10.50	15.70	22.10
6½ "	5.30	6.30	7.50	9.30	10.90	16.30	22.80
7 "	5.60	6.70	7.90	9.70	11.30	17.00	23.60
7½ "	6.00	7.20	8.40	10.20	11.80	17.50	24.40
8 "	6.50	7.80	8.90	10.70	12.30	18.10	25.20
9 "	....	....	10.00	11.80	13.30	19.30	26.60
10 "	....	....	11.25	13.00	14.30	20.60	28.00
11 "	....	....	....	14.25	15.30	21.80	29.50
12 "	....	....	....	15.50	16.30	23.00	31.00
13 "	....	....	....	....	17.40	24.20	32.60
14 "	....	....	....	....	18.50	25.40	34.20
15 "	....	....	....	....	20.00	26.60	35.80
16 "	....	....	....	....	21.50	27.80	37.40
17 "	....	....	....	....	....	29.00	39.00
18 "	....	....	....	....	....	30.40	40.60
19 "	....	....	....	....	....	31.90	42.20
20 "	....	....	....	....	....	33.50	44.00

Button-head bolts, round under head, in 1,000 lots, are sold at a discount, increased 5 per cent.
With hexagon nuts, 10 per cent. discount. For thumb or wing nuts, add 30 per cent.

ROUND UNDER HEAD.

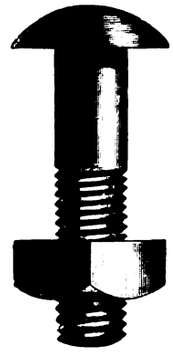


FIG. 5366.

Points finished.
Chamfered nuts.

SQUARE HEADS.



FIG. 5367.

Points finished.

BLANK BOLTS.

PRICES, FIGS. 5367 AND 5368, PER 100.

Length.	1/4	5/16	3/8	7/16	1/2	9/16 & 5/8	3/4	7/8	1
1½ inches ...	$2.25	$2.55	$2.90	$3.70	$4.80	$7.20	$10.15	$15.00	$22.00
2 "	2.35	2.70	3.10	4.00	5.15	7 75	10.90	16.00	23.30
2½ "	2.45	2.85	3.30	4.30	5 50	8.30	11.65	17.00	24.60
3 "	2.55	3.00	3.50	4.60	5.85	8.85	12.40	18.00	25.90
3½ "	2.65	3.15	3.70	4.90	6.20	9.40	13.15	19.00	27.20
4 "	2.75	3.30	3.90	5.20	6.55	9.95	13.90	20.00	28.50
4½ " ...	2.85	3.45	4.10	5.50	6.90	10.50	14.65	21.00	29.80
5 "	2.95	3.60	4.30	5.80	7.25	11.05	15.40	22.00	31.10
5½ "	3.05	3.75	4.50	6.10	7.60	11.60	16.15	23.00	32.40
6 "	3.15	3.90	4.70	6.40	7.95	12.15	16.90	24.00	33.70
6½ "	3.25	4.05	4.90	6.70	8.30	12.70	17.65	25.00	35.00
7 "	3.35	4.20	5.10	7.00	8.65	13.25	18.40	26.00	36.30
8 "	3.55	4.50	5 50	7.60	9.35	14.35	19.90	28.00	38.90
10 "	3.95	5.10	6.30	8.80	10.75	16.55	22.90	32.00	44.10
12 "	4.35	5.70	7.10	10.00	12.15	18.75	25.90	36.00	49.30
14 "	4.75	6 30	7.90	11.20	13.55	20.95	28.90	40.00	54.50
16 "	5.15	6.90	8.70	12.40	14.95	23.15	31.90	44.00	59.70
18 "	5.55	7.50	9.50	13.60	16.35	25.35	34.90	48.00	64.90
20 "	5.95	8.10	10.30	14.80	17.75	27.55	37 90	52.00	70.10

Hexagon heads, 10 per cent. extra.

HEXAGON HEADS.

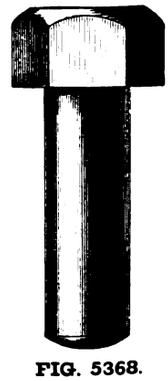


FIG. 5368.

Points finished.

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COMMON CARRIAGE BOLTS.

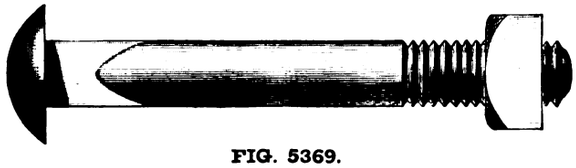


FIG. 5369.

With short full size square under heads, forged nuts and finished points.

PRICES, PER 100.

Length. Inch.	Diameter 5/16 and 3/8 inch.	Diameter 7/16 inch.	Diameter 1/2 inch.	Diameter 9/16 inch.	Diameter 5/8 inch.	Diameter 11/16 and 3/4 inch.	Diameter 7/8 inch.
1 to 1 1/2	$1.35	$1.60	$2.30	$3.10	$3.80	$7.50	....
1 3/4	1.40	1.68	2.30	3.10	3.80	7.50	....
2	1.45	1.75	2.30	3.10	3.80	7.50	....
2 1/4	1.50	1.83	2.40	3.23	3.96	7.50	....
2 1/2	1 55	1 90	2.50	3.35	4.12	7.50	....
2 3/4	1.60	1.98	2.60	3.48	4 28	7.50	....
3	1.65	2.05	2.70	3.60	4.44	7.50	$13.50
3 1/4	1.70	2.13	2.80	3.73	4.60	7.75	13.85
3 1/2	1.75	2.20	2.90	3.85	4.76	8.00	14 20
3 3/4	1.80	2.28	3.00	3.98	4.92	8.25	14.55
4	1.85	2.35	3.10	4.10	5.08	8.50	14.90
4 1/4	1.90	2.43	3.20	4.23	5.24	8.75	15.25
4 1/2	1.95	2.50	3.30	4.35	5.40	9.00	15.60
4 3/4	2.00	2.58	3.40	4.48	5.56	9.25	15.95
5	2.05	2.65	3.50	4.60	5.72	9.50	16.30
5 1/4	2.10	2.73	3.60	4.73	5.88	9.75	16.65
5 1/2	2.15	2.80	3.70	4.85	6.04	10.00	17.00
5 3/4	2.20	2.88	3.80	4.98	6.20	10.25	17.35
6	2.25	2.95	3.90	5.10	6.36	10.50	17.70
6 1/4	2.30	3.03	4.00	5.23	6.52	10.75	18.05
6 1/2	2.35	3.10	4.10	5.35	6.68	11.00	18.40
7	2.45	3.25	4.30	5.60	7.00	11.50	19.10
7 1/2	2.55	3.40	4.50	5.85	7.32	12.00	19 80
8	2.65	3.55	4.70	6.10	7.64	12.50	20.50
8 1/2	2.75	3.70	4.90	6.35	7.96	13.00	21.20
9	2.85	3.85	5.10	6.60	8.28	13.50	21.90
9 1/2	2.95	4.00	5.30	6.85	8.60	14.00	22.60
10	3.05	4.15	5.50	7.10	8.92	14.50	23.30
10 1/2	3.15	4 30	5.70	7.35	9.24	15.00	24.00
11	3.25	4.45	5.90	7.60	9.56	15.50	24.70
11 1/2	3.35	4.60	6.10	7.85	9.88	16.00	25.40
12	3.45	4.75	6.30	8.10	10.20	16.50	26 10
12 1/2	3.55	4.90	6.50	8.35	10.52	17.00	26.80
13	3.65	5.05	6.70	8.60	10.84	17.50	27.50
13 1/2	3.75	5.20	6.90	8.85	11 16	18.00	28.20
14	3.85	5.35	7.10	9.10	11.48	18.50	28.90
14 1/2	3.95	5.50	7.30	9.35	11.80	19.00	29.60
15	4.05	5.65	7.50	9.60	12.12	19.50	30.30
15 1/2	4.15	5.80	7.70	9.85	12.44	20.00	31.00
16	4.25	5.95	7.90	10.10	12.76	20.50	31.70
Advance per in.	20	30	40	50	64	1.00	1.40

UNION CARRIAGE BOLTS.

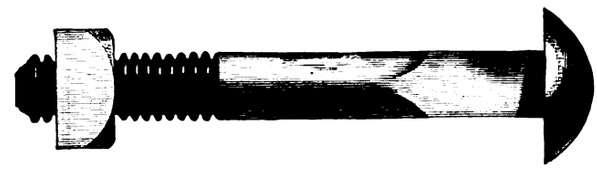


FIG. 5370.

Philadelphia finish. With full size square under heads, forged nuts, turned heads and finished points.

PRICES, PER 100.

Length. Inch.	Diameter 5/16 and 3/8 inch.	Diameter 7/16 inch.	Diameter 1/2 inch.	Diameter 9/16 inch.	Diameter 5/8 inch.
1 1/4	$2.40	$2.70	$3.60	$5.40	$7.20
1 1/2	2.40	2.70	3.60	5.40	7.20
1 3/4	2.45	2.80	3.70	5.40	7.20
2	2.50	2.90	3.70	5.40	7.20
2 1/4	2.55	3.00	3.82	5.55	7.40
2 1/2	2.60	3.10	3.95	5.70	7.60
2 3/4	2 65	3.20	4.08	5.85	7.80
3	2.70	3.30	4.20	6.00	8.00
3 1/4	2.75	3.40	4.32	6.15	8.20
3 1/2	2.80	3.50	4.45	6.30	8.40
3 3/4	2.85	3.60	4.58	6.45	8.60
4	2.90	3.70	4.70	6.60	8.80
4 1/4	2.95	3.80	4.83	6.75	9.00
4 1/2	3.00	3.90	4 95	6 90	9.20
4 3/4	3.05	4.00	5.07	7.05	9.10
5	3.10	4.10	5.20	7.20	9.60
5 1/2	3.20	4.30	5.45	7 50	10.00
6	3.30	4.50	5.70	7.80	10.40
6 1/2	3.40	4.70	5.95	8.10	10.80
7	3.50	4.90	6.20	8.40	11.20
7 1/2	....	5.10	6.45	8.70	11.60
8	....	5.30	6.70	9.00	12.00
8 1/2	....	5.50	6.95	9.30	12.40
9	....	5.70	7.20	9.60	12.80
9 1/2	....	....	7.45	9.90	13.20
10	....	....	7.70	10.20	13.60
10 1/2	....	....	7.95	10.50	14.00
11	....	....	8.20	10.80	14.40
11 1/2	....	....	8.45	11.10	14.80
12	....	....	8.70	11.40	15.20
12 1/2	....	....	....	....	15.60
13	....	....	....	....	16.00
14	....	....	....	....	16.80

PHILADELPHIA EAGLE CARRIAGE BOLTS.

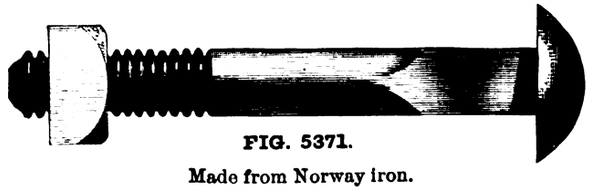


FIG. 5371.

Made from Norway iron.

With forged nuts, turned heads and finished points.

PRICES, PER 100.

Length. Inch.	Diameter 5/16, 3/8 and 1/4 inch.	Diameter 7/16 inch.	Diameter 1/2 inch.	Diameter 9/16 inch.	Diameter 5/8 inch.	Length. Inch.	Diameter 5/16, 3/8 and 1/4 inch.	Diameter 7/16 inch.	Diameter 1/2 inch.	Diameter 9/16 inch.	Diameter 5/8 inch.
1	$3.00	$4.00	$5.00	$7.40	$9.00	5	$4.80	$6.00	$7.40	$9.80	$12.00
1 1/4	3.10	4.00	5.00	7.40	9.00	5 1/2	5.10	6.30	7.80	10.20	12.50
1 1/2	3.20	4.00	5.00	7.40	9 00	6	5.40	6.60	8.20	10.60	13.00
1 3/4	3.30	4.00	5.00	7.40	9.00	6 1/2	5.70	7.00	8.60	11.00	13.50
2	3.40	4.10	5.00	7.40	9.00	7	6.00	7.30	9.00	11.40	14.00
2 1/4	3.50	4.20	5.20	7.60	9.25	7 1/2	6.30	7.60	9.40	11.80	14.50
2 1/2	3.60	4.40	5.40	7.80	9.50	8	....	7.90	9.80	12.20	15.00
2 3/4	3.70	4.50	5.60	8.00	9.75	8 1/2	....	8.20	10 20	12.60	15.50
3	3.80	4.70	5.80	8.20	10.00	9	....	8.50	10.60	13.00	16.00
3 1/4	3.90	4.90	6.00	8.40	10.25	9 1/2	....	....	11.00	13.40	16.50
3 1/2	4.00	5.00	6.20	8.60	10.50	10	....	....	11.40	13.80	17.00
3 3/4	4.10	5.20	6.40	8.80	10.75	10 1/2	....	....	11.80	14.20	17.50
4	4.20	5.30	6.60	9.00	11.00	11	....	....	12.20	14.60	18.00
4 1/4	4.35	5.50	6.80	9.20	11.25	11 1/2	....	....	12.60	15.00	18.50
4 1/2	4.50	5.70	7.00	9.40	11.50	12	....	....	13.00	15.40	19.00

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BOLT ENDS.

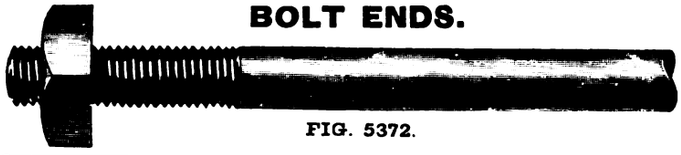


FIG. 5372.

Size of iron.	Lengths.	Prices, per lb.	Size of iron.	Lengths.	Prices, per lb.
5/16 inch.	6 & 8 inch.	28 cts.	1 1/8 inches.	13 inch.	14 cts.
3/8 "	7 & 10 "	24 "	1 1/4 "	14 "	16 "
7/16 "	7 & 10 "	22 "	1 3/8 "	15 "	16 "
1/2 & 9/16 "	8 & 12 "	18 "	1 1/2 "	16 "	16 "
5/8 "	9 & 12 "	16 "	1 5/8 "	17 "	18 "
3/4 "	10 & 12 "	14 "	1 3/4 "	18 "	18 "
7/8 "	12 "	14 "	1 7/8 "	19 "	18 "
1 "	12 "	14 "	2 "	20 "	18 "

Bolt ends cut with right or left hand threads to 3½ inches diameter.

If ordered of shorter lengths than those given in the list, advanced prices will be charged. Hexagon nuts, 10 per cent. extra.

RODS, WITH ENLARGED ENDS.

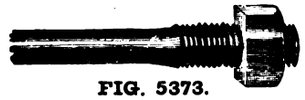


FIG. 5373.



FIG. 5374.

PRICES ON APPLICATION.

BOILER PATCH BOLTS.



FIG. 5376.

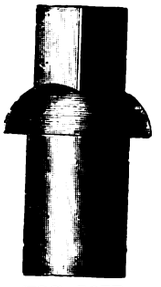


FIG. 5377.



FIG. 5378.



FIG. 5379.

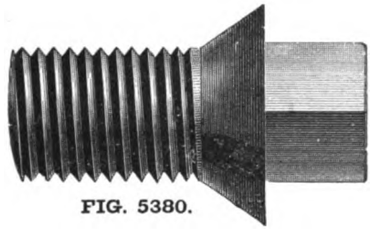


FIG. 5380.



FIG. 5381.

Diameter.	Length.	Prices, each, for small lots.		Prices, per lb., in lots of 25 lbs. or more.	
		Blank.	Cut.	Blank.	Cut.
½ in.	½ to 1 in.	.04	.05	.25	.33
9/16 "	5/8 " 1¼ "	.05	.06	.22	.29
5/8 "	¾ " 1½ "	.05	.06	.20	.26
11/16 "	¾ " 1½ "	.06	.07	.20	.26
¾ "	⅞ " 2 "	.07	.08	.19	.24
13/16 "	1 " 2 "	.09	.11	.19	.24
⅞ "	1 " 2 "	.10	.12	.18	.22
15/16 "	1 " 2 "	.13	.15	.18	.22
1 "	1 " 2½ "	.15	.17	.17	.20
1 1/8 "	1 " 2½ "	.18	.21	.17	.20
1¼ "	1 " 2½ "	.22	.25	.17	.20

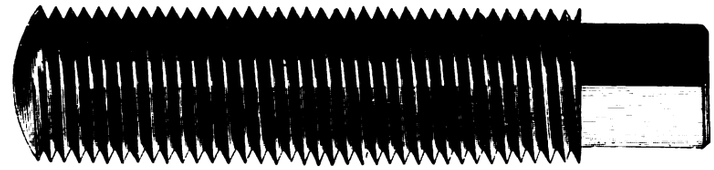
Patch bolts of shorter length are charged at 2 cts. per lb. advance.

Please state, when cut patch bolts are required, whether they are to be cut to U. S. standard gauge, or 12 threads to the inch.

If cut with a special thread in small quantities, an extra charge will be made.

Nicked, 5 per cent. less discount; in small lots at discretion.

BOILER STAY BOLTS.



PRICES, FIG. 5375.

Per 100, in lots of 100 or more.

Cut to U. S. standard threads, and with ends squared.

Length over all.	2½	3	3½	4	4½	5	5½	6	7	8	Longer than 8 in.
¾ in. dia.	12.50	13.00	13.50	14.00	14.75	15.50	16.50	17.50	19.50	21.50	23 cts. per lb.
1/8 and ⅞ in. dia.	14.25	14.75	16.00	17.50	19.00	20.50	22.00	23.50	27.00	30.00	22 cts. per lb.
1/8 and 1 in. dia.	20.50	21.50	22.50	24.00	25.50	27.00	28.50	30.50	34.50	38.00	21 cts. per lb.

When a few in number are ordered, the prices will be advanced at our discretion.

Cut 12 threads per inch at same rate, special threads extra.

Orders should be accompanied by gauge.

BUTTON HEAD. COUNTERSUNK HEAD.

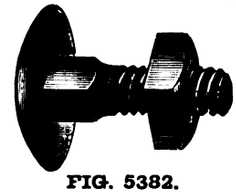


FIG. 5382.

BELT OR ELEVATOR BOLTS.

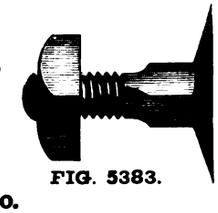


FIG. 5383.

PRICES, PER 100.

Diameter.....	¼ inch.	5/16 inch.	3/8 inch.
Size of heads.....	1 x 3/32	1 3/16 x 1/8	1 3/8 x 5/32
¾ inch long.....	$3.00	$4.00	
1 " "	3.20	4.00	$5.00
1¼ " "	3.30	4.20	5.00
1½ " "	3.40	4.30	5.20
1¾ " "		4.40	5.40
2 " "			5.60

Button-head bolts will be sent, unless otherwise ordered.

For thumb or wing nuts, add 30 per cent.

"ECLIPSE" ELEVATOR BOLT.



FIG. 5384.

Made of Norway iron, and, having a slotted head, can be held or turned by the use of an ordinary screw-driver, while the nut is held with the fingers or wrench.

½ in. x ¼ in.....Price, $1.00 per 100.
⅝ in. x ¼ in..... " 1.00 " "
¾ in. x ¼ in..... " 1.00 " "
1 in. x ¼ in..... " 1.25 " "

FLAT HEAD STOVE BOLT.

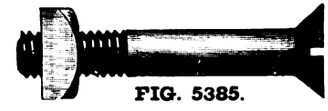


FIG. 5385.

PRICES, PER 100.

Length.	Diam. 3/16 and 1/4 in.	Diam. 5/16 in.	Diam. 3/8 in.	Diam. 7/16 in.	Diam. 1/2 in.
½ in.	$0.60	$0.62	$0.65		
5/8 "	.60	.62	.65		
¾ "	.60	.62	.65	$1.05	$2.20
⅞ "	.65	.67	.70	1.10	2.20
1 "	.65	.67	.70	1.10	2.20
1 1/8 "	.70	.72	.75	1.15	2.20
1¼ "	.70	.72	.75	1.15	2.20
1½ "	.75	.77	.80	1.20	2.20
1¾ "	.80	.82	.85	1.25	2.20
2 "	.85	.87	.90	1.30	2.20
2¼ "	.90	.92	.95	1.35	2.30
2½ "	.95	.97	1.00	1.40	2.40
2¾ "	1.00	1.02	1.05	1.45	2.50
3 "	1.05	1.07	1.10	1.50	2.60

ROUND HEAD STOVE BOLT.

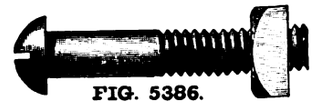


FIG. 5386.

PRICES, PER 100.

Length.	Diam. 3/16 and 1/4 in.	Diam. 5/16 in.	Diam. 3/8 in.	Diam. 7/16 in.
½ in.	$0.85	$0.90	$0.95	
5/8 "	.85	.90	.95	
¾ "	.85	.90	.95	$1.35
⅞ "	.90	.95	1.00	1.40
1 "	.90	.95	1.00	1.45
1 1/8 "	.95	1.00	1.05	1.50
1¼ "	.95	1.00	1.05	1.55
1½ "	1.00	1.05	1.10	1.60
1¾ "	1.05	1.10	1.15	1.65
2 "	1.10	1.15	1.20	1.70
2¼ "	1.15	1.20	1.25	1.75
2½ "	1.20	1.25	1.30	1.80
2¾ "	1.25	1.30	1.35	1.85
3 "	1.30	1.35	1.40	1.95

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DOUBLE AND SINGLE EXPANSION BOLTS.

WEDGE HEAD, DOUBLE.



FIG. 5387.

PRICES, PER 100.

Length over all.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4
2	$13.00	$14.50						
2½	13.05	14.55	$17.50	$22.00				
3	13.10	14.60	17.58	22.10	$26.00	$32.00	$33.00	
3½	13.15	14.65	17.66	22.20	26.12	32.15	33.20	
4	13.20	14.70	17.74	22.30	26.24	32.30	33.40	$48.00
4½		14.75	17.82	22.40	26.36	32.45	33.60	48.25
5		14.80	17.90	22.50	26.48	32.60	33.80	48.50
5½		14.85	17.98	22.60	26.60	32.75	34.00	48.75
6		14.90	18.06	22.70	26.72	32.90	34.20	49.00
6½			18.14	22.80	26.84	33.05	34.40	49.25
7			18.22	22.90	26.96	33.20	34.60	49.50
7½			18.30	23.00	27.08	33.35	34.80	49.75
8			18.38	23.10	27.20	33.50	35.00	50.00
Length of expansion.	1½	1 7/8	2 1/8	2¼	2 3/4	3	3	3 3/4
Size hole to receive expansion.	7/16	9/16	5/8	11/16	13/16	7/8	15/16	1 1/16

Single expansions per cent. less.

SQUARE HEAD, DOUBLE.



FIG. 5388.

PRICES, PER 100.

Length, inches.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
2	$9.00	$11.00	$12.40	$16.35	$19.70					
2½	9.05	11.08	12.50	16.50	19.85	$24.75	$26.75			
3	9.10	11.16	12.60	16.65	20.00	25.00	27.00	$41.40		
3½	9.15	11.24	12.70	16.80	20.15	25.25	27.25	41.70		
4	9.20	11.32	12.80	16.95	20.30	25.50	27.50	42.00		
4½		11.40	12.90	17.10	20.45	25.75	27.75	42.30	$61.59	$83.34
5		11.48	13.00	17.25	20.60	26.00	28.00	42.60	62.00	83.90
5½		11.56	13.10	17.40	20.75	26.25	28.25	42.90	62.43	84.45
6		11.64	13.20	17.55	20.90	26.50	28.50	43.20	62.86	85.00
6½			13.30	17.70	21.05	26.75	28.75	43.50	63.29	85.55
7			13.40	17.85	21.20	27 00	29.00	43.80	63.72	86.10
7½			13.50	18.00	21.35	27.25	29.25	44.10	64.15	86 65
8			13.60	18.15	21.50	27.50	29.50	44.40	64.58	87.20
9						27.75	29.75	44.70	65 01	87.75
10						28.00	30.00	45.00	65.44	88.30
Length of expansion.	1½	1 7/8	2 1/8	2¼	2 3/4	3	3	3 3/4	4½	5
Size hole to receive expansion.	7/16	9/16	5/8	11/16	13/16	7/8	15/16	1 1/16	1¼	1½

Single expansions per cent. less.

Bolts and expansions made in brass to order at special prices.

PRESSED WROUGHT IRON OPEN TURNBUCKLES.



FIG. 5389.

WITH RIGHT AND LEFT BOLT ENDS.

Size.	Prices.	Size.	Prices.	Size.	Prices.
3/8 inch.	$0.40	1 3/8 inch.	$1.38	2 5/8 inch.	$5.00
7/16 "	.42	1½ "	1.50	2¾ "	5.50
½ "	.45	1 5/8 "	1.75	2 7/8 "	6.00
9/16 "	.48	1¾ "	2.00	3 "	6.50
5/8 "	.50	1 7/8 "	2.25	3 1/8 "	7.50
¾ "	.63	2 "	2.65	3¼ "	8.00
7/8 "	.75	2 1/8 "	3.10	3 3/8 "	9.00
1 "	.88	2¼ "	3.50	3½ "	10.00
1 1/8 "	1.00	2 3/8 "	4.00	3¾ "	15.00
1¼ "	1.25	2½ "	4.50	4 "	20.00

Above prices are for first or standard length buckles, viz., 6 inches clear between heads.

DIMENSIONS.

For second length, viz., 9 in. between heads A, and 6 in. longer over all, L, add 25 per cent. to list prices.

For third length, viz., 12 in. between heads A, and 12 in. longer over all, L, add 50 per cent. to list prices.

For fourth length, viz., 15 in. between heads A, and 18 in. longer over all, L, double list figures.

Fifth length, viz., 18 in. between heads A, and 24 in. longer over all, L, are two and one-half times the price of standard first length.

Sixth length, viz., 24 in. between heads A, and 36 in. longer over all, L, are three and one-half times the prices given in list.

Seventh length, viz., 36 in. between heads A, and 60 in. longer over all, L, are four times the prices of first length.

Eighth length, viz., 4 feet between heads A, and 7 feet longer over all, L, are six times the list prices for first length.

Ninth length, viz., 6 feet between heads A, and 11 feet longer over all, L, when extended, are eight times the prices of first standard lengths.

DIMENSIONS.

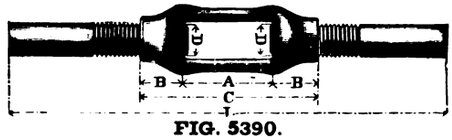


FIG. 5390.

D. Size=outside diameter of screw.

A. Length in clear between heads=6 in. first length for all sizes.

B. Length of tapped heads=1½ D, nearly.

C. Total length of buckle without bolt ends=6 in. +3 D, nearly.

L. Total length of buckle and stub ends when extended.

Size D.	L.	Size D.	L.	Size D.	L.
3/8 inch.	22 inch.	1 3/8 inch.	27 inch.	2 5/8 inch.	32 inch.
7/16 "	22 "	1½ "	27 "	2¾ "	33 "
½ "	22 "	1 5/8 "	28 "	2 7/8 "	33 "
9/16 "	22 "	1¾ "	28 "	3 "	34 "
5/8 "	22 "	1 7/8 "	29 "	3 1/8 "	36 "
¾ "	23 "	2 "	29 "	3¼ "	36 "
7/8 "	24 "	2 1/8 "	29 "	3 3/8 "	37 "
1 "	25 "	2¼ "	30 "	3½ "	37 "
1 1/8 "	25 "	2 3/8 "	31 "	3¾ "	39 "
1¼ "	26 "	2½ "	32 "	4 "	41 "

BUCKLES.



FIG. 5391.

For prices of buckles without bolt ends deduct 20 per cent.

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PIPE SWIVELS.

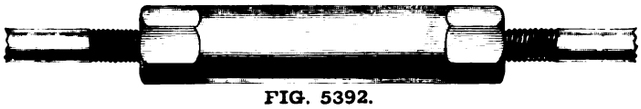


FIG. 5392.

ARM SWIVELS.

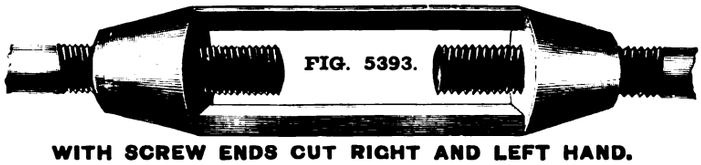


FIG. 5393.

WITH SCREW ENDS CUT RIGHT AND LEFT HAND.

TURNBUCKLE,

WITH BOLT HEAD—SWIVEL—IN ONE END.



FIG. 5394.

PRICES, FIG. 5392.	
Size.	
3/8	$0.60
1/2	.80
5/8	1.00
3/4	1.25
7/8	1.50
1	2.00
1 1/8	2.50
1 1/4	3.00
1 3/8	3.50
1 1/2	4.00
1 3/4	5.00
2	6.00

PRICES, FIGS. 5393 AND 5394.	
Size.	
3/8	$0.75 each.
1/2	1.00 "
5/8	1.25 "
3/4	.20 per lb.
7/8	.18 "
1	.17 "
1 1/8	.17 "
1 1/4	.16 "
1 3/8	.16 "
1 1/2	.16 "
1 5/8	.16 "
1 3/4	.17 "
1 7/8	.17 "
2	.18 "
2 1/8	.18 "
2 1/4	.18 "

We can make swivels up to 3 1/2 inch, inclusive.

WROUGHT IRON SCREW RING BOLTS.



FIG. 5397.

PRICES.

Size.	Galvanized. Per doz.	Plain. Per doz.	Length under the eye.
1/4 inch	$1.60	$1.50	2 inches.
5/16 "	2.40	2.20	2 1/4 "
3/8 "	2.80	2.40	2 1/2 "
7/16 "	3.20	3.00	2 3/4 "
1/2 "	3.60	3.30	3 1/4 "
5/8 "	4.80	4.25	4 "
3/4 "	9.60	8.85	4 1/2 "
7/8 "	13.50	12.00	5 "
1 "	19.00	17.00	6 "

WROUGHT IRON EYE BOLTS.

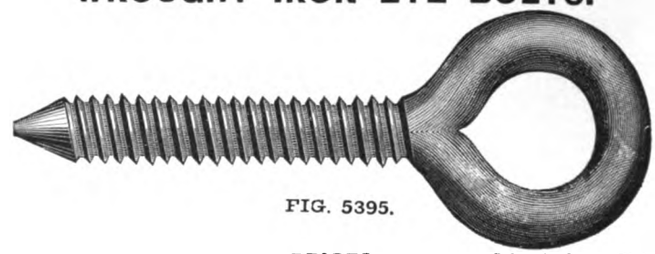


FIG. 5395.

Size.	PRICES. Galvanized. Per doz.	Plain. Per doz.
1/4 inch	$1.00	$0.90
5/16 "	1.20	1.10
3/8 "	1.60	1.50
7/16 "	2.00	1.90
1/2 "	2.40	2.25
5/8 "	3.20	2.95
3/4 "	5.80	5.30
7/8 "	8.00	7.25
1 "	9.60	8.50

HOOK AND EYE TURNBUCKLES.



FIG. 5396.

Size.	PRICES. Galvanized. Each.	Plain. Each.
5/16 inch	$1.50	$1.00
3/8 "	1.75	1.25
7/16 "	2.00	1.50
1/2 "	2.25	1.75
5/8 "	3.00	2.00
3/4 "	4.00	3.00
7/8 "	5.00	4.00
1 "	6.00	5.00

HANGER BOLTS.



FIG. 5398.

PRICES, PER 100.

Length.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.
3 in.	$5.00	$5.75						
4 "	.....	6.50						
5 "	.....	7.50	$9.50					
6 "	.....	8.00	10.50	$13.00	$16.00			
7 "	.....	8.50	11.25	14.50	18.00	$25.00		
8 "	.....	9.00	12.00	15.50	19.50	27.00	$36.00	
9 "	.....	.....	12.75	16.50	21.00	28.50	38.50	$52.00
10 "	.....	.....	13.50	17.50	22.00	30.00	41.00	56.00
11 "	.....	.....	.....	18.25	23.00	31.50	43.00	59.50
12 "	.....	.....	.....	19.00	24.00	33.00	45.00	63.00
14 "	.....	.....	.....	.....	.....	35.50	49.00	69.00
16 "	.....	.....	.....	.....	.....	.....	.....	75.00

Hexagon nuts, 10 per cent. extra.

SPECIAL LAG SCREWS.

FETTER DRIVE SCREW.

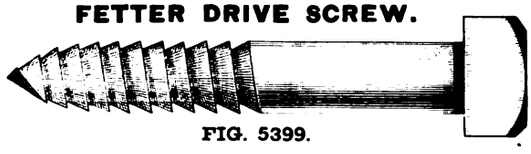


FIG. 5399.

DOUBLE END, GIMLET POINT.

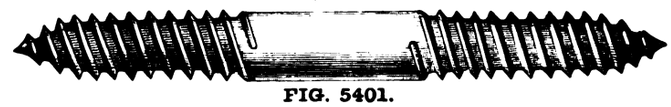


FIG. 5401.

GIMLET POINT, WITH PIPE THREAD.



FIG. 5400.

DOUBLE END LAG SCREW.

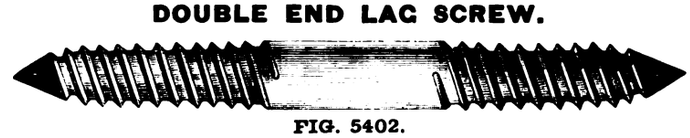


FIG. 5402.

FOR PRICES, FIGS. 5399 TO 5402, SEE NEXT PAGE, FIG. 5403.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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LAG SCREWS.

CONICAL POINTS.



FIG. 5403.

PRICES, FIGS. 5399, 5400, 5401, 5402 AND 5403.
PRICES, PER 100.

Length under head.	5/16	3/8	7/16	1/2	9/16 & 5/8	3/4	7/8	1
1½ in.	$2.70	$3.10	$4.00	$4.30				
2 "	2.90	3.30	4.25	4.65	$6.50			
2½ "	3.10	3.50	4.50	5.00	7.05	10.20		
3 "	3.30	3.70	4.75	5.35	7.60	10.95	16.00	
3½ "	3.50	3.90	5.00	5.70	8.15	11.70	17.00	22.60
4 "	3.70	4.10	5.25	6.05	8.70	12.45	18.00	24.00
4½ "	3.90	4.30	5.50	6.40	9.25	13.20	19.00	25.40
5 "	4.10	4.50	5.75	6.75	9.80	13.95	20.00	26.80
5½ "	4.30	4.70	6.00	7.10	10.35	14.70	21.00	28.20
6 "	4.50	4.90	6.25	7.50	10.90	15.50	22.00	29.60
7 "			6.75	8.20	12.00	17.00	24.00	32.40
8 "			7.25	8.90	13.10	18.50	26.00	35.20
9 "			7.75	9.60	14.20	20.00	28.00	38.00
10 "				10.30	15.30	21.50	30.00	40.80
11 "				11.00	16.40	23.00	32.00	43.60
12 "				11.70	17.50	24.50	34.00	46.40
Add per inch.	$0.60	$0.70	$0.80	$1.00	$1.20	$1.70	$2.30	$3.00

Hexagon heads, 10 per cent. extra.
Wood screw ends made to order.

GIMLET POINTS.

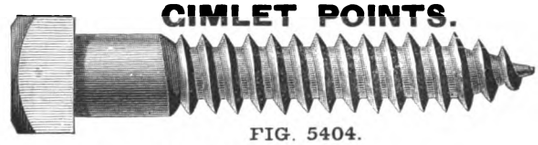


FIG. 5404.

PRICES, PER 100.

Length under head.	5/16	3/8	7/16	1/2	9/16 & 5/8	3/4
1½ in.	$2.70	$3.10	$4.00	$4.30		
2 "	2.90	3.30	4.25	4.65	$6.50	
2½ "	3.10	3.50	4.50	5.00	7.05	$10.20
3 "	3.30	3.70	4.75	5.35	7.60	10.95
3½ "	3.50	3.90	5.00	5.70	8.15	11.70
4 "	3.70	4.10	5.25	6.05	8.70	12.45
4½ "	3.90	4.30	5.50	6.40	9.25	13.20
5 "	4.10	4.50	5.75	6.75	9.80	13.95
5½ "	4.30	4.70	6.00	7.10	10.35	14.70
6 "	4.50	4.90	6.25	7.50	10.90	15.50
7 "			6.75	8.20	12.00	17.00
8 "			7.25	8.90	13.10	18.50
9 "			7.75	9.60	14.20	20.00
10 "				10.30	15.30	21.50
11 "				11.00	16.40	23.00
12 "				11.70	17.50	24.50
Add per inch.	$0.60	$0 70	$0.80	$1.00	$1.20	$1.70

Hexagon heads, 10 per cent. extra. Wood screw ends made to order.

DROP FORCED STEEL THUMB NUT BLANKS.

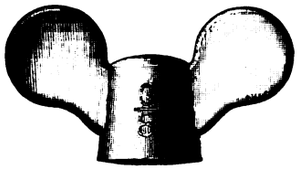


FIG. 5406.

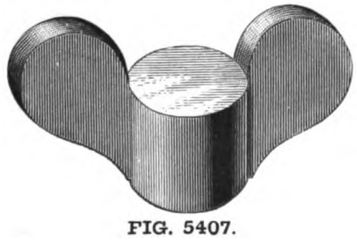


FIG. 5407.

PRICES, EITHER STYLE.
Will tap for size of bolts given.

Size of bolt	1/8	3/16	1/4	5/16	3/8
Prices, per 100	$3.00	$3.50	$4.00	$4.50	$5.00
Size of bolt	7/16	1/2	9/16	5/8	3/4
Prices, per 100	$6.00	$8.00	$10.00	$12.00	$14.00

TAPPED MALLEABLE THUMB OR WING NUTS.

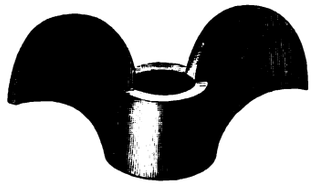


FIG. 5408.

For bolts.	Weight per 100.	Prices, in 25-lb. lots.	Prices, in smaller lots.
1/4 inch.	1⅞ lbs.	32 cts. per lb.	35 cts. per lb.
5/16 "	2½ "	26 " "	30 " "
3/8 "	4½ "	21½ " "	25 " "
7/16 "	6½ "	18 " "	20 " "
1/2 "	9¼ "	16 " "	18 " "
5/8 "	19 "	15 " "	17 " "
3/4 "	40 "	12½ " "	14 " "

EXTRAS, FIG. 5409.

For finished nuts, with double chamfer, add 10 per cent.
Finished nuts, not case hardened, at a reduction of 5 per cent. from list prices; polished, not case hardened, at regular rates.
Polished, after case hardening, 10 per cent. less discount.
Case hardened semi-finished nuts, 5 per cent. less discount.
Semi-finished square nuts made to order.

ORE WASHER, WOOD OR LAG SCREWS.



FIG. 5405. PRICES ON APPLICATION.

CASE HARDENED HEXAGON NUTS.

FINISHED. SEMI-FINISHED. PLAIN.

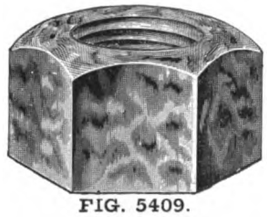


FIG. 5409.

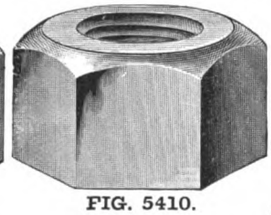
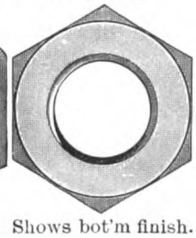


FIG. 5410.



Shows bot'm finish.

The thread and outside of each finished nut are made to an accurate gauge and to the standard adopted by the U. S. Government.
The semi-finished nuts correspond with the finished nuts in all dimensions; they are U. S. standard nuts, tapped and faced true on the bottom.

For bolt.	Width.	Thickness.	Number of threads.	Prices, Fig. 5409, finished case hardened nuts, each.	Prices, Fig. 5410, each.	Semi-finished, with double chamfer. Prices, each.
1/4 in.	1/2	1/4	20	$0.06	$0.02	$0.02½
5/16 "	19/32	5/16	18	.07	.02½	.03
3/8 "	11/16	3/8	16	.08	.03¼	.04
7/16 "	25/32	7/16	14	.09	.03¾	.04½
1/2 "	7/8	1/2	13 or 12	.10	.04	.04¾
9/16 "	31/32	9/16	12	.12	.05	.06
5/8 "	1 1/16	5/8	11	.15	.05½	.06½
11/16 "	1 5/32	11/16	11	.17	.06½	.07¾
3/4 "	1¼	3/4	10	.18	.07½	.08¾
7/8 "	1 7/16	7/8	9	.22	.10	.11½
1 "	1 5/8	1	8	.30	.13½	.15½
1⅛ "	1 13/16	1⅛	7	.35	.17	.19½
1¼ "	2	1¼	7	.45	.24	.27
1⅜ "	2 3/16	1⅜	6	.55	.34	.38
1½ "	2⅜	1½	6	.65	.44	.48
1⅝ "	2 9/16	1⅝	5½	.80	.54	.60
1¾ "	2¾	1¾	5	1.00	.70	.78
1⅞ "	2 15/16	1⅞	5	1.50	.90	1.00
2 "	3 1/8	2	4½	2.00	1.10	1.25
2¼ "	3½	2¼	4½	3.50	1.50	1.80

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U. S. STANDARD SIZES NUTS, HOT AND COLD PRESSED.

Chamfered and trimmed holes drilled in the cold punched. Holes reamed in the hot pressed.

COLD PUNCHED, SQUARE.



FIG. 5411.

COLD PUNCHED, HEXAGON.

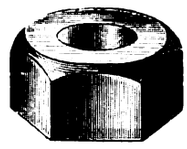


FIG. 5412.

HOT PRESSED, SQUARE.

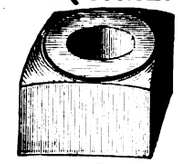


FIG. 5413.

HOT PRESSED, HEXAGON.



FIG. 5414.

Bolt.	Wide.	Thick.	Hole for cold pressed.	Square, prices per pound. Fig. 5411.	Number of square in 100 pounds.	Hexagon, prices per pound. Fig. 5412.	Number of hexagon in 100 pounds.
1/4	1/2	1/4	13/64	20.	7,000	27.	8,200
5/16	19/32	5/16	1/4	18.	4,300	24.	5,100
3/8	11/16	3/8	19/64	14.5	2,550	18.5	3,000
7/16	25/32	7/16	11/32	14.	1,770	18.	2,030
1/2	7/8	1/2	25/64	11.3	1,180	14.	1,400
9/16	31/32	9/16	29/64	11.3	920	14.	1,060
5/8	1 1/16	5/8	33/64	10.	660	12.5	780
3/4	1 1/4	3/4	39/64	9.4	380	10.9	470
7/8	1 7/16	7/8	45/64	9.4	260	10.9	308
1	1 5/8	1	51/64	9.4	172	10.9	212
1 1/8	1 13/16	1 1/8	57/64	9.4	130	10.9	150
1 1/4	2	1 1/4	1 1/8	10.1	96	11.5	111
1 3/8	2 3/16	1 3/8	1 5/32	10.3	70	12.	85
1 1/2	2 3/8	1 1/2	1 9/32	10.7	59	12.6	69
1 5/8	2 9/16	1 5/8	1 13/32	11.1	46	13.2	54
1 3/4	2 3/4	1 3/4	1 1/2	11.5	35	14.	41
1 7/8	2 15/16	1 7/8	1 5/8	12.	29	14.5	35
2	3 1/8	2	1 25/32	12.	24	14.5	29
2 1/8	3 5/16	2 1/8	1 29/32	12.5	20	15.	25
2 1/4	3 1/2	2 1/4	1 13/16	12.5	17 1/2	15.	21
2 3/8	3 11/16	2 3/8	2 1/16	13.5	15	16.	19 1/2
2 1/2	3 7/8	2 1/2	2 5/16	13.5	12	16.	15 1/2
2 5/8	4 1/8	2 5/8	2 7/16	14.	11	16.5	14
2 3/4	4 1/4	2 3/4	2 7/8	14.	9	16.5	11
3	4 5/8	3	2 11/16	14.5	7 1/3	17.	8 1/2
3 1/4	5	3 1/4	2 15/16	14.5	6	17.	7
3 1/2	5 3/8	3 1/2	3 3/16	14.5	5	17.	5 3/4
4	6 1/8	4	3 7/16	15.5	3 1/3	18.	4

PRICES, WITH REAMED HOLES.				PRICES, HOLES NOT REAMED.			
Bolt.	Hole.	Square, prices per pound. Fig. 5413.	Hexagon, prices per pound. Fig. 5414	Square, prices per pound. Fig. 5413.	Number of square in 100 pounds.	Hexagon, prices per pound. Fig. 5414.	Number of hexagon in 100 pounds.
1/4	3/16 scant	13.8	21.0	13.0	7,400	20.0	8,880
5/16	1/4 scant	12.8	19.0	12.0	4,000	18.0	4,800
3/8	19/64 scant	11.0	14.7	10.5	2,730	14.0	3,276
7/16	11/32	10.5	13.7	10.0	1,700	13.0	2,040
1/2	25/64 scant	9.3	11.5	9.0	1,231	11.2	1,392
9/16	29/64	9.3	11.5	9.0	918	11.2	1,080
5/8	1/2 full	8.9	10.7	8.7	653	10.5	784
3/4	5/8 scant	8.6	10.2	8.5	390	10.0	463
7/8	47/64 scant	8.6	10.2	8.4	265	9.9	312
1	27/32 scant	8.4	10.0	8.2	190	9.7	204
1 1/8	15/16 full	8.4	10.0	8.2	134	9.7	146
1 1/4	1 1/16 full	8.8	10.5	8.4	104	9.9	108
1 3/8	1 5/16 full	8.8	10.5	8.5	74	10.0	83
1 1/2	1 7/16 full	9.6	11.3	8.8	56	10.3	65
1 5/8	1 25/32 scant	9.6	11.3	9.0	43	10.5	52
1 3/4	1 1/2 scant	10.2	12.1	9.3	35	10.8	42
1 7/8	1 5/8 scant	10.2	12.1	9.5	29	11.0	35
2	1 23/32 scant	10.6	12.6	9.7	24	11.2	29
2 1/8	1 27/32 scant	11.0	13.0	10.0	20 1/4	11.7	26
2 1/4	1 31/32 scant	11.5	13.5	10.0	17	11.7	23

Width and thickness same as Figs. 5411 and 5412.

U. S. STANDARD PLAIN NUTS, NOT CHAMFERED OR TRIMMED.

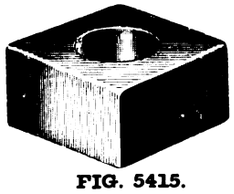


FIG. 5415.

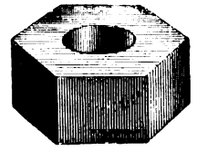


FIG. 5416.

PRICES, COLD PUNCHED.

Wide.	Thick.	Hole.	Bolt.	Square, prices per pound. Fig. 5415.	Number of square in 100 pounds.	Hexagon, prices per pound. Fig. 5416.	Number of hexagon in 100 pounds.
1/2	1/4	13/64	1/4	13.8	6,700	21.	7,500
19/32	5/16	1/4	5/16	12.8	4,100	19.	4,700
11/16	3/8	19/64	3/8	11.	2,400	14.7	2,800
25/32	7/16	11/32	7/16	10.5	1,550	13.7	1,830
7/8	1/2	25/64	1/2	9.3	1,100	11.5	1,300
31/32	9/16	29/64	9/16	9.3	825	11.5	990
1 1/16	5/8	33/64	5/8	8.9	580	10.7	700
1 1/4	3/4	39/64	3/4	8.6	348	10.2	438
1 7/16	7/8	45/64	7/8	8.6	228	10.2	290
1 5/8	1	51/64	1	8.4	156	10.	198
1 13/16	1 1/8	57/64	1 1/8	8.4	122	10.	140
2	1 1/4	1 1/16	1 1/4	8.8	88	10.5	103
2 3/16	1 3/8	1 5/32	1 3/8	8.8	65	10.5	77
2 3/8	1 1/2	1 9/32	1 1/2	9.6	54	11.3	63
2 9/16	1 5/8	1 13/32	1 5/8	9.6	42	11.3	50
2 3/4	1 3/4	1 1/2	1 3/4	10.2	33	12.1	39
2 15/16	1 7/8	1 5/8	1 7/8	10.2	27	12.1	33
3 1/8	2	1 23/32	2	10.6	23	12.6	28
3 5/16	2 1/8	1 13/16	2 1/8	11.	19	13.	24
3 1/2	2 1/4	1 15/16	2 1/4	11.5	17	13.5	20

PRICES, EXTRA, FOR TAPPING.

In 200 pound lots.

Extra cost of tapping. Add to nut lists.				U. S. S. tapped nut. Number in 100 pounds.	
Size of bolt.	Threads to inch.	Square nuts, prices per pound.	Hexagon nuts, prices per pound.	Square nuts, cupped.	Hexagon nuts, cupped.
1/4 inch.	20	6.	9.	7,500	9,000
5/16 "	18	4.5	7.	4,500	5,500
3/8 "	16	3.7	6.	2,720	3,200
7/16 "	14	3.	4.5	1,900	2,170
1/2 "	13 or 12	2.5	3.5	1,250	1,500
9/16 "	12	2.1	2.8	980	1,150
5/8 "	11	1.6	2.3	700	850
3/4 "	10	1.3	2.	400	520
7/8 "	9	1.2	1.8	270	340
1 "	8	1.2	1.8	180	230
1 1/8 "	7	1.2	1.8	137	165
1 1/4 "	7	1.5	2.2	101	122
1 3/8 "	6	1.5	2.2	74	94
1 1/2 "	6	1.5	2.2	63	75
1 5/8 "	5 1/2	2.2	2.7	49	58
1 3/4 "	5	2.2	2.7	37	44
1 7/8 "	5	2.5	3.2	31	38
2 "	4 1/2	2.5	3.2	26	31
2 1/8 "	4 1/2	3.	4.	21	26
2 1/4 "	4 1/2	3.	4.	18 1/2	22
2 1/2 "	4	3.5	4.5	12 1/2	15 3/4
2 3/4 "	4	3.5	4.5	9 1/2	11 3/4
3 "	3 1/2	3.5	4.5	7 3/4	9
3 1/4 "	3 1/2	4.	5.	6 1/4	7 1/2
3 1/2 "	3 1/4	4.	5.	5 1/4	6 1/4
4 "	3	4.	5.	3 1/2	4 1/4

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MANUFACTURERS' STANDARD SIZES NUTS, COLD PUNCHED.

PLAIN HEXAGON.

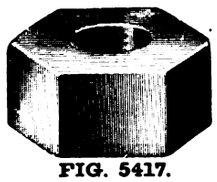


FIG. 5417.

CUPPED HEXAGON.

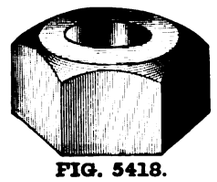


FIG. 5418.

PLAIN SQUARE.

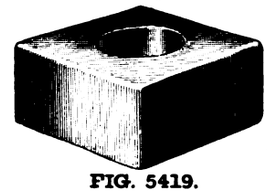


FIG. 5419.

CUPPED SQUARE.

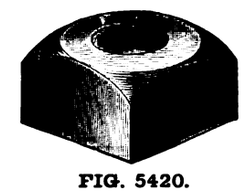


FIG. 5420.

PRICES, COLD PUNCHED NUTS.

Bolt.	Wide.	Thick.	Hole.	Plain, prices, per lb. Fig. 5417.	Plain, number in 100 lbs.	Cupped, prices, per lb. Fig. 5418.	Cupped, number in 100 lbs.
1/4	1/2	1/4	7/32	21.	7,800	27.	8,500
5/16	5/8	5/16	9/32	17.5	4,440	21.5	4,790
3/8	3/4	3/8	11/32	13.8	2,330	17.5	2,510
7/16	7/8	7/16	13/32	11.5	1,430	14.	1,580
1/2	7/8	1/2	7/16	11.5	1,330	14.	1,440
1/2	1	1/2	7/16	11.	1,010	12.5	1,090
1/2	1	9/16	7/16	11.	930	12.5	980
9/16	1 1/8	9/16	1/2	10.6	730	12.	800
5/8	1 1/8	5/8	9/16	10.6	630	12.	660
5/8	1 1/8	3/4	9/16	10.6	560	12.	588
5/8	1 1/4	5/8	9/16	10.1	514	11.	541
3/4	1 1/4	3/4	9/16	10.1	435	11.	460
3/4	1 3/8	3/4	11/16	10.1	376	11.	394
3/4	1 3/8	7/8	11/16	10.1	330	11.	347
3/4	1 1/2	3/4	11/16	9.7	290	10.6	310
3/4	1 1/2	7/8	11/16	9.7	250	10.6	266
7/8	1 1/2	7/8	13/16	10.1	265	11.	283
7/8	1 1/2	1	13/16	10.1	218	11.	230
7/8	1 5/8	7/8	13/16	9.7	221	10.6	235
7/8	1 5/8	1	13/16	9.7	197	10.6	210
1	1 3/4	1	15/16	9.7	174	10.6	186
1	1 3/4	1 1/8	15/16	9.7	157	10.6	168
1 1/8	2	1 1/4	15/16	9.7	100	10.6	110
1 1/4	2 1/4	1 3/8	1 1/16	10.1	72	11.2	79
1 3/8	2 1/2	1 1/2	1 3/16	10.1	54	11.2	59
1 1/2	2 3/4	1 5/8	1 5/16	10.3	41	11.5	45
1 5/8	3	1 3/4	1 7/16	10.9	30	12.	33
1 3/4	3 1/4	1 7/8	1 9/16	11.2	24 1/2	12.3	27
1 7/8	3 1/2	2	1 11/16	12.	20 1/4	13.	21 3/4
2	3 1/2	2	1 13/16	12.5	20 1/2	13.5	22
2	3 1/2	2 1/8	1 13/16	12.5	19 1/2	13.5	20 1/2

Bolt.	Wide.	Thick.	Hole.	Plain, prices, per lb. Fig. 5419.	Plain, number in 100 lbs.	Cupped, prices, per lb. Fig. 5420.	Cupped, number in 100 lbs.
1/4	1/2	1/4	7/32	13.8	6,750	20.	7,200
5/16	5/8	5/16	9/32	12.3	3,540	16.	4,000
3/8	3/4	3/8	11/32	10.8	2,100	13.5	2,380
7/16	7/8	7/16	13/32	9.3	1,330	11.3	1,460
1/2	7/8	1/2	7/16	9.3	1,120	11.3	1,230
1/2	1	1/2	7/16	9.	840	10.	930
9/16	1 1/8	9/16	1/2	8.8	650	9.8	700
5/8	1 1/8	5/8	9/16	8.8	575	9.8	620
5/8	1 1/4	5/8	9/16	8.5	435	9.2	475
3/4	1 3/8	3/4	11/16	8.5	315	9.2	345
3/4	1 1/2	3/4	11/16	8.2	244	8.8	270
7/8	1 1/2	7/8	13/16	8.5	215	9.2	240
7/8	1 5/8	7/8	13/16	8.2	180	8.8	205
7/8	1 3/4	7/8	15/16	8.2	163	8.8	183
1	1 3/4	1	15/16	8.2	141	8.8	156
1	2	1	15/16	8.2	105	8.8	115
1 1/8	2	1 1/8	15/16	8.2	98	8.8	106
1 1/8	2 1/4	1 1/8	15/16	8.2	74	8.8	81
1 1/4	2 1/4	1 1/4	1 1/16	8.6	64	9.3	70
1 1/4	2 1/2	1 1/4	1 1/16	8.6	52	9.3	57
1 3/8	2 3/4	1 3/8	1 3/16	8.6	40	9.3	44
1 1/2	3	1 1/2	1 5/16	9.2	31 1/2	10.	35
1 5/8	3 1/4	1 5/8	1 7/16	9.4	22	10.2	25
1 3/4	3 1/2	1 3/4	1 9/16	9.8	18	10.6	20
1 7/8	3 3/4	1 7/8	1 11/16	10.	15	10.8	16
2	4	2	1 13/16	10.2	12 1/4	11.	12 3/4

PRICES, HOT PRESSED NUTS.

Bolt.	Wide.	Thick.	Hole.	Number in 100 lbs.	Prices, per lb. Fig. 5418.
1/4	1/2	1/4	7/32	8,880	20.
5/16	5/8	5/16	9/32	4,740	16.
3/8	3/4	3/8	11/32	2,622	13.
7/16	7/8	7/16	13/32	1,596	11.2
1/2	7/8	1/2	7/16	1,440	11.2
1/2	1	1/2	7/16	1,076	10.5
9/16	1 1/8	9/16	1/2	818	10.3
5/8	1 1/8	5/8	9/16	691	10.3
5/8	1 1/4	5/8	9/16	550	10.
5/8	1 1/4	3/4	9/16	465	10.
3/4	1 3/8	3/4	11/16	385	9.8
3/4	1 1/2	3/4	11/16	302	9.6
3/4	1 1/2	7/8	11/16	260	9.6
7/8	1 1/2	7/8	13/16	245	9.8
7/8	1 5/8	7/8	13/16	236	9.6
7/8	1 5/8	1	13/16	206	9.6
1	1 5/8	1	15/16	197	9.7
1	1 3/4	1	15/16	188	9.6
1	1 3/4	1 1/8	15/16	167	9.6
1 1/8	2	1 1/4	15/16	113	9.6
1 1/8	2 1/4	1 3/8	1 1/16	80	9.8
1 1/4	2 1/2	1 1/2	1 3/16	55	10.
1 3/8	2 3/4	1 5/8	1 5/16	42	10.2
1 1/2	3	1 3/4	1 7/16	33	10.5
1 5/8	3 1/4	1 7/8	1 9/16	26	10.7
1 3/4	3 1/2	2	1 11/16	22	10.8
1 7/8	3 1/2	2 1/8	1 13/16	22	11.
2	3 3/4	2 1/8	1 13/16	....	11.3
2 1/8	3 3/4	2 1/4	2	....	11.5
2 1/4	4	2 3/8	2 1/8	....	11.8
2 3/8	4 1/4	2 1/2	2 1/4	....	12.1
2 1/2	4 1/2	2 3/4	2 7/16	....	12.6
2 3/4	4 3/4	3	2 11/16	....	13.2

Bolt.	Wide.	Thick.	Hole.	Number in 100 lbs.	Prices, per lb. Fig. 5420.
1/4	1/2	1/4	7/32	7,400	13.
5/16	5/8	5/16	9/32	3,950	11.5
3/8	3/4	3/8	11/32	2,185	10.
7/16	7/8	7/16	13/32	1,330	9.
1/2	7/8	1/2	7/16	1,190	9.
1/2	1	1/2	7/16	897	8.7
9/16	1 1/8	9/16	1/2	682	8.5
5/8	1 1/8	5/8	9/16	580	8.5
5/8	1 1/4	5/8	9/16	458	8.4
3/4	1 3/8	3/4	11/16	315	8.35
3/4	1 1/2	3/4	11/16	252	8.2
7/8	1 5/8	7/8	13/16	180	8.15
7/8	1 3/4	7/8	15/16	164	8.1
1	1 3/4	1	15/16	141	8.15
1	2	1	15/16	113	8.1
1 1/8	2	1 1/8	15/16	98	8.15
1 1/8	2 1/4	1 1/8	15/16	78	8.1
1 1/4	2 1/4	1 1/4	1 1/16	64	8.3
1 1/4	2 1/2	1 1/4	1 1/16	53	8.2
1 3/8	2 3/4	1 3/8	1 3/16	41	8.4
1 1/2	3	1 1/2	1 5/16	31	8.6
1 5/8	3 1/4	1 5/8	1 7/16	24	8.8
1 3/4	3 1/2	1 3/4	1 9/16	21	9.
1 7/8	3 3/4	1 7/8	1 11/16	17	9.1
2	4	2	1 13/16	14	9.2
2 1/8	4	2 1/8	1 7/8	....	9.4
2 1/4	4 1/4	2 1/4	2	....	9.6
2 3/8	4 1/4	2 3/8	2 1/8	....	9.6
2 1/2	4 1/2	2 1/2	2 1/4	....	9.8
2 3/4	4 3/4	2 3/4	2 7/16	....	10.3
3	5	3	2 11/16	....	10.8

DOUBLE CUPPED NUTS.

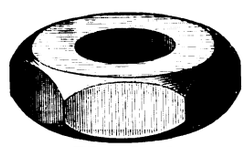


FIG. 5421.

Made to order.

PRICES ON APPLICATION.

ROUND NUTS OR COLLARS.

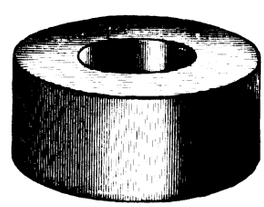


FIG. 5422.

Can furnish almost any sizes.

PRICES ON APPLICATION.

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WASHERS.

PLATE WASHERS.

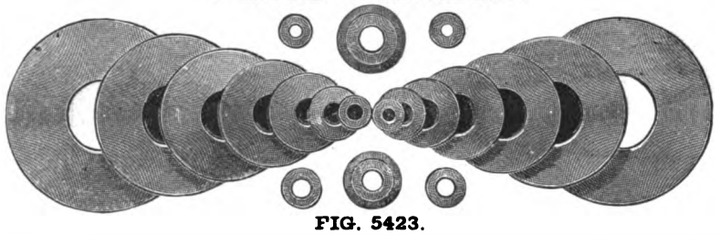


FIG. 5423.

Diameter.	Thickness, wire gauge.	Size of hole.	Size of bolt.	Prices, per lb.	No. in 100 lbs.
9/16	No. 18 (3/64)	1/4	3/16	18.	39,400
3/4	" 16 (1/16)	5/16	1/4	12.5	13,900
7/8	" 16 "	3/8	5/16	11.5	11,250
1	" 14 (5/64)	7/16	3/8	10.5	6,800
1 1/4	" 14 "	1/2	7/16	9.5	4,300
1 3/8	" 12 (3/32)	9/16	1/2	9.	2,600
1 1/2	" 12 "	5/8	9/16	9.	2,250
1 3/4	" 10 (1/8)	11/16	5/8	8.5	1,300
2	" 10 "	13/16	3/4	8.5	1,010
2 1/4	" 10 "	15/16	7/8	8.5	860
2 1/2	" 9 (5/32)	1 1/16	1	8.5	625
2 3/4	" 9 "	1 1/4	1 1/8	8.5	520
3	" 9 "	1 3/8	1 1/4	8.5	400
3 1/2	" 8 (11/64)	1 1/2	1 3/8	9.	280
3 3/4	" 8 "	1 5/8	1 1/2	9.	240
3 3/4	" 8 "	1 3/4	1 5/8	9.	245
4	" 8 "	1 7/8	1 3/4	9.	220
4 1/4	" 8 "	2	1 7/8	9.	190
4 1/2	" 8 "	2 1/8	2	9.	175
4 3/4	" 6 (7/32)	2 3/8	2 1/4	9.5	110
5	" 6 "	2 5/8	2 1/2	9.5	91

ADDITIONAL SIZES.

Diameter.	Thickness, wire gauge.	Size of hole.	Size of bolt.	Prices, per lb.	No. in 100 lbs.
1/2	No. 18	1/4	3/16	21.5	45,500
5/8	" 16	5/16	1/4	16.	21,500
3/4	" 16	3/8	5/16	14 5	16,500
7/8	" 14	7/16	3/8	12.5	11,500
1	" 14	1/2	7/16	11.5	7,400
1 1/8	" 14	9/16	1/2	10.5	5,450
1 1/8	" 12	9/16	1/2	12.	4,800
1 1/4	" 12	9/16	1/2	10.5	3,650
1 1/2	" 12	9/16	1/2	9.	2,000
1 1/4	" 12	9/16	1/2	11.	3,900
1 3/8	" 12	5/8	9/16	10.	3,000
1 1/4	" 12	5/8	9/16	11.5	4,100
1 3/8	" 12	11/16	5/8	10.5	3,200
1 1/2	" 10	11/16	5/8	9.5	2,150
1 1/2	" 10	13/16	3/4	10.	2,200
1 3/4	" 10	13/16	3/4	9.3	1,400
2	" 9	15/16	7/8	9.3	1,150
2 1/4	" 9	1 1/16	1	9.3	940

Cupped washers made to order.
Washers made of a thinner gauge than detailed, at advanced rates.

PLATE WASHERS.

EXTRA SIZES. IN 200 LB. LOTS.



FIG. 5424.

Diameter.	Thickness, wire gauge.	Size of hole.	Size of bolt.	Prices, per lb.
9/16	No. 16	5/16	1/4 in.	20.
3/4	" 16	7/16	3/8 "	16.
7/8	" 14	9/16	7/16 "	15.
1	" 14	11/16	1/2 "	14.
1 1/16	" 12	11/16	1/2 "	14.
1 1/8	" 12	13/16	5/8 "	14.
1 5/8	" 10	13/16	5/8 "	10.
1 3/8	" 10	15/16	3/4 "	13.
1 5/8	" 10	15/16	3/4 "	10.
1 3/4	" 10	1 1/16	7/8 "	11.
1 7/8	" 10	1 1/16	7/8 "	10.
1 3/4	" 10	1 1/16	1 "	13.
2	" 9	1 1/16	1 "	11.
2	" 9	1 1/4	1 1/8 "	12.
2 1/4	" 9	1 1/4	1 1/8 "	11.
2 1/2	" 9	1 1/4	1 1/8 "	10.
2 1/2	" 9	1 3/8	1 1/4 "	11.
2 3/4	" 9	1 3/8	1 1/4 "	10.
3 or 3 1/4	" 9	1 1/2	1 3/8 "	10.
3	" 8	1 5/8	1 1/2 "	11.
3 1/4 or 3 1/2	" 8	1 5/8	1 1/2 "	10.
3 1/2	" 8	1 7/8	1 3/4 "	11.
3 3/4	" 8	1 7/8	1 3/4 "	10.
4	" 8	2 1/8	2 "	11.

SQUARE WASHERS.

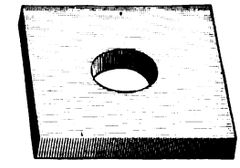


FIG. 5425.

Wide.	Thick.	Hole.	Bolt.	Prices, per lb.	No. in 100 lbs.
1 1/2	1/8	7/16	3/8	9.6	1,300
1 3/4	1/8	1/2	7/16	9.1	1,100
2	3/16	9/16	1/2	8.5	500
2 1/4	1/4	5/8	9/16	8.3	315
2 1/2	1/4	3/4	5/8	8.2	250
3	1/4	7/8	3/4	8.1	165
3 1/2	3/8	1 1/8	1	8.1	87
4	3/8	1 1/4	1 1/8	8.1	65
4 1/2	3/8	1 3/8	1 1/4	8.1	48
5	3/8	1 1/2	1 3/8	8 2	40
6	3/8	1 5/8	1 1/2	8.3	28
6 1/2	3/8	1 7/8	1 3/4	8.4	24
7	3/8	2 1/8	2	8.4	21

Cast iron washers promptly furnished at reasonable prices.

CAST ROUND WASHERS.

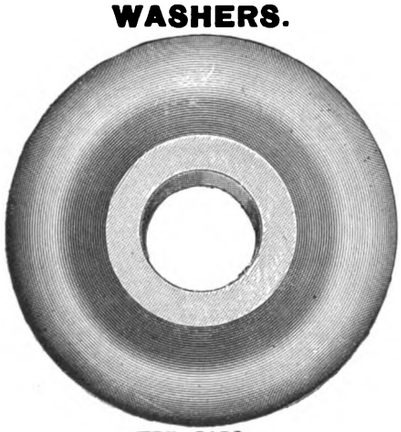


FIG. 5426.

CAST SQUARE BEVEL WASHERS.

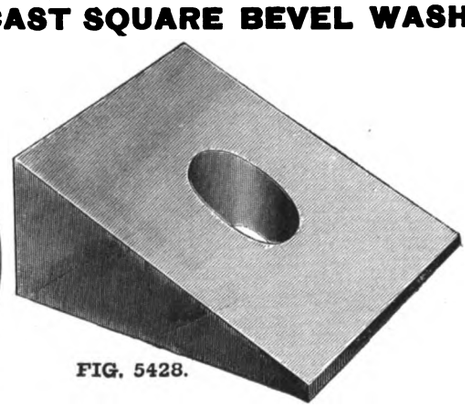


FIG. 5428.

We are prepared to furnish any style of cast washers on receipt of pattern or description. Regular sizes carried in stock.

PRICES QUOTED ON APPLICATION.

COUNTERSINK FOR BOLT HEAD WASHERS.

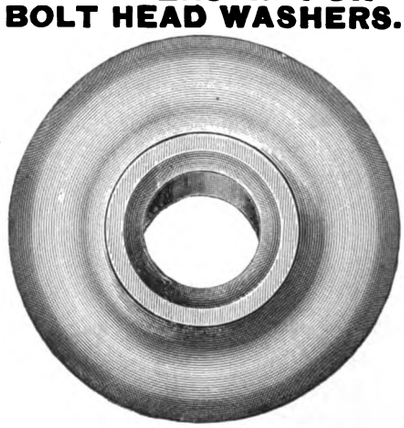


FIG. 5429.

COPPER RIVETS.

PRICES ON APPLICATION.

ROUND BEVEL WASHERS.



FIG. 5427.

COPPER BRAZIERS' RIVETS.

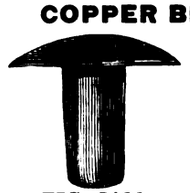


FIG. 5430.

Nos.	0	1	2	3	4	5
No. to lb.	148	100	70	44	34	24
Thickness.	3/16	1/4	17/64	9/32	5/16	23/64
Length ...	3/8	1/2	1/2	5/8	11/16	3/4

Nos.	6	7	8	9	10
No. to lb.	18	12	9	6	4
Thickness.	3/8	7/16	17/32	5/8	21/32
Length ...	13/16	15/16	1 1/8	1 1/4	1 1/4

FLAT HEAD COPPER RIVETS.

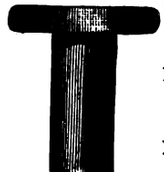


FIG. 5431.

	3/8x1	1 1/4	1 3/8	1 1/2
No. to lb.	17	15	13	12

	1/2x1	1 1/4	1 3/8	1 1/2
No. to lb.	9	8	7	5

CONE HEAD RIVETS.

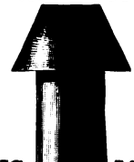


FIG. 5432.
Made to order.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BOILER, BRIDGE AND SHIP RIVETS.

BUTTON HEAD. CONE HEAD. OVAL COUNTERSINK HEAD. STEEPLE HEAD. FLAT COUNTERSINK HEAD.


FIG. 5433.

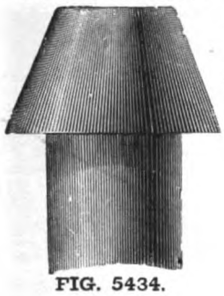
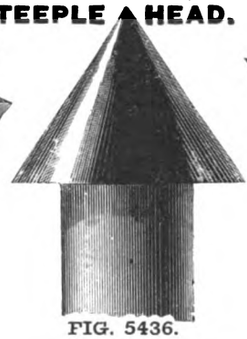

FIG. 5434.


FIG. 5435.


FIG. 5436.

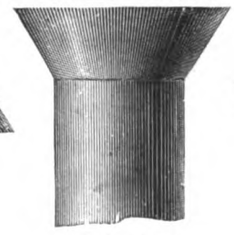

FIG. 5437.


FIG. 5438.

PRICES, EITHER STYLE.

½ and $\frac{9}{16}$ diameter by 1¼ and longer..... cents per lb. Rivets shorter than 1¼ inches, add 25 cents per 100 lbs.
⅝ or larger " 1¼ " ..... " " " " ⅞ " " 50 " 100 "

NORWAY IRON RIVETS AND BURRS.

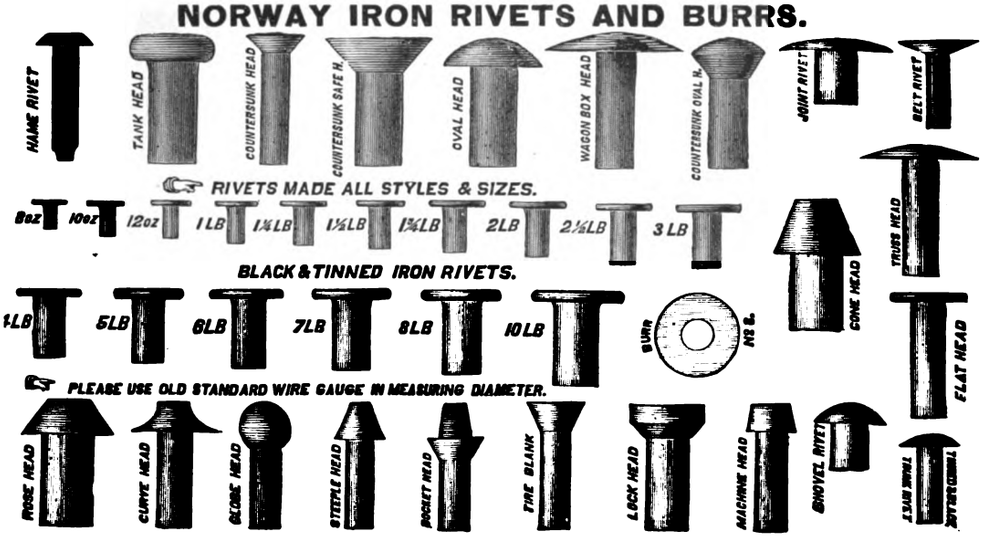


FIG. 5439. FIG. 5439.

PRICES.

Black and tinned iron rivets	8 oz.	10 oz.	12 oz.	14 oz.	1 lb.	1¼ lb.	1½ lb.	1¾ lb.	2 lb.	2½ lb.	3 lb.	3½ lb.	4 lb.	5 lb.	6 lb.	7 lb.	8 lb.	9 lb.	10 lb.	12 lb.	14 lb.	16 lb.	Size.
*Black iron rivets, in packages of 1,000	20	22	24	26	27	29	32	36	40	47	53	58	64	75	90	105	120	127	140	165	190	220	Cts. per M.
" " " in bulk	38	34	31	29	26	23	21	20	19	18	17	16	15	14	14	14	14	13	13	12½	12½	12½	Cts. per lb.
*Tinned " in packages of 1,000	24	25	28	30	33	37	41	47	52	63	72	80	88	105	126	150	170	180	200	240	275	310	Cts. per M.
" " in bulk	45	40	37	35	32	29	27	26	25	24	23	22	21	20	20	20	20	19	19	18½	18½	18½	Cts. per lb.

Rivets, any style head, size of wire	7/16	3/8	11/32	5/16	1	2	3	1/4	4	5	6	3/16	7	8	9	10	11	12	13	14			Size of wire.
Iron rivets, ½ inch and longer	12	12	12	12½	12½	12½	12½	12½	12½	14	14	14	15	16	18	19	20	21	25	27			Cts. per lb.
" " 13/32 " long		12	12	12½	12½	12½	13	13	14	15	15	15	16	16	19	20	22	24	27	30			"
" " 7/16 " "			12	12½	12½	12½	13	13	14	16	16	16	17	17	19	21	24	26	30	35			"
" " 15/32 " "				13	13	13	14	14	15	16	16	16	17	17	20	22	26	28	33	38			"
" " 3/8 " "				13	13	13	14	14	15	16	17	17	17	18	20	23	27	29	34	40			"
" " 11/32 " "					13	13	14	14	15	17	17	17	17	18	21	25	28	30	35	45			"
" " 5/16 " "						14	15	15	16	17	18	18	18	19	21	27	30	32	37	50			"
" " 9/32 " "							15	15	16	18	18	18	18	19	21	28	31	34	39	52			"
" " 1/4 " "							15	15	16	18	19	19	19	19	21	28	31	35	40	54			"
" " 7/32 " "								16	17	19	20	20	20	21	23	30	33	36	41	56			"
" " 3/16 " "								16	17	19	21	22	22	22	25	33	37	41	45	58			"
" " 5/32 " "									18	20	22	23	23	23	27	35	40	45	50	60			"
" " 1/8 " "										20	22	24	24	24	29	37	42	50	55	63			"
" " 3/32 " "										21	23	25	25	25	30	38	45	55	60	65			"
Black Swedes iron burrs		23	23	23	23	23	23	23	24	25	28	28	30	33	34	35	36	42	42	45			"
Tinned Swedes iron burrs		29	29	29	29	29	29	29	30	31	34	34	36	39	40	41	42	48	48	51			"
Blk. and car'ge rivets, in pgs. of 100, ½ in. long,							18	18	16	14	12		11	9									Cts. per C.
" " " " " 5/8 " "							21	21	19	16	14		13	10									"
" " " " " 3/4 " "							24	24	21	18	16		14	11									"
" " " " " 7/8 " "							27	27	24	21	18		16	13									"
" " " " " 1 " "							30	30	26	22	19		17	14									"
" " " " " 1⅛ " "							33	33	29	25	21		19	16									"
" " " " " 1¼ " "							36	36	32	27	22		20	18									"
" " " " " 1⅜ " "							42	42	37	31	25		23	20									"
" " " " " 1¾ " "							48	48	42	35	29		26	23									"
" " " " " 2 " "							54	54	47	40	33		29	25									"
" " " " " 2¼ " "							60	60	53	45	37		33	28									"
" " " " " 2½ " "							66	66	58	49	41		36	30									"
" " " " " 3 " "							75	75	66	57	49		42	35									"
" " " " " 3½ " "							84	84	75	66	57		58	40									"
" " " " " 4 " "							94	94	84	74	64		64	44									"

*Oval or countersunk heads, or extra lengths, 5 cents per 1,000 in addition to the above prices.

Rivets made from wire smaller than No. 14, all lengths, 70 cents per pound.
Any of the above sizes, tinned, and not specified, 6 cents per pound advance on above prices.

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CHAINS.

CLOSE LINK, STRAIGHT.



FIG. 5440.

TWISTED.



FIG. 5441.

SHACKLE AND SWIVEL IN STUD CHAIN.



FIG. 5442. PRICES ON APPLICATION. FIG. 5443. PRICES ON APPLICATION.

STUD.



FIG. 5444.

SLING CHAINS.



FIG. 5445.

PRICES ON APPLICATION, giving diameter chain and length.

PRICES, FIGS. 5440, 5441, AND 5444, ON APPLICATION, according to size, grade and quantity, made in following grades:

COMMON. TESTED. B. B. B. B. B. CRANE.

Sizes Figs. 5440 and 5441, from ⅛ to 1⅝ inches.

Sizes Fig. 5444, from ⅝ to 3 inches.

Furnished either natural color, black or galvanized. Long link chain made to order.

TABLE WEIGHTS AND STRENGTHS.

B. B. CHAIN.

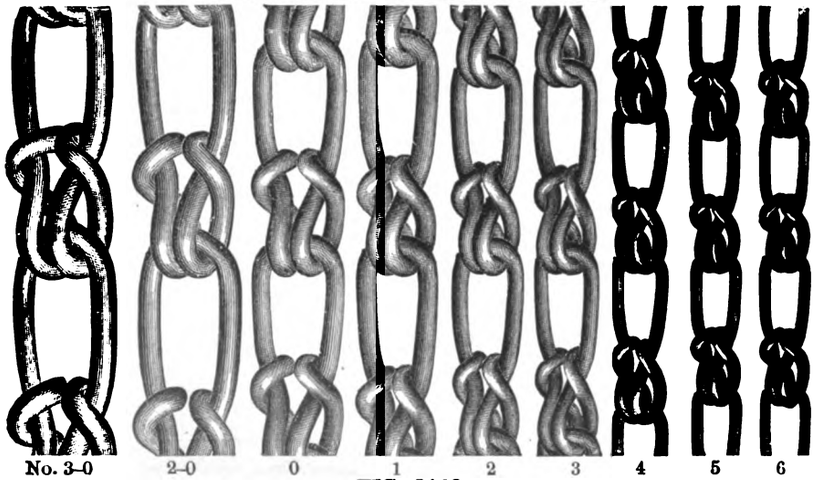
Diam. of iron.	Average weight, per foot.	Breaking strain.	Diam. of iron.	Average weight, per foot.	Breaking strain.
Inch.	Lbs.	Lbs.	Inch.	Lbs.	Lbs.
3/16	.42	1,731	1	10.	49,280
1/4	.91	3,069	1 1/16	11.3	52,790
5/16	1.22	4,794	1 1/8	12.5	59,226
3/8	1.5	6,922	1 3/16	14.	65,960
7/16	2.	9,408	1 1/4	15.5	73,114
1/2	2.5	12,320	1 3/8	18.5	88,301
9/16	3.2	15,590	1 1/2	22.	105,280
5/8	4.1	19,219	1 5/8	25.5	123,514
11/16	5.	23,274	1 3/4	29.5	143,293
3/4	5.8	27,687	1 7/8	33.5	164,505
13/16	6.6	32,307	2	38.	187,152
7/8	7.7	37,632	2 1/4	48.5	224,448
15/16	8.9	43,277	2 1/2	60.	277,088

B. B. B. CRANE CHAIN.

Diam. of iron.	Average weight, per foot.	Breaking strain.	Diam. of iron.	Average weight, per foot.	Breaking strain.
Inch.	Lbs.	Lbs.	Inch.	Lbs.	Lbs.
3/8	1.5	8,960	7/8	7.7	51,520
7/16	2.	13,440	15/16	8.9	58,240
1/2	2.5	15,680	1	10.	62,720
9/16	3.2	22,400	1 1/8	12.5	82,880
5/8	4.1	26,880	1 1/4	15.5	100,800
11/16	5.	31,360	1 3/8	18.5	120,960
3/4	5.8	38,080	1 1/2	22.	143,360
13/16	6.6	44,800			

Proof = ⅓ breaking strain. Safe working load = ¼ breaking strain.

TRIUMPH COIL CHAIN.



No. 3–0 2–0 0 1 2 3 4 5 6

FIG. 5449.

CONNECTING SHACKLES.



FIG. 5446.

PRICES.

Size iron	¼	5/16	⅜	7/16	½ in.
Per doz.	$2.50	$2.60	$2.75	$2.87	$3.10
Size iron.	9/16	⅝	11/16	¾	7/8	1 in.
Per doz.	$3.38	$3.62	$4.00	$4.25	$6.00	$7.25

ANCHOR AND CHAIN SHACKLES.

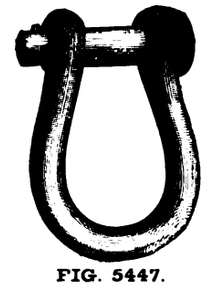


FIG. 5447.

Anchor shackle.



FIG. 5448.

Chain shackle.

½ inch, galvanized, 27 cts. per lb.	Black, 24 cts. per lb.
⅝ inch, galvanized, 23 cts. per lb.	Black, 20 cts. per lb.
¾ in. and larger, galvan., 19 cts. per lb.	Black, 16 cts. per lb.

PRICES, "TRIUMPH" COIL CHAIN, FIG. 5449.

Nos.	3–0	2–0	0	1	2
Per 100 feet.	$7.75	$6.75	$6.00	$5.25	$4.65
Nos.	3	4	5	6	
Per 100 feet.	$4.25	$4.00	$3.90	$3.80	

GERMAN COIL CHAIN.

Twisted or straight link.

Nos.	6–0	5–0	4–0	3–0	2–0	0
Per 100 feet.	$13.50	$11.25	$10.00	$8.75	$7.75	$6.75
Nos.	1	2	3	4	5	6
Per 100 feet.	$6.00	$5.60	$5.30	$5.10	$5.00	$4.90

Twisted link only in stock.

Galvanizing.....cents per lb. net extra.

MACHINE CHAIN.

Best quality twisted link.

Nos.	6–0	5–0	4–0	3–0	2–0
Per 100 feet.	$18.00	$16.00	$14.00	$12.75	$11.80
Nos.	0	1	2	3	4
Per 100 feet.	$11.25	$10.70	$10.20	$10.00	$10.00

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IRON, BRASS AND SILVERED JACK CHAIN.

Single chain. The cuts represent exact sizes.



FIG. 5452. NO. 8.



FIG. 5454. NO. 10.



FIG. 5456. NO. 13.



FIG. 5458. NO. 15.



FIG. 5453. NO. 9.



FIG. 5455. NO. 12.

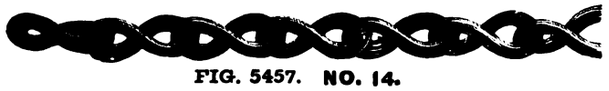


FIG. 5457. NO. 14.



FIG. 5459. NO. 16.



FIG. 5460. NO. 17.

PRICES, FIGS. 5452 TO 5462.

Price, by the package of twelve yards.

Single iron.		Single brass.		Single nickel-plated or silvered.		Brass safety.	
No.	Prices.	No.	Prices.	No.	Prices.	No.	Prices.
		5	$8.00	5	$10.00	000	$1.20
6	$1.60	6	7.00	6	8.75	00	1.30
7	1.40	7	6.60	7	8.25	0	1.50
8	1.30	8	5.70	8	7.12½	1	1.80
9	1.20	9	5.00	9	6.25	2	2.40
10	1.00	10	4.00	10	5.00	3	3.60
11	.80	11	3.30	11	4.12½		
12	.70	12	2.40	12	3.00		
13	.60	13	2.00	13	2.50		
14	.50	14	1.50	14	1.87½	Silver-plated safety.	
15	.40	15	1.10	15	1.37½		
16	.36	16	.90	16	1.12½	No.	Prices.
17	.32	17	.70	17	.87½	000	$1.35
18	.30	18	.60	18	.75	00	1.45
19	.28	19	.54	19	.67½	0	1.65
20	.28	20	.50	20	.62½	1	1.95
21	.26	21	.44	21	.55	2	2.55
22	.24	22	.40	22	.50	3	3.75
23	.24	23	.40	23	.50		
24	.24	24	.40	24	.50		

Double iron.		Double brass.		Double nickel-plated or silvered.		Nickel-plated safety.	
No.	Prices.	No.	Prices.	No.	Prices.	No.	Prices.
10	$1.30	10	$4.50	10	$5.62½	000	$1.45
11	1.10	11	3.70	11	4.62½	00	1.55
12	1.00	12	3.20	12	4.00	0	1.75
13	.90	13	2.60	13	3.25	1	2.05
14	.80	14	2.00	14	2.50	2	2.65
15	.70	15	1.60	15	2.00	3	3.85
16	.60	16	1.40	16	1.75		
17	.50	17	1.20	17	1.50		
18	.44	18	1.00	18	1.25		
19	.40	19	.90	19	1.12½		
20	.40	20	.80	20	1.00		
21	.38	21	.70	21	.87½		
22	.36	22	.60	22	.80		
23	.36	23	.60	23	.80		
24	.36	24	.60	24	.80		

BRASS AND IRON DOUBLE CHAIN.

These cuts represent the exact sizes.

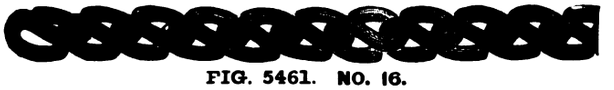


FIG. 5461. NO. 16.



FIG. 5462. NO. 17.

BRASS SAFETY CHAIN.

This cut represents the exact size.



FIG. 5463. NO. 2 SAFETY.

PRICES ON APPLICATION.

BRASS SASH CHAIN.



FIG. 5464.

PRICES ON APPLICATION.

BRASS LADDER CHAIN.



FIG. 5465. NOS. 17 AND 18.

PRICES ON APPLICATION.

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STRAIGHT LINK CHAIN.

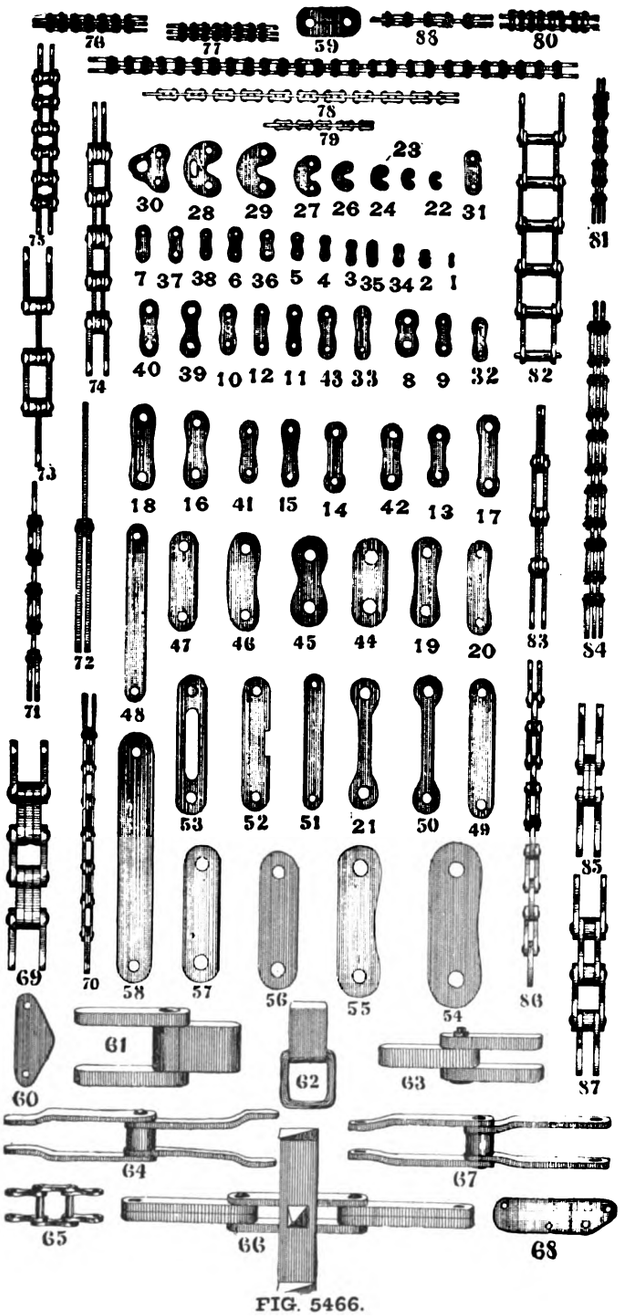


FIG. 5466.

COPPER OR STEEL.



FIG. 5468. NO. 40 FOR 75 LB. SASH.



FIG. 5469. NO. 30 FOR 125 LB. SASH.



FIG. 5470. NO. 10 FOR 250 LB. SASH



FIG. 5471. NO. 110 FOR 400 LB. SASH.

PRICES, FIG. 5466.

No. on card.	Breaking strain, 1 & 2 links.	Entire length.	Length from cen. to cen.	Thickness.	Diameter of holes.	Weight per 100 links.	Price for loose links.	Chain, price per foot, 1 & 2 links.
	Pounds.	Inches.	Inches.		Inch.	Pounds.	Per 100.	
1	615	7/8	1/2	No. 16	5/32	.32	$0.25	$0.24
2	750	15/16	1/2	" 14	3/16	.50	.25	.24
34	900	1 3/16	5/8	" 12	7/32	1.40	.40	.27
35	1,000	1 3/16	3/4	" 11	1/4	1.87	.45	.27
3	1,000	1 3/8	3/4	" 11	1/4	2.00	.45	.27
4	1,450	1 7/16	7/8	" 10	1/4	2 15	.50	.27
5	1,100	1 5/16	7/8	" 10	5/32	2.80	.50	.27
36	1,500	1 5/8	7/8	" 8	5/16	4.75	.80	.33
6	1,600	1 3/4	1	" 10	5/16	3.75	.65	.30
37	1,575	1 13/16	1 3/32	" 10	5/32	2.75	.55	.27
38	1,225	1 3/4	1 1/8	" 11	1/4	2.66	.55	.27
7	2,200	2	1 1/4	" 10	9/32	4.37	.75	.33
8	4,400	2 1/2	1 1/4	3/16 in.	7/16	15 62	₱ lb. .18	.45
9	4,450	2 3/8	1 1/2	No. 7	5/16	8.00	" .18	.33
10	3,500	2 3/4	1 3/4	3/16 in.	3/8	11.50	" .18	.36
11	4,200	2 3/4	1 15/16	1/4 "	5/16	11.43	" .18	.36
12	4,200	2 3/4	1 15/16	1/4 "	5/16	12.75	" .18	.36
39	7,200	3 1/8	2	5/16 "	13/32	16.00	" .18	.48
40	7,800	3 1/8	2	3/8 "	13/32	23 00	" .17	.54
13	7,900	3 9/16	2 5/16	7/16 "	1/2	41.00	" .17	.60
41	3,900	3 7/16	2 1/2	3/16 "	3/8	12.00	" .17	.39
42	5,900	3 3/4	2 1/2	1/4 "	1/2	24.00	" .17	.45
15	5,000	4	3	1/4 "	3/8	30.50	" .17	.45
14	11,800	4 1/16	2 7/8	3/8 "	1/2	36.00	" .16	.54
16	9,200	4 3/8	3	5/16 "	1/2	36.62	" .16	.54
17	9,000	4 1/2	3 3/16	7/16 "	5/8	56.00	" .15	.66
18	11,500	4 3/4	3 1/4	3/8 "	9/16	45.00	" .15	.60
19	12,500	5 1/8	3 1/2	7/16 "	21/32	81.00	" .14	.90
20	12,000	5 3/8	4	7/16 "	11/32	74.62	" .14	.69
21	10,000	7 13/32	5 31/32	3/8 "	19/32	62.50	" .13	.48

COC LINKS AND CHAIN.

22	650	1	5/8	No. 12	5/32	.94	₱ 100, .60	.33
23	775	1 3/16	23/32	" 12	3/16	1.75	" .65	.39
24	925	1 7/16	13/16	" 11	7/32	3.20	" .80	.42
25	1,275	1 7/8	1 1/8	" 10	5/16	6.43	" 1.25	.48
26	1,275	1 7/8	1 1/8	" 10	5/16	5.20	" 1.00	.42
27	1,975	2 1/2	1 1/2	3/16 in.	3/8	11.43	₱ lb. .26	.60
28	2,200	3 1/4	2	3/16 "	1/2	18.90	" .25	.66
29	2,200	3 1/4	2	3/16 "	1/2	19.70	" .25	.66

Chain, less than 25 feet in length, special.

For chain made of links 2 x 2, 2 x 3, or of more links in number, add one-third, two-thirds, or relative proportion, to the list prices per foot.

BRASS STEAMBOAT CHAIN.



FIG. 5467.

PRICE, in lengths of 100 feet, per foot.....$0.25

Also put up in lengths of one foot, large link on each end to attach wires to.

PRICE, per dozen lengths.....$3.00

This chain is specially made for use on the steering gear of launches, steamboats, and wherever a reliable substitute for breaking or stretching wires is needed. Is used over a pulley, and, having no projecting rivet heads, is specially desirable for this class of work.

PRICES, FIGS. 5468 TO 5471.

COPPER CABLE CHAINS.	Prices, per foot.	STEEL CABLE CHAINS.	Prices, per foot.
No. 110 copper sash chain....	$0.23	No. 110 steel sash chain.....	$0.17
" 10 " " "	.17	" 10 " " "	.14
" 30 " " " ...	.12	" 30 " " "	.10
" 40 " " " ...	.11	" 40 " " "	.09

Reels contain 450 feet.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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STEEL CABLE CHAINS.

PRICES.

No. 6, for load 1,000 lbs., per foot.....30c.
" 5, " 800 " " .....22c.
" 4, " 500 " " .....20c.

Fastenings for suspending doors, gates, etc., per set for 1 door, etc.....75c.

Special pulleys, with heavy frames, turned wheel and steel pin for use with these chains.

For No. 6, with 6 in. wheel, per doz...$24.00
" " 5 " 4 " " " ... 8.00
" " 4 " 4 " " " ... 8.00

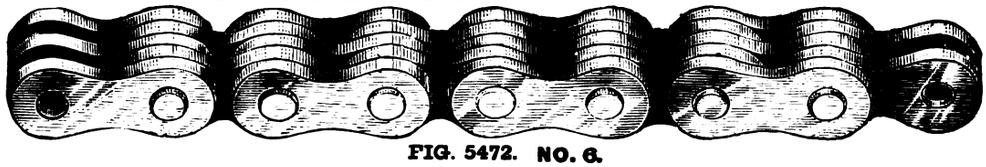


FIG. 5472. NO. 6.

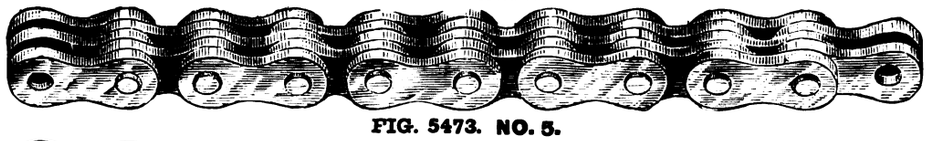


FIG. 5473. NO. 5.



FIG. 5474. NO. 4.

DETACHABLE LINK BELTING.

ATTACHMENTS FOR LINK BELTING.



FIG. 5476.

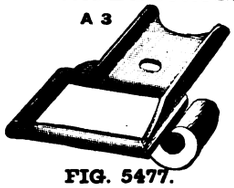


FIG. 5477.

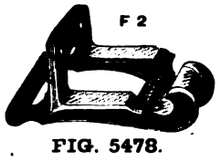


FIG. 5478.



FIG. 5479.

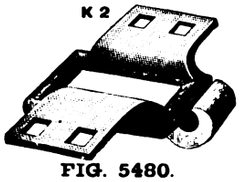


FIG. 5480.

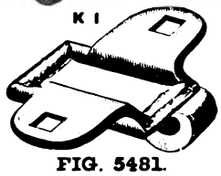


FIG. 5481.

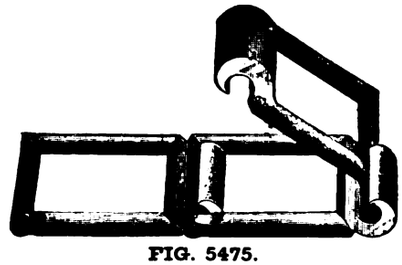


FIG. 5475.

ILLUSTRATES METHOD OF COUPLING LINKS.

Detachable link belting is made of refined malleable iron; and although made of iron, is no heavier, and in many instances is much lighter, than the leather or rubber belt which it replaces.

Link belting has taken a prominent place among the necessities, and is very extensively employed in the equipment of flour mills, grain elevators, breweries, malt houses, paper and pulp mills, sugar refineries, phosphate works, tanneries, etc.

No.	Prices, per foot. All plain links.	Prices, per foot. All attachment links.	Prices, per foot. With attachments at intervals.	Links, per foot.	Working strain.	Approximate in leather belting.
25	$0.08	$0.19	$0.11	13.3	75 lbs.	1 in. single.
32	.08	.17	.11	10.4	150 "	1½ " "
33	.07	.17	.10	8.6	200 "	2 " "
34	.08	.17	.11	8.6	225 "	2½ " "
35	.08	.15	.11	7.4	250 "	2½ " "
42	.09	.16	.12	8 8	300 "	3 " "
45	.09	.16	.12	7.4	350 "	3½ " "
51	.11			10.4	375 "	3½ " "
52	.12	.17	.13	8.	500 "	4 " "
55	.12	.17	.13	7.4	450 "	4 " "
57	.12	.20	.16	5.2	600 "	6 " "
62	.16	.21	.18	7.3	650 "	6½ " "
66	.16	.21	.18	6.	700 "	6½ " "
67	.16	.21	.18	5.2	700 "	7 " "
75	.18	.22	.19	4.6	750 "	7½ " "
77	.18	.22	.19	5.2	800 "	8 " "
78	.21	.28	.23	4.6	1,000 "	10 " "
83	.25	.35	.28	3.	1,200 "	12 " "
85	.27	.35	.30	3.	1,300 "	9 " double.
88	.25	.35	.30	4.6	1,200 "	8 " "
93	.30	.40	.35	3.	1,600 "	10 " "
95	.32	.40	.35	3.	1,600 "	10 " "
103	.40	.42	.41	4.	1,800 "	12 " "
105	.35	.40	.37	2.	1,500 "	10 " "
106	.45	.50	.48	2.	1,700 "	11 " "
107	.40	.42	.41	2.	1,600 "	10 " "
108	.40	.45	.42	2.55	2,000 "	13 " "
114	.50	.60	.55	3.66	2,000 "	13 " "
122	.60	.80	.70	2.	2,200 "	15 " "
124	.60	.80	.70	3.	2,250 "	17 " "
146	.60	.70	.65	2.	2,800 "	19 " "
160	.80	1.00	.90	1.	4,000 "	

The above prices of attachments are for A 1, A 3, F 2, H 1, K 1, K 2, and as they are now made for the respective chains. Other attachments will be furnished at special prices.

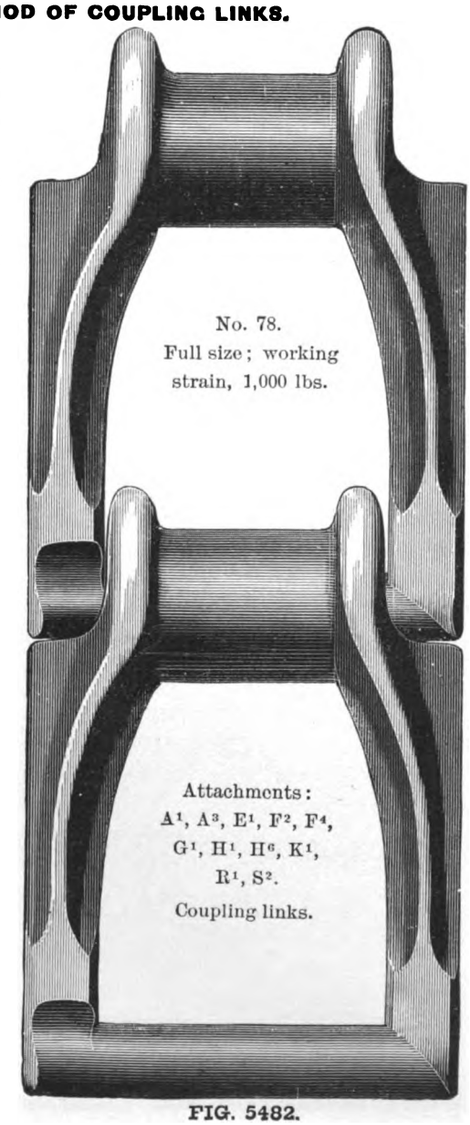


FIG. 5482.

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SPROCKET WHEELS.

BORED AND SET SCREWED OR KEY SEATED.

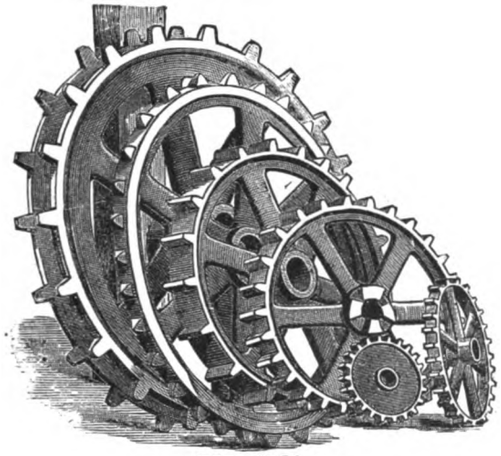


FIG. 5483.

In some instances several numbers of link belting run on same wheels, as in case of Nos. 57, 67 and 77.

PRICES, FIG. 5483, CONTINUED.

No. 52.			Nos. 57, 67 & 77.			No. 62.			Nos. 75, 78 & 88.			Nos. 83 & 93.		
Diameter.	No. of teeth.	Prices.	Diameter.	No. of teeth.	Prices.	Diameter.	No. of teeth.	Prices.	Diameter.	No. of teeth.	Prices.	Diameter.	No. of teeth.	Prices.
3	6	$1.05	4½	5	$1.10	3½	7	$1.60	4	5	$1.40	12	18	$3.75
3½	7	1.10	4¾	6	1.20	4½	8	1.75	5	6	1.50	16	26	4.90
4	8	1.15	5½	7	1.50	4¾	9	1.90	6	7	1.60	20	32	7.00
4¼	9	1.20	6	8	1.70	5½	10	1.95	6½	8	1.80	24	38	7.80
5	10	1.25	6¾	9	2.00	5¾	11	2.00	7½	9	2.10	25¼	40	8.20
5½	12	1.40	7½	10	2.25	6	12	2.10	8¼	10	2.40	28½	44	9.00
6	13	1.60	8	11	2.35	6¾	13	2.20	9	11	2.60	30	48	10.60
6½	14	1.70	8¾	12	2.60	7¼	14	2.25	10	12	2.80	34	54	13.00
7	15	1.90	9½	13	2.70	8	15	2.40	10¾	13	3.10	41	64	19.00
7½	16	2.10	10½	14	3.00	8¼	16	2.50	11½	14	3.40			
8	17	2.25	11	15	3.30	9¼	18	2.70	12½	15	3.60	Nos. 85 & 95.		
9	19	2.50	12	16	3.40	10	19	2.85	13	16	3.85			
9½	20	2.65	12½	17	3.50	10½	20	3.00	14¼	17	4.20	7¾	6	$2.50
10	21	2.75	13	18	3.75	11	21	3.15	15	18	4.45	10	8	3.30
11	23	2.95	14	19	4.00	11½	22	3.30	16	19	4.70	12	9	3.50
12½	26	3.20	14¾	20	4.25	12	23	3.50	16½	20	5.25	12½	10	3.70
13	27	3.35	15½	21	4.50	12¾	24	3.70	18½	22	5.50	13½	11	4.00
14½	30	3.70	16½	22	4.80	13¾	26	4.00	20	24	6.00	15½	12	4.40
15	31	3.80	17	23	5.00	14¾	28	4.30	21	25	6.20	16	13	4.80
16½	34	4.00	17¾	24	5.15	16	30	4.90	22	26	6.35	17½	14	5.50
17	35	4.15	18¼	25	5.30	18	34	5.30	22½	27	6.50	20	16	6.50
17½	37	4.45	19	26	5.40	20	38	5.60	23½	28	7.00	22½	18	7.75
18	38	4.50	19¾	27	5.50	22	41	6.10	24	29	7.50	24	19	8.00
19¼	40	4.75	20	28	5.60	22¼	42	6.30	24¾	30	7.75	24½	20	9.00
20	42	5.00	22	30	6.25	23	43	6.50	26	32	8.25	28	22	10.50
22	46	5.50	24	32	6.75	24	45	6.90	27	33	8.50	30	24	12.00
23¾	49	6.00	24¼	33	7.00	25½	48	7.45	28½	34	8.75	31½	25	12.75
24½	51	6.40	25	34	7.20	26	49	7.60	29	35	9.00	33	26	13.50
25	52	6.55	26	36	7.60	30½	58	9.00	30	36	9.25	34	27	14.25
26	54	6.85	28	38	8.25				30½	37	9.50	35½	28	15.00
26½	55	7.00	29¾	40	8.75				32½	39	10.70	48	37	26.00
30½	64	8.00	30	41	9.00				33½	40	11.00	60	47	38.00
36	75	9.20	32	43	9.50				37	44	11.50			
			32½	44	9.75				38	46	13.00			
			35¾	48	10.50				42	49	14.00			
			36	49	10.75				42¼	50	14.70			
			38	50	11.25				46	56	18.70			
			38½	52	12.00				48	58	21.00			
			41½	56	13.50				48¼	60	23.00			
			44¼	60	17.00				54	65	27.00			
			47½	64	20.00				64	77	35.00			

DODGE CHAIN.

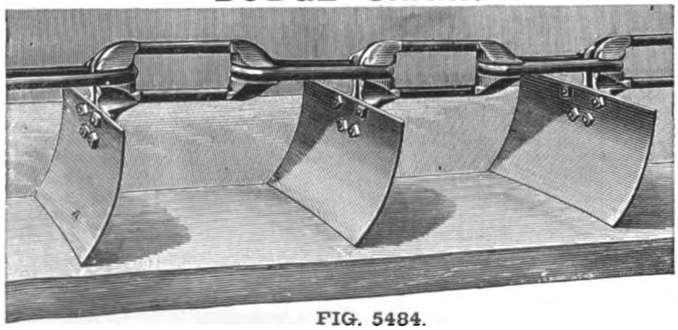


FIG. 5484.

For this chain we have F attachments for flights; K2 attachments for buckets, etc., and coupling links. SEE CUTS, ATTACHMENTS, PAGE 689.

PRICES, FIG. 5483.

No. 25.			No. 32.			Nos. 33 & 34.			Nos. 35, 45 & 55.			No. 42.		
Diameter.	No. of teeth.	Prices.	Diameter.	No. of teeth.	Prices.	Diameter.	No. of teeth.	Prices.	Diameter.	No. of teeth.	Prices.	Diameter.	No. of teeth.	Prices.
1¼	6	$0.50	2	5	$0.60	2¾	6	$0.60	2½	5	$0.80	3	7	$0.85
2	7	.55	2½	6	.65	3	7	.70	3	6	.85	3½	8	1.00
2½	8	.55	2¾	7	.70	3½	8	.80	3¾	7	.95	3¾	9	1.10
2¾	9	.60	3	8	.75	4	9	.90	4¼	8	1.10	4¾	11	1.40
3	10	.65	3½	9	.80	4½	10	1.00	4¾	9	1.20	5	12	1.50
3¼	11	.70	3¾	10	.85	5	11	1.10	5¼	10	1.25	5¾	13	1.60
3½	12	.75	4¼	11	1.00	5½	12	1.20	5¾	11	1.30	6¼	14	1.70
3¾	13	.80	4½	12	1.05	6	14	1.30	6	12	1.50	7	16	1.80
4	14	.90	4¾	13	1.10	6¾	15	1.35	6¾	13	1.60	8	18	1.90
4¼	15	.95	5¼	14	1.20	7	16	1.50	7¼	14	1.75	8¼	19	2.00
4¾	16	1.05	6	16	1.35	8	18	1.60	8½	16	2.00	9½	22	2.30
5	17	1.15	8¼	22	1.65	8½	19	1.65	8¾	17	2.10	10½	24	2.50
5¼	18	1.15	8½	23	1.85	9	20	1.80	9½	18	2.20	11¾	27	3.00
5¾	20	1.25	9	24	2.00	9¾	22	2.00	10	19	2.30	12	28	3.15
6	21	1.25	9¾	26	2.05	10¾	24	2.20	10½	20	2.50	14	32	3.60
6¼	22	1.30	10	27	2.10	12	27	2.50	11½	22	2.70	15½	36	3.90
6½	23	1.35	10¼	28	2.15	13¼	29	2.70	12	23	2.90	18	41	4.40
7	24	1.35	11¾	32	2.40	13½	30	2.80	12½	24	3.00	20	46	5.00
7¼	25	1.40	12	33	2.50	14¼	32	3.00	13	25	3.20	24	55	6.00
7½	26	1.40	13	36	2.80	15¼	34	3.25	14¼	27	3.50			
8	28	1.50	14	38	3.00	16	36	3.75	14½	28	3.60	No. 51.		
9	30	1.60	14¾	40	3.40	18¼	41	4 25	15	29	3.65			
9¾	34	1.75	16	44	4.25	18¾	42	4.35	15½	30	3.70	1¾	5	$0.65
10	35	1 75	16½	45	4.35	24	54	5.75	16	31	3.75	2	6	.85
10¼	36	1.85				28	64	6.85	16½	32	3.85	2½	7	1.00
10½	37	1.90							18¼	35	4.25	3	8	1.05
11½	40	2.05							18½	36	4.40	3¼	9	1.15
12	42	2.15							20¼	39	4.75	4	11	1.25
12¼	43	2.20							20¾	40	4.95	5	14	1.50
12½	44	2.25							21¾	42	5.30	6¼	17	1.75
13¾	48	2.40							22½	44	5.60	8	22	2.40
14¼	50	2.50							23½	45	5.75	10	27	2 80
15	52	2.60							24	46	5.90	12	33	3.30
16	56	2.90							24½	48	6.20	13	36	3.60
17¼	60	3.15							25¼	49	6.35	14	39	3.80
18¼	64	3.25							26	50	6.55	15½	42	4.00
20	70	4.00							28	54	7.25	15¾	44	4.20
24	84	4.50							30	58	7.50	16	45	4.25
									36	69	9.00	18¼	50	4.70
									42	82	10.50			

No. 103.			Nos. 105 & 107.			No. 108.			No. 122.			No. 146.		
7	7	$2.10	11¾	6	$4.50	12	8	$4 25	16	8	$8.00	16	8	12.00
7¾	8	2.50	15¾	8	5.00	13½	9	4.50	17½	9	9.00	18	9	13.00
8¾	9	2.70	19½	10	7.00	16½	11	5.00	19	10	10.00	20	10	14.00
9¾	10	3.20	23	12	9.00	18	12	6.00	22	11	11.25	24	12	19.00
10¾	11	3.45	25¼	13	10.00	19	13	6.50	23	12	12.50	28	14	24.00
11¾	12	3.70	27½	14	12.20	20	14	7.00	29½	15	17.00	36	18	36.00
12½	13	3.80	31	16	13.80	24	16	9.00	31	16	18.50			
13½	14	4.25	36¾	19	15.00	30	20	12.00	37	19	22 25	No. 160.		
14½	15	4.50	48½	25	26.00	36	24	15.00	40¾	21	24.75			
15½	16	4.80				46	30	23.25	42½	22	26.00	30	9	36.00
16½	17	5.25				48	32	26.00				40	12	55.00
17¼	18	5.50							No. 121.			43	13	58.50
18	19	5.75				No. 114.						48	15	65.00
19¼	20	6.00							10½	8	$4.50			
21½	22	7.00				8	8	$3.50	11½	9	4.80			
22½	23	7.50				10	10	4.00	12½	10	5.20			
23½	24	8.00				12	12	5.35	14½	11	5.80			
25½	26	9.00				13¼	13	6.00	15½	12	6.50			
28	28	10.20				14¼	14	6.25	16½	13	7.00			
29½	30	11.40				16½	16	7.00	18	14	7.90			
30	31	12.00				17½	17	8.25	18¾	15	8.75			
31¾	32	12.50				19½	19	10.50	21½	17	11.00			
32	33	13.00				22	21	11.00	24	19	12.50			
33¼	34	13.60				24	23	11.75	26	20	14.00			
35	36	14.80				24½	24	12.00	28	22	15.20			
37	38	16.00				31	30	15.00	29½	23	15.85			
39	40	17.00				33	32	16.50	31	24	16.50			
41	42	18.00				36	35	18.50	36	28	20.00			
45	46	21.00				48½	47	26.00	41	32	23.40			
48	49	24.00							44	34	25.00			
72	73	65.00							48	38	32.00			
79	81	75.00							62	48	50.00			
									72	56	65.00			
									84	66	83.00			

The Dodge chain is an accurately pitched cable chain, in which detachable wearing blocks are inserted between the links. These give a large wearing surface and admit of high tensile strain without straightening of the links, thereby making the strongest and cheapest chain for use in long and heavy conveyers and elevators. It is especially adapted to the handling of coal and for elevators handling heavy packages.

PRICES.

Size.	Pitch.	Working strain.	Prices, per foot.	Bearing blocks.	Attachments.		Connec'g links.
					Flight.	Bucket.	
½ in.	6 in.	10,000	$0.80	$0.30	$0.45	$0.45	$0.65
⅝ "	6 "	12,000	1.00	.35	.50	.50	.75
¾ "	8 "	20,000	1.50	.60	.80	.85	1.00

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DODGE CHAIN WHEELS.

PRICES OF SPROCKET WHEELS.

Size of chain.	Diameter.	No. of teeth.	Plain wheel. Fig. 5486.	Removable tooth wheel. Fig. 5485.
½ & ⅝ in.	24 in.	6	$15.00	$25.00
½ " ⅝ "	30 "	8	25.00	45.00
½ " ⅝ "	38 "	10	30.00	55.00
½ " ⅝ "	46 "	12	.....	60.00
½ " ⅝ "	95 "	18	145.00	.....
¾ in.	30 "	6	.....	50.00
¾ "	41 "	8	.....	65.00
¾ "	50 "	10	.....	90.00
¾ "	66 "	13	Special wheel.	80.00

PRICES OF TRACTION WHEELS.

Diameter.....	24 in.	30 in.	40 in.	42 in.
Chain, ½ and ⅝ in.....	$10.00	$20.00	.....	$26.00
" ¾ in	.....	25.00	$35.00	.....

PRICES OF TOOTHED IDLERS.

Chain, ½ and ⅝ in.; diameter, 20 in ....price, $5.75
" ¾ in.; diameter, 24 in .... " 11.00

REMOVABLE SPROCKETS.



FIG. 5485.

PLAIN.

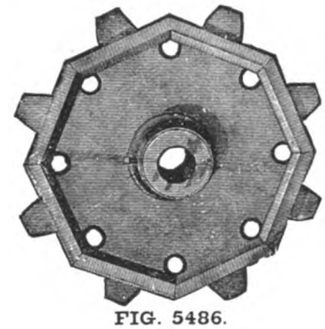


FIG. 5486.

When it is considered that the introduction of the Dodge chain has enabled the construction of conveyers 500 ft. long and upward, either horizontal or incline, and as the driving wheel is the only part subjected to excessive wear, the importance of making a wheel of the best quality will be appreciated.

Wheels, as illustrated above, are used with Dodge chains. They are very heavy, strongly made and well adapted for the severe service for which they are intended. They are of four varieties:

Removable sprocket wheels, have removable gray-iron teeth, fitting a wheel having a chilled rim, making it long-lived under severe work, and practically an indestructible wheel, the teeth of which can be renewed at trifling expense.

Plain wheels, not chilled.

Traction wheels, capable of running horizontally or vertically.

Idlers, for supporting the return chain in long conveyers.

CONVEYER FLIGHTS.

PRICES.

Style C, D, E, F, or plain scrapers.

Size..	4 x 10	4 x 12	5 x 10	5 x 12	5 x 15	6 x 12	6 x 18	8 x 18	8 x 20	8 x 24
Prices	$0.20	$0.22	$0.23	$0.25	$0.30	$0.30	$0.40	$0.60	$0.65	$0.75

STYLE C. STYLE F. STYLE D. STYLE E.



FIG. 5487.

PATENT DETACHABLE SAWDUST CARRIER.

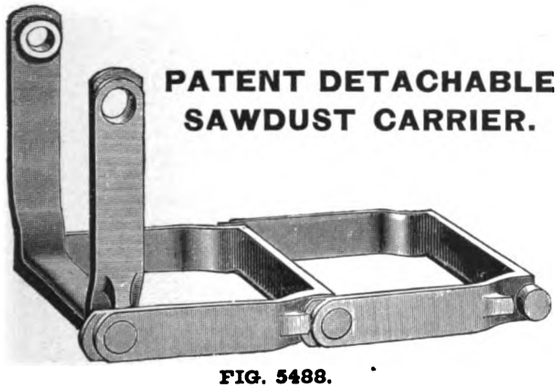


FIG. 5488.

The No. 550 chain is a low-priced, malleable-iron chain, 7 inches wide and 6 inches pitch, embodying the detachable feature, combined with lightness. It is used for horizontal conveying of sawdust, tan bark, etc.

Ultimate strength, 5,000 lbs.

PRICE, PER FOOT, $0.40.

Sprocket wheels, No. 550, 17 inches diameter; 9 teeth.....$9.75
" " " 550, 21 " " 11 " 12.00

TRACTION WHEELS.

These wheels are very satisfactory for use in elevators, handling heavy or gritty material, the grip being ample to do all the work that the link-belting and buckets should be called upon to do; and at the same time, in event of a serious obstruction, the absence of sprockets will permit the traction wheel to slip. Elevators provided with these wheels will run smoother and last longer in gritty material than they would if sprocket wheels were used.

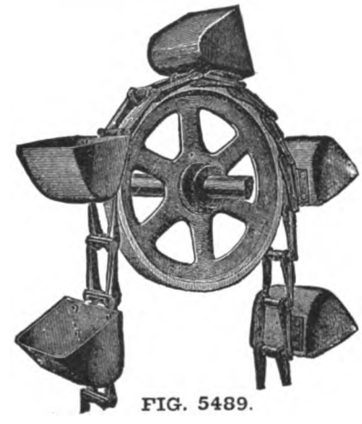


FIG. 5489.

PRICES.

Diameter..	12	16	18	20	22	24	25	28	30	36	40	42
Chain No. 85	$4.60	$6.00	$7.50	$9.00	.....	.....	11.75	14.50	15.85	19.00	.....	.....
" 108	.....	7.25	8.00	9.85	10.90	11.60	.....	.....	16.50	22.75	.....	.....
" 122	7.00	7.50	9.75	10.00	11.00	12.75	.....	.....	16.85	22.00	.....	25.00
" 160	....	...	.....	.....	.....	.....	.....	.....	25.00	.....	40.00	.....

GIANT CHAIN.

PRICES, FIG. 5490 AND PARTS.

Size.	Prices per foot.	Prices, each, double link.	Prices, each, coupler.	K2, K5 or slat attachments.	Log tooth link, each.	Prices per ft. All K attachments.
600	$1.00	$0.30	$0.20	$0.40	$0.70	$1.20
1,200	.90	.60	.30	.80	....	1.10
1,050	1.30	.75	.35	1.05	1.40	1.68
1,075	1.40	.80	.40	.. ..	1.50	.....

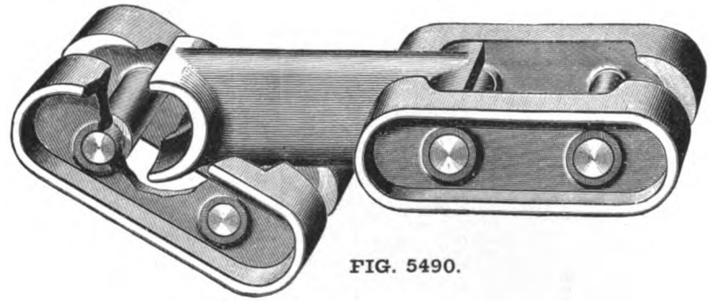


FIG. 5490.

In our chain, it will be observed, the rivet simply serves to hold the check-plates in position and to aid in preventing the detachment of the parts when in service. Shearing is impossible, and the life of our chain is much greater than that of the riveted style; while the feature of detachability is as perfect as in our regular patterns of link-belting.

Those who have used the giant chain have pronounced it eminently satisfactory.

For log haul-up work, Nos. 1,050 and 1,075 are used, the L or tooth links being placed from three to five feet apart in the chain, and run over 20-inch wheels at head and foot. No wear comes upon the rivets, but upon the curved projections only; and, as stock for wear is there provided, this chain can be used a long time without having its strength impaired.

The numbers of this chain indicate its pitch; thus, No. 600 is 6-inch pitch.

Several sizes are constructed with rollers in the double links, and are employed in making endless carriers or traveling gangways for unloading vessels, moving heavy merchandise, stone, etc.

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HOWE BULL CHAIN, WITH LOG TOOTH. SINGLE STRAND. ELEVATOR.

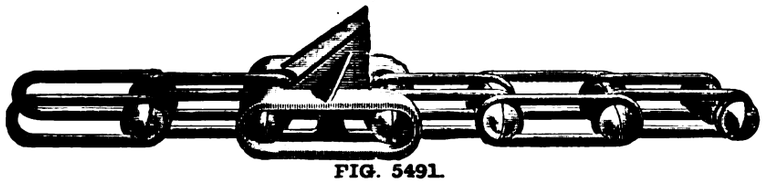


FIG. 5491.

We have a form of wrought-iron chain, as illustrated above, of 5/8 iron, which may be used for haul-up works, or for any purpose which requires a strong and durable, but comparatively light, chain. The log tooth link is made in one piece. It has the advantage of detachability, and in case of breakage a link can be replaced almost as readily as in regular Ewart chain, and at the same time it will not detach itself in any position.

PRICES.

Per foot..... $1.40
Log tooth.....each, 1.60



FIG. 5492.

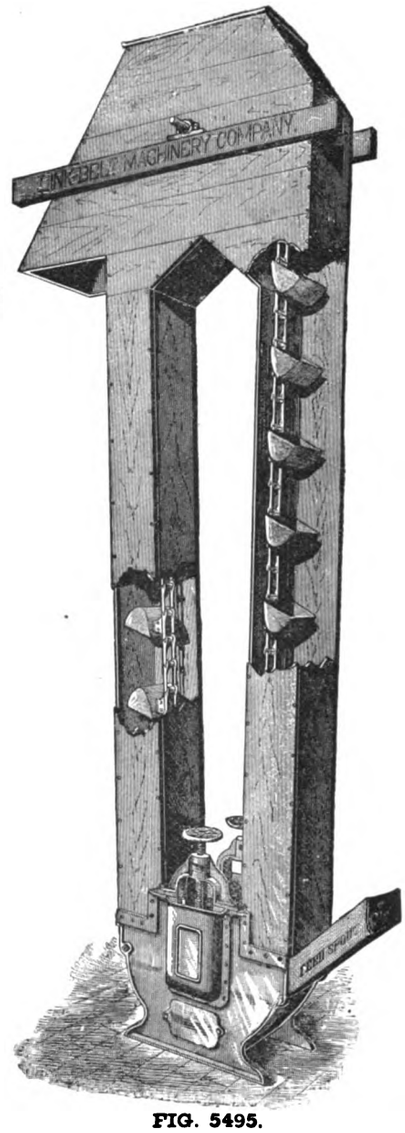


FIG. 5495.

SAFETY ELEVATOR BOOTS.

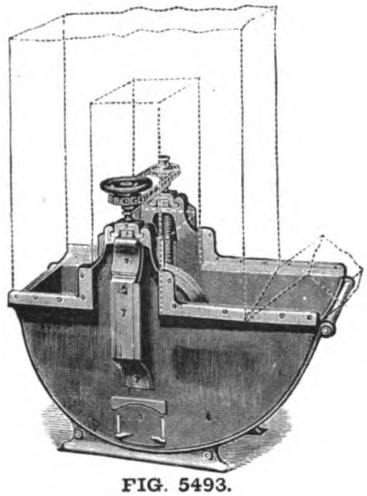


FIG. 5493.

First—The chute end, being longer than the back, gives free escape for loaded buckets, effectually preventing jamming or breaking of material.

Second—Take-up screws are connected by Ewart link belting, insuring the same movement up and down of both ends of the shaft.

Third—Hollow take-up screws, through which oil is carried to the bearings, allowing the boot to be—

Fourth—Entirely closed, enabling it to be made dust-tight.

Fifth—Tight cleaning doors, having no bolts, and consequently easy to remove.

Sixth—A safety device, for securing the nuts of the take-up screws, making serious breakage impossible.

PRICES, SAFETY ELEVATOR BOOTS, COMPLETE WITH SPROCKET WHEEL OR PULLEY, WITH SINGLE STRAND, AS PER FIG. 5492.

No.	Size of bucket.	Diameter of boot wheel.	No. of Ewart link-belt.	Prices, complete.
5	4 x 3	14	45, 57 & 67	$20.00
5	5 x 4	14 1/2	57, 67 & 77	21.00
5	6 x 4	12 1/2	67, 77 & 78	22.00
7	7 x 4 1/2	18 1/2	77, 78 & 88	35.00
7	8 x 5	16 3/4	85 & 95	36.00
7	"B" 10 x 4	16 3/4	85 & 95	38.00
7	10 x 6	16 3/4 & 17 1/4	85 & 108	39.00
7	"B" 12 x 5 1/2	17 1/4	108	40.00
9	12 x 7	17 1/4	108	55.00
9	14 x 7	17 1/4	108	58.00
12	12 x 7	20	122	80.00
12	14 x 7	20	122	82.00
12	14 x 9	20	122	83.00
12	16 x 10	17 1/2	122	84.00
12	18 x 10	17 1/2	122	85.00
15	20 x 10	30	160	114.00
15	24 x 10	30	160	116.00
15	30 x 10	30	160	120.00

DOUBLE STRAND.

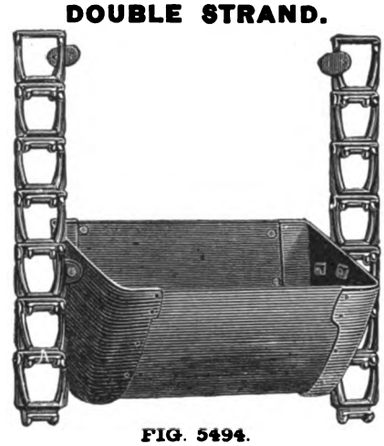


FIG. 5494.

DESCRIPTION, FIG. 5495.

These elevators may be driven from the bottom, where the lift or distance between centers is not too great. This, in many instances, is a point of too great importance to be overlooked, as it obviates the necessity for running an upright shaft or belt to elevator head. This form works admirably with buckets from 12 x 6 to the smallest size in use. We have link-belting of various widths for use with the different sizes of buckets, and extra heavy patterns where power is transmitted through the elevator belt, or for long lifts, or for handling heavy materials.

A smaller size of link-belting should be used to drive elevators than that to which the buckets are attached.

TAKE-UPS FOR ELEVATORS AND CONVEYERS.

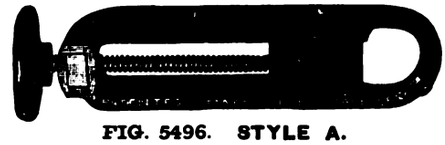


FIG. 5496. STYLE A.



FIG. 5497. STYLE B.

Our take-ups are made in two forms, "A" and "B," as shown above. The sizes above No. 20 have handles instead of hand wheels. Their lightness, beauty and strength have combined to make them the most popular in the market. The number of the take-up indicates its length of adjustment in inches.

PRICES.

No. of frame	4	4	4	5	5	7	7	7	9	9	12	12	12
Diam. of shaft	1 1/2	1 3/4	1 15/16	1 3/16	1 5/16	1 7/16	1 9/16	1 11/16	1 15/16	2 3/16	2 3/16	2 5/16	2 7/16
Length of bearing	2	2	2	3	3	4	4	4	4 5/8	4 5/8	5	5	5
Prices, each, A or B	$1.75	1.90	2.00	2.55	2.70	3.25	3.50	4.00	4.75	5.00	6.00	6.25	6.75

No. of frame	20	20	20	20	20	24	24	24	36	48	60	72
Diam. of shaft	2 7/16	2 9/16	2 11/16	2 13/16	2 15/16	3 1/16	3 7/16	3 15/16	3 15/16	3 15/16	3 15/16	4 7/16
Length of bearing	6 1/8	6 1/8	6 1/8	6 1/8	6 1/8	10	10	10	10	12	12	12
Prices, each, A or B	$9.00	9.50	10.00	11.00	12.00	13.50	14.00	15.00	20.00	35.00	40.00	50.00

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DETACHABLE CHAIN.

PRICES, FIGS. 5498 TO 5502.

No.	Links per foot.	Size of pin.		Working strain in lbs.	Prices, per foot.
25	13.3	3-16	Malleable.	100	$0.14
33	8.6	7-32	"	300	.14
34	8.6	7-32	"	350	.14
42	8.75	1-4	"	450	.16
45	7.4	1-4	"	450	.16
52	8.	19-64	"	600	.24
55	7.4	19-64	"	650	.22
57	5.02	5-16	"	800	.24
62	7.03	11-32	"	900	.26
67	5.02	11-32	"	900	.26
75	4.6	3-8	"	1,000	.28
77	5.02	3-8	"	1,000	.30
78	4.6	27-64	"	1,200	.34
83	3.	33-64	Steel.	1,600	.43
85	3.	31-64	"	1,800	.50
88	4.6	15-32	Malleable.	1,300	.43
103	4.	37-64	Steel.	2,200	.65
108	2.55	5-8	"	2,400	.70
146	2.	13-16	"	3,300	1.00
121	2.	19-32	"	2,400	.65
122	2.	3-4	"	3,000	1.00

Above prices include attachments at intervals of not less than 12 inches.

ATTACHMENTS FOR FIG. 5498.

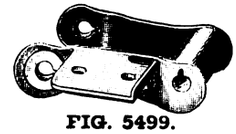


FIG. 5499.



FIG. 5500.

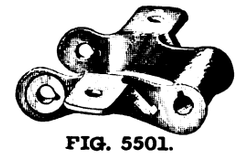


FIG. 5501.

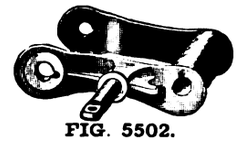


FIG. 5502.

Fig. 5498 represents No. 67, full size.

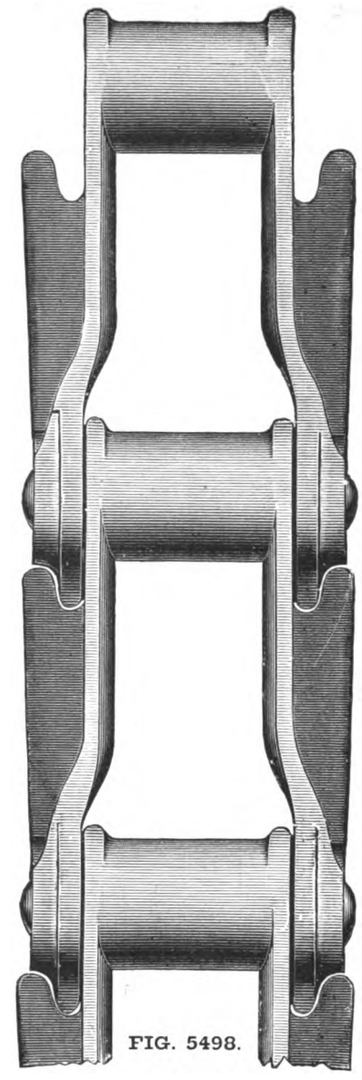


FIG. 5498.

ROLLER CHAIN.

Made of best malleable iron, with malleable iron and steel pins. Prices include attachments, Fig. 5504 to Fig. 5508, at intervals of not less than 12 inches. Fig. 5503 represents No. 77, full size.

PRICES.

No.	Working strain.	Pitch of link.	Width of link.	Size pin.	Prices, per foot.
20	500	1½ inch.	$1\frac{5}{16}$ inch.	$\frac{9}{32}$ malleable iron.	$0.30
52	600	1½ "	1⅝ "	$\frac{5}{16}$ " "	.34
55	600	1⅝ "	1⅝ "	$\frac{5}{16}$ " "	.34
77	800	2¼ "	2 "	⅜ " "	.42
15	800	2 "	1⅝ "	⅜ " "	.40
0	800	2 "	1½ "	$\frac{5}{16}$ " "	.40
62	800	$1\frac{11}{32}$ "	1⅞ "	⅜ " "	.40
8	900	$2\frac{9}{16}$ "	1¾ "	⅜ " "	.40
9	900	3 "	1¾ "	⅜ " "	.40
88	1,200	2⅝ "	2⅛ "	$\frac{7}{16}$ " "	.60
17	1,200	$2\frac{9}{16}$ "	2 "	$\frac{7}{16}$ " "	.60
18	1,500	3 "	2 "	½ " "	.70
14	1,600	4 "	2¼ "	$\frac{17}{32}$ " "	.75
11	1,800	3⅛ "	2⅝ "	½ steel.	.80
2	1,850	$3\frac{11}{13}$ "	2⅞ "	⅝ "	1.00
12	2,000	3½ "	$2\frac{7}{16}$ "	½ malleable iron.	.80
103	2,000	3⅛ "	2¾ "	⅝ steel.	.90
114	2,400	3⅜ "	3⅛ "	$\frac{11}{16}$ "	1.20
1	2,500	3 "	3 "	⅝ "	1.00
3	2,700	4 "	3¼ "	$\frac{11}{16}$ "	1.20
126	3,000	6 "	3⅛ "	$\frac{11}{16}$ "	1.20
124	3,200	4 "	3⅜ "	¾ "	1.50
5	4,000	5 "	3¾ "	⅞ "	1.80

FOR SPROCKET WHEELS, SEE NEXT PAGE.

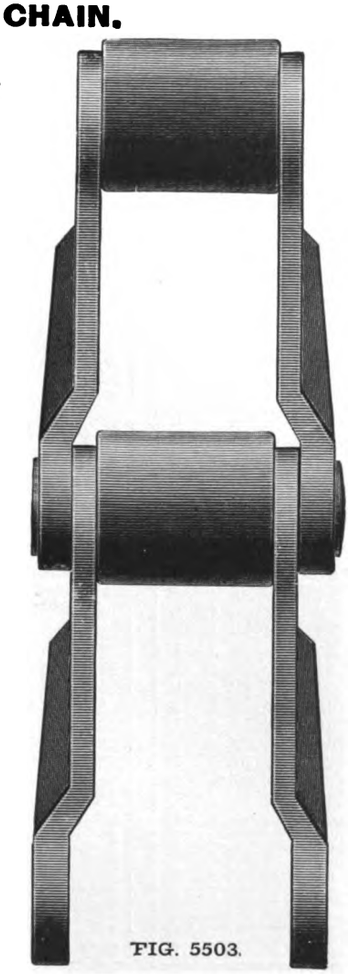


FIG. 5503.

ATTACHMENTS FOR FIG. 5503.

OTHER ATTACHMENTS CAN BE FURNISHED AS REQUIRED.

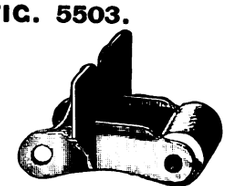


FIG. 5504.



FIG. 5505.

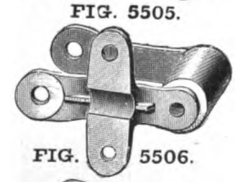


FIG. 5506.



FIG. 5507.

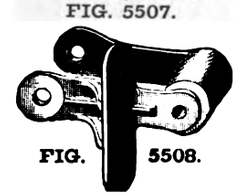


FIG. 5508.

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SPROCKET WHEELS FOR FIG. 5498, BORED AND SET-SCREWED OR KEY-SEATED.

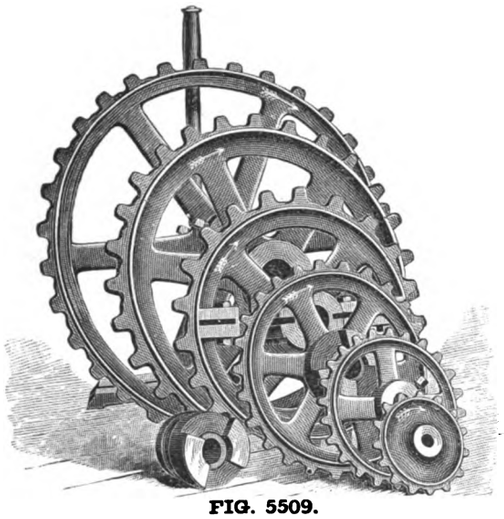


FIG. 5509.

In ordering, always state which are the driving and which the driven wheels.

Use driven wheels at head of elevators.

Wheels made in halves—split—or with large hubs and solid webs can be furnished, for which an additional charge is made.

In the following lists "A" stands for driving, and "B" for driven.

PRICES.

NOS. 75, 78, 88 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
4¾	5	$1.40	A	B
5¼	6	1.50	A	B
6	7	1.60	A	B
6½	8	1.80		B
7¾	9	2.10	A	B
8½	10	2.40	A	B
9½	11	2.60	A	B
10½	12	2.80	A	B
11¼	13	3.10	A	B
12	14	3.40	A	B
13	15	3.60	A	B
14	16	4.00	A	B
15¼	18	4.45		B
16½	19	4.70	A	B
16¾	20	5.25		B
18	21	5.35	A	B
18½	22	5.50	A	
20½	24	6.00	A	B
21	25	6.20		B
22½	27	6.50	A	B
24¼	29	7.50	A	B
26¾	32	8.50	A	B
27¾	33	8.75	A	
28½	34	8.85	A	B
29¼	35	9.00	A	B
32	38	10.00	A	
32¾	39	10.70	A	B
33¾	40	11.00		B
36	43	11.50		B
41¼	49	14.00	A	B
48	57	20.00		B
54½	65	27 00		B
60	72	32.00		B
64½	77	35.00		B

NO. 52 CHAIN.

Diam.	Teeth	Prices.	Kind.	
3	7	$1.10		B
4	8	1.15	A	B
5¼	11	1.25		B
6	12	1.40	A	B
6¼	13	1.60	A	B
7¼	15	1.90		B
8¼	17	2.25	A	B
10	21	2.75		B
12	25	3.10		B
16½	34	4.00	A	B
18	37	4.50	A	B
20¾	42	5.00	A	B
24½	50	6.40		B
25½	53	6.75	A	

NO. 85 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
7	5	$2.25	A	
8	6	2.50	A	B
10¼	8	3.30	A	B
13	10	3.70	A	B
15½	12	4.50	A	B
16¾	13	4 80	A	B
18¼	14	5.50	A	B
21	16	6.50	A	B
23	18	7.75		B
24½	19	8.00	A	B
29¼	23	12.00	A	B
33	26	13.50		B
34½	27	14.25	A	B
40¾	32	18.00		B

NO. 25 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
1¾	6	$0.50	A	
2	7	.55	A	B
2¼	8	.55		B
2½	9	.60		B
3¼	11	.70	A	B
3½	12	.75	A	B
3¾	13	.80	A	B
4	14	.90	A	B
4½	16	1.05	A	B
5¼	18	1.15		B
6½	21	1.25	A	B
8	28	1.50	A	B
10¼	35	1.75	A	B
12	42	2.15	A	B
15	52	2.60	A	B
16¼	56	2.90		B
22¼	77	4.00	A	
24½	84	4.50	A	B

NO. 62 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
4¼	8	$1.75		B
5¾	11	2.00		B
6	12	2.10	A	
7½	14	2.25	A	
8	15	2.40	A	B
10¼	19	2.80		B
12	23	3.50	A	B
12¾	24	3.70	A	
13½	25	3.90		B
14½	28	4.30	A	B
16	30	4.90	A	B
18	34	5.30		B
20½	38	5.60	A	B
21¾	41	6.50		B
25¾	49	7.60	A	B

NO. 83 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
6¾	5	$2.20		B
10½	8	3 50		B
12	9	3.75	A	B
15½	12	4.50	A	B
18	14	5.50	A	B
20½	16	7.00	A	B
24¼	19	8.00	A	B
25½	20	8.50		B
30½	24	10.60		B
35¾	28	14.00		B
48½	38	22.00		B

NO. 108 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
9¾	6	$3.75	A	B
12¼	8	4.25	A	B
14	9	4.50	A	B
15½	10	4.75		B
17¼	11	5.00	A	B
18½	12	6.00		B
20¼	13	7.00	A	B
25	16	9.00	A	B
30½	20	12.00	A	B
37	24	15.00	A	B

NO. 33 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
2½	5	$0.60		B
3¼	7	.70	A	B
4¼	9	.90	A	B
4¾	10	1.00	A	B
5¼	11	1.10	A	
5½	12	1.20	A	B
7	15	1.35	A	B
7¼	16	1.50		B
8½	19	1.65	A	B
10	22	2.00	A	B
12¼	27	2.50	A	B
14¼	32	3.00		B
15¼	34	3.25	A	B
16¼	36	3.75	A	B
18½	41	4 25	A	B
23¾	53	5.50	A	B

NO. 34 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
3¼	7	$0.70	A	B
5¾	13	1.25		B
8	18	1.60	A	

NOS. 57, 67, 77 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
4½	6	$1.20	A	B
5¾	7	1.50	A	B
6½	8	1.70	A	B
7	9	2.00	A	B
8½	11	2.35	A	B
10	13	2.70	A	B
11½	16	3.40	A	B
12½	17	3.50	A	B
14¼	19	4.00	A	B
15¾	21	4.50	A	B
16	22	4.80	A	B
19	25	5.30	A	B
20½	28	5.60		B
21¼	29	6.00	A	
22¼	30	6.25	A	B
24¼	33	7.00	A	B
26½	36	7.60		B
30¼	41	9.00	A	B
32	43	9.50	A	
36	49	10.75		B
40	54	13.00		B

NO. 146 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
16¼	8	$12.00	A	B
18½	9	13.00		B
20½	10	14.00	A	B
24½	12	19.00	A	B
29¾	15	26.00	A	B
36¼	18	36.00		B

TRACTION WHEELS.

No. chain.	Diam.	Prices.
103	20	$9.00
103	30	15 85
108	14	7.00
108	20	9.85
108	21½	10.90
108	29	16.50
108	34	22.00

NO. 42 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
3¼	7	$0.85		B
4	9	1.10	A	B
4¾	11	1.40	A	B
5½	13	1.60	A	B
8	18	1.90	A	B
9¾	22	2.30	A	B
10½	24	2.50	A	B
11¾	27	3.00		B
13¾	32	3.60	A	B
15¾	36	3.90	A	B
17¾	41	4.40	A	B
20	46	5.00	A	
21¾	50	5.50	A	B
23	53	5.75		B
24	55	6.00		B

NOS. 45, 55 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
2¾	5	$0.80		B
3¼	6	.85	A	B
3½	7	.95		B
4¼	8	1.10	A	
4½	9	1.20	A	B
5¼	10	1.25	A	B
6	11	1.30	A	B
6½	12	1.50	A	B
7	13	1.60	A	B
7¼	14	1.75	A	B
8¼	16	2.00	A	B
8¾	17	2.10		B
10	19	2.30	A	B
10½	20	2.50	A	B
11½	22	2.70	A	B
12	23	2.90	A	B
14¼	27	3.50	A	B
16¼	31	3.75	A	B
18	35	4.25	A	B
20	39	4.75	A	B
21½	42	5.30	A	B
23¼	45	5.75	A	B
24	47	6.35		B
24¾	48	6.50		B
28	54	7.25	A	B
30	57	7.50		B
36½	60	9.00		B

NO. 103 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
8¼	8	$2.50	A	B
9	9	2.70	A	
10	10	3.20	A	B
12	12	3.70	A	B
14	14	4.25	A	
17	17	5.25	A	B
18	18	5.50	A	B
19¾	20	6.00		B
23½	24	8.00		B
26½	27	9.50	A	
27¾	28	10.20		B
30½	31	12.00	A	B
35½	36	14 80		B
40	41	18.00		B
48	49	24.00		B

SPROCKET WHEELS FOR ROLLER CHAINS, FIG. 5503.

NO. 0 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
3	4	$0.90	A	
3½	5	.95		B
4¼	6	1 00	A	B
4¾	7	1.20		B
5	8	1.40		B
6	9	1.70	A	B
6½	10	1.80		B
7	11	2.00		B
8	12	2.35	A	B
8½	13	2.60		B
9¼	14	2.60	A	B
9¾	15	2.70		B
10¾	17	3.30	A	B
11¼	18	3.40	A	B
12¼	19	3.50	A	B
12¾	20	3.60		B
14	22	4.00		B
16¼	25	4.80	A	B
18¼	28	5.30	A	B
20¼	31	5.60	A	B
22	34	6.25		B

NO. 1 CHAIN.

Heavy pattern.

Diam.	Teeth.	Prices.	Kind.	
6	6	$3.30	A	B
7¾	8	3.85	A	B
8¾	9	4.15	A	
9¼	10	4.40	A	B
11½	12	5.50	A	B
13½	14	6.25	A	B
14½	15	6.85	A	B
15¼	16	7.35	A	B
18¼	19	8.80	A	B
20	21	11.50	A	B
21	22	12.00		B
23	24	12.40		B
24	25	12.65	A	B
26	27	13.20	A	B
28	29	14.00	A	
29¾	31	15.00	A	B
36¼	38	20 00	A	B
42	44	24.00		B
48	50	28.50		B
60	63	38.50	A	B

NO. 2 CHAIN.

Heavy pattern.

Diam.	Teeth.	Prices.	Kind.	
6½	5	$3.50	A	B
8½	7	4.00	A	B
9¾	8	4.75	A	B
12¼	10	5.50	A	B
13¼	11	6.60	A	B
14½	12	7.00	A	B
16½	14	7.70	A	B
18¼	15	8.25	A	B
20	17	9.50	A	B
22¾	19	11.50	A	B
24	20	12.00	A	B
25	21	12.50	A	B
28¼	24	13.00	A	B
29¾	25	14.00	A	B
31	26	15.00	A	B
35½	30	20.00	A	B
44	37	24.00		B
48	40	28.00		B
60¾	51	38.50		B

NO. 2 SPECIAL CHAIN.

Heavy pattern.

Diam.	Teeth.	Prices.	Kind.	
8½	7	$4.00		B
9¾	8	4.75		B
12	10	5.50	A	B
14½	12	7.00	A	B
15¾	13	7.50	A	B
18	15	8.25	A	B
20½	17	9.50	A	B
24	20	12.00	A	B
27½	23	12.50	A	B

NO. 11 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
18	18	$5.50	A	B
24	24	8.00		B
40	40	16.00		B

NO. 3 CHAIN.

Heavy pattern.

Diam.	Teeth.	Prices.	Kind.	
8¼	6	$4.50	A	B
10½	8	5.50	A	B
12	9	6.50	A	B
13¼	10	7.00	A	B
14½	11	7.50	A	B
15¾	12	8.50	A	B
18¼	14	10.50	A	B
21¼	16	12.00	A	B
23¾	18	14.00	A	B
25	19	15.00		B
26¼	20	16.00	A	B
29¼	23	17.00		B
31¼	24	18.00	A	B
36½	28	22.00	A	B
38	30	24.00		B
40	31	25.00		B
42¾	33	26.00	A	B
44¾	35	30.00		B
72	56			B

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PRICES, SPROCKET WHEELS FOR ROLLER CHAIN, FIG. 5503.

NO. 5 CHAIN.

Heavy pattern.

Diam.	Teeth.	Prices.	Kind.	
12	7	$12.00	A	
15	9	14.00		B
20	12	16.00	A	B
24½	15	18.00		B
26¼	16	18.50	A	B
27½	17	19.00		B
30	19	21.00	A	
34	21	25.00		B
36	22	28.00	A	B
43	27	34.00		B
49¼	30	40.00	A	
60	38	60.00		B

NO. 17 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
4½	5	$1.40	A	
5	6	1.50	A	
6	7	1.60	A	B
7½	9	2.10		B
8¼	10	2.40	A	B
9	11	2.65	A	B
10	12	2.80	A	B
11¾	14	3.40	A	B
12¼	15	3.60	A	B
14¾	18	4.40	A	B
15¾	19	4.70	A	B
18¼	22	5.50	A	B
20	24	6.00	A	B
23¼	28	7.00		B
24¼	29	7.50	A	B
28¼	34	8.50	A	B
29½	36	10.00	A	B
35½	43	11.50	A	B
39¾	48	14.00		B
44¾	54	18.00		B
48	58	21.00		B
59½	72	32.00		B

NO. 77 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
5¼	7	$1.50	A	B
6	8	1.70		B
6¾	9	2.00	A	B
7¼	10	2.25		B
8	11	2.35	A	B
9¾	13	2.70	A	
10¼	14	3.25	A	B
11¾	16	3.50	A	B
13½	18	4.00	A	B
14½	20	4.25	A	B
16	22	4.80	A	B
18½	25	5.30	A	B
19½	27	5.50		B
22¼	30	6.25	A	B
24¼	33	7.00	A	B
29½	40	9.00	A	B
31¾	43	9.50	A	B
59½	72	25.00		B

NO. 8 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
6	7	$1.60	A	
10¼	12	3.00	A	B
11¾	14	3.60		B
14½	17	4.20	A	B
18½	22	5.50		B
24½	29	7.75	A	B

NO. 9 SPECIAL CHAIN.

Diam.	Teeth.	Prices.	Kind.	
6¾	7	$2.10		B
11¾	12	3.40	A	B
16½	17	5.20	A	B
18¼	19	5.50	A	B

NO. 20 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
2	4	$0.80		B
3	6	1.00		B
3½	7	1.10	A	B
4½	9	1.20	A	B
5¼	11	1.30	A	B
5¾	12	1.40	A	B
7	14	1.70		B
7½	15	2.00		B
8½	17	2.25	A	B
10	20	2.50	A	B
10½	21	2.75	A	B
13¼	27	3.50	A	
14½	30	3.70		B
16	33	4.00	A	B
20½	42	5.00	A	B
25	51	6.75		B

NO. 52 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
3¾	7	$1.10	A	B
4	8	1.15	A	B
4¾	10	1.25		B
5½	11	1.30	A	B
6	12	1.40	A	B
7¾	16	2.10	A	B
8	17	2.25	A	B
9½	20	2.60	A	B
10	21	2.75		B
10½	22	3.00		B
11¾	24	3.25	A	B
12	25	3.50	A	B
14	29	3.70	A	B
16¼	34	4.00		B
17¾	37	4.50		B
20¼	42	5.00	A	B
22	46	5.50		B
24	50	6 40		B
25	52	6.75		B
30¾	64	8.00	A	B

NO. 9 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
5¼	5	$1.50	A	
6	6	1.60	A	B
7¼	7	2.10	A	
8	8	2.40	A	B
9½	10	2.60	A	B
11½	12	3.40		B
12½	13	3.60	A	B
14½	15	4.20	A	B
16¼	17	5.25	A	B
18¼	19	5.50	A	B
20	21	6.00	A	B
24	25	7.50	A	B
29¼	31	9.00	A	B
35¼	37	12.00	A	B
40¼	42	13.50		B
48½	51	21.00	A	B

NO. 55 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
4¼	8	$1.15	A	B
12	23	2.90		B
15	29	3.70	A	B
21½	42	5.30	A	

NO. 62 CHAIN.

Diam.	Teeth.	Prices.	Kind.
12	22	$3.30	A

NO. 88 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
8	9	$2.10	A	B
8½	10	2.40		B
10¼	12	2.80		B
12¼	14	3.40	A	B
13	15	3.60	A	
14	16	4.00	A	
15½	18	4.45	A	B
16	19	4.70	A	B
18	21	5.00	A	B
18¾	22	5.50		B
20¼	24	6.00	A	B
24¾	29	7.50	A	B
28	33	8.50	A	B
29¾	35	9.00	A	
32½	38	10.00	A	
33¼	39	10.70		B
44½	53	18 00	A	B
47½	56	21.00		B

NO. 12 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
11½	10	$4.50	A	
16½	14	5.75	A	
31¾	28	13.00		B

NO. 15 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
5¼	8	$1.40		B
9¾	15	2.70		B
10¼	16	3.00		B
11¾	18	3.40		B
18¼	28	5.30		B
20½	32	6.00		B

NO. 103 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
9	9	$2.70	A	B
10	10	3 20	A	B
12	12	3 70	A	
15	15	4.50	A	B
20	20	6.00	A	B
23	23	7.50		B
24	24	8.00	A	
30	30	12.00	A	B
37	37	16.00		B
45	45	21 00		B
49¾	50	25.00		B

NO. 124 CHAIN.

Heavy pattern.

Diam.	Teeth.	Prices.	Kind.	
9½	7	$9.00		B
12	9	11.00	A	
13¼	10	12.00	A	
15¾	12	14.00		B
18¼	14	15.00	A	B
19½	15	16.00		B
26	20	18 00		B
27½	21	19.00	A	
31¼	24	21.00		B
34	26	24.00	A	B
48¾	37	40.00		B
60	46	.....		B

NO. 18 CHAIN.

Diam.	Teeth.	Prices.	Kind.	
6	6	$2.75	A	B
8	8	3.00	A	B
9	9	3.30	A	B
10	10	3.50	A	B
10¾	11	3.90	A	B
11½	12	4.00	A	B
12½	13	4.40	A	B
13½	14	4.65	A	B
14¾	15	5.00	A	B
15¾	16	5.25	A	B
16½	17	5.75	A	B
17½	18	6.25	A	B
18½	19	6.50		B
19¼	20	7.00		B
20½	21	7.50	A	B
24½	25	9.30	A	B
25½	26	10.00	A	
27¼	28	11.50	A	B
31	32	13.00	A	B
36¼	37	15 00	A	B
36¾	38	17.00		B
40¾	42	18.00		B
44½	46	22.00		B
48½	50	26.00	A	B
59	61	35.00		B

NO. 126 CHAIN.

Heavy pattern.

Diam.	Teeth.	Prices.	Kind.	
12	6	$8.00		B
17¾	9	10.50	A	B
19½	10	12.00	A	B
23¾	12	14.00	A	B
25½	13	16.00	A	B
29¼	15	18.00	A	B
35	18	20.00	A	B
37	19	22.00	A	B
48½	25	30 00	A	B

STANDARD STEEL CONVEYOR SCREWS.

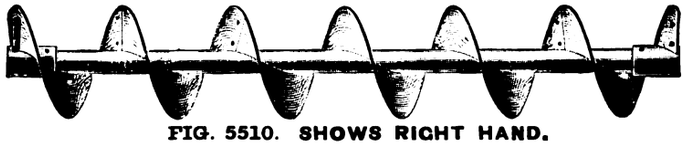


FIG. 5510. SHOWS RIGHT HAND.

A CONVEYOR COMPLETE CONSISTS,

First.—Of sections of hollow shaft, upon which are properly fastened the spiral flights.

Second.—Couplings and bolts to connect the sections and to give supporting bearings for same at proper distances.

Third.—Hangers to support the sections.

Fourth.—Curved iron to line the box.

Fifth.—Wooden box.

Sixth.—Driving end properly supported.

State whether right-hand conveyor or left-hand conveyor is wanted.

State whether linings and hangers are wanted, and state style of hanger preferred.

State length and diameter of driving end, and, if possible, order driving ends of standard diameters.

When possible, order conveyors in feet without fractional parts of a foot, and we can fill promptly with stock lengths.

All conveyors made of steel unless otherwise ordered.

All conveyors shipped right hand unless otherwise ordered.

PRICES.

Diameter.	Prices, per foot.	Standard lengths.	Inside diameter hollow shaft.	Revolutions per minute.	Capacity per hour. Bushels.
4 inch.	$1.00	8 feet.	1 inch.	100	100
6 "	1.67	10 "	1½ "	140	300
9 "	2.00	10 "	1½ "	150	1,000
12 "	2.80	12 "	2 "	160	2,000
16 on 2 in.	3.75	12 "	2 "	160	3,000
16 on 3 in.	5.08	12 "	3 "	160	5,000
18 inch.	6.15	12 "	3 "	160	6,000

The standard lengths, as given above, include the width of one hanger bearing.

Above prices include one hanger and one coupling for each standard length, with necessary bolts and linings.

Proper deduction made for fittings when not wanted.

Can make any length of conveyor desired.

CONVEYOR COUPLING.

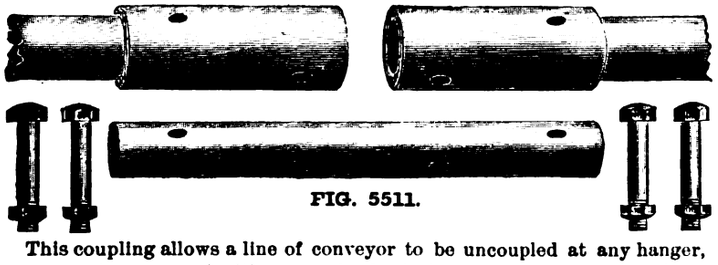


FIG. 5511.

This coupling allows a line of conveyor to be uncoupled at any hanger, or any section removed without moving back the whole line to get the clearance required when feathered or male and female couplings are used.

PRICES ON APPLICATION.

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DRIVING ENDS FOR CONVEYORS, FIG. 5510.

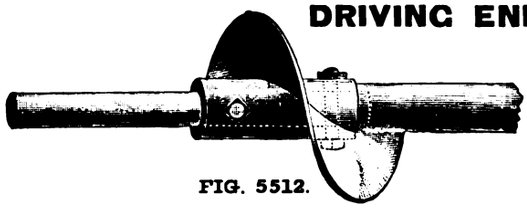


FIG. 5512.

Driving ends, sometimes called gudgeons or projections, extend about 6 inches inside of conveyor shaft and project suitable distance to attach driving power and to give bearing in pillow block.

We charge for standard diameter driving ends at conveyor rates when less than 12 inches long. For standard driving ends longer than 12 inches we charge for shaft used and labor in cutting off, drilling and fitting same.

The standard diameters of driving ends are as follows:

Dia. of conveyor,	4 in.	6 in.	9 in.	12 in.	16–2 in.	16 on 3 in. 18 in.
Dia. of drive end,	1 in.	1½ in.	1½ in.	2 in.	2 in.	3 in. 3 in.

PILLOW BLOCKS FOR DRIVING ENDS.

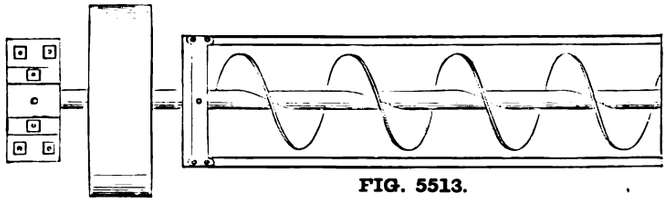


FIG. 5513.

PRICES.

Diameter conveyor,	4 in.	6 and 9 in.	12 and 16 on 2 in		16 on 3 and 18 in.
" driving end,	1 in.	1½ in.	2 in.		3 in.
Length of bearing,	3½ in.	4½ in.	light pattern 4 in. / heavy " 6¼ in.		8 in.
Prices,	$0.90	$1.20	$1.50	$1.90	$4.00

CONVEYOR DELIVERY GATES.

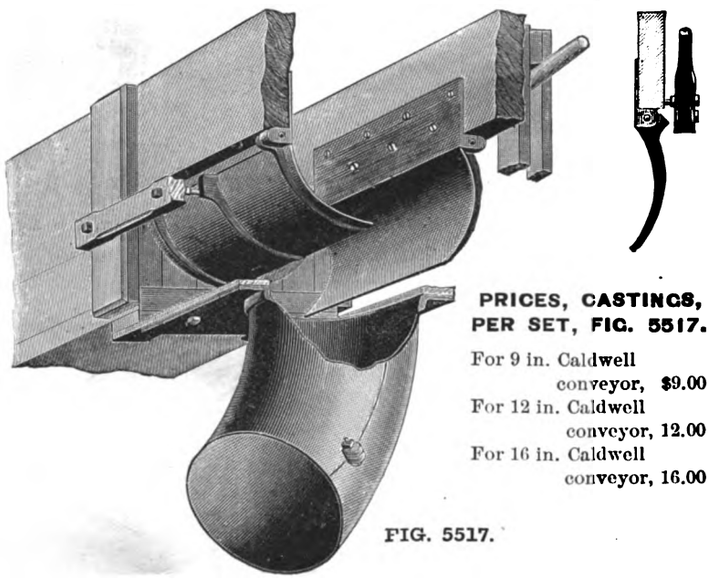


FIG. 5517.

PRICES, CASTINGS, PER SET, FIG. 5517.

For 9 in. Caldwell conveyor, $9.00
For 12 in. Caldwell conveyor, 12.00
For 16 in. Caldwell conveyor, 16.00

CONVEYOR HANGERS, LININGS AND FLIGHTS.



FIG. 5514.



FIG. 5515.



FIG. 5516.

Fig. 5514 is our regular hanger made for all sizes of conveyor, and will be sent for all conveyor 12 inch diameter, and smaller sizes, unless otherwise ordered.

Fig. 5515 is made for 12 inch diameter and larger sizes, and will be sent for all conveyor over 12 inch diameter, unless otherwise ordered. Not made for conveyor smaller than 12 inch diameter.

Fig. 5516 is made for 9 inch conveyor and larger sizes. Not made for conveyor smaller than 9 inch diameter. Should be placed invariably on the side of the box opposite to that on which the material travels.

Our price list includes linings and hangers, but when wanted for repairs or extras we charge as follows:

PRICES.

Diam. conveyor,	4 in.	6 in.	9 in.	12 in.	16 in. 2 in. pipe.	16 in. 3 in. pipe.
Hangers, each,	$0.25	$0.40	$0.55	$1.25	$2.50	$3.00
Linings, per foot,	.03½	.05	.07	.12	.20	.20
Flights, each,	.20	.30	.45	.75	1.20	1.35

In ordering flights be particular to state the pitch of screw, inside diameter of pipe, and whether right or left hand.

DUC'S STEEL ELEVATOR BUCKETS.

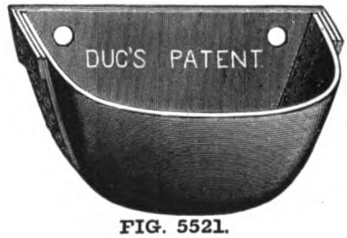


FIG. 5521.

PRICES, MILL BUCKETS NO. 20 GAUGE STEEL.

On belt, width.	Projection, broad.	Deep.	Capacity, in cubic inches.	Prices, each.
3½ inch.	2⅝ inch.	2¾ inch.	11¾	$0.15
4 "	2¾ "	3 "	13¾	.18
4½ "	2⅞ "	3 "	17½	.20
5 "	3¼ "	3½ "	24½	.23
5½ "	3⅝ "	3⅝ "	28	.25
6 "	4⅛ "	3⅝ "	46	.30
7 "	4½ "	4½ "	65	.38
8 "	5⅛ "	4¾ "	104	.40
9 "	5½ "	4⅞ "	131	.50
10 "	6⅛ "	5⅛ "	158	.60

PRICES, ORE BUCKETS, NO. 16 GAUGE STEEL.

On belt, width.	Projection, broad.	Deep.	Capacity, in cubic inches.	Prices, each.
4 inch.	2¾ inch.	3 inch.	13¾	$0.37½
4½ "	2⅞ "	3 "	17½	.42
5 "	3¼ "	3¼ "	24½	.47
5½ "	3⅝ "	3⅝ "	28	.50
6 "	4⅛ "	3⅝ "	46	.55
7 "	4½ "	4½ "	65	.65
8 "	5⅛ "	4¾ "	104	.70
9 "	5½ "	4⅞ "	131	.78
10 "	6⅛ "	5⅛ "	158	.85

PRICES, STORE HOUSE BUCKETS, NO. 16 GAUGE STEEL.

On belt, width.	Projection, broad.	Deep.	Capacity, in cubic inches.	Capacity in dry measure.	Prices, each.
12 inch.	6⅛ inch.	5⅛ inch.	216	3¼ qts.	$1 00
14 "	6⅛ "	6⅛ "	282	4¾ "	1.25
16 "	6¾ "	6⅛ "	395	6 "	1.50
17 "	7 "	6¾ "	436	6½ "	1.75

MALLEABLE IRON ELEVATOR BUCKETS.

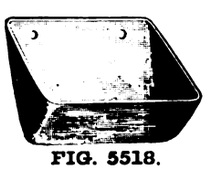


FIG. 5518.

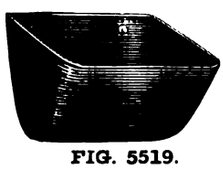


FIG. 5519.

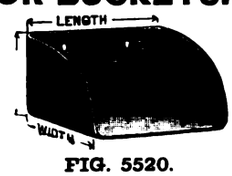


FIG. 5520.

Our malleable iron buckets are seamless, strong and smooth, and their rounded corners guarantee free delivery of the material to be handled.

PRICES, WITH HOLES PUNCHED, FIG. 5518.

Length.	Width.	Depth.	Capacity, cubic inches.	Capacity, quarts.	Prices.
4	2¾	2⅛	13	.2	$0.20
5	3⅛	3	25	.4	.35
6	4	3⅛	50	.74	.45
7	4⅛	4	60	.86	.55
8	5	4	108	1.6	.65
10	6	5	160	2.37	.90
12	7	5⅛	300	4.4	1.25
14	7	5⅛	350	5.1	1.75
18	10	7	1,175	20.3	4.00

FIG. 5519. FIG. 5520.

Length.	Width.	Depth.	Capacity, cu. ins.	Capacity, quarts.	Prices.	Length.	Width.	Depth.	Capacity, cu. in.	Capacity, quarts.	Prices.
4	1⅝	1	4		$0.15	8	4½	4	84	1.	$0.50
8	3½	2½	45	.7	.50	10	5	4	120	1.5	.70
10	4	3	60	.9	.70	12	5	4	144	2.	.90
12	6½	4	135	2.	.90	16	7	6½	380	6.5	1.80

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SALEM ELEVATOR BUCKETS.

REAR VIEW, STANDARD.

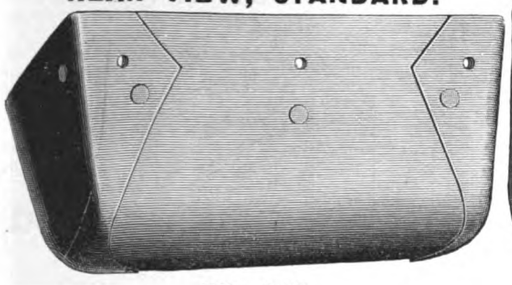


FIG. 5522.

RE-ENFORCED BACK.

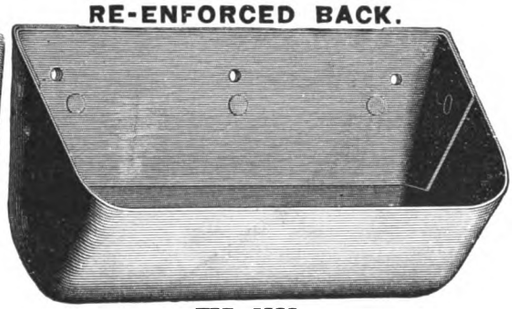


FIG. 5523.

The blanks for these buckets are so cut that they may be stamped into shape without crimping or straining the metal, and so that the bottom corners and the back will be double thick.

PERFORATED.

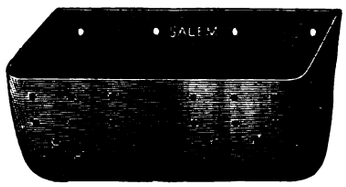


FIG. 5524.

For handling wet substances which require draining during the elevating process. The perforations not only afford outlet for air and water in the "take," but they also facilitate "delivery" by inletting air when the bucket is inverted. Holes ¼ inch diameter and one hole to every square inch on the front, bottom and ends only, unless otherwise ordered. Price for perforating, 5 cents, net, per 100 holes, any size desired.

WITH MALLEABLE IRON BRACE.

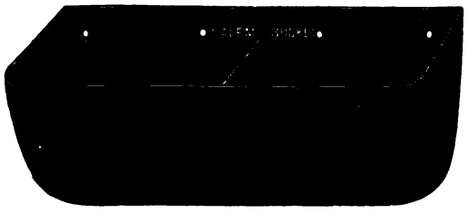


FIG. 5525.

The brace adds strength, and, being made with bevel edges, admits of easy discharge to bucket.

PRICE, 4c. per bucket.

CALVANIZING.

We galvanize after making, which unites the entire structure and thoroughly protects it from rust by an unbroken coating of zinc. The ordinary galvanized bucket is made of galvanized iron, the zinc coating of which invariably cracks and peels off in the making, leaving portions of the iron unprotected.

WITH HOODED HIGH BACK.

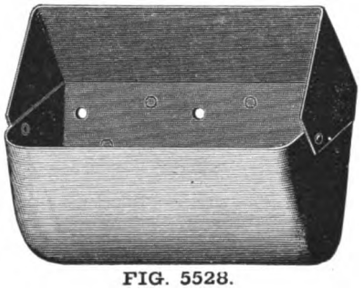


FIG. 5528.

The buckets shown above are used for handling sand or other gritty material. They cover the carrying belt and save it from unnecessary wear by preventing the material from falling upon it.

Any size or thickness of steel to order.

PRICES NAMED ON APPLICATION.

WITH TOOTHED EDGE.

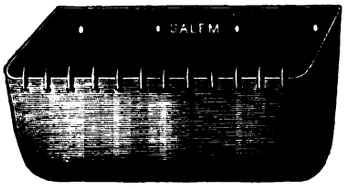


FIG. 5526.

For handling ground bark, or other substances similarly liable to pack in the elevator boot. The teeth keep the substance forked loose in the boot so that it can be carried out by the buckets.

Teeth may be applied to any size or gauge of bucket named in foregoing list. They are placed one inch apart. Price, one cent per tooth, net, extra.

WITH STRAIGHT HIGH BACK.

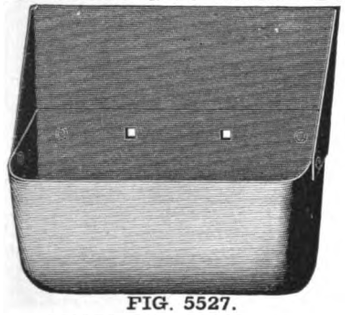


FIG. 5527.

PRICES ON APPLICATION.

PRICES.

Capacity. Bush. per hour 200 ft. per min. Buckets every 12 inches.	Size of bucket. Width on belt.	Size of bucket. Projection.	Suitable for ordinary mill and elevator work. Gauge of steel used.	Suitable for ordinary mill and elevator work. Prices.	Suitable for ear corn, corn and cobs and similar heavy substances. Gauge.	Suitable for ear corn, corn and cobs and similar heavy substances. Prices.	Suitable for ores, coal, broken stone, and similar extra heavy substances. Gauge.	Suitable for ores, coal, broken stone, and similar extra heavy substances. Prices.	Gauge.	Prices.	Gauge.	Prices.	Gauge.	Prices.
21	2 in.	x 2 in.	No. 25,	$0.05										
40	2½ "	x 2¼ "	No. 24,	.05										
59	3 "	x 2⅝ "	"	.06										
69	3⅛ "	x 2½ "	"	.06										
87	3 "	x 3 "	No. 23,	.07										
102	3½ "	x 3 "	"	.07										
116	4 "	x 3 "	"	.08	No. 18,	$0.20			No. 14,	$0.36				
131	4½ "	x 3 "	"	.08	"	.20			"	.37				
159	4 "	x 3½ "	No. 22,	.09	"	.21			"	.38				
179	4½ "	x 3½ "	"	.10	"	.21			"	.39				
199	5 "	x 3½ "	"	.10	"	.22			"	.40				
229	5 "	x 4 "	"	.11	"	.24			"	.42	No. 12,	$0.50		
251	5½ "	x 4 "	No. 21,	.12	"	.25			"	.43	"	.50		
274	6 "	x 4 "	"	.12	"	.25			"	.44	"	.51		
500	7 "	x 4½ "	No. 20,	.14	"	.26			"	.45	"	.55		
670	8 "	x 5 "	No. 19,	.20	"	.31	No. 16,	$0.43	"	.50	"	.67	No. 10,	$0.80
754	9 "	x 5 "	"	.23	"	.33	"	.44	"	.55	"	.69	"	.82
973	10 "	x 5½ "	"	.29	"	.41	"	.53	"	.63	"	.79	"	.94
1,220	10 "	x 6 "	No. 18,	.39			"	.56	"	.67	"	.83	"	.99
1,342	11 "	x 6 "	"	.39			"	.57	"	.68	"	.84	"	1.01
1,464	12 "	x 6 "	"	.40			"	.58	"	.69	"	.86	"	1.03
1,708	14 "	x 6 "	"	.47			"	.67	"	.78	"	.96	"	1.15
1,952	16 "	x 6 "	"	.48			"	.71	"	.83	"	1.04	"	1 21
2,196	18 "	x 6 "	"	.60			"	.85	"	.97	"	1.16	"	1.38
2,440	20 "	x 6 "	"	.65			"	.89	"	1.00	"	1.21	"	1.43
1,590	10 "	x 7 "	"	.40			"	.60	"	.72	"	.90	"	1.08
1,749	11 "	x 7 "	"	.45			"	.62	"	.74	"	.92	"	1.11
1,908	12 "	x 7 "	"	.50			"	.64	"	.76	"	.95	"	1.15
2,226	14 "	x 7 "	"	.58			"	.74	"	.86	"	1.06	"	1.27
2,544	16 "	x 7 "	"	.65			"	.77	"	.90	"	1.11	"	1.34
2,862	18 "	x 7 "	"	.75			"	.93	"	1.06	"	1.26	"	1.52
3,180	20 "	x 7 "	"	.79			"	.96	"	1.09	"	1.31	"	1 58
3,184	16 "	x 8 "	"	.80			"	.98	"	1.12	"	1.35	"	1.62
3,582	18 "	x 8 "	"	.85			"	1.02	"	1.17	"	1 41	"	1.70
3,980	20 "	x 8 "	"	.90			"	1.08	"	1.24	"	1.49	"	1.80
4,378	22 "	x 8 "	"	.93			"	1.11	"	1.27	"	1.54	"	1.86
4,776	24 "	x 8 "	"	.97			"	1.15	"	1.31	"	1.59	"	1.93

Gauge	Prices.	Gauge	Prices.	Gauge	Prices.
No. 8,	$0.94	No. 6,	$1.06		
"	.97	"	1.11		
"	1.12	"	1.27		
"	1.19	"	1.36		
"	1.21	"	1 38		
"	1.24	"	1.41		
"	1.37	"	1.56		
"	1.46	"	1.66		
"	1.64	"	1.85		
"	1.71	"	1.93		
"	1.31	"	1.49		
"	1.36	"	1.54		
"	1.39	"	1.59		
"	1 54	"	1.74		
"	1.62	"	1.84		
"	1.81	"	2 06		
"	1 89	"	2.15		
"	1.93	"	2.21		
"	2.06	"	2.34		
"	2.16	"	2.50		
"	2.27	"	2.59		
"	2.37	"	2.69		

For "double ends"—sometimes used when buckets are carried by ends instead of back—add to price of bucket chosen, as follows, viz.:

12 cts. for 5 in. projection. 14 cts. for 5½ in. projection. 16 cts. for 6 in. projection. 18 cts. for 7 in. projection. 23 cts. for 8 in. projection, if made of No. 18 steel.
17 " " " 19 " " " 21 " " " 24 " " " 30 " " " " " " 16 "
22 " " " 24 " " " 26 " " " 29 " " " 37 " " " " " " 14 "

For "re-enforced back"—sometimes used when buckets are carried by back instead of ends—add 30 per cent. to price of bucket. For "galvanized," add 65 per cent.
For "japanned," add to price of any bucket chosen 7½ per cent. of price of same size in first column of prices.

SPECIAL SIZES AND SHAPES TO ORDER IN STEEL, BRASS, COPPER OR ZINC.

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AVERY ELEVATOR BUCKETS.

PLAIN ELEVATOR.

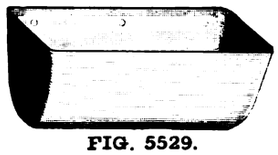


FIG. 5529.

Seamless steel; all corners round; in stock in sizes named; no other sizes made. Can run faster than other buckets and make perfect discharge.

PRICES.

Width on belt. Projection.	Plain.	Galvanized.	Gauge of steel, Stub's.*	Elevating bu. per hour at 200 feet per min. Can run 500 feet.
2 x 2	$0.12	$0.15	23	28
2½ x 2½	.13	.17	23	50
3 x 3	.15	.19	23	88
3½ x 3	.18	.22	23	98
4 x 3	.20	.25	22	128
4½ x 3½	.22	.29	21	180
5 x 4	.24	.32	20	240
5½ x 4	.28	.37	20	281
6 x 4	.34	.44	20	345
7 x 4½	.44	.59	19	491
8 x 5	.54	.73	19	649
9 x 5½	.68	.96	18	811
10 x 5½	.80	1.10	18	963
11 x 6	.92	1.27	18	1,282
12 x 6½	1.04	1.44	18	1,567
14 x 6½	1.20	1.74	16	1,882
16 x 6½	1.60	2.27	16	2,227

*Stub's gauge is two gauges heavier than American gauge.

Punched for belt or chain as wanted. If buckets are to replace others, or to go on belt already punched, send templet.

CORRUGATED.

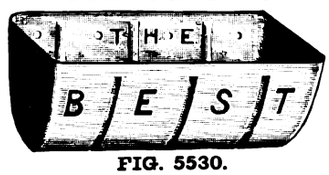


FIG. 5530.

Seamless steel; all corners round; in stock in sizes named; no other sizes made.

Width on belt. Projection.	Prices. Plain.	Prices. Galvanized.	Gauge of steel, Stub's.*	Elevating bu. per hour at 200 feet per min. Can run 500 feet.
8 x 5	$0.54	$0.73	19	649
9 x 5½	.68	.96	18	811
10 x 5½	.80	1.10	18	963
11 x 6	.92	1.27	18	1,282
12 x 6½	1.04	1.44	18	1,567
14 x 6½	1.20	1 74	16	1,882
16 x 6½	1.60	2.27	16	2,227
18 x 7	2.00	2.84	15	2,906
20 x 7	2.40	3.40	15	4,485

*Stub's gauge is two gauges heavier than American gauge.

EXTRA HEAVY ORE BUCKETS.

PRICES, FIG. 5530.

Width on belt. Projection.	Prices. Plain.	Galvanized.	Gauge of steel, Stub's.*	Capacity, qts.	Elevating bu. per hour at 200 feet per min. Can run 500 feet.
5 x 4	$0.70	Prices quoted on application.	16	.64	240
6 x 4	.72		16	.92	345
7 x 4½	.84		16	1.31	491
8 x 5	1.00		15	1.73	649
9 x 5½	1.28		15	2.32	811
10 x 5½	1.56		14	2.57	963
11 x 6	1.84		14	3.42	1,282
12 x 6½	2.12		13	4.18	1,567
14 x 6½	2.48		13	5.02	1,882
16 x 6½	3.00		12	5.94	2,227
18 x 7	3.60		12	7.75	2,906

*Stub's gauge is two gauges heavier than American gauge.

FLAT SPRING KEYS.

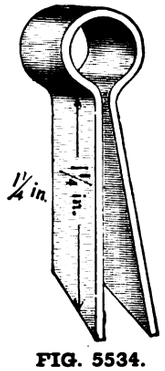


FIG. 5534.

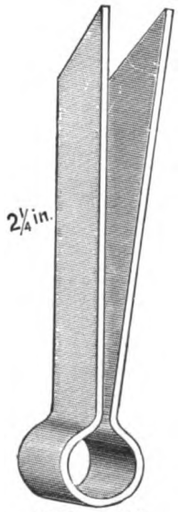


FIG. 5535.

These keys are made of best quality cold-rolled spring iron, and are especially adapted to the uses of locomotive, car and bridge builders.

We can make these keys of any length and gauge of iron desired. The length measurements given are from center of point to neck, or under the eye.

SPLIT AND RIVETED KEYS.

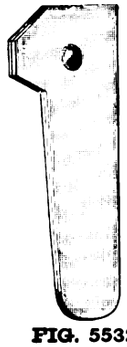


FIG. 5532.

In ordering split and riveted keys, buyers should send with their orders a sketch if goods are to differ from Figs. 5532 and 5533.

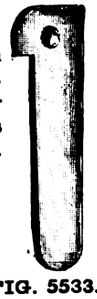


FIG. 5533.

PRICES.

For bolt.	No. in 100 lbs.	Size under head.	Thickness.	Prices.
⅜ inch.	3,640	13/32 x 1½	⅛ in.	$2.00 per 100
9/16 "	2,260	9/16 x 1¾	⅛ "	2.20 "
11/16 "	1,250	11/16 x 2	5/32 "	2.50 "
13/16 "	880	13/16 x 2¼	5/32 "	3.20 "
15/16 "	700	15/16 x 2⅞	5/32 "	3.20 "
1 "	770	1 x 2	5/32 "	3.20 "
1 "	700	1 x 2½	5/32 "	3.20 "
1⅛ "	413	1⅛ x 3⅝	3/16 "	4.60 "
1¼ "	410	1¼ x 2⅞	3/16 "	4.60 "
1½ "	232	1½ x 3½	7/32 "	8.50 "
½ in., P.R.R. pattern.	3,090	½ x 1¼	3/32 "	2.00 "
⅝ "	1,500	⅝ x 1¾	⅛ "	2.35 "
¾ "	1,070	¾ x 2	5/32 "	3.00 "
1 inch brake shoe keys.	338	15/16 x 2⅝	9/32 "	.16 per lb.
" "	316	15/16 x 3	9/32 "	.16 "
1⅛ in. double riveted keys	450	1⅛ x 2¾	3/16 "	6.00 per 100
1¼ in. "	388	1¼ x 2¾	3/16 "	6.00 "
1¾ inch.		1¾ x any length	5/16 or ⅜ "	Special.
2 "		2 x any length	5/16 or ⅜ "	"
2½ "		2½ x any length	5/16 or ⅜ "	"

NUBBED END SPRING KEYS.

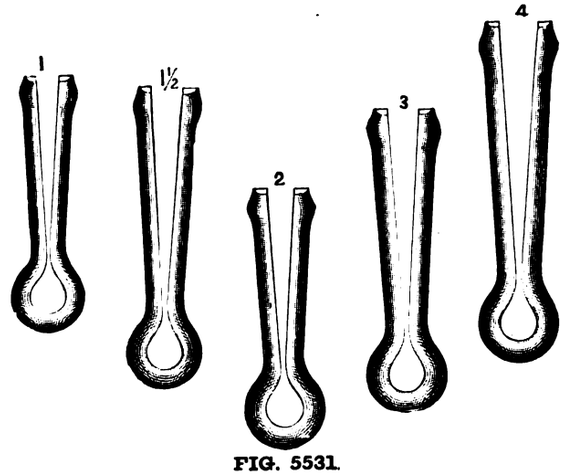


FIG. 5531.

PRICES, PER 1,000, FIG. 5531.

No.	Wire gauge.	Hole.	Bolts.	Prices, per 1,000.
000	12	7/32 inch.	⅝ inch.	$5.00
00	12	7/32 "	¾ "	5.50
0	12	7/32 "	7/8 "	6.00
1	11	¼ "	⅝ "	6.50
1½	11	¼ "	7/8 "	6.75
2	10	9/32 "	⅝ "	7.00
3	10	9/32 "	7/8 "	7.50
4	10	9/32 "	1 "	8.00

The keys are made of spring wire, in special dies, and are nubbed on the end to prevent their dropping out after being sprung in. Being adapted to all uses that keys are generally put to, we make no other sizes than those given above.

FLAT SPRING KEYS.

PRICES, PER 1,000, FIGS. 5534 AND 5535.

Wire gauge.	16 and 17	16 and 17	16 and 17	16 and 17
Width.	⅜	½	⅝	¾
Length.				
1¼	$8.00	$12.00		
1½	9.00	13.00		
1¾	10.00	14.00	$15.00	
2	11.00	15.00	16.00	$19.50
2¼	12.00	16.00	17.50	21.00
2½	13.00	17.00	19.00	22.50
2¾	14.00	18.00	20.50	23.75
3	15.00	19.00	22.00	25.50
3½			25.00	28.50

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SPRING COTTERS.

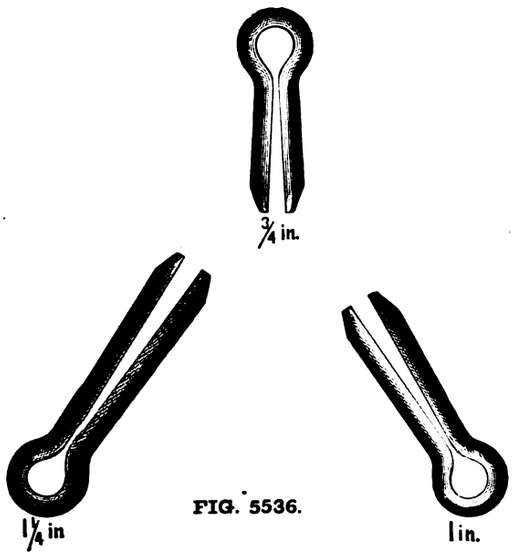


FIG. 5536.

These cotters are made of best quality half-round spring wire, and are pointed by specially prepared machinery. We keep in stock all the above lengths, and can make other sizes, if desired.

The length measurements given are from point to neck, or under the eye.

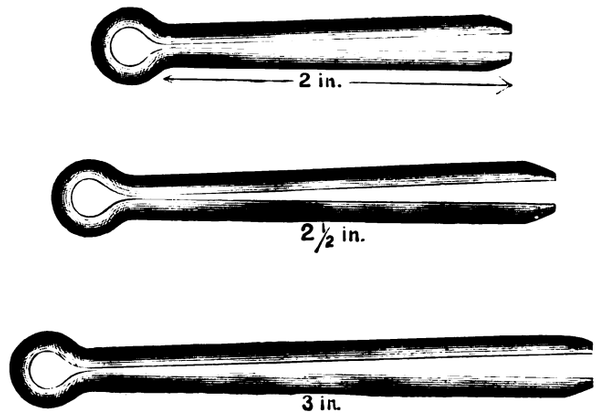


FIG. 5536.

PRICES, PER 1,000.

Wire gauge.....	13	12	11	10	9	8	7	6	5	4	1				
Diameter.....	3/32	7/64	1/8	9/64	5/32	11/64	3/16	13/64	7/32	1/4	5/16	3/8	7/16	1/2	5/8
Length.															
7/16	$3.00														
1/2	3.00	$3.25	$3.50	$3.75	$4.00	$4.25									
5/8	3.25	3.50	3.75	4.00	4.25	4.50									
3/4	3.50	3.75	4.00	4.25	4.50	4.75	$5.00	$5.50	$7.50						
7/8	3.75	4.00	4.25	4.50	4.75	5.00	5.50	6.00							
1	4.00	4.25	4.50	4.75	5.00	5.50	6.00	6.50	8.00	$10.00	$13.50				
1 1/8										10.50					
1 1/4	4.25	4.75	5.00	5.25	5.50	6.25	7.00	7.50	9.00	11.00	15.00				
1 3/8										11.50					
1 1/2	4.75	5.25	5.50	6.00	6.25	7.25	7.75	8.50	10.00	12.00	16.50	$18.75			
1 5/8										12.75					
1 3/4	5.25	5.75	6.00	6.75	7.00	8.25	8.75	9.50	11.25	13.25	18.00	20.50			
2	5.75	6.25	6.50	7.50	7.75	9.00	9.50	10.50	12.25	14.50	19.50	22.25	$29.00	$35.00	
2 1/4			7.25	8.25	8.50	10.00	10.50	11.75	13.50	16.00	21.00	24.00	31.50	38.50	
2 1/2			8.00	9.00	9.50	11.00	11.50	12.75	14.75	17.50	22.50	25.75	34.00	42.00	
2 3/4							12.50	14.00	16.00	18.75	24.50	27.00			
3							13.50	15.25	17.25	20.00	26.50	28.75	39.00	49.00	$75.00
3 1/2										22.75	30.00	32.50	44.00	56.00	
4										25.50	33.00	36.50	49.00	63.00	91.00
5													59.00	77.00	107.00
6													69.00	91.00	123.00

LAP-WELDED CHARCOAL IRON BOILER TUBES.

Outside diameter.	Prices, per foot.	Thickness.	Thickness nearest B'gm W. G.	Nominal weight per foot.
Inches.		Inches.		Pounds.
1	$0.32	.095	13	.90
1 1/4	.30	.095	13	1.15
1 1/2	.27	.095	13	1.40
1 3/4	.24	.095	13	1.85
2	.22	.095	13	1.91
2 1/4	.25	.095	13	2.16
2 1/2	.28	.109	12	2.75
2 3/4	.31	.109	12	3.04
3	.34	.109	12	3.33
3 1/4	.38	.120	11	3.96
3 1/2	.43	.120	11	4.28
3 3/4	.45	.120	11	4.60
4	.52	.134	10	5.47
4 1/2	.60	.134	10	6.17
5	.72	.148	9	7.58
6	1.00	.165	8	10.16
7	1.45	.165	8	11.90
8	1.85	.165	8	13.65
9	2.25	.180	7	16.76
10	2.75	.203	6	21.00
11	3.25	.220	5	25.00
12	3.55	.229	4 1/2	28.50
13	4.20	.238	4	32.00
14	4.75	.248	3 1/2	36.00
15	5.75	.259	3	40.60
16	6.75	.284	2	47.11
17	8.00	.300	1	52.89
18	9.50	.340	0	63.37

These prices are for tubes up to 20 feet long. For tubes in excess of that length, ten per cent. will be added to net of invoice.

Tubes shorter than 12 inches, sold from "safe end" list.

Extra thickness of tubes will be charged as per list of extra gauges.

NET PRICES, EXTRA GAUGES.

For extra wire gauge "boiler tubes" away from standard, not exceeding four wire gauges, add one cent for each inch in diameter to the net price per foot for each additional number. To calculate price, take discounts from list prices of regular tubes, and add thereto net charge for extra wire gauge, thus:

For 1 No.	For 2 Nos.	For 3 Nos.	For 4 Nos.
In.	In.	In.	In.
2 ..2 cts.	2 ..4 cts.	2 ..6 cts.	2 .. 8 cts.
2 1/4 .. 2 1/4 "	2 1/4 .. 4 1/2 "	2 1/4 .. 6 3/4 "	2 1/4 .. 9 "
2 1/2 .. 2 1/2 "	2 1/2 .. 5 "	2 1/2 .. 7 1/2 "	2 1/2 .. 10 "

Beyond four numbers, price is per pound.

Swaging or swelling 2 in. or 2 1/4 in. tubes, 5 cents per end extra.

SAFE ENDS.

Net prices for safe ends to 6 inches long, inclusive. Over 6 inches, and not exceeding 12 inches long, the extra length will be charged for in same proportion. Longer than 12 inches, from regular tube list.

Size	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4
Each end,	.13	.13	.13	.13	.13	.14	.16	.18
Size	3	3 1/4	3 1/2	3 3/4	4	4 1/2	5	6
Each end,	.20	.22	.25	.27	.29	.32	.37	.45

BEST STEEL LAP-WELDED BOILER TUBES.

OF EXTRA GAUGE.

Outside diameter.	Prices, per foot.	Inside diameter.	Thickness nearest B'gm W. G.	Nominal weight per foot.
Inches.		Inches.		Pounds.
1 1/2	$0.33	1.310	13	1.42
1 3/4	.32	1.532	12	1.91
2	.32	1.782	12	2.20
2 1/4	.35	2.032	12	2.49
2 1/2	.38	2.260	11	3.05
2 3/4	.42	2.510	11	3.37
3	.45	2.760	11	3.68
3 1/4	.50	3.01	11	4.10
3 1/2	.55	3.26	11	4.45
3 3/4	.60	3.51	11	4.80
4	.65	3.74	10	5.70
4 1/2	.75	4.	10	6.40
5	.90	4.72	9	7.90
6	1.20	5.69	8	10.60
7	1.70	6.65	8	12.40
8	2.15	7.63	8	14.20

Prices on larger diameters furnished on application.

For extra wire gauges, "steel or special boiler tubes" away from standard, not exceeding four wire gauges, add one and a half cents for each inch in diameter to the net price per foot for each additional number. To calculate price, take discount from list prices of "steel or special tubes," and add net charge for extra wire gauge thereto.

Tubes lighter wire gauge than standard, same price as standard.

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BOILER TUBE FERRULES AND EXPANDERS.

FERRULES.

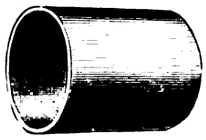


FIG. 5541.

PRICES.

Outside diam. of tube—ins.	1¼	1½	1¾	2	2¼
Each	.20	.20	.20	.20	.25
Outside diam. of tube—ins.	2½	2¾	3	3¼	3½
Each	.30	.35	.40	.45	.50
Outside diam. of tube—ins.	4	4½	5	6	
Each	.60	.80	.80	1.10	

SPRING TUBE EXPANDER.

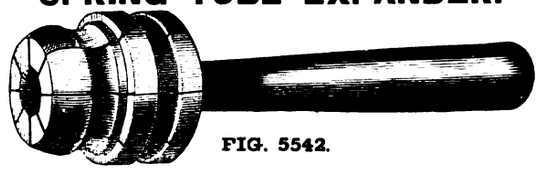


FIG. 5542.

PRICES.

Outside diam. of tube—ins.	1	1¼	1½	1¾	2
Each	$8.00	$8.00	$9.00	$11.00	$12.00
Outside diam. of tube—ins.	2¼	2½	2¾	3	3¼
Each	$13.00	$15.00	$18.00	$22.00	$26.00
Outside diam. of tube—ins.	3½	4	4½	5	6
Each	$30.00	$33.00	$37.00	$42.00	$60.00

GUIDE RING TUBE EXPANDER.

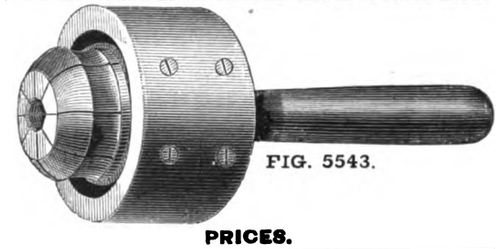


FIG. 5543.

PRICES.

Outside diam. of tube—ins.	1¼	1½	1¾	2	2¼
Each	$11.00	$12.00	$13.00	$15.00	$18.00
Outside diam. of tube—ins.	2½	2¾	3	3¼	3½
Each	$22.00	$26.00	$30.00	$33.00	$37.00
Outside diam. of tube—ins.	4	4½	5	6	
Each	$45.00	$52.00	$56.00	$75.00	

When ordering expanders, state thickness of tube sheet for which they are required.

CAULKING TOOLS.

Yarning tools, ½ to 1 in. .....
Caulking " 3/16 " ⅞ " ..... } 60c. lb.

DUDGEON ROLLER TUBE EXPANDER.

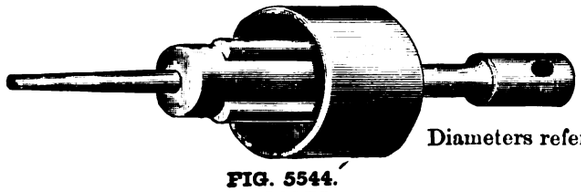


FIG. 5544.

Diameters refer to outside measurements of tubes.

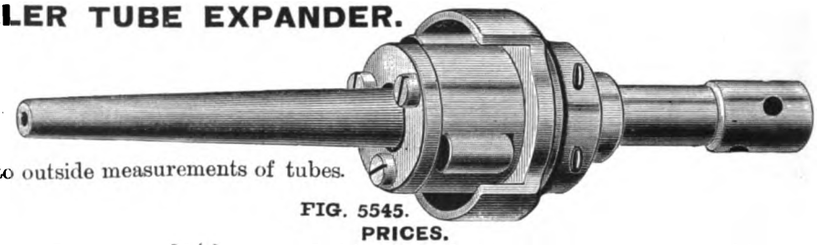


FIG. 5545.

PRICES.

1 in.	1¼ in.	1½ in.	1¾ in.	1⅞ in.
$20.00	$20.00	$20.00	$25.00	$25.00

2 in,	2¼ in.	2½ in.	2¾ in.	3 in.	3¼ in.
$30.00	$35.00	$42.00	$48.00	$55.00	$60.00
3½ in.	4 in.	4½ in.	5 in.	6 in.	7 in.
$70.00	$85.00	$100.00	$120.00	$130.00	$180.00

DUDGEON'S IMPROVED TUBE EXPANDER.

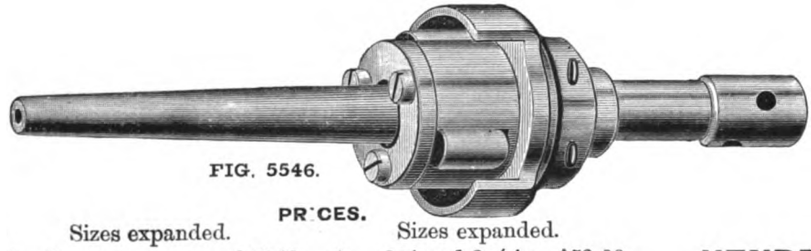


FIG. 5546.

By means of this expander the tubes can be expanded without striking a blow on them, thus rendering them far less liable to crack. Leaky ones can be tightened, with steam on the boiler, with perfect safety. One expander will answer for any thickness of tube sheet, thus avoiding the necessity of an expander for each different thickness of sheet. They are no more liable to break than the common tool, and are much more easily kept in order, as the rollers are the only thing that can give out, and they can be replaced in a few moments by unscrewing cap.

PRICES.

Sizes expanded.		Sizes expanded.	
1 in.	$15.00	3, 3⅛ and 3¼ in.,	$52.00
1¼ "	15.00	3¼, 3⅜ " 3½ "	60.00
1⅜ "	15.00	3½, 3⅝ " 3¾ "	70.00
1½ "	15.00	3¾, 3⅞ " 4 "	75.00
1⅝ and 1¾ in.	20.00	4, 4⅛ " 4¼ "	80.00
1¾ " 1⅞ "	20.00	4¼, 4⅜ " 4½ "	85.00
1⅞ " 2 "	25.00	4½, 4⅝ " 4¾ "	85.00
2, 2⅛ and 2¼ in.,	30.00	4¾, 4⅞ " 5 "	90.00
2¼, 2⅜ " 2½ "	36.00	5, 5¼ " 5½ "	100.00
2½, 2⅝ " 2¾ "	39.00	5½, 5¾ " 6 "	105.00
2¾, 2⅞ " 3 "	45.00	6, 6¼ " 6½ "	115.00

HENDERER ROLLER TUBE EXPANDER.



FIG. 5547.

Diameter, in.,	1	1¼	1½	1¾	1⅞	2	2¼	2½	2¾
Prices	$7.00	$7.00	$8.00	$9.00	$10.00	$10.00	$12.00	$14.00	$16.00
Diameter, in.,	3	3¼	3½	3¾	4	4¼	4½	5	6
Prices	$18.00	$20.00	$23.00	$25.00	$28.00	$30.00	$33.00	$40.00	$48.00

COLLINS SELF FEED TUBE EXPANDER.

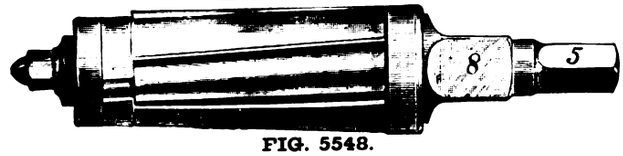


FIG. 5548.

PRICES.

Outside diameter of tubes.		Outside diameter of tubes.	
1¼ inches	$12.00	2¾ inches	$21.00
1½ "	12.00	3 "	22.00
1¾ "	14.00	3¼ "	24.00
1⅞ "	14.00	3½ "	28.00
2 "	15.00	3¾ "	30.00
2¼ "	18.00	4 "	35.00
2½ "	20.00		

HAYES TUBE EXPANDER.

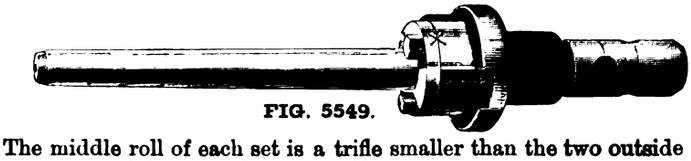


FIG. 5549.

The middle roll of each set is a trifle smaller than the two outside rolls. This gives a triple expansion, expanding the tube both outside and inside the tube sheet. Places all the strain of expanding upon the tube itself and not on the sheet. Makes every tube a perfect brace between the tube sheets. Will roll over a bunch or seam in a tube without trouble. Sets each tube perfectly steam-tight at first.

PRICES.

2 inch o. d. tube	$30.00	3 inch o. d. tube	$55.00
2¼ " " "	35.00	3¼ " " "	60.00
2½ " " "	42.00	3½ " " "	70.00
2¾ " " "	48.00	4 " " "	85.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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TUBE EXPANDERS AND CUTTERS.

TONKIN TUBE EXPANDER.

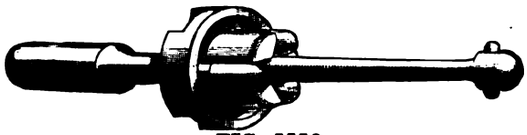


FIG. 5550.

SINGLE SIZE EXPANDER.

No.			No.		
31.	1 in.	$7.00	41.	3½ in.	$23.00
32.	1¼ "	7.00	42.	3¾ "	25.50
33.	1½ "	7.00	43.	4 "	28.00
34.	1¾ "	8.50	44.	4¼ "	30.50
35.	2 "	10.00	45.	4½ "	33.00
36.	2¼ "	12.00	46.	4¾ "	36.50
37.	2½ "	14.00	47.	5 "	40.00
38.	2¾ "	16.00	48.	5½ "	44.00
39.	3 "	18.00	49.	6 "	48.00
40.	3¼ "	20.00			

ADJUSTABLE EXPANDER.

Will expand three sizes of tubes without changing any of the parts.

No.			No.		
60.	1⅝ and 1¾ in.	$10.00	69.	3½, 3⅝ and 3¾ in.	$32.00
61.	1⅞ " 1⅞ "	10.00	70.	3¾, 3⅞ " 4 "	35.00
62.	1⅞ " 2 "	12.50	71.	4, 4⅛ " 4¼ "	38.00
63.	2, 2⅛ and 2¼ in.	15.00	72.	4¼, 4⅜ " 4½ "	41.00
64.	2¼, 2⅜ " 2½ "	17.50	73.	4½, 4⅝ " 4¾ "	45.00
65.	2½, 2⅝ " 2¾ "	20.00	74.	4¾, 4⅞ " 5 "	50.00
66.	2¾, 2⅞ " 3 "	22.50	75.	5, 5¼ " 5½ "	55.00
67.	3, 3⅛ " 3¼ "	25.00	76.	5½, 5¾ " 6 "	60.00
68.	3¼, 3⅜ " 3½ "	29.00	77.	6, 6¼ " 6½ "	75.00

TUBE CUTTER.

For cutting tubes to length, after expanding them in the boiler at one end.

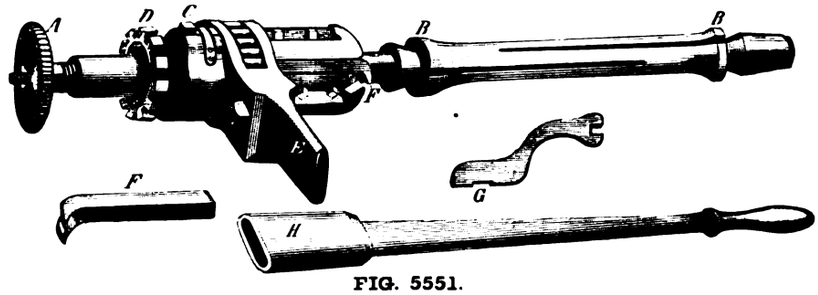


FIG. 5551.

No. 1, to cut 2, 2¼, 2½, 3, 3½, 4, 4½ inch tubes..... $70.00
No. 2, to cut 1¾, 2, 2¼ inch tubes..... 40.00

VANCE TUBE CUTTER.

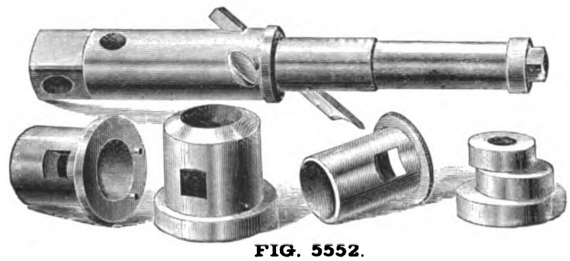


FIG. 5552.

PRICES.

No.		
1.	1½ inch flue	$25.00
2.	2 " "	30.00
3.	2¼ " "	30.00
4.	2½ " "	35.00
5.	2¾ " "	35.00
6.	3 " "	40.00
7.	3½ " "	40.00
8.	Combination for removing 2, 2¼, 2½ and 3 inch flues	50.00

HARRISON FLUE HOLE CUTTER.

Fig. 1.

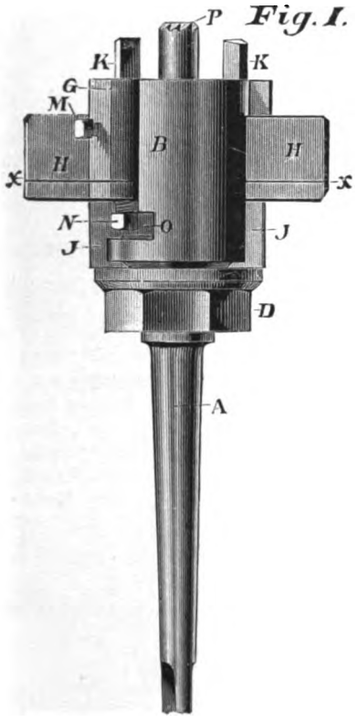


Fig. 2.

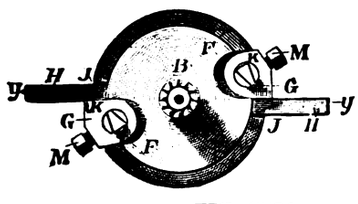


FIG. 5554.

Fig. 5



Fig. 6.



Fig. 7.



DESCRIPTION, FIG. 5554.

This tool is made entirely of steel, and is adjustable, so that one tool will cut holes of any size from 2 to 5 inches in diameter. The cutters are of simple construction, easily adjusted, and are firmly held, rapidly cutting accurate and smooth holes.

The tool is to be used in a drill press, and should be fitted accurately to the spindle. In adjusting the cutters, be careful to get them the same distance from the center and adjusted vertically, so that both cutters will operate equally. The cutters must also be adjusted so that the sides do not touch the sides of the channel which they cut, except at the front cutting edge. The tube sheet, before being operated upon by the cutter, should first have the centers of the intended flue holes punched out or drilled to ¾ inch diameter for the center guiding pin.

With each flue hole cutter are furnished a gauge for adjusting the cutters, a wrench, one set of off-set cutters for small size holes, and one set of straight cutters.

PRICE, $35.00.

BARNES TUBE CUTTER.

PRICES, FIG. 5553.

1¼	inch	$23.00
1½	"	23.00
1¾	"	23.00
2	"	23.00
2¼	"	24.00
2½	"	25.00
2¾	"	26.00
3	"	28.00
3¼	"	30.00
3½	"	32.00
3¾	"	35.00
4	"	40.00
4½	"	45.00
5	"	50.00
6	"	60.00

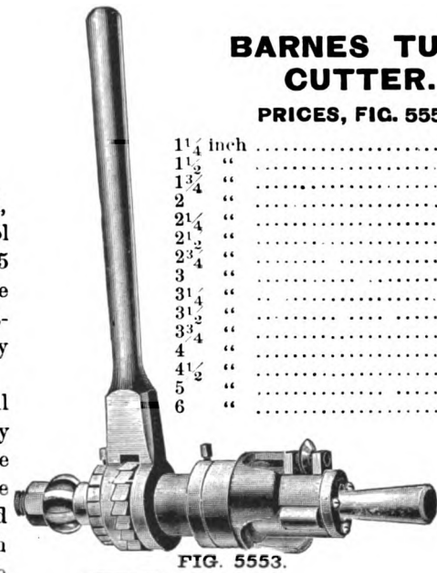


FIG. 5553.

HAYES TUBE SHEET CUTTER.

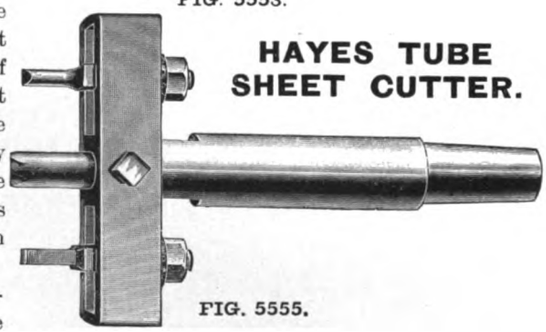


FIG. 5555.

This one tool will cut tube holes from 2½ to 6 inches diameter. The knives have a tapering shank, which fits a corresponding taper in the cross arms. This taper fit, together with the shoulders, clamping upon the bottom of the cross arms, makes the tool firm and rigid in any position. It can be easily and quickly adjusted exactly.

PRICE, $30.00.

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STEAM TUBE CLEANERS.

VACUUM.

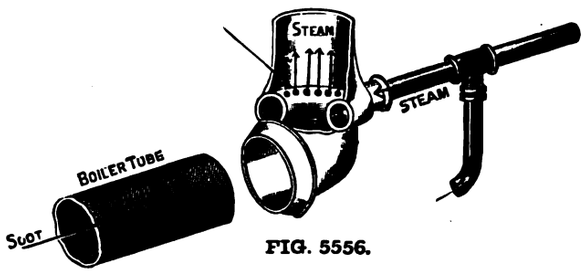


FIG. 5556.

Turn on the steam and thoroughly warm the cleaner, then partially close off the steam and introduce the cleaner into the smoke-head, with the discharge pointing into the chimney flue. As soon as the soot in the smoke-head is sufficiently removed to allow the steam to be turned fully on, place the cleaner in the lower tubes first; as each tube is cleaned, change to the next, allowing the steam to blow continuously, thereby maintaining the forced draft in the stack.

By slightly lowering the handle when changing from one tube to another, the operation of entering the tube is greatly facilitated. It is not necessary to push the cleaner hard into the tubes, as the vacuum sufficiently holds it.

The cleaner can be placed on the handle and fittings of any of the various blowers, or a straight piece of pipe, if desired.

PRICES.

1 inch tube	$9.00	4 inch tube	$12.00
1½ " "	9.50	4½ " "	12.50
2 " "	10.00	5 " "	13.00
2½ " "	10.50	Handle and fittings	3.50
3 " "	11.00	4 ply steam hose, ¾ inch, per foot	.67
3½ " "	11.50	4 " " " 1 " " "	.83

CRIMM'S INJECTOR BLOWER.

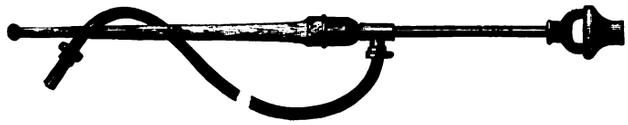
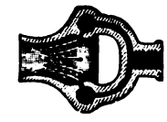


FIG. 5558.



SECTION VIEW OF NOZZLE.

PRICES.

No. 0. For 1 to 2 in. tubes, inclusive, without hose	$6.00;	with 8 ft. hose and couplings	$10.00
" 1. " 2 " 3 " " " " "	6.00;	" " " " "	10.00
" 2. " 3 " 4 " " " " "	8.00;	" " " " "	12.00
" 3. " 4 " 5 " " " " "	10.00;	" " " " "	15.00

Also made to use on upright boilers.

CYCLONE FLUE CLEANER FOR UPRIGHT BOILERS.

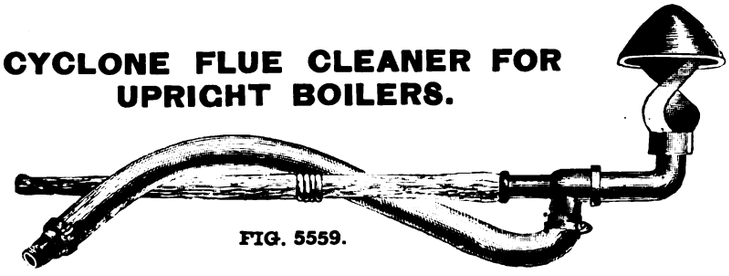


FIG. 5559.

CYCLONE FLUE CLEANER FOR HORIZONTAL BOILERS.



FIG. 5560.

PRICES, FIGS. 5559 AND 5560.

Size.	Clean following sizes of tubes, "outside measurement."	Price of cleaners with clamps and couplings.	Price of cleaner heads only.
No. 0	¾ to 1¼ in.	$7.50	$5.00
No. 1	1¼ to 2¼ in.	8.00	5.50
No. 2	2½ to 3½ in.	9.00	6.00
No. 3	4 to 5 in.	10.00	7.00
No. 4	6 to 8 in.	12.00	9.00
No. 5	6 to 10 in.	13.00	11.00
No. 6	6 to 12 in.	14.00	12.00
No. 7	6 to 14 in.	15.00	13.00
No. 8	6 to 16 in.	16.00	14.00

DIRECTIONS FOR USE.

In making connections take steam from the dome of boiler, to get dry steam.

Connections should never be smaller than the pipe on the cleaner, and preferably larger.

Before using the cleaner, blow all condensed steam from the pipe and hose, and shut off the draft to prevent the soot from being sucked back in the flues.

CLEANER AND ATTACHMENTS.

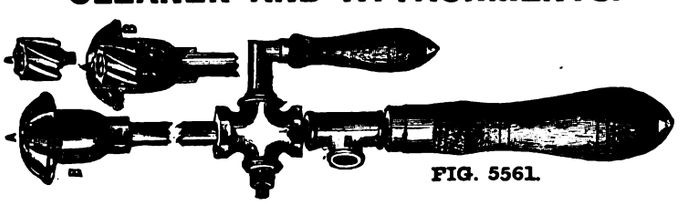


FIG. 5561.

The peculiar manner in which steam is introduced into the tube, which is in a rapidly revolving screw-like form, caused by the great velocity of the spiral fan-wheel A, and the air which is drawn through the air spaces, or slots in the rosehead, increases the current which is created by the revolution of the fan collecting the accumulated sediment in the flue, and causing it to revolve with increasing speed and force as it traverses the tube, until ejected at the opposite end.

PRICES.

Outside diameter of tubes.	Prices of cleaner.	Size of extension pipe.	Prices of extension pipe, per foot.	Size of steam hose.	Prices of steam hose, per ft.	Couplings, per pair.	Clamps, per pair.
1½ in. and 1¾ in.	$7.50	⅜ in.	$0.09	½ in.	$0.51	$1.10	$0.30 each.
2 in. and 2¼ in.	9.00	⅜ in.	.09	½ in.	.51	1.10	.30 each.
2½ in. and 2¾ in.	10.50	½ in.	.10½	¾ in.	.67	1.10	.30 each.
3 in. and 3¼ in.	12.50	½ in.	.10½	¾ in.	.67	1.10	.30 each.
3½ in. and 4 in.	15.00	½ in.	.10½	¾ in.	.67	1.10	.30 each.

Please give the outside diameter of tubes, and state whether you desire the attachments sent with the machine. If attachments are wanted, give the length of steam hose and extension pipe required.

In order that the machine may work satisfactorily, it is necessary, before using, to remove the slotted screw which holds the spiral fan-wheel A in place, and insert a few drops of oil in the oil-well G.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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STEAM TUBE AND FLUE CLEANERS AND BRUSHES.

PRICES.

For tubes from 1 to 2¼ inch..... ..$8.00
" " " 2¼ to 3¼ " 9.00
" " " 3¼ to 6 " 12.00

WHIRLWIND.

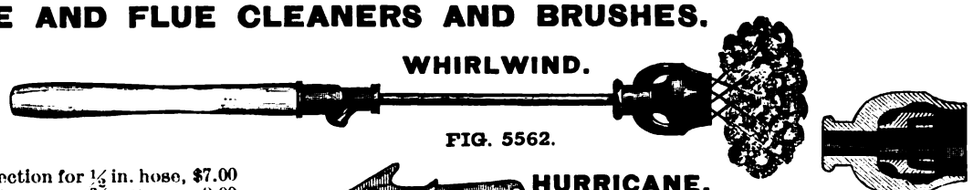


FIG. 5562.

No. 1, for 2 inch to 3 inch flues, with hose connection for ½ in. hose, $7.00
No. 2, " 3½ " 4 " " " " " ¾ " 8.00
No. 3, " flues over 4½" " " " ¾ " 9.00

Where hose is needed we furnish extra quality 4 ply at 25 cents per foot for ½ inch and 30 cents for ¾ inch, net. Patent couplings and clamps, complete, $1.50.

HURRICANE.



FIG. 5563.

FARLEY STEEL BRUSH.

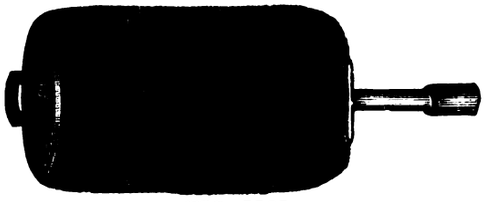


FIG. 5565.

PRICES.

With leather washers, per inches diameter.....$1.00
" metal " " " 1.25

Brushes under 2 inches, same price as 2 inch.

STEEL FLUE BRUSH.

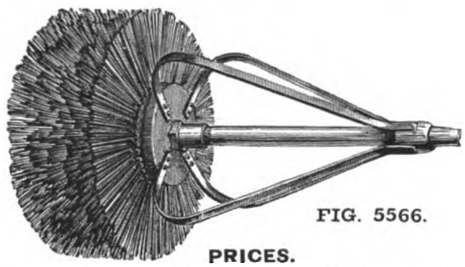


FIG. 5566.

PRICES.

For brushes over 6 inch diameter, $1.25 per inch.

AIR JET CLEANER.

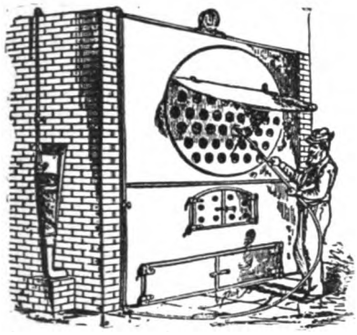


FIG. 5564.

PRICES.

1½ to 2½ inch tubes..... ...$10.00
2½ to 3½ " " 12.00
3½ to 4½ " " 15.00

PRICES, FIG. 5567.

Size, inches..	1½	2	2¼	2½	2¾	3	3¼
Prices.....	$2.00	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25
Size, inches..	3½	3¾	4	4½	5	5½	6
Prices	$3.50	$3.75	$4.00	$4.50	$5.00	$5.50	$6.00

Above sizes are outside measurement of tube.

SPENCER STEEL FLUE BRUSH.

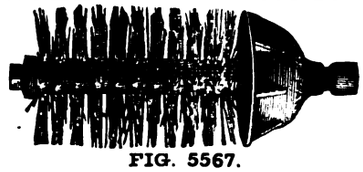


FIG. 5567.

WHALEBONE.

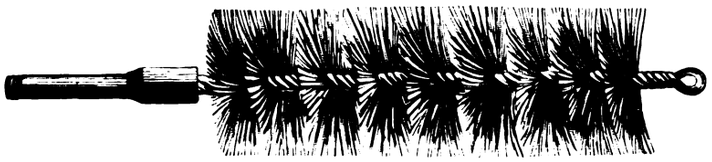


FIG. 5568.

STEEL WIRE.

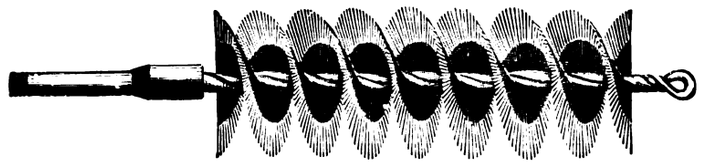


FIG. 5569.

PRICES.

Outside diameter of tube, inches..	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	4	4½	5	5½	6	7
Whalebone brushes, Fig. 5568, ea.	$0.75	$0.75	$0.75	$0.80	$0.90	$1.00	$1.00	$1.25	$1.40	$1.50	$1.75	$2.00	$2.25	$2.25	$2.75	$3.00	$3.50
Steel wire brushes, Fig. 5569, ea.	1.10	1.10	1.20	1.20	1.25	1.40	1.50	1.60	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.50

CHRISTOFFEL'S STEEL COIL BRUSH AND FLEXIBLE SCRAPER COMBINED.

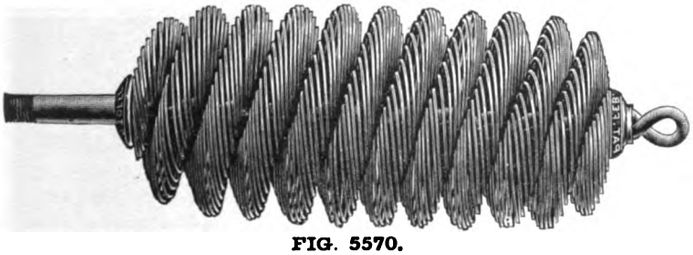


FIG. 5570.

PRICES.

Size...	1 to 1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4 in.
Prices.	$1.00	$1.10	$1.20	$1.30	$1.40	$1.50	$1.65	$1.75	$1.90	$2.00

Over 4 inches, 75 cents per inch. Outside measurement of tube.

CHRISTOFFEL'S ELLIPTIC SPRING STEEL AND ADJUSTABLE TUBE SCRAPER.

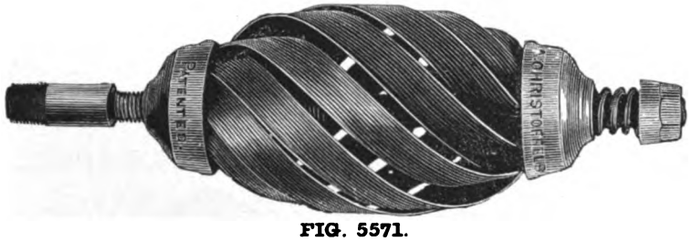


FIG. 5571.

PRICES.

Size...	1 to 2	2¼	2½	2¾	3	3¼	3½	3¾	4 in.
Prices.	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00

Over 4 inches, $1.25 per inch. Outside measurement of tube.



FIG. 5572.

STEEL WIRE, WHALEBONE OR RATTAN BRUSHES.

PRICES.

Steel wire, per inch diameter.....$1.00
Whalebone, " " ..... .75
Rattan, " ..... .30

EXCELSIOR STEEL TUBE CLEANER.

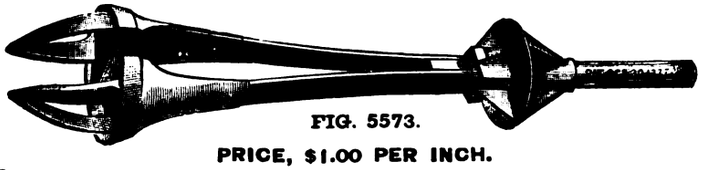


FIG. 5573.

PRICE, $1.00 PER INCH.

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STEEL BOILER TUBE SCRAPERS AND CLEANERS.

NATIONAL.

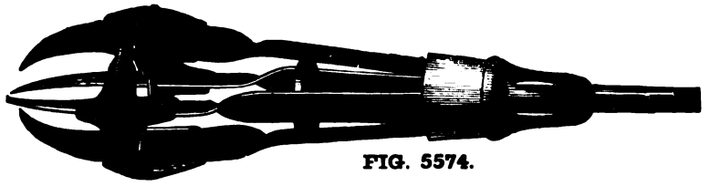


FIG. 5574.

PRICES, FIG. 5574.

1¼ in.	1½ in.	2 in.	2½ in.	2½ in.	2¾ in.	3 in.
$2.00	$2.00	$2.00	$2.25	$2.50	$2.75	$3.00

3¼ in.	3½ in.	4 in.	4¼ in.	5 in.	5½ in.
$3.25	$3.50	$4.00	$4.50	$5.00	$5.50

SPIRAL.

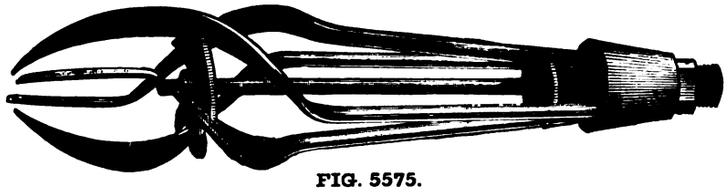


FIG. 5575.

PRICES, FIG. 5575.

Prices are governed by outside measurement of tubes.

1½ inch	$2.00	3¼ inch	$3.25
1¾ "	2.00	3½ "	3.50
2 "	2.00	3¾ "	3.75
2¼ "	2.25	4 "	4.00
2½ "	2.50	4½ "	4.50
2¾ "	2.75	5 "	5.00
3 "	3.00	6 "	6.00

FREEMAN'S.

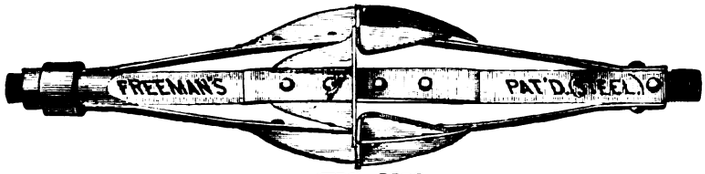


FIG. 5576.

PRICES, FIG. 5576.

Size of flue, outside diameter,	2	2¼	2½	2¾	3	3¼	3½	3¾	4
Prices	$2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00

SELF-ADJUSTINC.

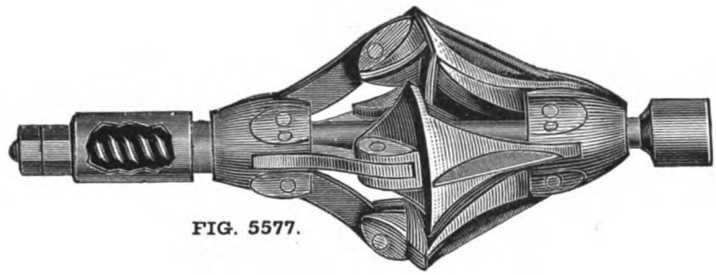


FIG. 5577.

Sizes, 1½ to 6 inches. **PRICE, $1.00 PER INCH.**

ENGINEER'S FAVORITE.

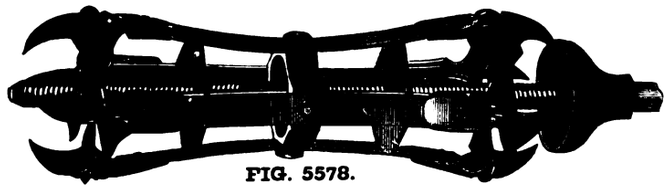


FIG. 5578.

It combines with the elasticity of its steel springs the double head—or principle of two cleaners combined in one—and the adjustable or expanding feature.

PRICES.

$1.00 per in. all sizes from 2 to 4½ in. inclusive; all smaller sizes same as 2 in. $1.25 per inch for 5 in. and all sizes above.

DUPLEX BOILER TUBE SCRAPER.

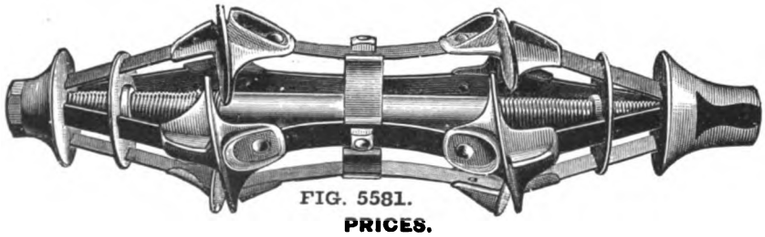


FIG. 5581.

PRICES.

1½, 1¾, 2 inch	$2.00	3 inch	$3.00	4 inch	$4.00
2¼ inch	2.25	3¼ "	3.25	4½ "	5.00
2½ "	2.50	3½ "	3.50	5 "	6.25
2¾ "	2.75	3¾ "	3.75	6 "	7.50

Scrapers are made to fit boiler tubes having outside diameter of sizes given.

PRATT'S ELASTIC BOILER TUBE SCRAPER.

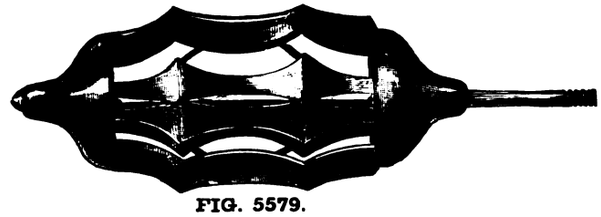


FIG. 5579.

Sizes vary by quarters of an inch from 1½ to 4 inches.

PRICE, $1.00 PER INCH.

GILMORE CONICAL SCRAPER.

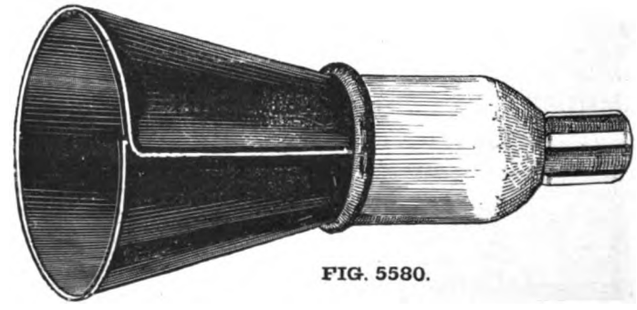


FIG. 5580.

It has a cutting edge of flexible steel cone; adjusting ring or washer; sleeve moving on threaded shank contracting or expanding cutting edge of cone; socket to carry handle, also acts as jam nut to hold sleeve in place. Shanks, being made of brass, make corrosion of working parts impossible.

The elasticity of the steel cone permits its close adaptation to the internal circumference of tubes; the thin steel cutting edge of cone passes between the tube and the scale and other accumulations, cutting it free, the cone gathering and carrying it forward at one operation, leaving an absolutely clean tube.

PRICES.

Inch Nos.	2	2¼	2½	2¾	3	3½	4	4½	5	6
	$2.00	2.25	2.50	2.75	3.00	3.50	4.00	4.50	5.00	6.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BRAZED BRASS, ZINC AND BRONZE TUBING.

PLAIN ROUND.

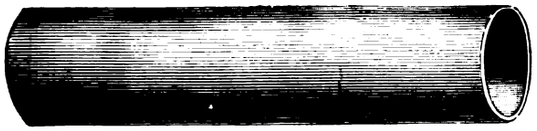


FIG. 5582.
Sizes, ⅛ to 6 inch.

PLAIN HEXACON.

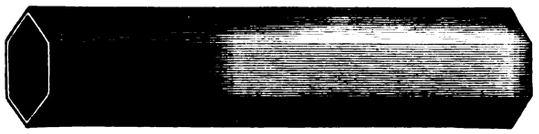


FIG. 5583.
Sizes, ½ inch to 1 inch.

Other sizes of above patterns to order at extra price.

All mandrel-drawn tubes, ⅜ inch and above, 5c. advance on list prices.

All mandrel-drawn tubes under ⅜ inch, 25c. per pound advance on list prices.

PRICES.

	Per lb.
Brass, ⅜ to 3 inches	$ .....

EXTRAS.

Over 3 inches	$0.10
5/16 inch	.10
¼ "	.25
3/16 "	.65
⅛ "	1.15

Bronze tubing, advance 3c. over brass.

ZINC TUBING.

PRICES.....$

PLAIN SQUARE.



FIG. 5584.
Sizes, 3/16 to 1½ inches.

PLAIN FLAT.



FIG. 5585.
Sizes in great variety. Also fancy patterns.

Tubing sawed or cut, 2 to 4 feet long, 1c. advance on list.

Add to 1c. one-half cent for each additional cutting under two feet.

SEAMLESS BRASS AND COPPER TUBING IN 12 FT. LENGTHS.

BRASS.

Outside diameter	⅛	3/16	7/32	¼	5/16	⅜	½	5/8	¾	⅞	1	1⅛	1¼	1⅜	1½ in.
No. by Stubs' gauge	21	21	20	19	19	19	18	18	17	17	16	16	15	14	14
Weight per foot				.11	.15	.18	.27	.33	.46	.53	.67	.76	.97	1.22	1.36

Outside diameter	1¾	2	2¼	2½	2¾	3	3¼	3½	4	4¼	4½	4¾	5	6 in.
No. by Stubs' gauge	13	12	12	10	10	10	10	10	10	10	10	10	10	
Weight per foot	1.79	2.35	2.68	3.74	4.14	4.54	4.94	5.35	6.14	6.52	6.92	7.30	7.67	9.30

COPPER.

Outside diameter	1/16	3/32	¼	5/16	⅜	½	5/8	¾	⅞	1	1⅛	1¼	1⅜	1½	1¾	2 in.
No. by Stubs' gauge	21	21	19	19	19	18	18	17	17	16	16	15	14	14	13	12
Weight per foot	.036	.065	.12	.16	.19	.29	.35	.49	.58	.71	.80	1.02	1.29	1.44	1.88	2.47

Outside diameter	2¼	2½	2¾	3	3¼	3½	4	4¼	4½	4¾	5	6	6⅝ in.
No. by Stubs' gauge	12	10	10	10	10	10	10	10	10	10	10	10	7
Weight per foot	2.82	3.94	4.36	4.78	5.20	5.63	6.46	6.86	7.28	7.68	8.08	9.79	13.60

IRON PIPE SIZES, IN BRASS.

Same as iron size	1/8	¼	3/8	½	¾	1	1¼	1½	2	2½	3	4	5	6 in.
Outside diameter	13/32	17/32	11/16	13/16	1 1/16	1 5/16	1 5/8	1 7/8	2⅜	2⅞	3½	4½	5½	6½
Weight per foot	.32	.43	.58	.81	1.19	1.66	2.42	2.92	3.90	5.14	8.08	12.70	16.00	18.00

IRON PIPE SIZES, IN COPPER.

Same as iron size	1/8	¼	3/8	½	¾	1	1¼	1½	2	2½	3	4	5	6 in.
Outside diameter	13/32	17/32	11/16	13/16	1 1/16	1 5/16	1 5/8	1 7/8	2⅜	2⅞	3½	4½	5½	6½
Weight per foot	.33	.44	.60	.85	1.25	1.74	2.54	3.07	4.09	5.40	8.48	13.33	16.80	18.90

All the above sizes of seamless brass and copper tubes carried in stock in 12-foot lengths. Any length other than 12 feet, or any diameter or thickness other than the above, will have to be made to order, necessitating a delay of from one to two weeks, according to requirements. All tubes carried in stock are hard.

Annealed tubes, for bending, made to order.

In ordering, be careful to state whether tube is wanted O. G. (which is Stubs') or N. G. (which is Brown & Sharpe's), or whether outside or inside diameter is wanted.

TAPS.—BRASS THREAD.

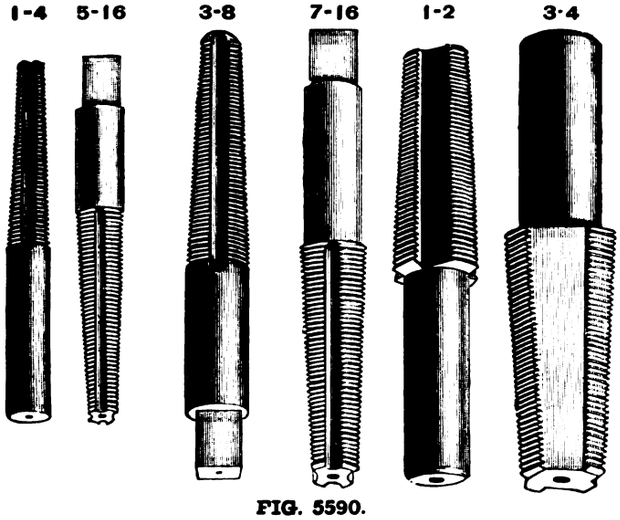


FIG. 5590.

PRICES.

1/4	5/16	3/8	7/16	½	5/8	¾	⅞	1	1¼ in.
$1.40	$1.40	$1.40	$1.50	$1.50	$1.75	$2.00	$2.00	$2.75	$3.25

ADJUSTABLE BRASS STOCK AND DIES.

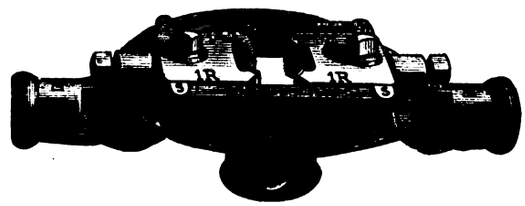


FIG. 5591.

PRICES.

5 brass dies, 5/8, ¾, ⅞, 1 and 1¼ inch	$15.00
5 " " and taps, 5/8, ¾, ⅞, 1 and 1¼ inch	26.25

PRICES OF PARTS.

Stock	each,	$3.50
Brass dies, right or left, 5/8 to 1¼ inch	"	2.50
Bushings—pipe, bowl or brass	"	.25

BRASS PIPE SCROLL DIE STOCK.



FIG. 5592.
Thread sizes, 5/16 to ⅞.

PRICE, $15.00.

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PIPE TAPS AND REAMERS.

PIPE TAPS.

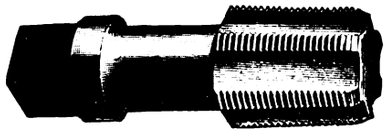


FIG. 5593.

PIPE REAMERS.



FIG. 5594.

HUMPHREY'S COMBINED DRILL, REAMER AND TAP.

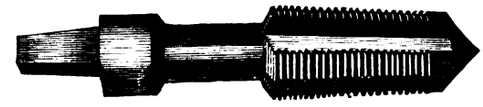


FIG. 5595.

	Diam.....	1/8 in.	1/4 in.	3/8 in.	1/2 in.	3/4 in.	1 in.	1 1/4 in.	1 1/2 in.	2 in.	2 1/2 in.	3 in.	
Fig. 5593.	Prices	$1.12	$1.25	$1.50	$1.87	$2.50	$3.12	$3.75	$4.62	$6.25	$10.50	$15.00	Larger sizes to order.
" 5594.	"	1.12	1.25	1.50	1.87	2.50	3.12	3.75	4.62	6.25	10.50	15.00	
" 5595.	"		2.50	2.50	3.00	4.50	6.00	7.25	8.50	10.75			
No. threads per inch ...		27	18	18	14	14	11 1/2	11 1/2	11 1/2	11 1/2	8	8	

Standard taper, 1 inch to foot.

COMBINED PIPE TAP AND DRILL.

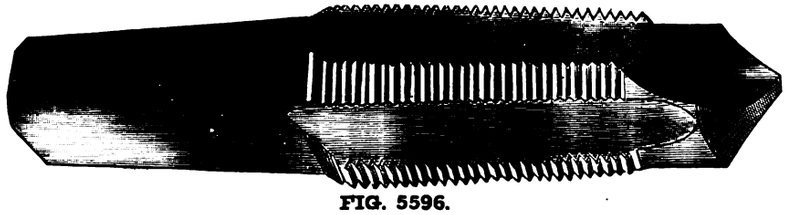


FIG. 5596.

For tapping gas and water pipes.

Size.	Length.	Prices, ea.	Size.	Length.	Prices, ea.	Size.	Length.	Prices, ea.
1/4 in.	3 3/4 in.	$1.50	3/4 in.	4 1/2 in.	$3.00	1 1/2 in.	5 1/2 in.	$5.80
3/8 "	4 "	1.75	1 "	4 3/4 "	3.80	2 "	5 3/4 "	7.60
1/2 "	4 1/4 "	2.20	1 1/4 "	5 "	4.80	2 1/2 "	6 1/2 "	10.00

Shanks for sizes 1/4 to 1 1/4 in. are 1/16 by 1/2 in. and 1 3/4 in. long.
Shanks for sizes 2 to 2 1/2 in. are 1 by 3/4 in. and 2 in. long.

PIPE BURR REAMER.



FIG. 5597.

With this tool the inside burr is easily and quickly taken off from all sizes of pipe.

Reamer takes from 3/4 to 3 inches, inclusive. Price, $3.00.

The adjustable knife can be readily re-sharpened.

EXPANDING OR COLLAPSING PIPE TAPS.

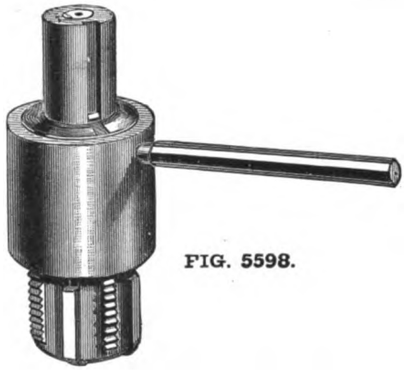


FIG. 5598.

PRICES, FIG. 5598.

TAPS.

3/4	$18.00	4 1/2	$43.50
1	18.00	5	48.00
1 1/4	18.00	6	58.00
1 1/2	20.00	7	67.00
2	22.50	8	77.00
2 1/2	25.50	9	87.00
3	30.00	10	97.00
3 1/2	35.50	11	110.00
4	39 00	12	132.00

REAMING CUTTERS.

Extra.

3/4	$0.80	4 1/2	$1.90
1	.80	5	2.00
1 1/4	.80	6	2.15
1 1/2	1.15	7	2.25
2	1.38	8	2.37
2 1/2	1.80	9	2.70
3	1.80	10	2.90
3 1/2	1.80	11	3.25
4	1.90	12	3.75

TAPPING CUTTERS.

Extra.

3/4	$2.10	4 1/2	$4.05
1	2.15	5	4.15
1 1/4	2.25	6	4.88
1 1/2	2.65	7	5.10
2	2.70	8	5.45
2 1/2	3.10	9	5.85
3	3.25	10	6.00
3 1/2	3.65	11	6.50
4	3.80	12	7.25

Any size and any thread made to order. In ordering, give size and length of shank.

GUIDE OR BUSHING.



FIG. 5600.

DIE HOLDER OR FRAME.



FIG. 5601.

PIPE STOCKS, WITH SOLID DIES.

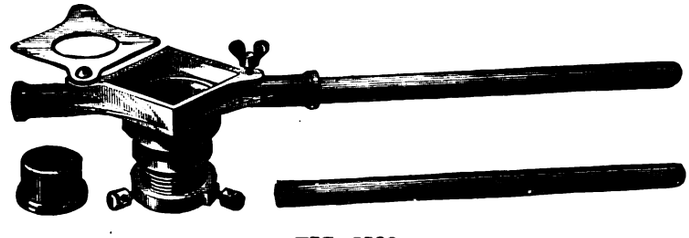


FIG. 5599.

STANDARD PIPE DIES.

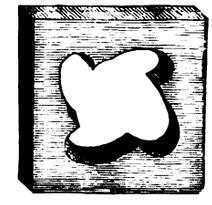


FIG. 5602.

PRICES.

Numbers	0	1*	1 1/2	1 3/4	2	3
Pipe sizes of dies	1/8, 1/4, 3/8, 1/2.	1/4, 3/8, 1/2, 3/4, 1.	3/4, 1, 1 1/4.	1, 1 1/4, 1 1/2.	1 1/4, 1 1/2, 2.	2 1/2, 3.
Dimensions of dies	2 x 1/2	2 1/2 x 3/4	3 x 3/4	3 x 3/4	4 x 7/8	5 x 1 1/4
Complete with right-hand dies, Fig. 5599.	$9.50	$15.00	$13.50	$13.50	$20.00	$43.00
Stocks only	3.50	5.00	6.00	6.00	9.50	25.00
Extra dies, right or left, Fig. 5602	1.50	2.00	2.50	2.50	3.50	9.00
Extra guides, Fig. 5600	.25	.35	.45	.45	.60	1.00
Die frames, Fig. 5601	....	.30	.40	.40	.50	.60

* No. 1 stock made with 1 in. bushing extra.

Note.—With No. 2 stocks 4 x 7/8 dies are always sent unless otherwise ordered. Nos. 2 and 3 stocks have leader screws. Bushings furnished with all stocks.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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FOUR ARM PIPE STOCKS, WITH SOLID DIES.

PRICES, FIG. 5603.

No. 3½. With dies, bushing and leader screw, cutting 2½ and 3 inches $51.00

Each pipe stock is carefully packed in a wooden box.

Without dies 33.00

Dies are 5 x 1¼ inches.

Extra dies ..... $9.00 each.
Extra bushings ..... 1.00 "
Extra die holders ..... .60 "

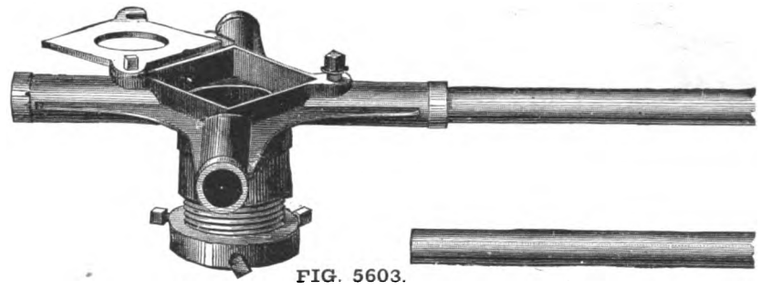


FIG. 5603.

FOUR ARM PIPE STOCK, WITH INSERTED TEETH DIES.

PRICES, FIG. 5604.

No. 4. With dies, bushings and leader screw, cutting 2½ and 3 inch pipe $40.00

Dies are 5 x 1¼ inches.

Extra dies 10.00
Extra bushings 1.00
Extra die frames 1.00

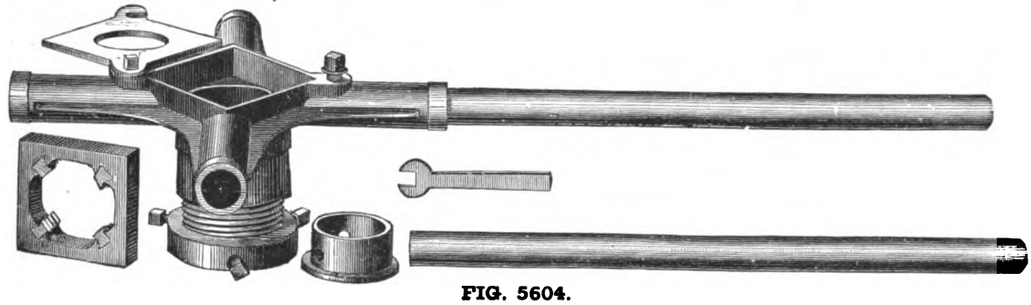


FIG. 5604.

FOUR ARM PIPE STOCKS, WITH OCTAGON INSERTED TEETH DIES AND CUTTING-OFF ATTACHMENT.

PRICES, EXTRAS, 5605.

	Each.
Size of die, 4½ and 4 in., 7½ x 1½ in.	$18.00
Size of die, 3½, 5 and 6 in., 10 x 1½ in.	28.00
Extra guides for No. 5	1.50
Extra guides for No. 6	2.00
Extra die holder for No. 5, outside size 7½ octagon by 1½ in., to hold dies 5 x 1¼ inches	1.50
Extra die holder for No. 6, outside size 10 octagon by 1½ in., to hold dies 7½ x 1½ inches	2.00

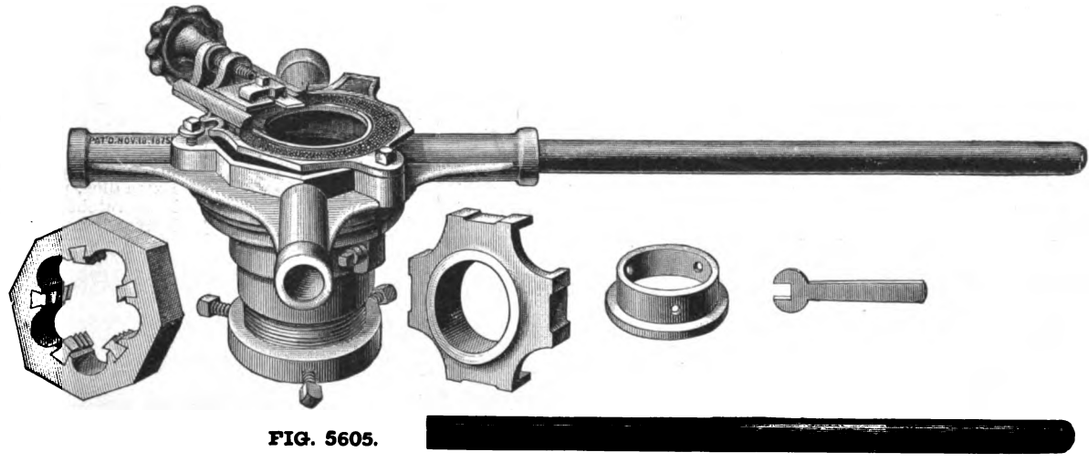


FIG. 5605.

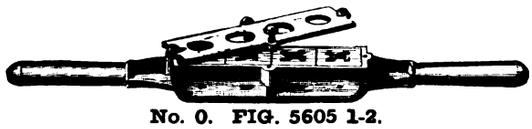
PRICES.

No. 5 stock, without cutting-off attachment, with dies 7½ in. octagon by 1½ in., with leader screw to thread 2½, 3, 3½ and 4 in $85.00
2½ and 3 inch dies have malleable frames 5 x 1¼ inches.

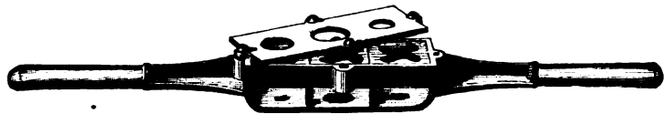
No. 5, arranged to cut off and thread pipe, with dies 7½ in. octagon by 1½ in., with leader screw to thread 2½, 3, 3½ and 4 in 110.00
2½ and 3 inch dies have malleable frames 5 x 1¼ inches.

No. 6, arranged to cut off and thread pipe, with dies 10 in. octagon by 1½ in., with leader screw to thread 2½, 3, 3½, 4, 5 and 6 inches 200.00

COMBINATION LOOSE DIE STOCKS.



No. 0. FIG. 5605 1-2.



No. 00. FIG. 5606.

PRICES, FIGS. 5605 1-2 AND 5606.

No. 0 cuts ⅛, ¼, ⅜ and ½ inch $8.00
No. 00 cuts ½, ¾ and 1 inch 9.00
No. 0 extra dies, right or left, 1⅝ in. square by ½ in. thick, each ... 1.00
No. 00 extra dies, right or left, 2¼ in. square by ¾ in. thick, each .. 1.50

SOLID STOCKS AND DIES.



No. A. FIG. 5607.

Threads ⅛, ¼, ⅜ and ½ inch pipe.

PRICE ..... each, $7.00
" of extra die plates ..... " 5.00



No. AA. FIG. 5608.

Threads ⅛, ¼, ⅜, ½, ¾ and 1 inch pipe.

PRICE ..... each, $10.00
" of extra die plates, ⅛ to ⅜ ..... " 3.50
" of extra die plates, ½ to 1 ..... " 4.00

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BEAN'S PIPE STOCKS, WITH SOLID DIE SIDE OPENING.

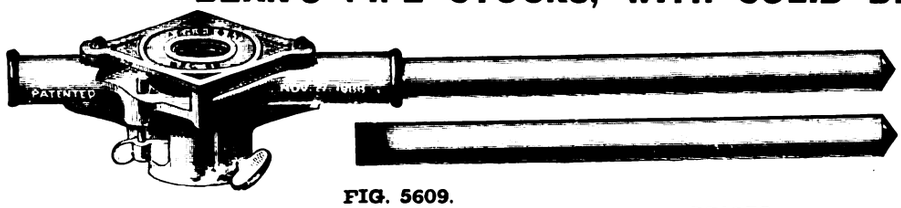


FIG. 5609.

The die to be used is slid into the die chamber and the catch turned up, thus holding the die in proper position in the die chamber.

Nos. 2 and 3 have leader screws.

PRICES.

Numbers	0	1	1½	1¾	2	3
Pipe size of dies	⅛, ¼, ⅜, ½	¼, ⅜, ½, ¾, 1	¾, 1, 1¼	1, 1¼, 1½	1¼, 1½, 2	2½, 3
Dimension of dies	2 x ½	2½ x ¾	3 x ¾	3 x ¾	4 x ⅞	5 x 1¼
Complete, with R. H. dies	$9.50	$15.00	$13.50	$13.50	$20.00	$43.00
Stocks only	3.50	5.00	6.00	6.00	9.50	25.00
Extra dies, right or left	1.50	2.00	2.50	2.50	3.50	9.00
" guides	.25	.35	.45	.45	.60	1.00
Die frames	.....	.30	.40	.40	.50	.60

BEAN'S RATCHET PIPE STOCKS.

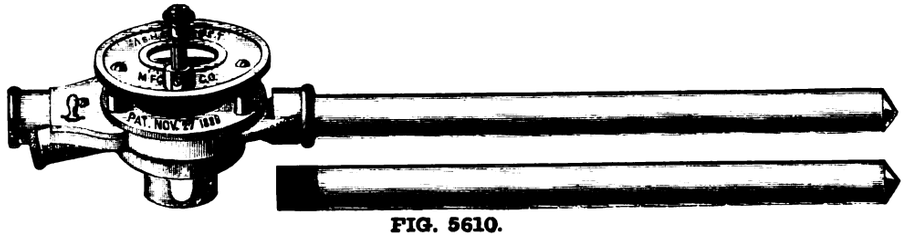


FIG. 5610.

The die to be used is slid into the die chamber and the catch turned down, thus holding the die in proper position in the die chamber. C, D and E have leader screws.

PRICES.

Ratchet die stock sizes	A	B	C	D	E
Pipe sizes of dies	⅛, ¼, ⅜, ½, ¾	¼, ⅜, ½, ¾, 1	1, 1¼, 1½	1¼, 1½, 2	2½, 3
Dimensions of dies	2 x ½	2½ x ¾	3 x ¾	4 x ⅞	5 x 1¼
Stocks, with R.H.dies, complete	$13.00	$15.00	$18.50	$20.00	$43.00
Stock, without dies	7.50	7.50	13.00	12.50	29.00
Extra dies, right or left hand	1.50	2.00	2.50	3.50	9.00
" guides	.25	.35	.45	.60	1.00
Die frames	....	.30	.40	.50	.60
Space required around pipe	2½	3	3½	4	5

JARECKI RATCHET PIPE STOCKS.

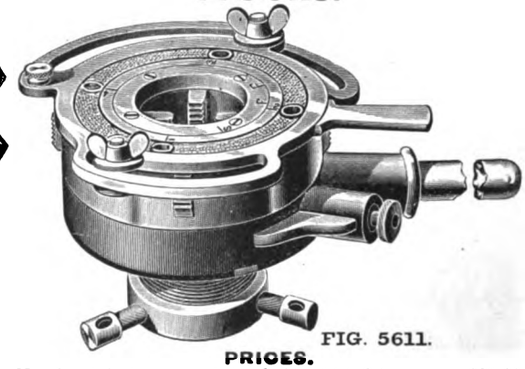


FIG. 5611.

PRICES.

No. 3 ratchet screw plate, 1, 1¼, 1½, 2 in	$20.00
Extra dies, per set	2.00
No. 4B ratchet screw plate, 2½, 3, 3½, 4 in	60.00
Extra dies, per set	3.00
No. 5 ratchet screw plate, 4½, 5, 6 in	90.00
Extra dies, per set	6.00

SINGLE HANDLE RATCHET DIE STOCKS.



FIG. 5613.

MILLER'S REVERSIBLE RATCHET PIPE STOCK, SOLID DIES.

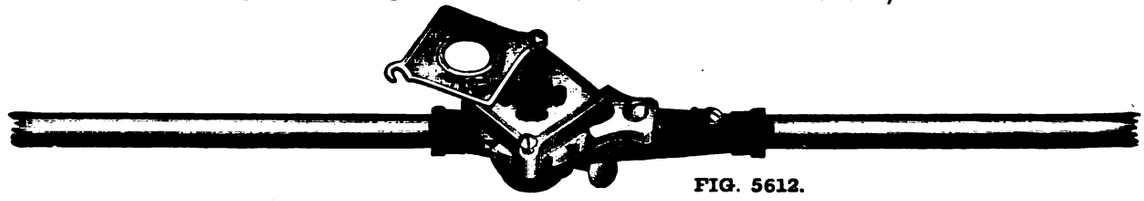


FIG. 5612.

PRICES.

Ratchet die stock No.	A	B	C	D	E
Pipe sizes of dies	⅛, ¼, ⅜, ½, ¾	¼, ⅜, ½, ¾, 1	1, 1¼, 1½	1¼, 1½, 2	2½, 3
Dimensions of dies	2 x ½	2½ x ¾	3 x ¾	4 x ⅞	5 x 1¼
Stocks, with right-hand dies, complete	$13.00	$15.00	$18.50	$20.00	$43.00
Stocks, without dies	7.50	8.50	13 00	13.50	29.00
Extra dies, right or left hand	1.10	1.50	1.80	2.50	7.00
Guides	.20	.25	.35	.45	.75
Die frames	....	.22	.30	.38	.45
Space required around pipe to cut and thread	2½ in.	3 in.	3½ in.	4 in.	5 in.

C, D and E have leader screws.

PRICES, FIG. 5613.

	Pipe size.	Size die.	Without die or bushing.	Dies, each.	Bushings, each.
No. 1	¼ to 1	2½ x ¾	$10.00	$2.00	$0.25
No. 2	¾ to 1¼	3 x ¾	12.00	2.50	.35
No. 3	1¼ to 2	4 x ⅞	14.00	3.50	.45

PRICES, FIG. 5614.

No. 1, with leader screw, dies and bushings for ½, ¾, 1, 1¼ and 1½ inch pipe	$24.00
No. 1, with leader screw, without dies or bushings	12.00
Extra dies, each, 3 inches square by ⅞ thick	2.25
Extra bushings, each	.40
No. 2, with leader screw, dies and bushings for 1, 1¼, 1½ and 2 inch pipe	30.00
No. 2, with leader screw, without dies or bushings	15.00
Extra dies, 4 inches square by 1 inch thick	3.25
Extra bushings, each	.50

RATCHET PIPE STOCK AND DIES.

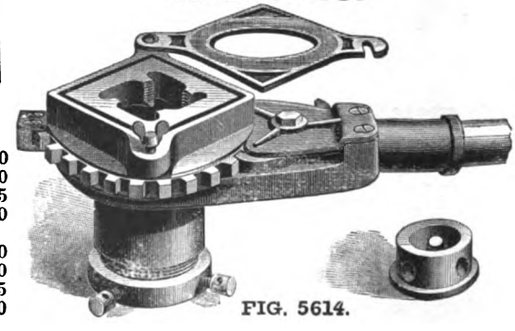


FIG. 5614.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ARMSTRONG'S PIPE STOCKS, WITH ADJUSTABLE DIES.

NO. 7. THREADS 2 1-2, 3, 3 1-2 AND 4 INCH PIPE.

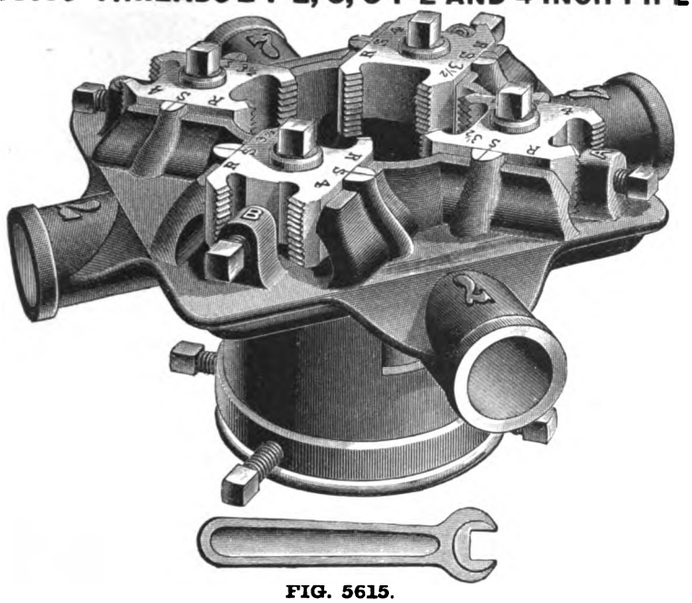


FIG. 5615.

PRICE, complete with 1 set of dies and arms $50.00
" " " 4 sets " " 60.00
" dies, per set of 4 pieces, right or left..... 16.00

NO. 6. THREADS 2 1-2 AND 3 INCH PIPE.

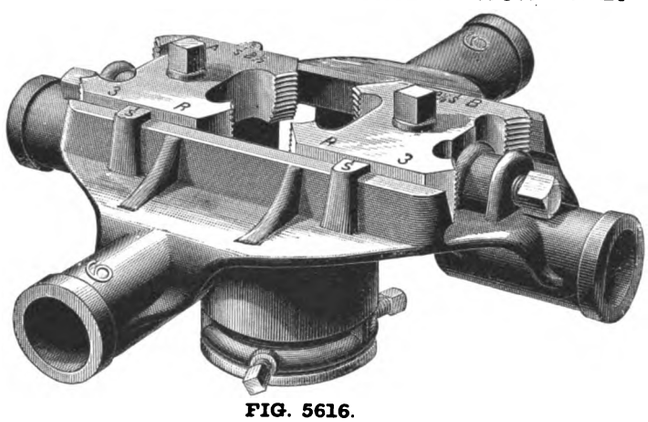


FIG. 5616.

They are adjustable to the variations in fittings, and have the double taper so that they will start on the pipe without lead screw.

The change from 2½ to 3 inch is made by simply reversing the dies end for end, when they will cut to standard sizes without further adjustment.

PRICE, complete with dies 2½ and 3, right or left..... $40.00
" " no dies..... 25.00
" dies, per set of 4 pieces, cutting 2½ and 3..... 15.00
" extra bushings..... 1.00

NO. 3. THREADS 1, 1 1-4, 1 1-2 AND 2 INCH PIPE.

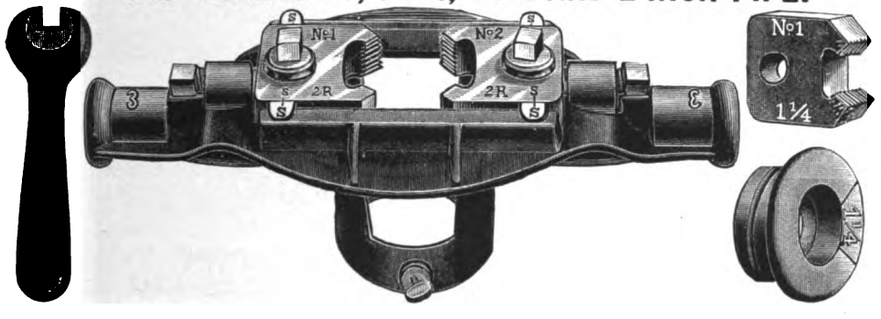




FIG. 5617. SHOWING ARMS.

PRICE, complete with 4 dies, right or left..... $24.00
" stock only..... 7.00
" dies only, right or left, $4.00. Bushings..... .50

NO. 2 1-2. THREADS 1-2, 3-4, 1, 1 1-4.

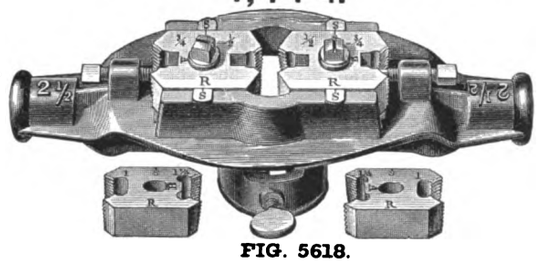


FIG. 5618.

PRICE, complete with 4 dies..... $12.00
" stock only..... 4.50
" dies, right or left..... 3.00
" bushings..... .40

JARECKI COMBINED PIPE THREADER AND PIPE CUTTER.

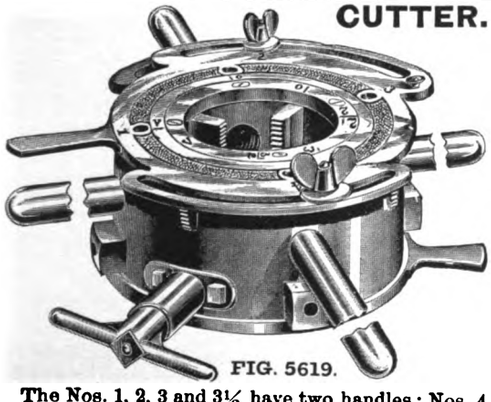


FIG. 5619.

PRICES, FIG. 5619.

No. 1	threads and cuts	¼,	⅜, ½, ¾,		$14.00
No. 2	" " "	½,	¾, 1, 1¼,		16.00
No. 3	" " "	1,	1¼, 1½, 2,		20.00
No. 3½	" " "	½,	¾, 1, 1¼, 1½, 2,		22.50
No. 4 A	" " "	1½,	2, 2½, 3,		35.00
No. 4 B	" " "	2½,	3, 3½, 4,		50.00
No. 5	" " "	4½,	5, 6,		75.00
No. 5½	" " "	6,	7, 8,		125.00

No. 1,	shipping weight, boxed	.....	12	pounds.
No. 2,	" " "	.....	24	"
No. 3,	" " "	.....	32	"
No. 3½,	" " "	.....	34	"
No. 4 A,	" " "	.....	84	"
No. 4 B,	" " "	.....	88	"
No. 5,	" " "	.....	108	"
No. 5½,	" " "	.....		"

The Nos. 1, 2, 3 and 3½ have two handles; Nos. 4 A and 4 B have four handles; Nos. 5 and 5½ have five handles.

Can furnish extra dies for casing and line pipe, also for English and Whitworth standard threads.

PRICES, EXTRA PARTS.

No.	1	2	3	3½	4 A	4 B	5	5½
Dies, per set, right or left hand....	$2.00	$2.00	$2.00	$4.00 2 sets.	$3.00	$3.00	$6.00	$6.00
Knives..	.40	.40	.40	.40	.50	.50	.75	.75

"DUPLEX" DIE STOCK.

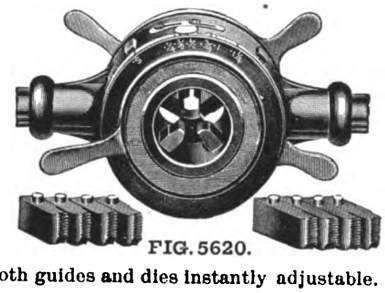


FIG. 5620.

Both guides and dies instantly adjustable.

PRICES.

For threading							Without cut-off.	With cut-off.
No. 1,	⅛, ¼,	⅜,	½,	¾	pipe,		$13.00	$16.00
No. 2,	¼, ⅜,	½,	¾,	1, 1¼	"		17.00	20.00
No. 3,	1, 1¼,	1½,	2	... ...	"		22.00	25.00
No. 3½,	½, ¾,	1,	1¼,	1½, 2	"		25.00	28.00
No. 4,	1½,	2,	2½,	3	"		40.00	45.00
No. 5,	2½, 3,	3½,	4	... ...	"		55.00	60.00

PRICES OF EXTRA DIES.

No. 1,	per single set, 4 pcs.,	right	or	left	hand			$1.50
No. 2,	" " "	"	"	"	"	"	"	1.75
No. 3,	" " "	"	"	"	"	"	"	2.00
No. 3½,	" " "	"	"	"	"	"	"	2.00
No. 4,	" " "	"	"	"	"	"	"	3.50
No. 5,	" " "	"	"	"	"	"	"	4.00

Stocks with cut-off will be sent unless otherwise ordered.

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ARMSTRONG'S ADJUSTABLE DIE PIPE STOCKS.

NO. 2 THREADS 1-4, 3-8, 1-2, 3-4 AND 1 INCH PIPE.



FIG. 5621.

PRICES, with 5 dies, right hand.....$12.00
" " 10 " right and left..... 19.50
" stock only..... 3.50
" dies, right or left..... 1.50
" long guides, 50c.....Bushings..... .25
" 1/8 die and bushing..... 1.75

NO. 1 THREADS 1-8, 1-4, 3-8 AND 1-2 INCH PIPE.

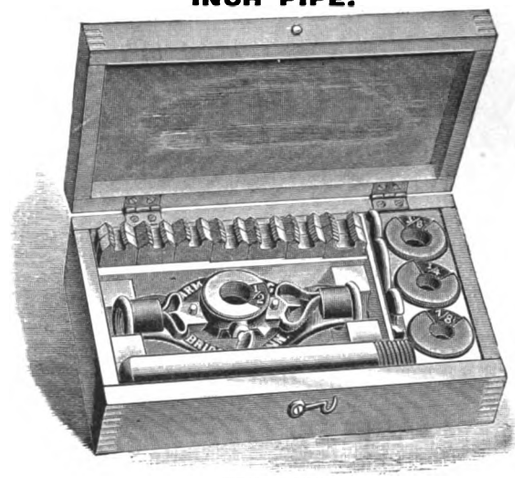


FIG. 5622.

PRICES, with 4 dies, right hand.....$9.00
" " 8 " right and left.....14.00
" stock only..... 3.00
" dies, right or left..... 1.20
" bushings..... .20

BROWN'S ADJUSTABLE PIPE TONGS.

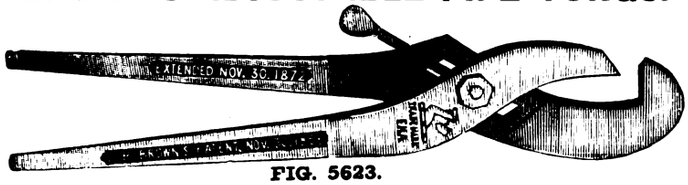


FIG. 5623.

PRICES.

No. 1. For 1/8 to 3/4 inch pipe.....$1.30
" 1 1/2. " 3/8 " 1 " " 1.65
" 2. " 1/2 " 1 1/4 " " 2.00
" 3. " 1 " 2 " " 3.00
" 4. " 1 1/2 " 3 " " 6.00
" 5. " 2 1/2 " 4 " " 11.00
" 6. " 3 " 5 " " 25.00
" 7. " 4 " 7 " " 35.00

COMMON PIPE TONGS.



FIG. 5624.

PRICES.

Size, inches,	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5
Prices, each,	$0.60	0.65	0.70	0.75	0.90	1.10	1.30	1.50	1.90	2.50	3.50	4.50	6.00	8.00

Handles as in cut kept in stock. Round handles furnished to order.

ACME CUBE PIPE TONGS.

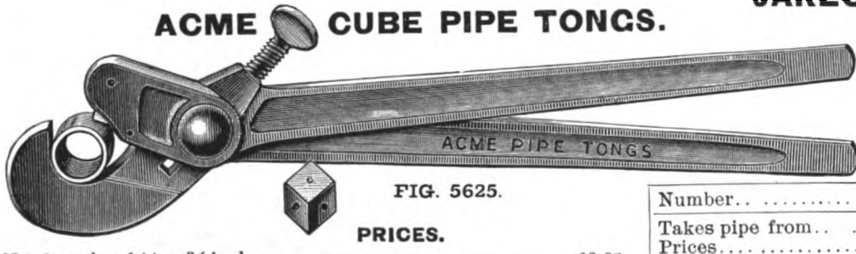


FIG. 5625.

PRICES.

No. 1 grips 1/8 to 3/4 inch.....$3.00
No. 1 1/2 " 1/4 " 1 1/4 " 3.50
No. 2 " 1/4 " 1 1/2 " 4.00
No. 3 " 1/2 " 2 1/2 " 5.30
No. 4 " 3/4 " 4 " 9.00

JARECKI ADJUSTABLE PIPE TONGS.

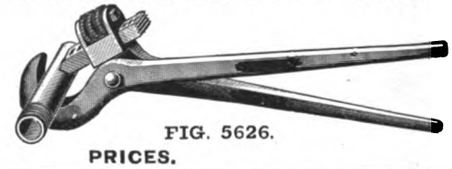


FIG. 5626.

PRICES.

Number..	0	1	2	3	4	5
Takes pipe from..	1/8 to 3/4	1/8 to 1	1/4 to 1 1/2	1/2 to 2 1/2	3/4 to 3 1/2	2 1/2 to 6
Prices	$3.00	$3.50	$4.00	$5.00	$9.00	$16.00
" tong bits	.30	.30	.50	.75	1.00	2.50
" worm wheels	.30	.30	.50	.60	.75	1.50
" handles, jaw part or hook part, each	1.00	1.00	1.25	1.50	1.75	3.00
" screws for worm wheel,	.15	.15	.20	.25	.25	.30

ROBBIN'S PATENT CHAIN PIPE WRENCHES.



FIG. 5627.

PRICES.

No.	Length of lever.	Size of lever near claw.	Size of chain.	Weight.	Size of pipe adapted to.	Prices.
2	27 in.	1 1/8 in.	5/16	7 lbs.	1 to 2 in.	$5.50
3	3 feet.	1 1/4 "	5/16	12 "	1 1/4 to 4 "	6.25
4	4 "	1 1/2 "	3/8	24 "	2 to 6 "	9.00
5	5 "	1 3/4 "	1/2	33 "	2 1/2 to 8 "	12.50
6	6 "	2 "	5/8	50 "	4 to 10 "	16.00
7	7 "	2 1/2 "	3/4	100 "	4 to 16 "	30.00

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PIPE WRENCHES.

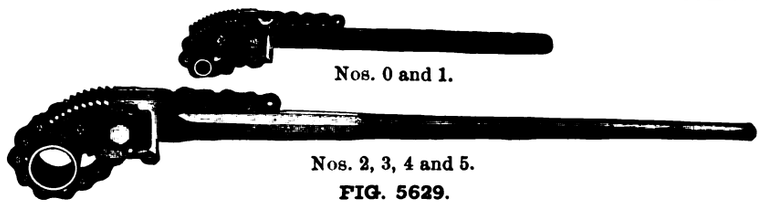
CHAIN WRENCHES.



FIG. 5628.

No.	Length.	Capacity.	Prices.
2	27 inches.	1 to 2 in.	$5.50
3	3 feet.	1¼ to 5 "	6.25
4	4 "	2 to 7 "	9.00
5	5 "	2½ to 10 "	12.50
6		2½ to 12 "	16 00

BROCKS DROP FORGED CHAIN WRENCHES.



Nos. 0 and 1.

Nos. 2, 3, 4 and 5.

FIG. 5629.

PRICES.

Size	No. 0.	No. 1.	No. 2.	No. 3.	No. 3½.	No. 4.	No. 5.
Prices	$2.50	$3.50	$5.50	$7.50	$9.00	$11.00	$18.00
Capacity	⅛ to ¾ in.	⅛ to 1½ in.	¼ to 2½ in.	¾ to 4 in.	1 to 6 in.	1½ to 8 in.	2 to 14 in.
Length	12½ in.	20 in.	27 in.	37 in.	44 in.	50 in.	64 in.
Weight	1¼ lbs.	4¼ lbs.	8 lbs.	15 lbs.	20 lbs.	28 lbs.	47 lbs.
Extra chain, each	$0.75	$1.00	$1.50	$2.50	$3.25	$4.00	$6.00
Extra jaws, pair.	1.00	1 75	2.75	4.00	4.75	5.50	7.50

CHAMPION PIPE WRENCHES.

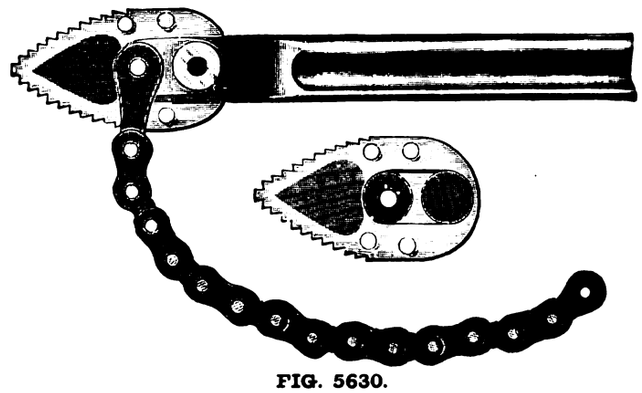


FIG. 5630.

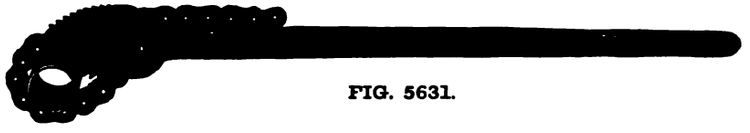


FIG. 5631.

IDE WRENCHES.

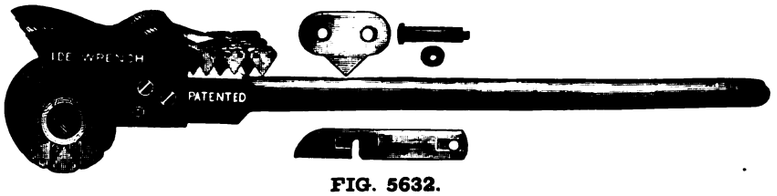


FIG. 5632.

PRICES, No. 2, holds pipe ½ to 2½ inches.....$7.00
" " 3, " " ½ to 4 " 8.00

PRICES, FIGS. 5630 AND 5631.

Size.	Each.	Capacity.	Length.	Weight.	Extra chain, each.	Extra jaws, per pair.
No. 0.	$2.50	⅛ to 1 in.	12½ in.	1¼ lbs.	$0.75	$1.00
No. 1.	3.50	¼ to 2 "	19½ "	4¼ "	1.00	1.75
No. 2.	5.50	½ to 3 "	28 "	8 "	1.50	2.75
No. 3.	7.50	¾ to 6 "	38¼ "	15 "	2.50	4.00
No. 4.	11.00	1½ to 10 "	50½ "	28 "	4.00	5.50
No. 5.	18.00	2 to 14 "	65 "	47 "	6.00	7.50

CURTIS PIPE WRENCHES.

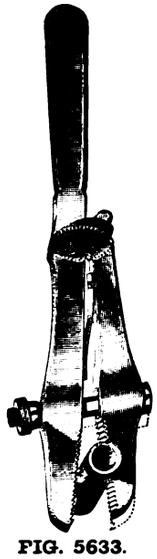


FIG. 5633.

PRICES.

Length.	Will take pipe. Inches.	Will take round iron. Inches.	Prices, each.
9 in.	⅛ to ¾	⅜ to 1⅛	$2.25
15 "	⅛ to 1½	¼ to 2	3.00
18 "	⅛ to 2½	¼ to 3	3.50
22 "	¼ to 3½	⅜ to 4	5.00

ALLIGATOR WRENCHES.

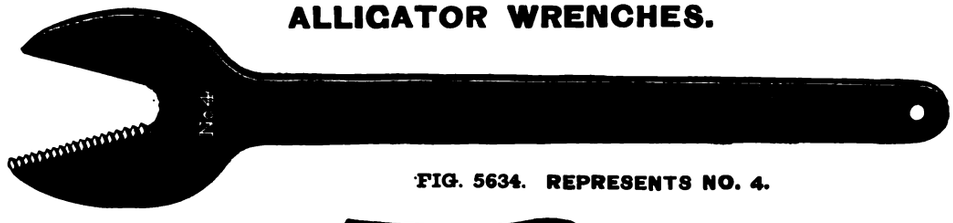


FIG. 5634. REPRESENTS NO. 4.



FIG. 5635. REPRESENTS NO. 1.

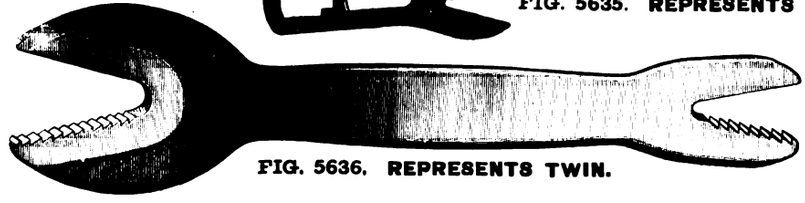


FIG. 5636. REPRESENTS TWIN.

PRICES.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	Twin.	Pocket.
Holds pipe, inches	⅛ to ⅜	⅜ to ¾	½ to 1¼	1¼ to 2	2 to 3	⅛ to ¾	
Holds round iron, inches.	¼ to ¾	½ to 1	¾ to 1⅜	1½ to 2½	2¼ to 3½	¼ to 1	
Length, inches	5¾	10	16	22	27	10	4
Prices, per doz.	$4.00	$12.00	$24.00	$36.00	$54.00	$18.00	$4.00

These wrenches are forged solid in one piece, from best refined iron, with tempered steel jaws. They have ratchet teeth, cut diagonally across one jaw, thus enabling them to bite with three teeth at once. A single wrench will hold many sizes of nuts or bolts without adjusting.

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ALWAYS READY WRENCHES

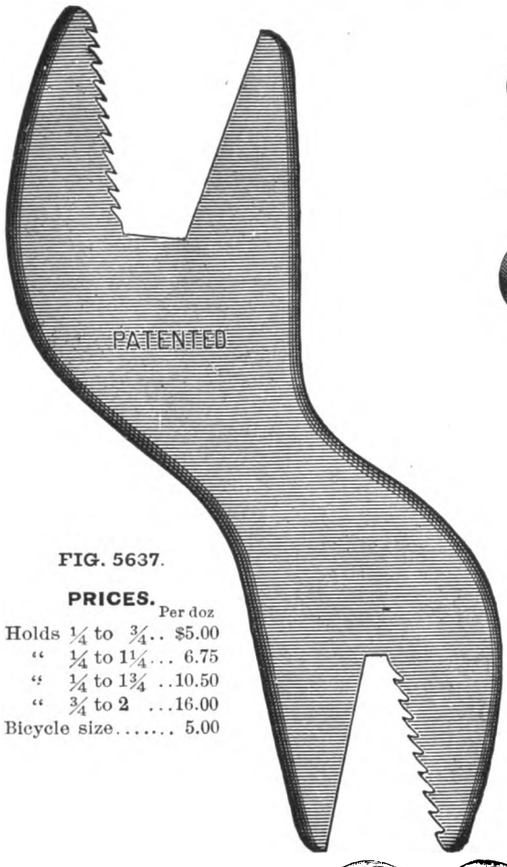


FIG. 5637.

PRICES.

	Per doz
Holds ¼ to ¾	$5.00
" ¼ to 1¼	6.75
" ¼ to 1¾	10.50
" ¾ to 2	16.00
Bicycle size	5.00

PIPE WRENCHES.

PHILIPS PIPE WRENCHES.

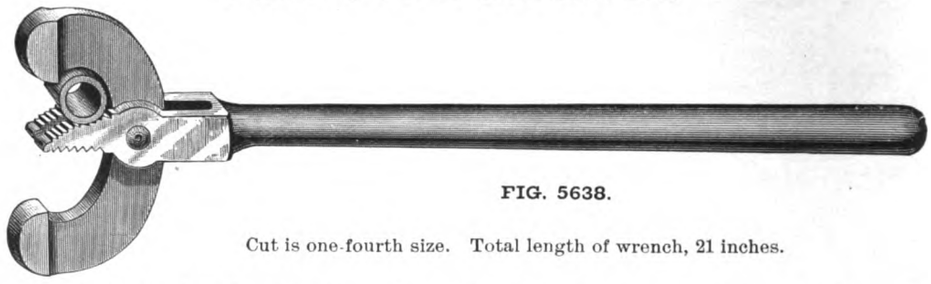


FIG. 5638.

Cut is one-fourth size. Total length of wrench, 21 inches.

This wrench is drop-forged from Norway iron and tool steel, and is finished in a thorough manner. A useful tool for plumbers, gas-fitters, bridge-builders, railroad repair shops, etc. Will take round, square, or hexagon shapes, taking pipe from ⅜ to 2 inches.

PRICE, EACH, $4.50.

BARWICK PIPE WRENCH.

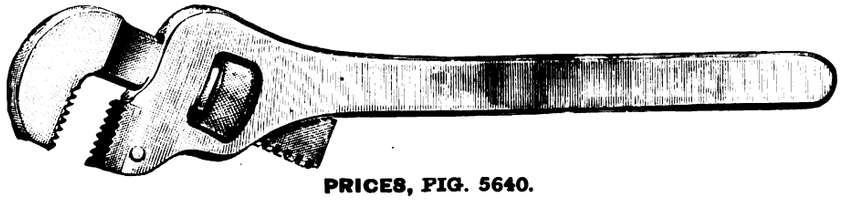


FIG. 5639.

PRICES.

No. 0.	Nickel-plated, takes from No. 7 wire to	⅛ inch pipe	$2.00
No. 1.	Finished and polished, takes from gas burner to	¾ " "	2.50
No. 2.	Ground and finished, takes from ½ inch to	1¼ " "	4.00
No. 3.	Ground and finished, takes from 1 inch to	2 " "	5.00
No. 4½.	Ground and finished, takes from 2 inch to	3½ " "	10.50

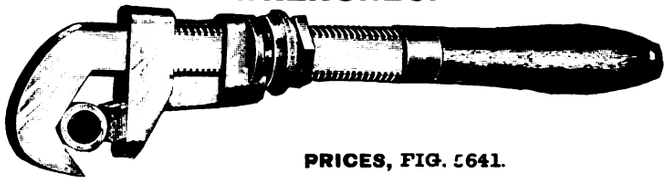
FRANKLIN PIPE WRENCHES.



PRICES, FIG. 5640.

Length open, ins.	6	8	10	14	18	24	36	48
Takes from	⅛ to ½ in. pipe.	⅛ to ¾ in. pipe.	⅛ to 1 in. pipe.	¼ to 1½ in. pipe.	¼ to 2 in. pipe.	¼ to 2½ in. pipe.	½ to 3½ in. pipe.	1 to 5 in. pipe.
Price, each	$2.00	$2.00	$2.25	$3.00	$4.00	$6.00	$12.00	$18.00
Extra jaws, each.	.67	.67	.75	1.00	1.33	2.00	4.00	6.00
Extra nuts, each.	.20	.20	.27	.35	.42	.50	.65	.80

BEMIS BRIGHT SHORT NUT WRENCHES.



PRICES, FIG. 5641.

10 inch, adjustable to pipe from	½	to	1	inch	in	diameter,	$19.00	per	doz.
12 " " " "	½	"	1¾	"	"		22.00	"	
15 " " " "	½	"	2	"	"		31.00	"	
18 " " " "	½	"	2½	"	"		48.00	"	

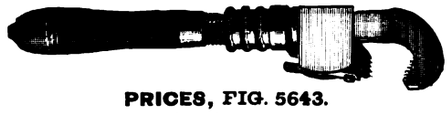
BEMIS BRIGHT LONG NUT WRENCHES.



PRICES, FIG. 5642.

10 inch, adjustable to pipe from	½	to	1	inch	in	diameter,	$20.75	per	doz.
12 " " " "	½	"	1¾	"	"		24.00	"	
15 " " " "	½	"	2	"	"		34.00	"	
18 " " " "	½	"	2½	"	"		50.00	"	

BARNES PIPE WRENCHES.



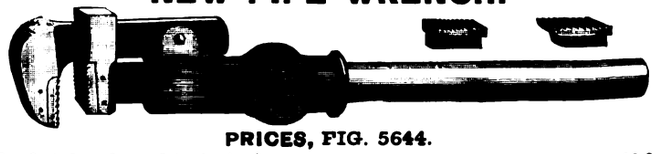
PRICES, FIG. 5643.

10 inch wrench	takes	⅛	to 1	inch pipe	$2.25
14 " "	"	¼	" 1½	"	3.00
18 " "	"	½	" 2	"	4.00

PRICES, EXTRA PARTS.

Knuckle jaw and spring	10 in. wrench,	$0.50	14 in.,	$0.65	18 in.,	$0.80
Slide	"	"	.30	"	.45	"	.80
Hand nut	"	"	.45	"	.50	"	.70
Handle and end nut	"	"	.10	"	.10	"	.16
Hook	"	"	1.00	"	1.50	"	2.00

NEW PIPE WRENCH.



PRICES, FIG. 5644.

No. 3, takes from	0	to	1	inch		$2.00
" 4, "	"	0	" 1½	"		2.75
" 5, "	"	⅜	" 2½	"		4.50
" 6, "	"	1	" 4	"		12.00

PRICES, EXTRA JAWS.

No. 3, $0.40 No. 4, $0.50 No. 5, $0.70 No. 6, $1.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PIPE WRENCHES.

GILES WRENCHES.



FIG. 5645.

Drop forged from tool steel.

Length,	10	14	18	24
Takes from,	⅛ to 1 in.	⅛ to 1½ in.	¼ to 2 in.	¼ to 2½ in.
Prices,	$2.25	$3.00	$4.00	$6.00

STILLSON WRENCHES, 6 TO 18 INCHES.



PRICES, FIG. 5646.

Length open	6 in.	8 in.	10 in.	14 in.	18 in.
Takes from	⅛ to ½ in.	⅛ to ¾ in.	⅛ to 1 in.	¼ to 1½ in.	¼ to 2 in.
Prices	$2.00	$2.00	$2.25	$3.00	$4.00
Jaws	.67	.67	.75	1.00	1.33
Frames	.25	.25	.33	.45	.55
Nuts	.20	.20	.27	.35	.42

TAYLOR PIPE AND NUT WRENCHES.

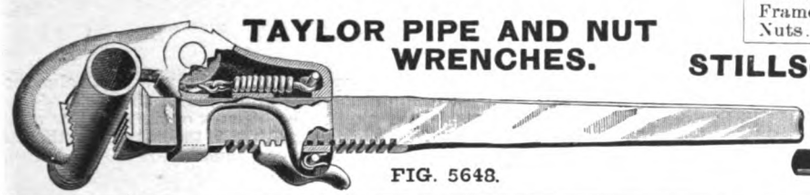
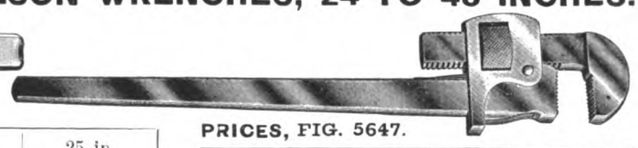


FIG. 5648.

Length open, inches	8 in.	12 in.	15 in.	20 in.	25 in.
Takes from	0 to ¾ in. pipe.	0 to 1 in. pipe.	0 to 1¼ in. pipe.	0 to 2 in. pipe.	0 to 2¼ in. pipe.
Prices	$2.00	$2.50	$3.00	$4.00	$6.00
Teeth Plates, per pair	.20	.25	.30	.35	.35

Sizes 8 in., 12 in., 15 in. and 20 in. packed one-half dozen in box.
Size 25 in. packed one-quarter doz. in box.

STILLSON WRENCHES, 24 TO 48 INCHES.



PRICES, FIG. 5647.

Length, open	24 in.	36 in.	48 in.
Takes from	¼ to 2½ in.	1½ to 3½ in.	1 to 5 in.
Prices	$6.00	$12.00	$18.00
Jaws	2.00	4.00	6.00
Frames	.65	.75	1.00
Nuts	.50	.65	.80

TRIMO WRENCHES.



PRICES, FIG. 5649.

Length open	6 in.	8 in.	10 in.	14 in.	18 in.	24 in.	33 in.	48 in.
Takes from	⅛ in. wire to ½ in. pipe.	⅛ in. wire to ¾ in. pipe.	⅛ in. wire to 1 in. pipe.	¼ in wire to 1¼ in. pipe.	¼ in. wire to 2 in. pipe.	¼ in. wire to 2½ in. pipe.	½ in. pipe to 3½ in. pipe.	1 in. pipe to 5 inch.
Prices	$2.00	$2.00	$2.25	$3.00	$4.00	$6.00	$12.00	$18.00
Jaw	.67	.67	.75	1.00	1.33	2.00	4.00	6.00
Nut	.20	.20	27	.35	.42	.50	.65	.80
Inserted jaw	.25	.25	.33	.50	.55	.65	1 00	1.25
Frame	.25	.25	.33	.45	.55	.65	.75	1.00

BOARDMAN COMBINATION WRENCHES.

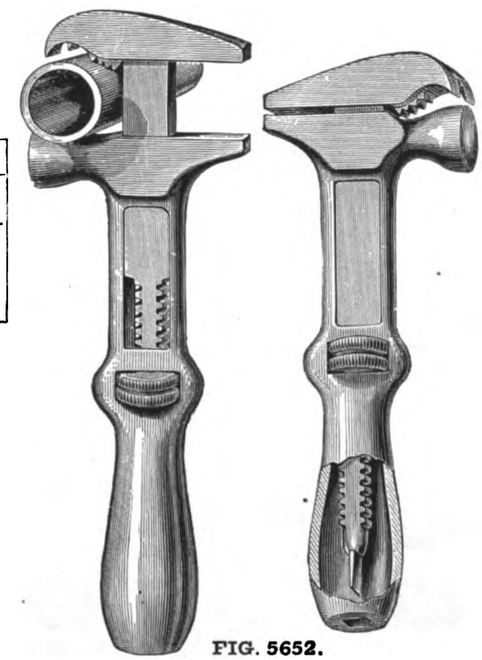


FIG. 5652.

Screw wrench, pipe wrench, hammer, nail claw, screw driver, bit handle or socket wrench.

PRICES.

		Polished.	Nickel plated.
No. 0.	Size, 4½ inch, opens 1 in., per doz.	$8.50	$10.00
" 1.	" 6 " " 1¼ " "	11.00	13.00
" 2.	" 8 " " 1¾ " "	16.50	18.50
" 3.	" 10 " " 2½ " "	22.50	25.00

COMBINATION ENGINEERS' WRENCHES, SHORT NUTS.

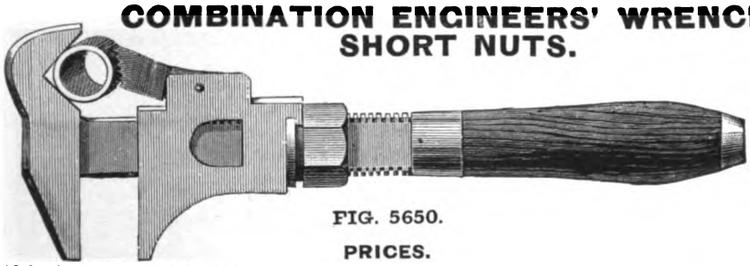
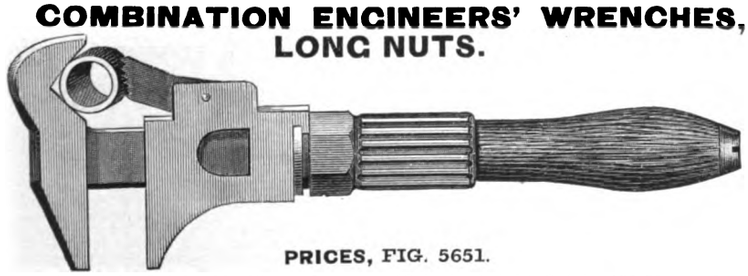


FIG. 5650.

PRICES.

10 inch, bright finish, $23.00 per dozen. 12 inch, bright finish, $26.00 per dozen.
15 inch, bright finish, $37.00 per dozen.
10 in. takes pipe ½ to 1 in. 12 in. takes ½ to 1¾ in. 15 in. takes ½ to 2¼.

COMBINATION ENGINEERS' WRENCHES, LONG NUTS.



PRICES, FIG. 5651.

10 inch, bright finish, $25.25 per dozen. 12 inch, bright finish, $28.50 per dozen.
15 " " " 40.50 " 18 " " " 72.00 "
21 inch, bright finish, $84.00 per doz.
10, 12 and 15 will take same as Fig. 5650. 18 and 21 inch take to 3 inch.
Agricultural black wrench, same as above, to order only.

DESCRIPTION, FIGS. 5650 AND 5651.

A recent improvement in this wrench consists in cutting the teeth of the pawl in oblique parallel lines. The effect is to give a more prompt and sure grip where other pipe wrenches fail to hold readily. With the oblique cut three teeth at least come into operation at the same time, and at each motion, with the pawl cut parallel with the line of the pipe, only one tooth grips at any one time.



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COMBINATION WRENCHES.

WITH SHORT NUT.

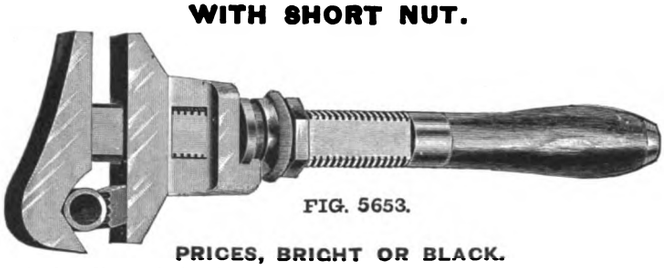


FIG. 5653.

PRICES, BRIGHT OR BLACK.

10 inch, adjustable to pipe from ⅛ to 1 inch in diameter...$23 00 per doz.
12 " " " " ⅛ " 1¾ " " ... 26.00 "
15 " " " " ⅛ " 2 " " ... 37.00 "

WITH LONG NUT.

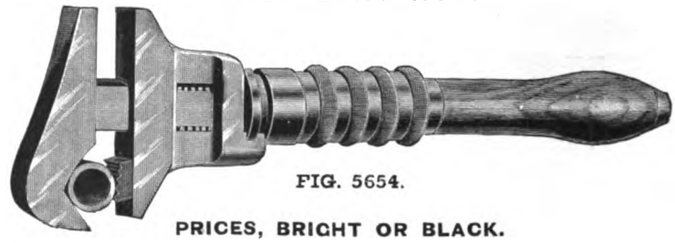


FIG. 5654.

PRICES, BRIGHT OR BLACK.

10 inch, adjustable to pipe from ⅛ to 1 inch in diameter...$25.25 per doz.
12 " " " " ⅛ " 1¾ " " ... 28.50 "
15 " " " " ⅛ " 2 " " ... 40.50 "

PIPE JAW FOR WRENCHES.

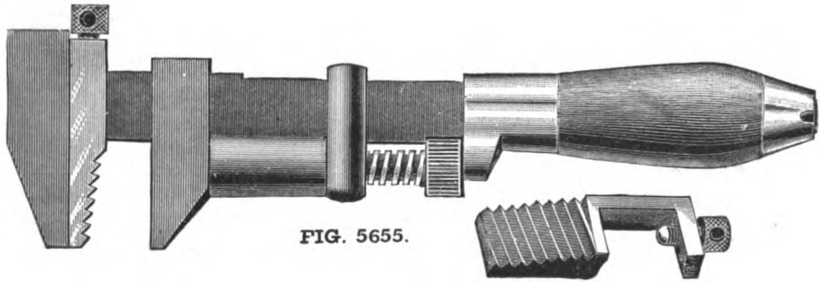


FIG. 5655.

Put the pipe jaw on the bar of the wrench as shown; then put the thumb against the middle of the teeth of the pipe jaw and screw up the thumb screw of the pipe jaw with the other hand. When using a lever in the hole in the thumb screw, never give it more than one-quarter turn.

PRICES, FIG. 5655.

No. 1. Fits 6 and 8 inch wrench, price, each.....$0.50
" 2. " 10, 12, 15 " " " " ..... .60
" 3. " 18, 21 " " " " 1.00

COMBINATION PIPE WRENCH AND CUTTER.

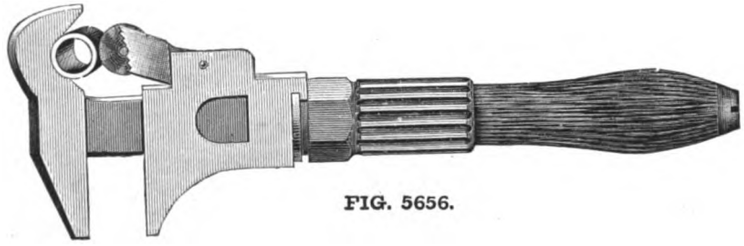


FIG. 5656.



FIG. 5657½.

PRICES, FIGS. 5656 AND 5657 1-2.

12 inch, bright finish.....$34.50 per doz.
15 " " " ..... 48.00 "
18 " " " ..... 79.50 "
21 " " " ..... 93.00 "

EXTRA PAWLS.

12 inch..$0.42 each.
15 " .. .50 "
18 " .. .58 "
21 " .. .58 "

EXTRA CUTTER WHEELS.

12 inch..$0.21 each.
15 " .. .25 "
18 " .. .29 "
21 " .. .29 "

STANWOOD'S PIPE CUTTERS.

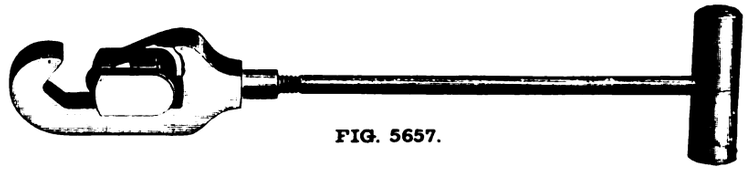


FIG. 5657.

PRICES, FIG. 5657.

	Case hardened.	Steel faced.	Cutter blocks with wheels.	Wheels.
No. 1 cuts ⅛ to 1 inch..	$1.50	$1.75	$0.40	$0.12
" 2 " 1 " 2 " ..	2.25	2.50	.60	.18
" 3 " 2 " 3 " ..	7.00	7.50	1.00	.25

EUREKA PIPE CUTTERS.



FIG. 5658.

EXTRA PARTS.



CUTTER BLOCK WITH WHEEL.



EXTRA JAW.



WHEEL.



WHEEL PIN.

	No. 1 cuts ⅛; ¼, ⅜, ½, ¾, 1 inch pipe.	No. 2 cuts ¾, 1, 1¼, 1½, 2 inch pipe.	No. 3 cuts 1, 1¼, 1½, 2, 2½, 3 inch pipe.
Cutter	$2.00	$3.00	$9.30
Cutter blocks and wheels	.60	.90	1.75
Extra jaws	.20	.30	.50
Cutter wheels	.17	.24	.35
Wheel pins	.10	.10	.15

BARNES' THREE-WHEEL CUTTERS.

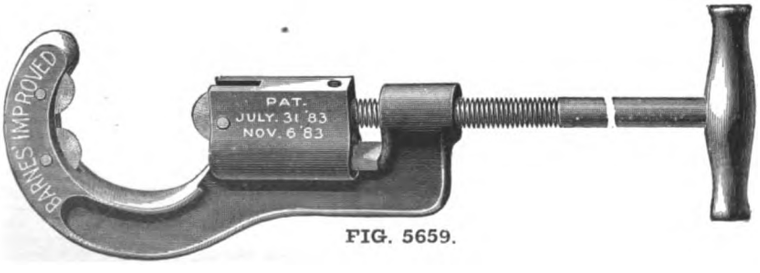


FIG. 5659.

This design is furnished in five sizes: No. 3 cuts pipe from 1½ to 3 inches diameter; No. 4, from 2½ to 4 inches; No. 5, from 4 to 6 inches; No. 6, from 6 to 8 inches; and No. 7, from 9 to 12 inches.

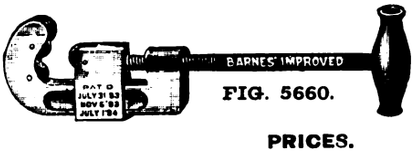


FIG. 5660.

This cut illustrates Nos. 1 and 2, used for the various sizes of pipe up to 2 in. diameter.

PRICES.

Pipe cutters.		Cutter wheels.	Wheel pins. Per dozen.
No. 1, ⅛ to 1 inch....	$4.50	$0.25	$1.00
" 2, ½ " 2 "	6.00	.30	1.00
" 3, 1½ " 3 "	10.00	.40	1.00
" 4, 2½ " 4 "	20.00	.50	2.00
" 5 4 " 6 "	30.00	.75	2.00
" 6, 6 " 8 "	40.00	.75	2.00
" 7, 9 " 12 "	50.00	.75	2.00

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PIPE CUTTERS.

ARMSTRONG THREE WHEEL.



FIG. 5661.

PRICES.

	Complete.	Cutter wheels, or rollers, each.
No. 1 cutting from ⅛ to 1¼ in.	$4.50	$0.25
" 2 " " ½ " 2½ "	6.00	.30
" 3 " " 1½ " 4 "	20.00	.50

SAUNDERS ONE WHEEL AND ROLLER.



FIG. 5662.

PRICES.

	Complete cutters.	Extra blocks and wheels.	Extra cutter wheels.
No. 1 cuts ⅛ to 1 in.	$3.00	$1.25	$0.24
" 2 " 1 " 2 "	4.50	1.75	.32
" 3 " 2 " 3 "	14.00	3.25	.60

REVERSIBLE RATCHET PIPE CUTTER.

PRICES, FIG. 5663.

Size.	0	1	1½	2	3
Cuts pipe	⅛ to ¾	½ to 1	1 to 1½	1¼ to 2	2½ to 3
Each,	$6.75	$8.50	$10.00	$11.00	$16.00
Extra wheels,	.12	.18	.18	.25	.40

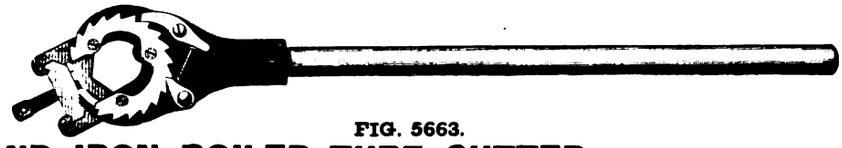


FIG. 5663.

BRASS, COPPER AND IRON BOILER TUBE CUTTER.

PRICES, FIG. 5664.

No. 1 cuts ⅛ in. to 1 in	$6.50
" 2 " 1 " " 2 "	8.00
" 3 " 2 " " 3 "	16.00
" 4 " 2½ " " 4 "	25.00

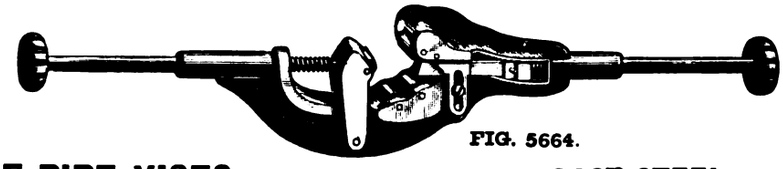


FIG. 5664.

MALLEABLE FRAME PIPE VISES.

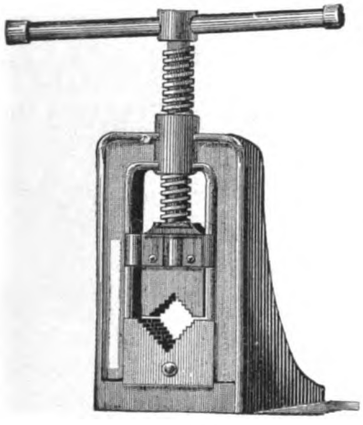


FIG. 5665.
Holds ⅛ to 2½ in. Price, $4.25.

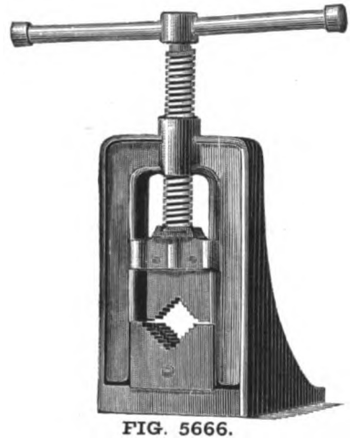


FIG. 5666.
Holds ⅛ to 2 in. Price, $8.00.

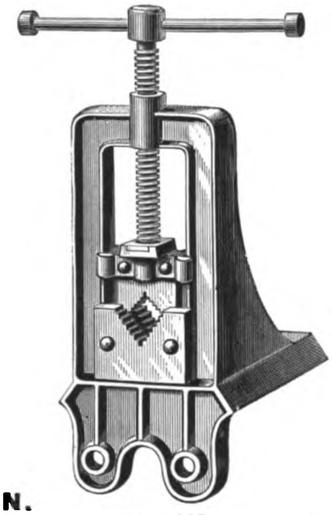


FIG. 5667.

CAST STEEL.

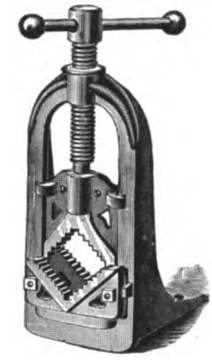


FIG. 5668.
Holds ⅛ to 2 in. Price, $3.50.

PRICE, FIG. 5667.
Holds ¼ to 3 in., $12.00.

CAST IRON.

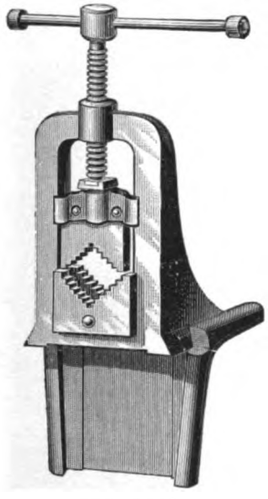


FIG. 5669.

No. 1 holds	⅛	to	2	in. pipe.	Price,	$10.00
" 2 "	¼	"	3	" "	"	16.00

EX. HEAVY CAST IRON.

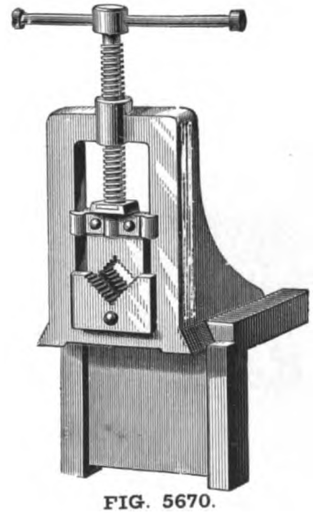


FIG. 5670.

No. 1 holds	⅛	to	2	in.	Price,	$11.00
" 2 "	¼	"	3	"	"	17.00
" 3 "	½	"	4	"	"	28.00

CAST IRON SWIVEL.

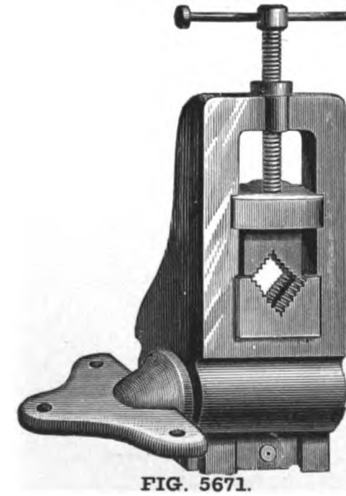


FIG. 5671.

No. 1 holds	⅛	to	2	in.	Price,	$14.00
" 2 "	⅛	"	3	"	"	18.00
" 3 "	¼	"	4	"	"	30.00

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PIPE VISES.

SWIVEL, WITH STAND.



FIG. 5672.

PRICES, COMPLETE.

		Stands and bolts.
No. 1, holds ⅛ to 2 inches	$19.00	$5.00
No. 2, " ⅛ to 3 "	26.00	8.00
No. 3, " ¼ to 4 "	40.00	10.00

SWIVEL.

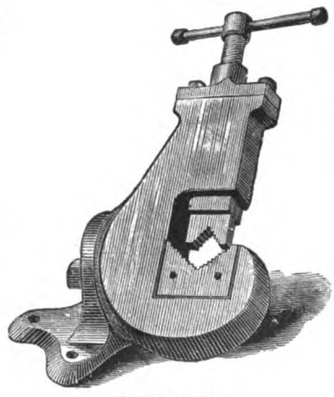


FIG. 5673.

PRICES.

No. 1, holds ⅛ to 1¼ inches,	$15.00
No. 2, " ⅛ to 2 "	18.00
No. 3, " ¼ to 3 "	30.00

POST VISE.

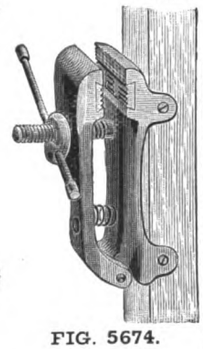


FIG. 5674.

PRICE, $4.00.

DESCRIPTION, FIG. 5674.

This most convenient little vise will hold from ⅛ to 1½ inch pipe, and will hold firmly a short nipple. It is also provided with regular jaws, which permits of its being used as an ordinary bench vise, as well as for holding pipe. It is very light, can easily be carried with the kit of tools from place to place, and can be attached in a moment to any bench, door-post, upright, or any place where four screws can be firmly driven.

HINGED VISE.



FIG. 5675.

PRICES.

No. 0, holds up to 1 inch.	$7.50
No. 1, " " 2 "	10.00
No. 2, " " 4 "	13.00

MALLEABLE HINGED.

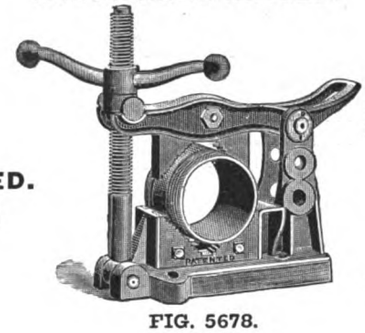


FIG. 5678.

PRICES.

No. 1A, holds ⅛ to 2 inches,	$12.00
No. 2A, " ⅛ to 4 "	16.00
No. 3A, " 1½ to 6 "	24.00
No. 4A, " 6 to 12 "	60.00

PRICES, FIG. 5679.

No. 15, holds ⅛ to 3 inches,	$6.50
No. 20, " ½ to 4 "	9.00
No. 25, " 1 to 6 "	15.00

MALLEABLE HINGED.

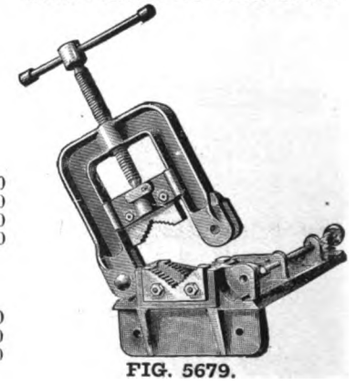


FIG. 5679.

MALLEABLE HINGED.

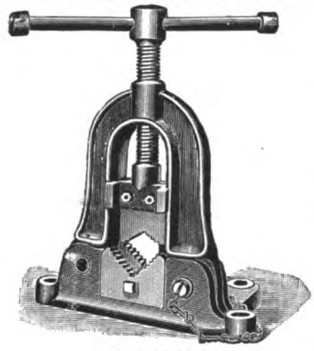


FIG. 5677.

PRICES.

No. 1, holds ⅛ to 2 in.	$10.00
No. 2, " ⅛ to 3 in.	14.00

MALLEABLE HINGED.

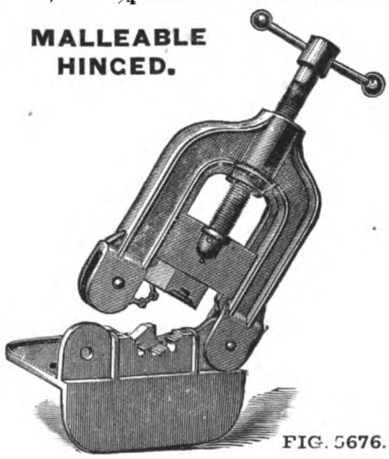


FIG. 5676.

PRICES.

No. 1, holds ⅛ to 2 inches	$10.00
No. 2, " ⅛ to 3 "	14.00

MALLEABLE HINGED.

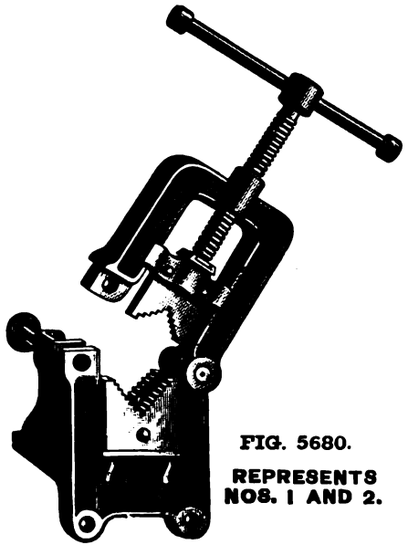


FIG. 5680.

REPRESENTS NOS. 1 AND 2.

MALLEABLE HINGED.

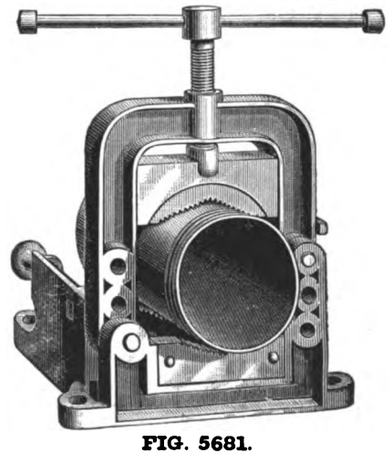


FIG. 5681.

REPRESENTS NOS. 3, 4 AND 5.

PRICES, FIGS. 5680 AND 5681.

No. 1, holds ⅛ to 2 inches	$10.00
No. 2, " ¼ to 3 "	13.00
No. 3, " ½ to 4 "	14.00
No. 4, " 2 to 6 "	30.00
No. 5, " 2½ to 8 "	45.00

HINGED VISES.

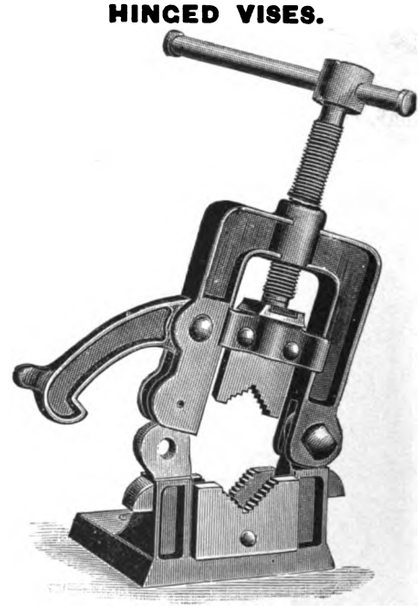


FIG. 5682.

PRICES.

No. 1 will hold from 0 to 2½ inch pipe.	Price, $10.00
No. 2 " " " ½ to 4½ " "	" 20.00
Extra jaws for No. 1 vise, per set	" 1.50
" " " " 2 " "	" 2.50

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COMBINATION PIPE VISES.

FIXED.

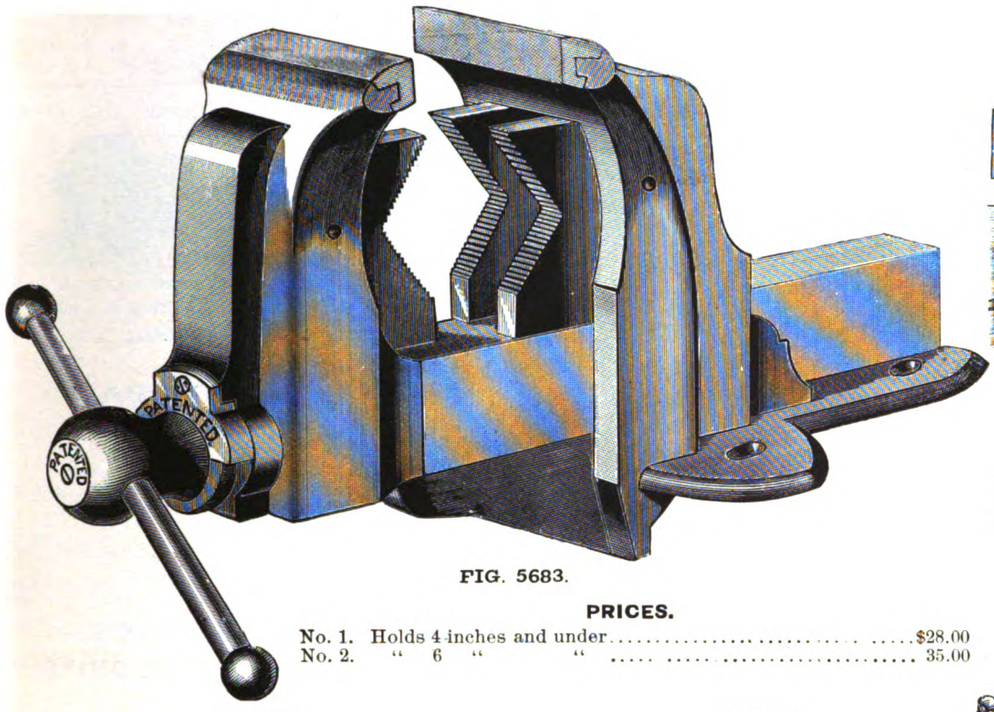


FIG. 5683.

PRICES.

No. 1. Holds 4 inches and under.....$28.00
No. 2. " 6 " " 35.00

SWIVEL.

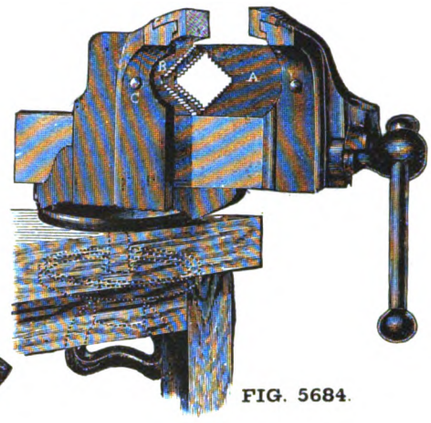


FIG. 5684.

PRICES.

No. 1. Holds 1⅛ to 2 inches.....$16.00
No. 2. " ¼ to 3 " 20.00
No. 3. " ¼ to 4 " 25.00

FIXED.

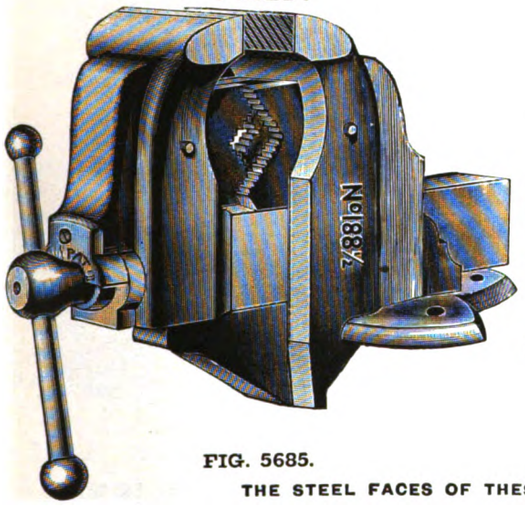


FIG. 5685.

SWIVEL.

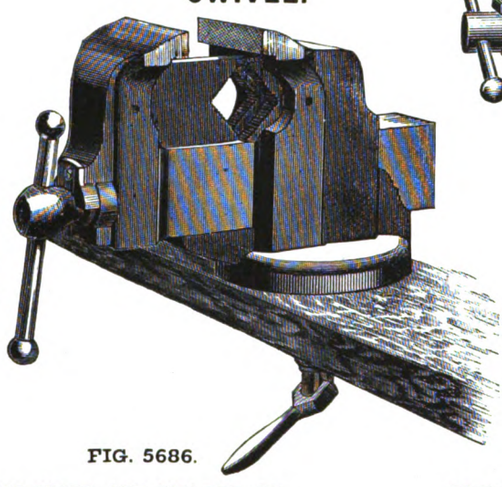


FIG. 5686.

SWIVEL.

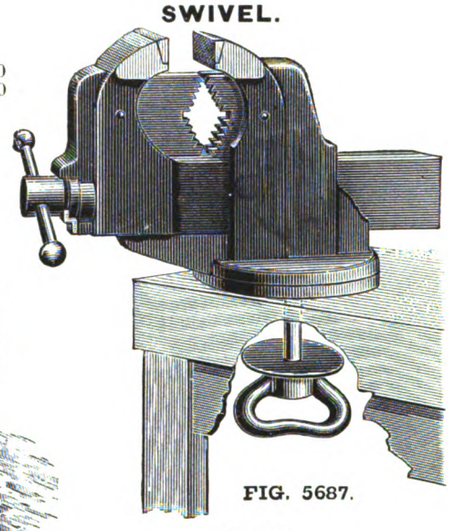


FIG. 5687.

PRICES.

No. 1. Holds ⅛ to 2 inches.....$16.00
No. 2. " ¼ to 3 " 20.00

THE STEEL FACES OF THESE VISES ARE WELDED ON.

FIXED.

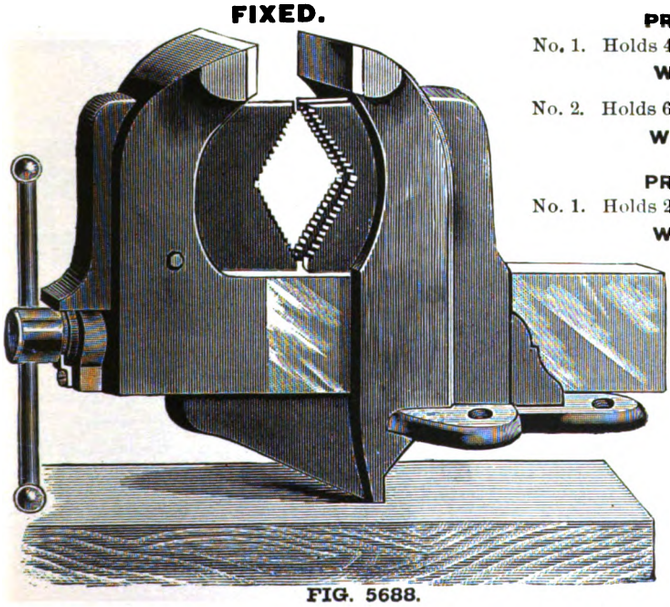


FIG. 5688.

PRICES, FIG. 5685.

No. 1. Holds 4 inch pipe and under.....$28.00
WEIGHT, 94 LBS.

No. 2. Holds 6 inch pipe and under.....$35.00
WEIGHT, 141 LBS.

PRICES, FIG. 5686.

No. 1. Holds 2 inch pipe and under.....$16.00
WEIGHT, 41 LBS.

No. 2. Holds 3 inch pipe and under.....$20.00
WEIGHT, 59 LBS.

PRICES, FIG. 5688.

No. 1. Holds ¼ to 4 inch.
WEIGHT, 95 LBS.
PRICE, $28.00.

No. 2. Holds ⅜ to 6 inch.
WEIGHT, 157 LBS.
PRICE, $35.00.

HEAVY JAW PIPE VISES.

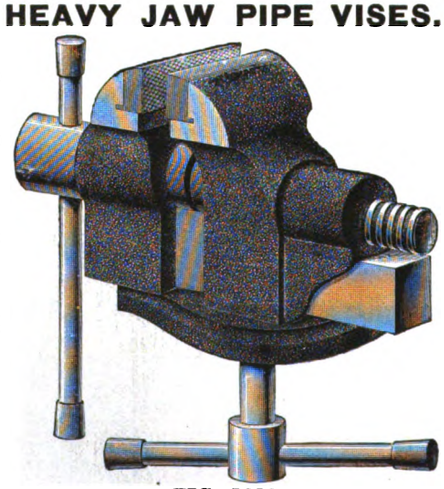


FIG. 5689.

Holds pipe ⅛ to 5 inches.
Length of jaw, 5 inches.

PRICE, $18.00.

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PIPE VISES AND PLIERS.

STEEL BAR VISES.



FIG. 5690.

PRICES.

4 inch, plain		$15.00
4 "	with extra jaw	17.50
5 "	plain	20.00
5 "	with extra jaw	23.00

A bolt for holding the vise to the bench, with a convenient nut, is included in price of vise.

FARMER'S VISES.

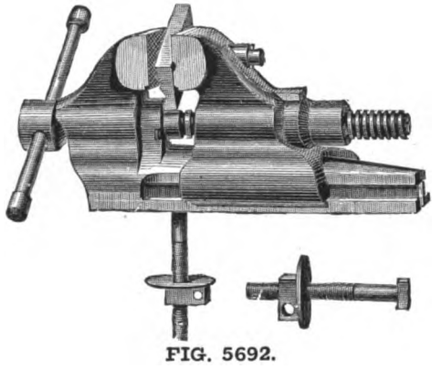


FIG. 5692.

PRICES.

Width of jaw, 4 inches		$17.50
" " " 5 "		23.00
" " " 8 "		33.00

STEEL SWIVEL GRIPS.



FIG. 5695.

PRICES.

No. 1 holds ¼ to 2½ in. pipe and fits any vise with jaws 3 to 4½ in.	$2.50
No. 2 holds ¼ to 5 in. pipe and fits any vise with jaws 4¾ to 5½ in.	2.75
No. 3 holds ¼ to 6 in. pipe and fits any vise with jaws 6 to 8½ in.	3.00

PIPE BENDING MACHINE.

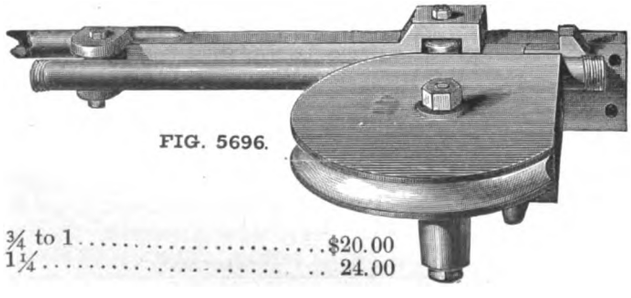


FIG. 5696.

¾ to 1	$20.00
1¼	24.00

SWIVELING JAWS.

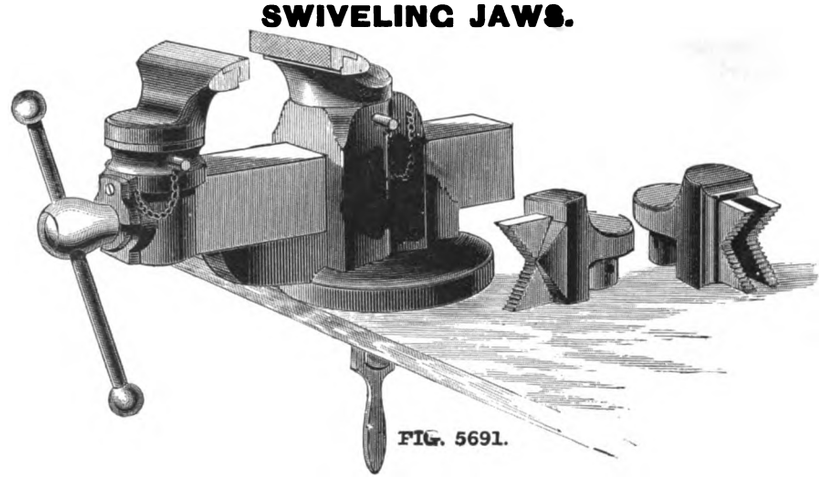


FIG. 5691.

PRICES.

No. 1, round jaws, both jaws swivel	weight 60 lbs.,	each,	$12.50
No. 2, pipers' jaws	" 63 "	"	12.50
No. 3, round and pipers' jaws	" 76 "	"	14.75
For holding 3 inch pipe and under.			
No. 4, round, pipers' and coach makers' jaws	weight, 94 "	"	16.00

PIPE ATTACHMENTS FOR STEVENS VISES.

VISE CAPS.

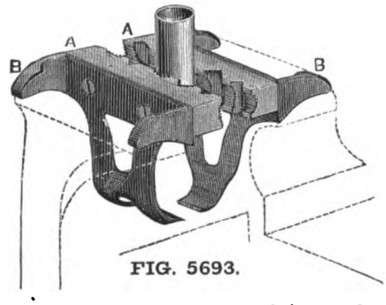


FIG. 5693.

This consists of two steel jaws, deeply corrugated, forming a pipe grip jaw, gripping the pipe either in a horizontal or perpendicular position. Readily adjusted to any ordinary machine vise.

PRICES.

2 in., $1.50; 2¾ in., $2.00; 3½ in., $3.00; 4½ in., $4.00; 5½ in., $5.00.

ADJUSTABLE PIPE GRIPS.

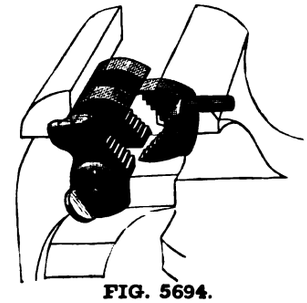


FIG. 5694.

Easily adjusted and at once transforms the machine vise into the most reliable pipe vise.

PRICES.

2¾ in., holding pipe to	1¼ in.			$2.75
3½ " "	"	1½ "		4.00
4½ " "	"	2 "		5.50
5½ " "	"	3 "		7.50
6½ " "	"	3 "		7.50

10 INCH IMPROVED COMBINATION PLIERS.

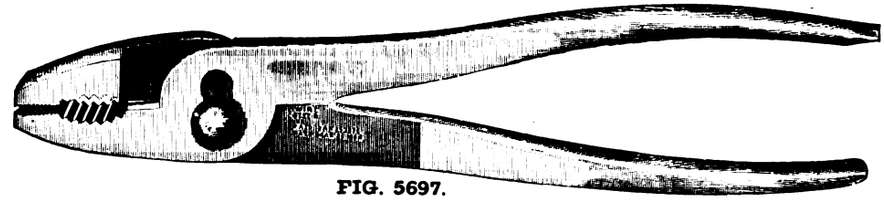


FIG. 5697.

6 INCH IMPROVED COMBINATION PLIERS.

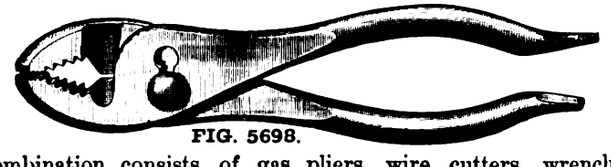


FIG. 5698.

Combination consists of gas pliers, wire cutters, wrench and screw driver. They are drop forged from tool steel. By sliding from one hole to the other the 6 inch will hold from burners to 1 inch, and the 10 inch from ¼ to 1¼ inches.

PRICES.	Black finish.	Nickel-plated.
6 inch, per dozen	$13.50	$15.00
10 inch, per dozen	18.00	21.00

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GAS PLIERS.

PRICES.

Solid cast steel, either full polished or black, warranted.

Inches	7	8	9	10	11
Per doz	$7.40	$8.25	$9.25	$10.70	$12.00
Inches	12	13	14	15	16
Per doz	$13.00	$15.00	$17.00	$19.00	$21.00

Packed one-half dozen in a box.

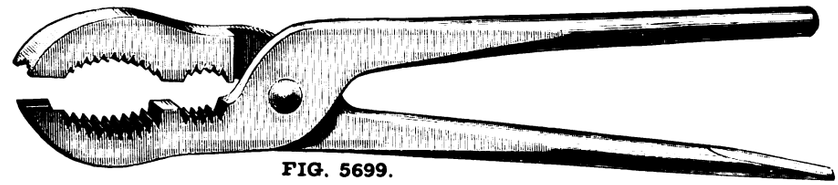


FIG. 5699.

GAS BURNER PLIERS.

PRICES.

Single joint, full polished.

Inches	4	5	6
No. 1, solid cast steel, per dozen	$4.80	$4.80	$6.50
No. 2, second quality, " "	4.80	4.80	6.50

Packed one dozen in a box.



FIG. 5700.

GAS-FITTERS' AUGERS.



FIG. 5701.

PRICES.

Gas pipe sizes, inch	¼	⅜	½	¾	1
Prices	$0.80	$1.00	$1.12	$1.60	$1.92
Gas pipe sizes, inch	1¼	1½	2	2½	
Prices	$2.25	$2.50	$3.25	$4.00	

BRASS BLOW PIPES.

WITH BALL.

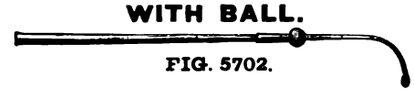


FIG. 5702.

PRICES.

9 inch, per dozen	$4.75
10 " "	5.00
11 " "	5.25
12 " "	5.50

PLAIN.



FIG. 5703.

PRICES.

9 inch, plain, per dozen	$2.25
10 " " "	2.55
11 " " "	2.85
12 " " "	3.00

GAS-FITTERS' TORCHES.

WITH ASKEY ATTACHMENT.



FIG. 5704.

PRICE.

Per doz. $60.00

WITH BLOW PIPE.

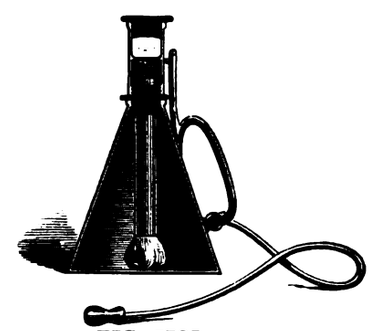


FIG. 5705.

PRICE.

Per doz. $30.00

PLAIN TORCH.

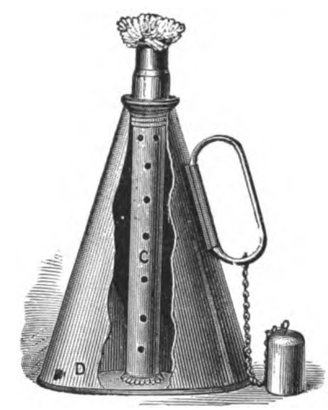


FIG. 5706.

PRICES.

Tin	$1.00
Brass	1.25

CLIMAX TORCH.

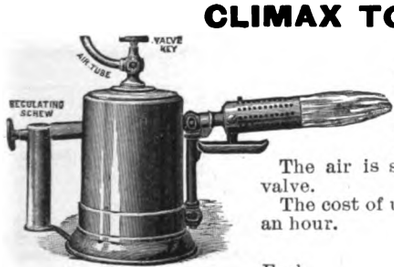


FIG. 5707.

This torch is possessed of all the advantages of the "Automatic," excepting the air pump, consequently will not get up as strong a flame, but is superior to any other torch in the market.

The air is supplied by blowing in the air valve.

The cost of using is but one-fourth of a cent an hour.

PRICE.

Each $3.50

DIRECTIONS FOR USING AND CARE OF CLIMAX TORCH.

Fill lamp nearly full with 76 gravity naphtha or gasoline, screw down plug, then open valve on top of torch, blow in air tube, screw down valve before taking mouth pressure off air tube, then open regulating screw by turning it to the left and let cup fill with oil, then shut off supply. When oil in cup is nearly burnt out, turn on again same as to fill cup, when your burner will be heated and will light with the oil burning in the cup. If the burner does not light before oil burns out, or if you should happen to forget to turn screw, then light with match; burner, after being heated, will light same as gas. If burner sputters or does not burn blue flame, it is because it is not hot enough; turn down low for a minute or two, when it will be all right. No packing is used in this torch. Soap regulating screw thread when needed.

AUTOMATIC TORCH, WITH AIR PUMP.

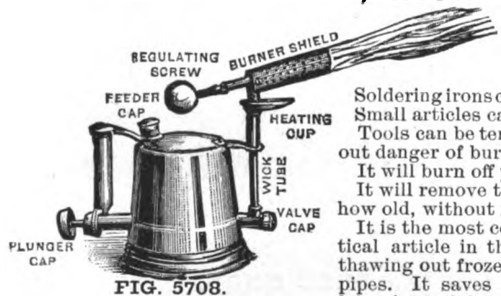


FIG. 5708.

REPRESENTS THE LARGE FLAME TORCH.

Soldering irons can be heated with it.

Small articles can be brazed with it.

Tools can be tempered with it, without danger of burning.

It will burn off paint.

It will remove the paint, no matter how old, without injuring the wood.

It is the most convenient and practical article in the world to use for thawing out frozen water and steam pipes. It saves half the time and labor in "wiping" joints on pipe and lead burning.

For melting "holding-wax" used by metal pattern makers and engravers, it has no equal.

The flame can be regulated to any desired size by simply turning a screw, thus keeping the heat constantly under complete control.

It can also be used in any position, bottom-up or otherwise.

The cost of using it is but one-half of a cent an hour with a full size flame, one-fourth of a cent an hour for a small flame.

Large flame torch for large flat surfaces.

Small flame torch for window sash and any work requiring small concentrated flame.

In ordering, state which torch is wanted.

PRICE, $6.00.

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GAS AND WATER MAIN TAPPING MACHINES.

PIPE DRILLING CROW.

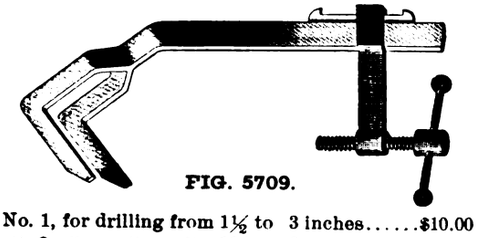


FIG. 5709.

No. 1, for drilling from 1½ to 3 inches.....$10.00
" 2, " " " 1½ " 6 " 13.00
" 3, " " " 1½ " 12 " 16.00

What we furnish with water tapping machine complete:

Combination drills and taps, 1 each, ½ in., ⅝ in., ¾ in., 1 in. and 1¼ in.

Cock holders, 1 each, ½ in., ⅝ in., ¾ in., 1 in. and 1¼ in.

Pure rubber saddles for mains, 4 in., 6 in., 8 in., 10 in., 12 in., 14 in. and 16 in.

Ratchet and other necessary wrenches, double chains, with clutches and eyebolts, etc.

PIPE DRILLS.



FIG. 5712.

Size.	Prices.
⅛	$0.91
¼	.91
⅜	.95
½	.98
⅝	1.04
¾	1.14
1	1.23
1¼	1.35
1½	1.56
2	

HALL'S TAPPER.

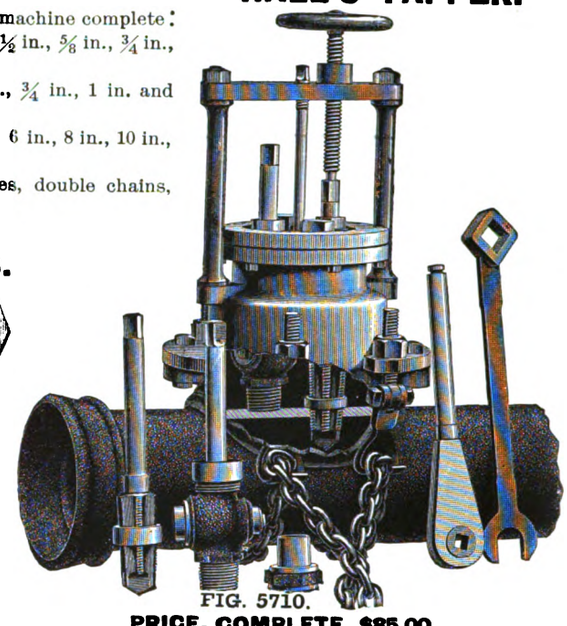


FIG. 5710.

PRICE, COMPLETE, $85.00.

MUELLER TAPPER.

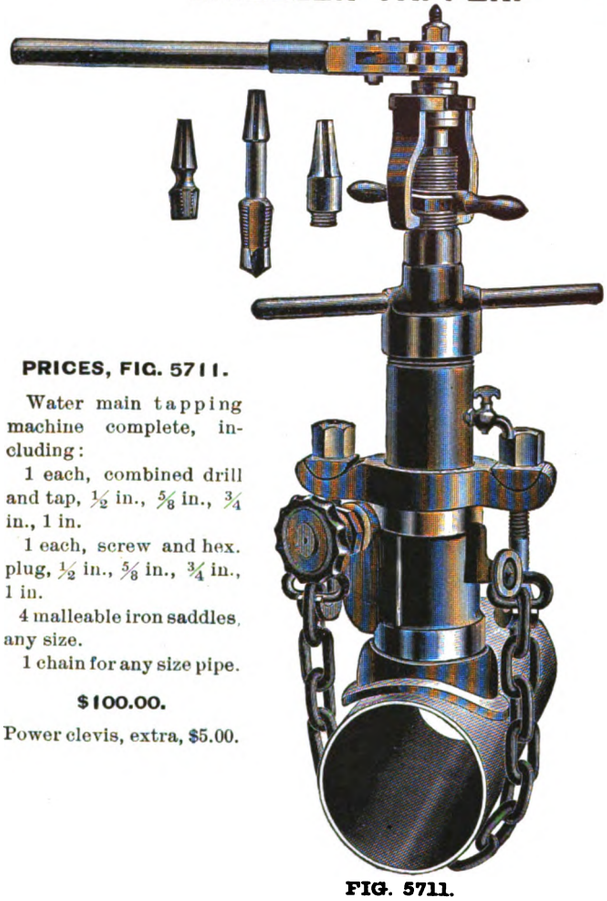


FIG. 5711.

PRICES, FIG. 5711.

Water main tapping machine complete, including:

1 each, combined drill and tap, ½ in., ⅝ in., ¾ in., 1 in.

1 each, screw and hex. plug, ½ in., ⅝ in., ¾ in., 1 in.

4 malleable iron saddles, any size.

1 chain for any size pipe.

$100.00.

Power clevis, extra, $5.00.

YOUNG'S MACHINE FOR TAPPING MAINS UNDER PRESSURE.

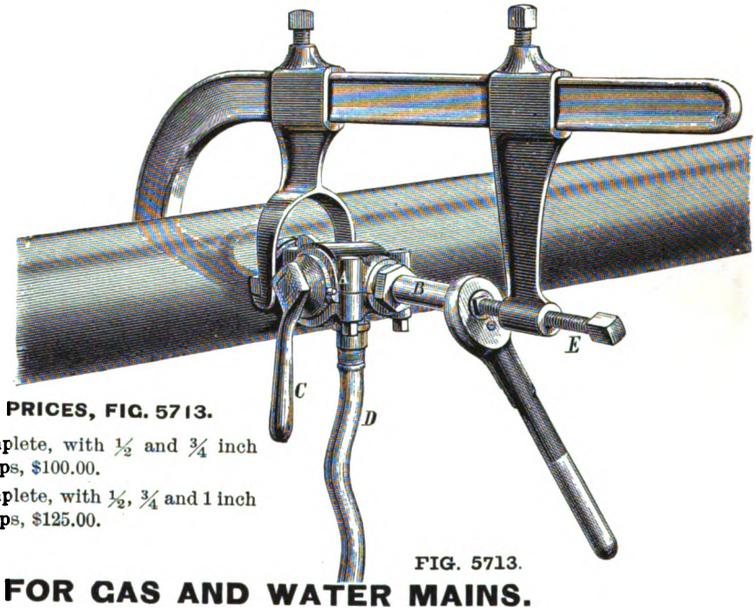


FIG. 5713.

PRICES, FIG. 5713.

Complete, with ½ and ¾ inch taps, $100.00.

Complete, with ½, ¾ and 1 inch taps, $125.00.

HEAVY CAST IRON PIPE FOR GAS AND WATER MAINS.

BELL AND SPIGOT ENDS.

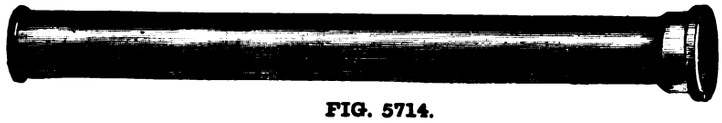


FIG. 5714.

FLANGED ENDS.



FIG. 5715. SEE TABLE NEXT PAGE.

We cast these pipes vertically in dry sand moulds. They are thoroughly cleaned and examined, and those intended for water are heated and given a bath in prepared coal tar and tested under hydraulic pressure with a hammer at 300 lbs. to the square inch. Pipe for gas is not coated and is tested at 200 lbs. pressure.

TABLE APPROXIMATE THICKNESS AND WEIGHTS, FOR FIG. 5714.

Size.	50 ft. head.		100 ft. head.		150 ft. head.		200 ft. head.		300 ft. head.	
	Thickness of metal.	Weight per length.	Thickness of metal.	Weight per length.	Thickness of metal.	Weight per length.	Thickness of metal.	Weight per length.	Thickness of metal.	Weight per length.
3	.344	144	.353	149	.362	153	.371	157	.390	166
4	.361	197	.373	204	.385	211	.397	218	.421	235
5	.378	254	.393	265	.408	275	.423	286	.453	309
6	.393	315	.411	330	.429	345	.447	361	.483	393
8	.422	445	.450	475	.474	502	.498	529	.546	584
10	.459	600	.489	641	.519	682	.549	723	.609	808
12	.491	768	.527	826	.563	885	.599	944	.671	1,064
14	.524	952	.566	1,031	.608	1,111	.650	1,191	.734	1,352
16	.557	1,152	.604	1,253	.652	1,360	.700	1,463	.796	1,673
18	.589	1,370	.643	1,500	.697	1,630	.751	1,761	.859	2,026
20	.622	1,603	.682	1,763	.742	1,924	.802	2,086	.922	2,412
24	.687	2,120	.759	2,349	.831	2,580	.903	2,811	1.047	3,279
30	.785	3,020	.875	3,376	.965	3,735	1.055	4,095	1.235	4,822
36	.882	4,070	.990	4,581	1.098	5,096	1.206	5,613	1.422	6,656
42	.980	5,265	1.106	5,958	1.232	6,657	1.358	7,360	1.610	8,804
48	1.078	6,616	1.222	7,521	1.366	8,431	1.510	9.340	1.798	11,195

All pipe cast vertically in dry sand; the 3 to 12 inch in lengths of 12 feet, all larger sizes in lengths of 12 feet 4 inches.

Flanged pipes are heavier. See table next page for sizes flanges, etc.

PRICES MADE ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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TABLE FOR FLANGED PIPE, FIG. 5715.

Diameter of pipe.	Length of pipe.	Thickness of metal.	Medium weight per length, including flanges.	Flanges. Diameter.	Thickness.	Weight of each.	Diameter from center to center of holes.	Number of bolts.	Size of bolts.
in.	ft.	in.	lbs.	in.	in.	lbs.	in.	in.	in.
3	12	3/8	160	8½	7/8	10.52	6¾	4	5/8
4	12	7/16	240	9	1	11.82	7¼	4	5/8
6	12	15/32	378	12	1 1/16	21.03	10⅜	6	5/8
8	12	½	540	14	1⅛	26.72	12⅜	6	¾
10	12	9/16	760	16	1⅛	30.73	14	8	¾
12	12	5/8	1,000	18	1¼	38.33	16	8	¾
14	12	5/8	1,200	20	1¼	43.23	18¼	10	¾
16	12	11/16	1,500	23	1⅜	64.51	20 11/16	10	¾
18	12	¾	1,800	25	1½	75.83	22½	12	⅞
20	12	¾	2,050	28	1⅝	108.00	25½	12	⅞
24	12	⅞	2,700	32	1¾	130.47	29½	14	⅞
30	12	1	4,000	40	1⅞	223.08	36⅞	20	1
36	12	1 1/32	5,000	46	2	275.62	42⅜	24	1
40	12	1⅛	6,000	50	2⅛	313.81	46½	26	1
48	12	1¼	8,000	58	2¼	378.20	54¾	30	1⅛

PRICES MADE ON SPECIFICATIONS.

FITTINGS FOR HEAVY CAST PIPE.

CROSSES.

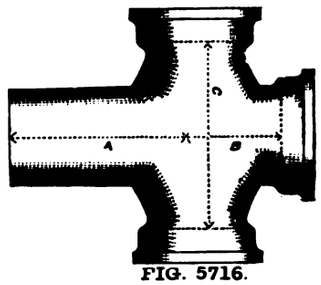


FIG. 5716.

Diam.	A.	B.	C.
in.	in.	in.	in.
3	18	8	15
4	18	8	15
5	20	9	17
6	20	9	17
8	22	10	20
10	24	11	23
12	26	12	26
14	28	13	29
16	30	14	32
18	32	15	35
20	34	16	38
24	36	20	44

TEES.

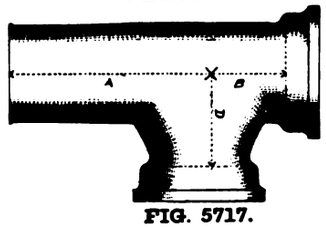


FIG. 5717.

Diam.	A.	B.	D.
in.	in.	in.	in.
3	18	8	7½
4	18	8	7½
5	20	9	8½
6	20	9	8½
8	22	10	10
10	24	11	11½
12	26	12	13
14	28	13	14½
16	30	14	16
18	32	15	17½
20	34	16	19
24	36	20	22

BENDS.

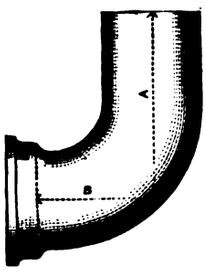


FIG. 5718.

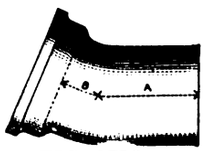


FIG. 5719.

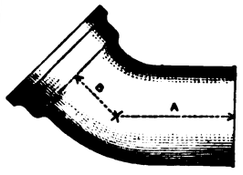


FIG. 5720.

	90°		45°		22½°	
Diam.	A.	B.	A.	B.	A.	B.
in.	in.	in.	in.	in.	in.	in.
3	17	7	10	4	8	3
4	18	8	11	4	9	3
5	19	9	12	5	10	3
6	20	10	13	5	11	4
8	22	12	14	6	12	4
10	24	14	15	7	13	5
12	26	16	16	8	14	5
14	28	18	17	9	15	6
16	30	20	18	10	16	6
18	32	22	19	11	17	7
20	34	24	20	12	18	7
24	38	28	22	14	20	8

REDUCERS.



FIG. 5721.

A.	A.	A.
4 to 3 26	12 to 8 38	18 to 8 47
5 " 4 29	12 " 6 38	20 " 18 50
5 " 3 29	14 " 12 41	20 " 16 50
6 " 5 29	14 " 10 41	20 " 14 50
6 " 4 29	14 " 8 41	20 " 12 50
6 " 3 29	14 " 6 41	20 " 10 50
8 " 6 32	16 " 14 44	20 " 8 50
8 " 5 32	16 " 12 44	24 " 20 56
8 " 4 32	16 " 10 44	24 " 18 56
8 " 3 32	16 " 8 44	24 " 16 56
10 " 8 35	18 " 16 47	24 " 14 56
10 " 6 35	18 " 14 47	24 " 12 56
10 " 5 35	18 " 12 47	24 " 10 56
12 " 10 38	18 " 10 47	

FLANGED BRANCHES.

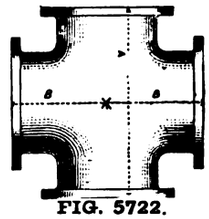


FIG. 5722.

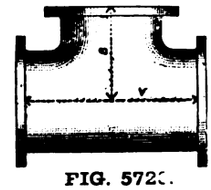


FIG. 5723.

Crosses.			Tees.		
Diam.	A.	B.	Diam.	A.	B.
in.	in.	in.	in.	in.	in.
3	13½	6¾	3	13½	6¾
4	15	7½	4	15	7½
5	16½	8¼	5	16½	8¼
6	18	9	6	18	9
8	21	10½	8	21	10½
10	24	12	10	24	12
12	27	13½	12	27	13½
14	30	15	14	30	15
16	33	16½	16	33	16½
18	36	18	18	36	18
20	39	19½	20	39	19½
24	45	22½	24	45	22½

DIMENSIONS, FIG. 5724. FIG. 5725.

90°			45°		
Diam.	A.	B.	Diam.	A.	B.
in.	in.	in.	in.	in.	in.
3	7	7	3	4	4
4	8	8	4	4	4
5	9	9	5	5	5
6	10	10	6	5	5
8	12	12	8	6	6
10	14	14	10	7	7
12	16	16	12	8	8
14	18	18	14	9	9
16	20	20	16	10	10
18	22	22	18	11	11
20	24	24	20	12	12
24	28	28	24	14	14

FLANGED BENDS.

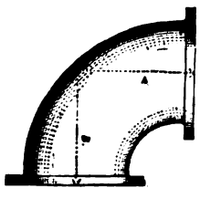


FIG. 5724.

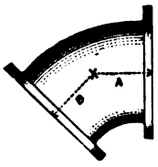


FIG. 5725.

CAPS, ETC., OF ALL SIZES.

SLEEVES.

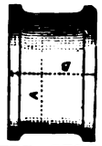


FIG. 5726.

HALF SLEEVES.



FIG. 5727.

PLUGS AND CAPS.



FIG. 5728.

PRICES FOR ALL ABOVE MADE ON SPECIFICATIONS.

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CAST IRON SOIL PIPES AND FITTINGS.

SINGLE HUB.



FIG. 5729.

PRICES.

	Standard.	Extra heavy.
2 inch, 5 feet long.....per foot,	$0.24	$0.35
3 " 5 " ..... "	.30	.55
4 " 5 " ..... "	.36	.75
5 " 5 " ..... "	.50	1.00
6 " 5 " ..... "	.60	1.20
8 " 5 " ..... "	1.25	2.25

DOUBLE HUB.



FIG. 5730.

PRICES.

	Standard.	Extra heavy.
2 inch.....per length of 5 feet,	$1.50	$2.05
3 " ..... " " "	1.80	3.05
4 " ..... " " "	2.10	4.05
5 " ..... " " "	2.80	5.30
6 " ..... " " "	3.30	6.30
8 " ..... " " "	7.25	12.75

LONG QUARTER BENDS.

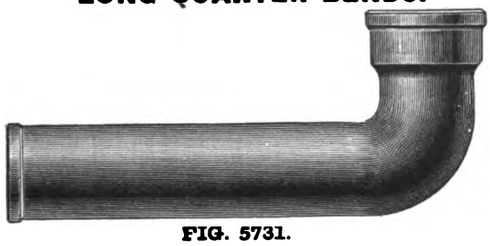


FIG. 5731.

PRICES.

	Standard.	Extra heavy.
4 inch, 18 inches in the clear.	$1.50	$2.25
5 " 18 " " "	2.25	3 00
6 " 18 " " "	2.50	3.50
8 " 18 " " "	5.50	

QUARTER BEND.

SIXTH BEND.

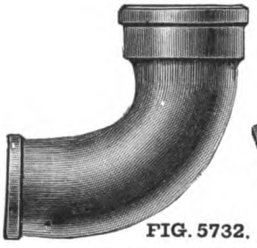


FIG. 5732.



FIG. 5733.

PRICES, FIGS. 5732 & 5733.

Size, in inches	Standard.	Extra heavy.
2	$0.40	$0.50
3	.55	.70
4	.65	1.10
5	1.00	1.35
6	1.20	1.75
8	3.00	4.00

EIGHTH BEND.

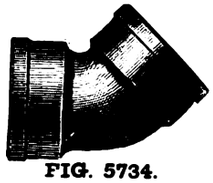


FIG. 5734.

PRICES. 4 in.
Standard. $0.90
Extra heavy..... 1.30

QUARTER BENDS.

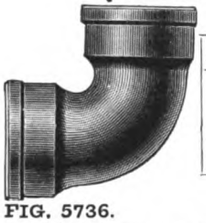


FIG. 5736.

PRICES, FIG. 5736.

Size, in inches.	Standard.	Extra heavy.
2	$0.70	$0.80
3	.85	1.00
4	.95	1.40
5	1.30	1.65
6	1.50	2.05

EIGHTH BENDS.



FIG. 5737.

PRICES, FIG. 5737.

Size, in inches.	Standard.	Extra heavy.
2	$0.35	$0.45
3	.45	.65
4	.65	1.00
5	.90	1.20
6	1.05	1.40
8	2.75	3.75

Y BRANCHES.

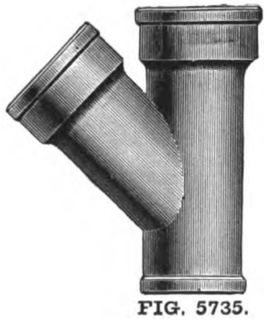


FIG. 5735.

PRICES, FIG. 5735.

Size in inches	Standard.	Extra heavy.
2 x 2	$0.60	$0.80
3 x 3	.80	1.25
3 x 2		
4 x 4	1.20	1.60
4 x 3		
4 x 2		
5 x 5	1.60	2.25
5 x 4		
5 x 3		
5 x 2		
6 x 6	2.00	3.25
6 x 5		
6 x 4		
6 x 3		
6 x 2		
8 x 8	5.00	8.00
8 x 6		
8 x 5		
8 x 4		
8 x 3		
8 x 2		

LONG T BRANCH.

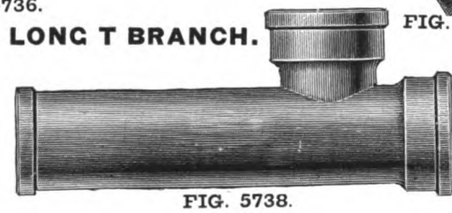


FIG. 5738.

PRICES.

Size, in inches.	In the clear, inches.	Standard.	Extra heavy.	Size, in inches.	In the clear, inches.	Standard.	Extra heavy.
4 x 4	24	$2.00	$3.00	5 x 4	36	$4.25	$6.00
4 x 4	30	2.50	3.75	6 x 4	24	3.50	5.00
4 x 4	36	3.00	4.50	6 x 4	30	4.50	6.50
5 x 4	24	2.75	4.00	6 x 4	36	5.50	8.00
5 x 4	30	3.50	5.00				

OFFSETS.

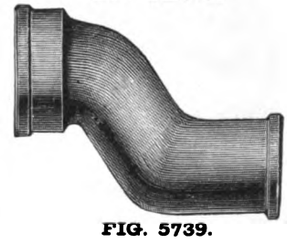


FIG. 5739.

PRICES.

Size of offset, inches.	Standard.	Extra heavy.
2 x 2	$0.40	$0.60
2 x 4	.50	.90
2 x 6	.60	1.00
2 x 8	.70	1.10
2 x 10	.80	1.20
2 x 12	.85	1.25
3 x 4	.75	1.10
3 x 6	.80	1 20
3 x 8	.90	1.35
3 x 10	.95	1.40
3 x 12	1.00	1.45
4 x 4	.85	1.25
4 x 6	1.00	1.40
4 x 8	1.15	1.50
4 x 10	1.25	1.60
4 x 12	1.40	1.80
4 x 14	1.65	2.00
4 x 16	1.80	2.25
4 x 18	2.15	2.80
4 x 20	2.25	3.00
5 x 4	1.40	1.80
5 x 6	1.60	2.00
5 x 8	1.80	2.25
5 x 12	2.00	2.50
5 x 16	2.40	3.00
6 x 4	2.00	3.00
6 x 6	2.25	3.25
6 x 8	2.40	3.50
6 x 10	2.60	3.75
6 x 12	2.75	4.00

S TRAP.

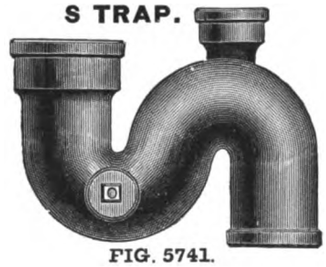


FIG. 5741.

With vent on top, and trap screw on side.

PRICES.

	Standard.	Extra heavy.
2 in. with 2 in. vent, and 1½ in. brass screw	$3.30	$3.75
3 " 2 " " 2 " "	3.75	4.50
4 " 2 " " 3 " "	4.25	5.25
5 " 2 " " 3 " "	5.50	6.50
6 " 2 " " 4 " "	6.50	8.00

Three-quarter S and half S traps same price.

The cut shows trap screw on right hand side when trap is set. We make them on either right or left side. Be careful in ordering to state on which side screw is wanted.

SANITARY T BRANCHES.

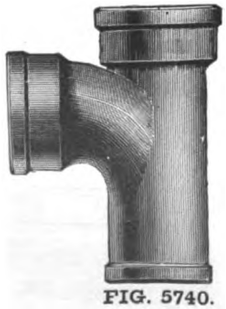


FIG. 5740.

PRICES, FIG. 5740.

Size, in inches	Standard.	Extra heavy.
2 x 2	$0.60	$0.80
3 x 3	.80	1.25
3 x 2		
4 x 4	1.20	1.60
4 x 2		
5 x 5	1.60	2.25
5 x 4		
5 x 2		
6 x 6	2.00	3.25
6 x 4		
6 x 2		

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CAST IRON SOIL PIPE FITTINGS.

DOUBLE Y BRANCH.

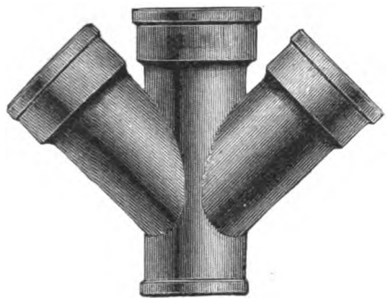


FIG. 5742.

PRICES, FIG. 5742.

	Standard.	Extra heavy.
2 x 2 inches	$1.00	$1.25
3 x 3 "	1.25	1.60
3 x 2 "		
4 x 4 "	1.65	2.00
4 x 3 "		
4 x 2 "		
5 x 5 "	2.25	3.00
5 x 4 "		
5 x 3 "		
5 x 2 "		
6 x 6 "	3.00	4.00
6 x 5 "		
6 x 4 "		
6 x 3 "		
6 x 2 "		
8 x 8 "	6.00	9.00
8 x 6 "		
8 x 5 "		
8 x 4 "		
8 x 3 "		
8 x 2 "		

PRICES, FIG. 5743.

Standard.	Extra heavy.
$0.80	$1.00
1.10	1.40
1.25	1.75
1.60	2.10
2.50	3.30
5.00	7.00

CROSSES.

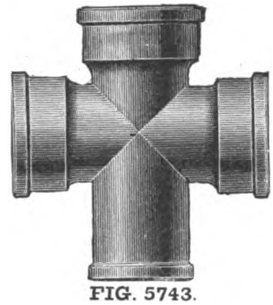


FIG. 5743.

ADJUSTABLE ELBOWS.

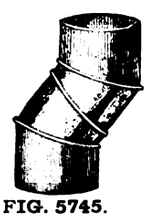


FIG. 5745.

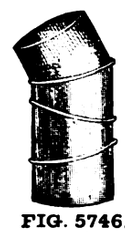


FIG. 5746.

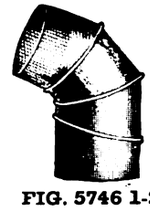


FIG. 5746 1-2.

LIGHT-HOUSE LEADER, GALVANIZED.

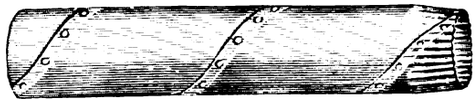


FIG. 5744.

PRICES, PER FOOT, 10 FOOT LENGTHS.

Inside diameter.	Galvanized.
2 inch	$0.14
2½ "	.17
3 "	.19
3½ "	.21
4 "	.25
5 "	.30
6 "	.38

SPIRAL RIVETED PIPES.

PRICES, PER DOZEN, FIGS. 5745, 5746 AND 5746 1-2.

Sizes.	Charcoal iron.	Planis'd iron.	Genuine Russia.	Galvanized iron.	Tin.
1½ inch				$2.40	$1.80
2 "				2.40	1.80
2½ "				3.00	2.40
3 "				3.60	2.40
3½ "				4.20	3.60
4 "	$3.00	$5.00	$6.00	4.80	3.60
4½ "	3.00	5.50	6.50	5.40	4.80
5 "	3.50	6.50	7.50	6.60	4.80
5½ "	4.50	7.00	9.50	7.80	6.60
6 "	4.50	7.00	9.50	8.40	6.60
7 "	6.00	9.50	11.00	10.20	8.40
8 "				13.80	10.80
9 "				15.00	12.60
10 "				16.80	14.40

SHOWING CRIMPED AND PLAIN ENDS.

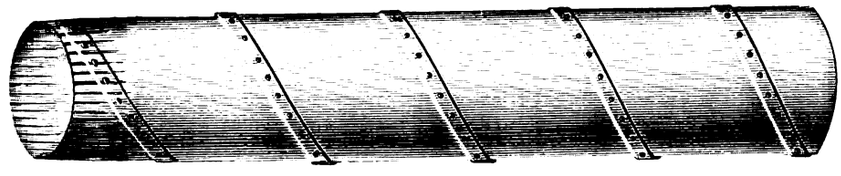


FIG. 5747.

PRICES, FIG. 5747, IN 10 FOOT LENGTHS.

No. 26, Birmingham gauge, .018 in. thick.
Per lineal foot, plain or crimped.

Diameter.	Black.	Dipped in coal tar and asphalt.	Galvanized.
3 inch	$0.17	$0.20	$0.25
4 "	.21	.25	.33
5 "	.25	.30	.40
6 "	.28	.34	.46

These approximate weights are for black pipe only, and intended as guides for estimating freight charges; galvanized or asphalted pipe, same gauge and diameter, is from 20 to 30 per centum heavier.

In ordering pipe, the margin of safety should be at least one-half or two-thirds of the bursting pressure.

PRICES, FIG. 5747, IN 10 FOOT LENGTHS.

No. 24, Birmingham gauge, .022 in. thick. Price per lineal foot. With plain or crimped ends or sheet iron sleeves for slip joint riveted on.

Diameter, in inches.	Prices. Black.	Prices. Dipped in coal tar and asphalt.	Prices. Galvanized.	Approximate weight per 100 feet.
3	$0.20	$0.23	$0.30	100 lbs.
4	.25	.29	.38	130 "
5	.30	.35	.45	160 "
6	.33	.39	.50	185 "
7	.37	.44	.60	210 "
8	.42	.50	.65	240 "
9	.48	.57	.75	280 "
10	.54	.64	.85	300 "
11	.60	.71	.90	330 "
12	.68	.80	1.05	400 "

In lengths of 10 feet and less. Each length tested to service required.

For other thicknesses, see next page.

PRICES, FIG. 5747, IN 20 FOOT LENGTHS.

No. 22, Birmingham gauge, .028 in. thick. Price per lineal foot. With plain or crimped ends or sheet iron sleeves for slip joint riveted on.

Diameter, in inches.	Prices. Black.	Prices. Dipped in coal tar and asphalt.	Prices. Galvanized.	Approximate weight per 100 feet.
3	$0.24	$0.27	$0.32	130 lbs.
4	.30	.34	.43	160 "
5	.37	.42	.53	200 "
6	.40	.46	.60	240 "
7	.45	.52	.65	260 "
8	.53	.61	.75	300 "
9	.60	.69	.90	340 "
10	.65	.75	1.00	380 "
11	.70	.81	1.10	420 "
12	.82	.94	1.25	490 "
13	.90	1.03	1.35	530 "
14	1.00	1.14	1.45	575 "

In lengths of 20 feet and less. Each length tested to service required.

For fittings, see page 725.

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SPIRAL RIVETED PIPES, CONTINUED, FIG. 5747.

PRICES, PER LINEAL FOOT OF PIPE. SEE PAGE 725 FOR FITTINGS.

With plain or crimped ends, or sheet iron sleeves for slip joint riveted on.

Thickness .0355 inch. No. 20 w. g.

Diameter, in inches.	Prices, black.	Prices, dipped in coal tar and asphalt.	Prices, galvanized.	Weight, per 100 feet.	Approximate bursting pres. in lbs. per sq. inch.
3	$0.27	$0.30	$0.38	150 lbs.	900 lbs.
4	.35	.39	.48	200 "	700 "
5	.40	.45	.60	250 "	550 "
6	.46	.52	.68	300 "	450 "
7	.51	.58	.75	325 "	400 "
8	.58	.66	.85	360 "	350 "
9	.66	.75	.97	410 "	325 "
10	.72	.82	1.05	500 "	275 "
11	.78	.89	1.20	550 "	250 "
12	.90	1.02	1.35	600 "	225 "
13	1.00	1.13	1.50	650 "	210 "
14	1.10	1.24	1.60	700 "	200 "
15	1.20	1.35	1.75	750 "	190 "
16	1.30	1.46	1.85	800 "	160 "
18	1.40	1.58	2.05	900 "	150 "
20	1.60	1.80	2.30	960 "	140 "
22	1.80	2.02	2.55	1,040 "	125 "
24	1.95	2.19	2.85	1,150 "	110 "

In lengths of 25 feet and less. Each length tested to service required.

Thickness .049 inch. No. 18 w. g.

Diameter, in inches.	Prices, black.	Prices, dipped in coal tar and asphalt.	Prices, galvanized.	Approximate weight, per 100 feet.	Approximate bursting pres. in lbs. per sq. inch.
3	$0.34	$0.37	$0.46	185 lbs.	1,300 lbs.
4	.42	.46	.58	245 "	1,000 "
5	.50	.55	.70	300 "	800 "
6	.57	.63	.85	360 "	700 "
7	.63	.70	.90	400 "	600 "
8	.73	.81	1.05	460 "	500 "
9	.82	.91	1.18	525 "	450 "
10	.90	1.00	1.30	575 "	400 "
11	.95	1.06	1.40	625 "	360 "
12	1.15	1.27	1.65	750 "	330 "
13	1.25	1.38	1.80	800 "	300 "
14	1.35	1.49	1.95	900 "	280 "
15	1.50	1.65	2.10	950 "	260 "
16	1.60	1.76	2.25	1,000 "	250 "
18	1.75	1.93	2.55	1,125 "	220 "
20	2.00	2.20	2.90	1,250 "	200 "
22	2.20	2.42	3.10	1,350 "	180 "
24	2.40	2.64	3.35	1,460 "	160 "

In lengths of 25 feet and less. Each length tested to service required.

Thickness .065 inches. No. 16 w. g.

Diameter, in inches.	Prices, black.	Prices, dipped in coal tar and asphalt.	Prices, galvanized.	Approximate weight, per 100 feet.	Approximate bursting pres. in lbs. per sq. inch.
6	$0.70	$0.76	$1.00	500 lbs.	800 lbs.
7	.80	.87	1.10	550 "	700 "
8	.93	1.01	1.28	650 "	600 "
9	1.08	1.17	1.47	750 "	550 "
10	1.15	1.25	1.55	800 "	500 "
11	1.20	1.31	1.70	850 "	450 "
12	1.45	1.57	2.05	1,025 "	400 "
13	1.55	1.68	2.15	1,100 "	380 "
14	1.70	1.84	2.40	1,200 "	360 "
15	1.85	2.00	2.60	1,300 "	330 "
16	2.00	2.16	2.75	1,375 "	300 "
18	2.20	2.38	3.10	1,550 "	280 "
20	2.45	2.65	3.40	1,675 "	250 "
22	2.80	3.02	3.90	1,825 "	230 "
24	3.00	3.24	4.30	2,000 "	210 "

In lengths of 25 feet and less. Each length tested to service required.

LUGS FOR WIRING. FLANGED ENDS.

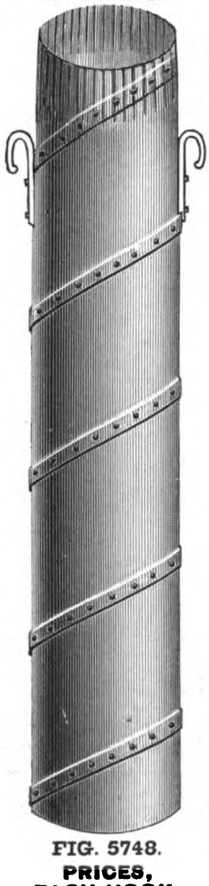


FIG. 5748.

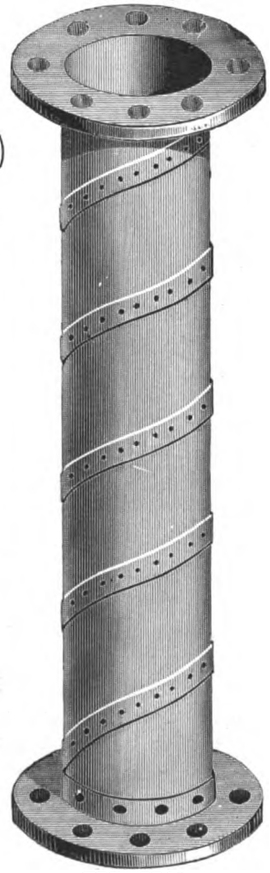


FIG. 5749.

PRICES, EACH HOOK.

Black.....$0.12
Galvanized..... .15

Thickness .083 inch. No. 14 w. g.

Diameter, in inches.	Prices, black.	Prices, dipped in coal tar and asphalt.	Prices, galvanized.	Approximate weight, per 100 feet.	Approximate bursting pres. in lbs. per sq. inch.
8	$1.15	$1.23	$1.50	825 lbs.	825 lbs.
9	1.32	1.41	1.70	925 "	750 "
10	1.40	1.50	1.80	1,025 "	650 "
11	1.50	1.61	1.95	1,125 "	600 "
12	1.80	1.92	2.35	1,325 "	550 "
13	1.90	2.03	2.50	1,425 "	500 "
14	2.10	2.24	2.70	1,560 "	470 "
15	2.25	2.40	2.90	1,680 "	450 "
16	2.40	2.56	3.15	1,790 "	400 "
18	2.75	2.93	3.60	2,000 "	370 "
20	3.10	3.30	4.00	2,200 "	325 "
22	3.40	3.62	4.55	2,400 "	300 "
24	3.70	3.94	4.85	2,620 "	275 "

In lengths of 25 feet and less. Each length tested to service required.

Thickness .109 inch. No. 12 w. g.

Diameter, in inches.	Prices, black.	Prices, dipped in coal tar and asphalt.	Prices, galvanized.	Approximate weight, per 100 feet.	Approximate bursting pres. in lbs. per sq. inch.
14	$2.90	$3.04	$3.75	2,010 lbs.	570 lbs.
15	3.10	3.25	4.00	2,165 "	530 "
16	3.25	3.41	4.25	2,310 "	500 "
18	3.60	3.78	4.70	2,570 "	440 "
20	4.00	4.20	5.25	2,830 "	400 "
22	4.35	4.57	5.75	3,090 "	365 "
24	4.70	4.94	6.25	3,380 "	335 "

In lengths of 25 feet and less. Each length tested to service required.

PRICES, FIG. 5749, INCLUDING ATTACHING.

Diameter, in inches.	Prices, black—for 1 flange.	Prices, galvanized—for 1 flange.	Diameter, in inches.	Prices, black—for 1 flange.	Prices, galvanized—for 1 flange.
3	$0.30	$0.45	11	$1.50	$2.25
4	.40	.60	12	1.60	2.40
5	.50	.75	13	1.80	2.70
6	.60	.90	14	2.00	3.00
7	.80	1.20	15	2.40	3.60
8	.90	1.35	16	3.40	5.10
9	1.20	1.80	18	3.90	5.75
10	1.40	2.10	20	4.30	6.45

DOUBLE GALVANIZED SPIRAL RIVETED FLANGED PRESSURE PIPE.

Made of galvanized iron and regalvanized after formation, thereby making all seams and laps perfectly solid.

Each length tested to 150 lbs. hydraulic pressure.

Inside diameter, in inches.	Prices, per lineal foot, including flanges.	Thickness, Birmingham gauge.	Nominal weight, per foot.
3	$0.50	No. 20	2¼ lbs.
4	.70	"	3 "
5	1.00	"	4 "
6	1.20	No. 18	5 "
7	1.40	"	6 "
8	1.70	"	7 "
9	2.00	"	8 "
10	2.60	No. 16	11 "
11	2.85	"	12 "
12	3.15	"	14 "
13	3.60	"	15 "
14	4.00	No. 14	20 "
15	4.40	"	22 "
16	5.15	"	24 "
18	6.40	"	29 "
20	7.95	"	34 "
22	10.00	No. 12	40 "
24	12.00	"	50 "

In lengths of 20 feet and less.

Pipe and fittings gotten out to specifications and drawings when desired. Where lengths required are all 5 feet or less, they are charged as being 5 feet each.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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GALVANIZED AND BLACK CAST AND WROUGHT IRON FITTINGS FOR SPIRAL RIVETED PIPES.

FLANGED ELBOW.



FIG. 5751.

FLANGED CROSS.



FIG. 5752.

FLANGED TEE.

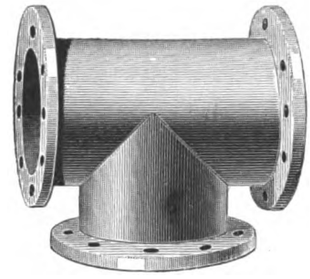


FIG. 5753.

PRICES, GALVANIZED.

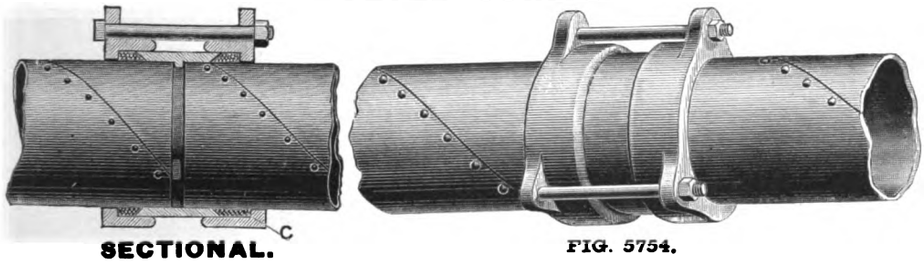
Inside diam.	Elbows.	Tees.	Crosses.	Reducers.	Flanges.	Disks or blind flanges.	Bolts and nuts.	Composition gaskets.
3 in.	$1.60	$2.75	$4.15	$....	$0.39	$0.45	$0.04	$0.09
4 "	2.10	3.25	5.30	* 3.00	.52	.65	.04	.10
5 "	2.85	4.40	6.70	* 3.50	.65	.78	.04	.12
6 "	4.10	5.70	8.00	* 4.75	.78	1.17	.04½	.16
7 "	5.10	7.30	11.00	* 5.50	1.04	1.56	.04½	.18
8 "	6.70	9.80	14.25	* 6.50	1.17	1.82	.04½	.23
9 "	9.00	13.80	18.80	* 8.00	1.56	2.34	.04½	.31
10 "	10.00	17.60	24.50	*10.25	1.82	2.47	.04½	.40
11 "	*13.00	*20.00	*26.50	*12.00	1.95	3.25	.04½	.45
12 "	15.80	22.50	30.00	*13.00	2.08	3.90	.04½	.50
13 "	19.15	*25.00	*33.50	*14.60	2.34	4.55	.04½	.56
14 "	*22.30	*30.50	*38.00	*16.50	2.60	5.46	.05	.63
15 "	26.00	*37.00	*45.00	*18.40	3.12	5.98	.05	.75
16 "	*30.00	*44.00	*53.00	*21.30	4.42	6.76	.05	.90
18 "	*34.00	*50.00	*59.00	*26.00	5.07	9.10	.05	1.08
20 "	*38.50	*56.00	*67.00	*29.40	5.59	11.70	.05	1.25
22 "	*42.00	*60.00	*77.00	*33.00	9.10	14.30	.05½	1.75
24 "	*45.00	*70.00	*87.00	*37.00	9.75	16.90	.05½	2.00

PRICES, BLACK.

Inside diam.	Elbows.	Tees.	Crosses.	Reducers.	Flanges.	Disks or blind flanges.	Bolts and nuts.	Composition gaskets.
3 in.	$1.25	$1.95	$3.00	$....	$0.24	$0.28	$0.02½	$0.09
4 "	1.50	2.20	3.70	* 2.00	.32	.40	.02½	.10
5 "	2.00	3.10	4.80	* 2.40	.40	.48	.02½	.12
6 "	2.90	3.90	5.70	* 3.25	.48	.72	.03	.16
7 "	3.50	5.00	7.70	* 4.00	.64	.96	.03	.18
8 "	4.50	6.60	9.80	* 4.75	.72	1.12	.03	.23
9 "	6.20	9.25	13.00	* 5.50	.96	1.44	.03	.31
10 "	6.80	11.50	16.50	* 7.00	1.12	1.62	.03	.40
11 "	* 8.75	*14.00	*19.00	* 8.00	1.20	2.00	.03	.45
12 "	10.50	15.00	21.00	* 9.00	1.28	2.40	.03	.50
13 "	12.00	*16.50	*24.00	* 9.75	1.44	2.80	.03	.56
14 "	*13.50	*18.60	*27.00	*11.00	1.60	3.36	.03½	.63
15 "	15.00	*22.00	*31.00	*12.25	1.92	3.68	.03½	.75
16 "	*17.00	*25.00	*34.50	*14.20	2.72	4.16	.03½	.90
18 "	*20.00	*29.00	*39.00	*17.40	3.12	5.60	.03½	1.08
20 "	*23.00	*34.00	*45.00	*19.60	3.44	7.20	.03½	1.25
22 "	*26.00	*39.00	*51.00	*22.00	5.60	8.80	.04	1.75
24 "	*30.00	*45.00	*58.00	*25.00	6.00	10.40	.04	2.00

* All fittings marked thus are riveted sheet iron; all others are cast iron.
The disks can be tapped to suit wrought iron screw threads if desired. Fittings of any design made to order.

BOLTED JOINTS.



SECTIONAL.

FIG. 5754.

PRICES, FIG. 5754.

Diam.	Prices.	Approximate weight.	Diam.	Prices.	Approximate weight.
3 in.	$1.15	8 lbs.	12 in.	$6.00	50 lbs.
4 "	1.40	11 "	13 "	6.50	55 "
5 "	1.70	14 "	14 "	7.25	60 "
6 "	2.10	17 "	15 "	8.00	65 "
7 "	2.50	20 "	16 "	8.50	70 "
8 "	3.25	25 "	18 "	10.00	80 "
9 "	4.00	30 "	20 "	11.50	90 "
10 "	4.75	36 "	22 "	12.50	105 "
11 "	5.50	45 "	24 "	13.50	120 "

The cement joint is for use where a moderate and constant pressure is maintained, and where the distribution is by gravity and no tapping for service is required. It consists simply of a sheet-iron sleeve, exceeding the diameter of the pipe by two inches, and from eight to twelve inches long. This sleeve encircles the pipe as shown, the annular space between the sleeve and pipe being packed with cement. In most cases this is the cheapest and simplest joint that can be used with spiral pipe.

Prices of sleeves for cement joint same as price of one foot of pipe of same gauge, but two inches larger in diameter than main pipe.

CEMENT JOINTS FOR CRIMPED END PIPE.

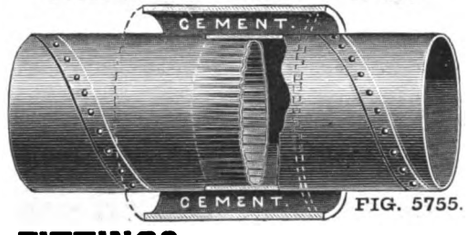


FIG. 5755.

STRAIGHT SEAM RIVETED PIPE AND FITTINGS.

Heavy gauges, black and galvanized sheet iron, suitable for water, blower, air, ventilator pipe and smoke stacks, etc.

PIPE, CALVANIZED.

No. 10 to 14, W. G. per lb....11 cts.
" 15 " 17, " " ....12 "
" 18 " 20, " " ....14 "
" 21 " 24, " " ....16 "

BLACK.

No. 10 to 14, W. G. per lb.... 8 cts.
" 15 " 17, " " .... 9 "
" 18 " 20, " " ....10 "
" 21 " 24, " " ....11 "

WROUGHT IRON LUGS FOR SLIP JOINT.

Black ..... 12 cents each.
Galvanized ..... 15 " "

FITTINGS COATED WITH COAL TAR AND ASPHALT AT 300° TEMPERATURE, EXTRA.

No. 16, W. G., and heavier..... .....extra net, 1 cent lb.
" 17, " " lighter..... " " 1½ " "
Pipe ½ cent for each inch of diameter per lineal foot.

FITTINGS, ELBOWS, TEES, CROSSES, ETC. CALVANIZED.

No. 10 to 14 W. G. 8 inch diam. and larger ..... per lb., 21 cents.
" 15 " 17 " 8 " " " " ..... " 22 "
" 18 " 20 " 8 " " " " ..... " 25 "
" 21 " 24 " 8 " " " " ..... " 30 "
" 18 " 20 " 7 " " and smaller ..... " 28 "
" 21 " 24 " 7 " " " " ..... " 35 "

FITTINGS, ELBOWS, TEES, CROSSES, ETC. BLACK.

No. 10 to 14 W. G. 8 inch diam. and larger ..... per lb., 18 cents.
" 15 " 17 " 8 " " " " ..... " 19 "
" 18 " 20 " 8 " " " " ..... " 21 "
" 21 " 24 " 8 " " " " ..... " 26 "
" 18 " 20 " 7 " " and smaller ..... " 24 "
" 21 " 24 " 7 " " " " ..... " 31 "

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WELDLESS COLD DRAWN STEEL TUBES.

PRICES, PER LINEAL FOOT.

Outside diameter. Inches.	Thickness of walls.													
	1/64 or 18 W.G.	1/32 or 16 W.G.	15 W.G.	3/64 or 14 W.G.	1/16 or 13 W.G.	12 W.G.	5/64 or 11 W.G.	10 W.G.	3/32	1/8	5/32	3/16	7/32	1/4
3/8	30	30	31	32	33									
7/16 or 1/2	30	30	31	32	33	35	37							
9/16 " 5/8	32	32	33	34	36	38	40	42	43					
11/16 " 3/4	34	34	36	38	39	41	43	45	47	55				
7/8	36	36	38	40	42	44	47	50	54	68				
1	38	38	42	44	46	50	53	58	64	75				
1 1/8	41	41	44	47	50	54	58	66	73	87	98			
1 1/4	44	44	47	50	54	59	64	73	81	98	109	121		
1 3/8	47	47	51	54	58	65	70	80	90	108	121	137	148	
1 1/2	50	50	54	58	62	72	76	84	100	122	136	154	170	181
1 5/8	53	53	57	61	66	76	80	90	107	130	147	167	185	200
1 3/4	55	55	60	65	69	79	84	96	114	139	157	180	200	216
1 7/8		58	63	68	73	83	89	101	120	148	169	193	214	233
2		61	66	72	77	87	93	108	125	156	180	206	228	250
2 1/8			72	77	81	92	99	114	133	166	194	220	242	268
2 1/4			77	81	85	96	104	122	141	176	208	233	255	285
2 3/8				85	90	107	111	128	148	187	221	248	273	303

Outside diameter. Inches.	Thickness of walls.										
	14 W.G.	3/32 or 13 W.G.	12 W.G.	1/8 or 11 W.G.	10 W.G.	3/16	1/4	5/16	3/8	7/16	1/2
2 1/2	89	94	112	118	131	154	198	233	262	290	320
2 5/8	94	98	118	123	138	163	207	245	277	308	338
2 3/4	98	102	120	127	144	171	216	256	291	325	355
3		110	130	137	156	187	233	278	319	356	390
3 1/8		117	138	144	162	196	242	290	333	371	407
3 1/4		124	145	150	168	204	250	301	347	386	423
3 3/8		130	150	156	174	212	259	313	361	401	441
3 1/2		135	155	161	180	220	267	325	375	416	458
3 3/4				174	198	237	290	350	403	446	492
4				189	214	255	312	375	431	478	527

Tubes are made up to 4 5/8 inches outside diameter, and any thickness of walls up to 1 1/4 inches. They can also be made of any intermediate size down to 1/64 of an inch. We can also supply some sizes of tubes smaller than 3/8 inch outside diameter, polished inside and outside. Please note that prices per list are for outside diameters. The bore of a tube can be ascertained by deducting thickness of wall from the given outside diameter.

The lightest wall for each size is indicated by price being omitted for all thinner walls.

For locomotive, marine and other boilers, hydraulic presses and pipes, boring and mining tools, coils, hollow spindles, rollers, shafting, connecting and lifting rods, axles and axle boxes, bicycles, bushings for link motion of locomotives, etc., collars, couplings, linings, punches, ferrules, and spinning caps. These tubes are made from solid blocks of specially prepared and tested steel, and are drawn cold, without weld or seam. They are smooth inside and outside, capable of being bent to any radius, and make a perfect joint in boilers without copper or other packing.

BUTT AND LAP-WELDED WROUGHT IRON PIPE.



FIG. 5758.

BUTT WELDED.

Inside diameter.	Nominal weight per foot.	Prices, per foot, black.	Prices, per foot, galvanized.	Prices, per foot, extra strong, black.	Prices, per foot, dbl. extra strong, black.
Inches.	Pounds.				
1/8	.24	$0.04	$0.05	$0.08	.....
1/4	.42	.04	.05	.08	$0.16
3/8	.56	.04 1/2	.05 1/2	.09	.18
1/2	.84	.06	.08	.12	.24
3/4	1.12	.07 1/2	.09 1/2	.15	.30
1	1.67	.10 1/2	.13 1/2	.21	.42
1 1/4	2.24	.14	.18 1/2	.28	.56

LAP WELDED.

Inside diameter.	Nominal weight per foot.	Prices, per foot, black.	Prices, per foot, galvanized.	Prices, per foot, extra strong, black.	Prices, per foot, dbl. extra strong, black.
Inches.	Pounds.				
1 1/2	2.68	$0.24	$0.28	$0.48	$0.96
2	3.61	.33	.38	.66	1.32
2 1/2	5.74	.50	.57	1.00	2.00
3	7.54	.62	.68	1.24	2.48
3 1/2	9.00	.74	.88	1.48	2.96
4	10.66	.88	1.03	1.76	3.52
4 1/2	12.34	1.06	1.31	2.12	4.24
5	14.50	1.28	1.60	2.56	5.12
6	18.76	1.65	2.00	3.30	6.60

LAP WELDED.

Inside diameter.	Nominal weight per foot.	Prices, per foot, black.	Prices, per foot, galvanized.	Prices, per foot, extra strong, black.	Prices, per foot, dbl. extra strong, black.
Inches.	Pounds.				
7	23.27	$2.10	...	....	....
8	28.18	2.75	....	....	....
9	33.70	3.75	....	....	....
10	40.06	4.75	....	....	....
11	45.02	6.00	....	....	....
12	49.00	7.00	....	....	....
13	54.00	8.00	....	....	....
14	58.00	9.50	....	....	....
15	62.00	11.00	...	....	....

CAST-IRON FITTINGS FOR WROUGHT-IRON PIPE.

ELBOW.



FIG. 5759.

REDUCING ELBOW.

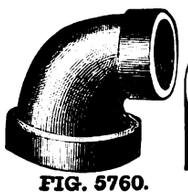


FIG. 5760.

ELBOW WITH SIDE OPENING.



FIG. 5761.

ELBOW 45°.



FIG. 5762.

TEE.

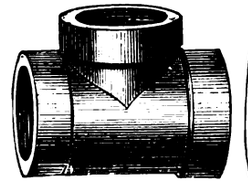


FIG. 5763.

REDUCING TEE.

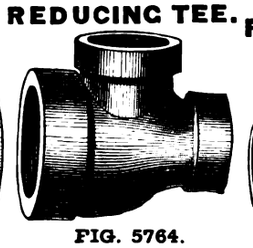


FIG. 5764.

REDUCING TEE. BULL HEAD.

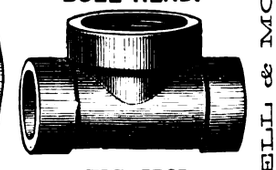


FIG. 5765.

REDUCING TEE.

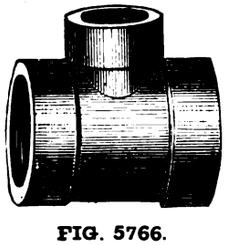


FIG. 5766.

Y.

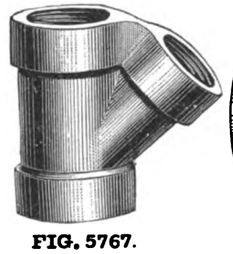


FIG. 5767.

CROSS.

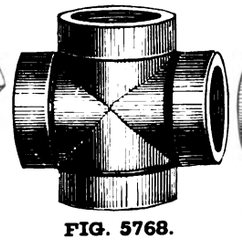


FIG. 5768.

REDUCING CROSS.

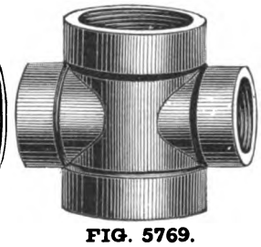


FIG. 5769.

OFFSET.

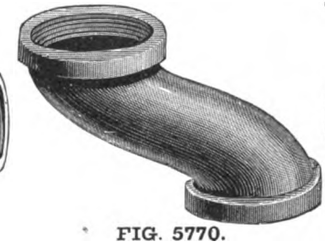


FIG. 5770.

CLOSE PAT. RET. BEND.

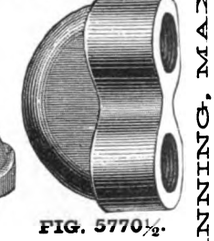


FIG. 5770½.

OPEN PAT. RETURN BEND.

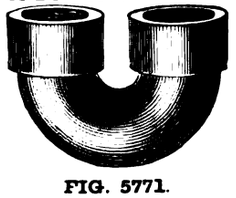


FIG. 5771.

BACK OUTLET RET. BEND.

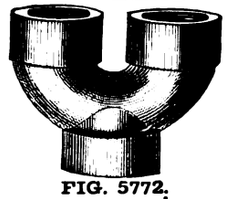


FIG. 5772.

SIDE OUTLET RET. BEND.

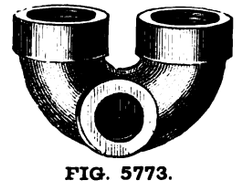


FIG. 5773.

FLANCE UNION.



FIG. 5774.

FLANCE UNION.

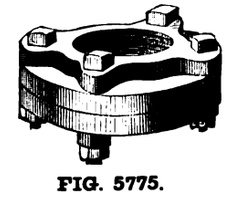


FIG. 5775.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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CAST IRON FITTINGS FOR WROUGHT IRON PIPE—Continued.

LOCKNUTS.



FIG. 5776.

CAPS.



FIG. 5777.

REDUCING COUPLINGS.

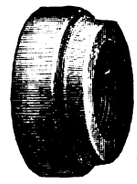


FIG. 5778.

BUSHINGS.

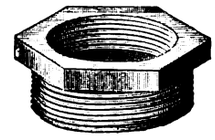


FIG. 5779.

PLUGS.

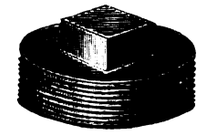


FIG. 5780.

SOCKET PLUGS.



FIG. 5781.

PRICES, EACH, FIGS. 5759 TO 5781.

Size of pipe, inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Elbows	.04	.05	.06	.09	.13	.20	.25	.40	.75	1.10	1.35	1.80	2.50	2.85	3.90	7.00	10.00	13.00	20.00	30.00
" reducing	.05	.06	.07	.11	.16	.23	.29	.46	.85	1.25	1.50	2.10	3.00	3.25	4.50	8.00	11.50	15.00	23.00	35.00
" R. and L.	.05	.06	.07	.11	.16	.23	.29	.46	.85	1.25	1.50	2.10	3.00	3.25	4.50	8.00	11.50	15.00	23.00	35.00
" with side outlet	.08	.10	.12	.18	.26	.40	.50	.80	1.50	2.20	2.70	3.60	5.00	5.70	7.80	14.00	20.00	26.00	40.00	60.00
45° elbows	.08	.10	.10	.15	.20	.26	.35	.50	1.30	1.60	1.90	2.50	3.50	4.50	6.50	9.00	12.00	16.00	22.00	33.00
Tees	.06	.07	.09	.13	.20	.30	.38	.60	1.10	1.50	2.00	2.50	3.50	4.00	5.50	10.00	15.00	20.00	25.00	45.00
" reducing	.07	.08	.11	.15	.23	.35	.44	.70	1.25	1.75	2.30	2.90	4.00	4.60	6.35	11.50	17.00	23.00	30.00	50.00
Y's	.....	.....	.25	.30	.40	.60	.90	1.25	2.25	3.25	4.50	6.00	.....	9.00	12.00	17.00	25.00	.....	.....	.....
" reducing	.....	.....	.29	.35	.46	.70	1.35	1.90	2.60	3.75	5.20	6.90	.....	10.35	13.80	19.50	28.75	.....	.....	.....
Crosses	.08	.10	.12	.18	.28	.40	.50	.80	1.50	2.20	2.70	3.50	5.00	5.70	7.80	14.00	20.00	26.00	40.00	60.00
" reducing	.10	.12	.14	.21	.32	.46	.58	.92	1.70	2.50	3.00	4.00	6.00	6.60	9.00	16.00	23.00	30.00	46.00	70.00
Offsets, to set off 4 inch	.....	.....	.....	.45	.70	1.00	1.20	1.80	3.00	4.00	5.00	6.00	.....	8.00	10.00	.....	.....	.....	.....	.....
" " 6 "	.....	.....	.....	.67	1.05	1.50	1.80	2.70	4.50	6.00	7.50	9.00	.....	12.00	15.00	.....	.....	.....	.....	.....
" " 8 "	.....	.....	.....	.90	1.40	2.00	2.40	3.60	6.00	8.00	10.00	12.00	.....	16.00	20.00	.....	.....	.....	.....	.....
Return bends, close pattern	.....	.....	.10	.15	.22	.34	.45	.75	1.50	2.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" " open "	.....	.....	.15	.20	.30	.48	.68	1.15	1.75	2.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" " back outlet	.....	.....	.....	.30	.40	.60	.90	1.25	2.25	3.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" " side "	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Flange unions	.....	.....	.60	.65	.70	.85	1.15	1.50	1.75	2.25	2.75	3.15	4.50	5.00	6.50	8.00	10.00	12.00	15.00	22.00
Locknuts	.....	.....	.....	.....	.....	.....	.....	.25	.40	.50	.70	.95	1.25	1.35	1.90	2.50	3.50	4.00	4.50	6.00
Reducing couplings	.....	.....	.....	.....	.....	.....	.....	.50	.75	1.20	1.50	2.00	2.75	3.00	4.00	8.00	10.00	12.00	15.00	22.00
Caps	.....	.....	.....	.....	.....	.....	.....	.....	.50	.80	1.10	1.30	1.60	2.00	2.35	4.00	4.35	6.00	7.25	10.00
Bushings	.....	.05	.06	.07	.09	.13	.17	.27	.42	.60	.80	1.00	1.50	1.85	2.50	3.75	5.50	6.50	7.50	10.00
Plugs	.03	.03	.04	.05	.06	.10	.13	.20	.35	.50	.75	.85	1.35	1.75	2.40	3.75	5.50	6.50	7.50	10.00
" socket	.....	.....	.....	.07	.09	.11	.15	.22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Right and left and left hand fittings not mentioned above will be charged 15 per cent. more than right hand fittings.

PRICES, EACH, GALVANIZED.

Size of pipe, inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Elbows	.06	.09	.12	.18	.30	.45	.55	.85	1.60	2.35	3.10	4.10	6.00	7.00	11.00	15.00	20.00	26.00	40.00	60.00
Tees	.08	.13	.17	.25	.40	.60	.85	1.20	2.25	2.85	3.80	5.25	7.00	8.00	12.50	18.00	24.00	31.00	55.00	80.00
Crosses	.15	.18	.23	.35	.55	.80	1.00	1.60	3.00	4.25	5.50	7.00	9.00	10.50	16.00	23.00	35.00	40.00	80.00	100.00
45° elbows	.....	.20	.20	.30	.40	.50	.70	1.00	2.60	3.20	4.75	5.00	7.00	9.00	11.00	18.00	24.00	31.00	44.00	66.00
Flange unions	.....	.....	1.20	1.30	1.40	1.70	2.30	3.00	3.50	4.50	5.50	6.30	9.00	10.00	13.00	16.00	20.00	24.00	30.00	44.00
Y's	.....	.....	.50	.60	.80	1.20	1.80	2.50	4.50	6.50	9.75	12.00	.....	18.00	24.00	34.00	50.00	.....	.....	.....

Galvanized reducing fittings will be charged at double the price of plain reducing fittings.

COMMON FLANGES.

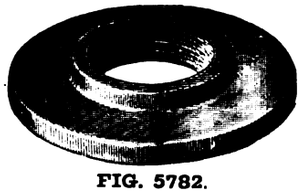


FIG. 5782.

BLANK FLANGES.

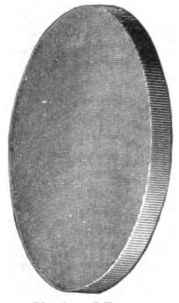


FIG. 5783.

PRICES, SPECIAL.

PRICES, FIG. 5782.

Size of pipe.	Diameter of flanges—in inches																								
	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12	13	14	15	16	17	18	19	20
In.																											
⅜	.14	.17	.20	.26	.31	.40	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
½	.....	.17	.20	.26	.31	.40	.50	.55	.65	.75	.85	.95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
¾	.....	.18	.21	.28	.33	.40	.50	.60	.68	.80	.90	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1	.....	.20	.22	.28	.33	.42	.52	.62	.72	.80	.90	1.00	1.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1¼	.....	.23	.25	.30	.35	.42	.52	.62	.72	.80	.90	1.00	1.10	1.20	1.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1½	.....	.....	.....	.31	.36	.42	.52	.62	.72	.80	.90	1.00	1.10	1.20	1.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	.....	.....	.....	.....	.38	.45	.55	.65	.75	.80	.90	1.00	1.15	1.25	1.45	1.65	1.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2½	.....	.....	.....	.....	.45	.55	.65	.75	.80	.90	1.00	1.15	1.30	1.45	1.65	1.90	2.00	2.25	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.55	.65	.75	.84	.96	1.08	1.22	1.37	1.52	1.69	1.90	2.12	2.35	2.60	3.25	.....	.....	.....	.....	.....	.....	.....
3½	.....	.....	.....	.....	.....	.....	.70	.75	.87	1.00	1.13	1.26	1.55	1.75	1.75	1.95	2.25	2.50	2.85	3.50	.....	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.87	1.04	1.22	1.40	1.58	1.76	1.96	2.16	2.36	2.56	2.85	3.50	.....	.....	.....	.....	.....	.....
4½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.55	1.70	1.90	2.10	2.32	2.54	2.76	3.00	3.75	.....	.....	.....	.....	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.65	1.80	2.00	2.20	2.40	2.60	2.80	3.05	3.75	.....	.....	.....	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.20	2.40	2.60	2.80	3.00	3.20	3.45	3.75	.....	.....	.....	.....	.....	.....	.....
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.80	3.00	3.75	4.10	4.50	5.00	5.50	6.25	.....	.....	.....
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.00	4.50	5.00	5.60	6.25	6.90	7.50	.....	.....
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.75	6.25	7.00	7.75	8.00	.....	.....
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.00	6.60	7.25	8.00	9.25	.....	.....
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.00	9.75	10.75	12.00	13.50

Curved flanges to order at double above prices. Blank flanges, special.

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WROUGHT IRON NIPPLES.

CLOSE NIPPLE.

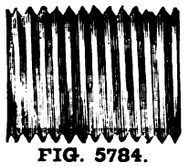


FIG. 5784.

SHOULDER NIPPLE.



FIG. 5785.

LONG NIPPLE.



FIG. 5786.

PRICES, FIGS. 5784, 5785 AND 5786.

Length. Inches.						Size.	Prices.		Prices of extra long.							
									Inches.							
Close.	Short.	Long.				Inch.	Close or short.	Long.	5	6	7	8	9	10	11	12
3/4	1 1/2	2	2 1/2	3	3 1/2	1/8	$0.05	$0.07	$0.16	$0.17	$0.18	$0.19	$0.20	$0.21	$0.22	$0.23
7/8	1 1/2	2	2 1/2	3	3 1/2	1/4	.05	.07	.16	.17	.18	.19	.20	.21	.22	.23
1	1 1/2	2	2 1/2	3	3 1/2	3/8	.06	.09	.17	.18	.19	.20	.21	.22	.23	.25
1 1/8	1 1/2	2	2 1/2	3	3 1/2	1/2	.07	.10	.18	.19	.20	.21	.22	.23	.25	.27
1 3/8	2	2 1/2	3	3 1/2	4	3/4	.09	.11	.20	.21	.22	.23	.25	.27	.29	.31
1 1/2	2	2 1/2	3	3 1/2	4	1	.10	.15	.22	.24	.27	.29	.31	.33	.36	.40
1 5/8	2 1/2	3	3 1/2	4	4 1/2	1 1/4	.14	.20	.29	.31	.33	.35	.38	.40	.43	.46
1 3/4	2 1/2	3	3 1/2	4	4 1/2	1 1/2	.17	.25	.36	.38	.40	.42	.45	.48	.51	.55
2	2 1/2	3	3 1/2	4	4 1/2	2	.25	.35	.44	.49	.54	.59	.64	.69	.74	.79
2 1/2	3	3 1/2	4	4 1/2	5	2 1/2	.56	.75	.....	.80	.85	.91	1.00	1.10	1.20	1.30
2 1/2	3	3 1/2	4	4 1/2	5	3	.75	.95	.....	1.00	1.06	1.15	1.24	1.34	1.44	1.55
2 3/4	4	4 1/2	5	5 1/2	6	3 1/2	1.00	1.25	.....	.....	1.38	1.50	1.62	1.74	1.86	2.00
3	4	4 1/2	5	5 1/2	6	4	1.25	1.60	.....	.....	1.75	1.92	2.10	2.30	2.50	2.70
3	4	4 1/2	5	5 1/2	6	4 1/2	1.75	2.25	.....	.....	2.35	2.45	2.56	2.75	2.94	3.15
3 1/2	4 1/2	5	5 1/2	6	6 1/2	5	2.00	2.60	.....	.....	2.75	2.95	3.20	3.45	3.80	4.20
3 1/2	4 1/2	5	5 1/2	6	6 1/2	6	2.75	3.60	.....	.....	3.75	3.90	4.15	4.40	4.65	4.90
4	5	.....	.....	.....	.....	7	4.00	.....	.....	4.20	4.45	4.70	5.10	5.50	5.90	6.30
4	5	.....	.....	.....	.....	8	5.75	.....	.....	6.00	6.30	6.60	6.90	7.20	7.50	7 80
.....	.....	.....	.....	.....	.....	9	7.00	.....	.....	.....	7.40	7.80	8.20	8.80	9.40	10.00
.....	.....	.....	.....	.....	.....	10	8.50	.....	.....	.....	9.00	9.60	10.20	11.00	11.80	12.60
.....	.....	.....	.....	.....	.....	12	12.00	.....	.....	.....	13.00	14.25	15.50	16.75	18.00	19.25

PRICES, WROUGHT IRON NIPPLES, RIGHT AND LEFT.

Size.....Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Right and left, short.....each	$0.10	$0.10	$0.12	$0.15	$0.18	$0.24	$0.30	$0.40	$1.00	$1.25	$1.50	$1.75
" " " long..... "	.12	.14	.16	.20	.24	.35	.46	.60	1.30	1.60	2.00	2.40

PRICES, WROUGHT IRON NIPPLES, GALVANIZED.

Size.....Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6
Close or short....each	.....	$0.07	$0.08	$0.09	$0.11	$0.13	$0.17	$0.23	$0.32	$0.65	$1.00	$1.25	$1.45	$1.90	$2.40	$3.50
Long..... "	.....	.09	.11	.13	.16	.19	.24	.31	.40	.85	1.20	1.50	1.90	2.40	3.00	4.40

PRICES, WROUGHT IRON COUPLINGS AND LONG SCREWS, FIGS. 5787 AND 5788.

Size.....Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8	9	10	12
Couplings.....each	.05	.05	.06	.07	.10	.13	.17	.21	.28	.40	.60	.80	1.00	1.50	1.65	2.40	3.25	4.25	5.50	7.50	10.00
" galvanized..... "	....	...	.08	.10	.13	.18	.25	.32	.40	.55	.80	1.05	1.40	2.00	2.25	3.25	....	....	....	....	.....
Long screws..... "	....	.30	.35	.40	.55	.75	1.00	1.30	1.70	2.70	3.70	5.40	6.60	....	....	....	....	....	....	....	.....

COUPLINGS.

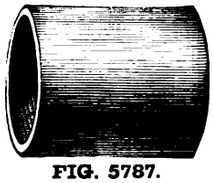


FIG. 5787.

LONG SCREWS.

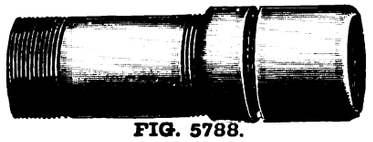


FIG. 5788.

NO. 2 FLOOR PLATE.

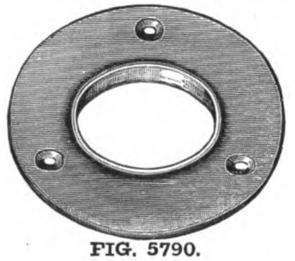


FIG. 5790.

NO. 1 FLOOR PLATE, IN HALVES.

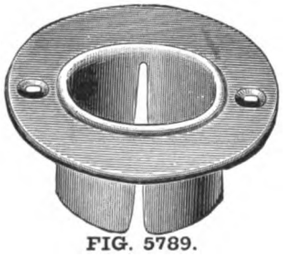


FIG. 5789.

CEILING PLATE.

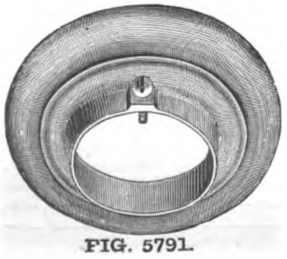


FIG. 5791.

CAST IRON FITTINGS, FLANGED.

FLANGED ELBOW.

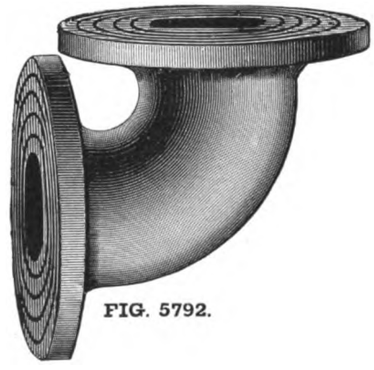


FIG. 5792.

FLANGED TEE.

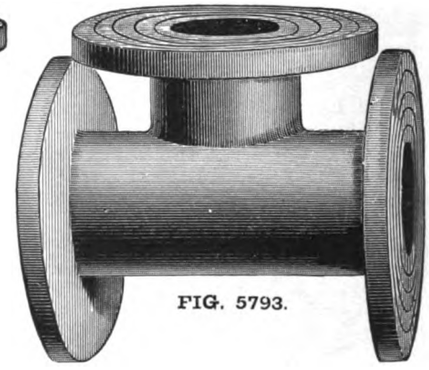


FIG. 5793.

PRICES, FLOOR PLATES, FIGS. 5789 AND 5790.

Size.....Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
No. 1, in halves.....each	$0.08	$0.10	$0.12	$0.15	$0.20	$0.25	$0.35	$0.40	$0.50	$0.65	$0.80	$1.00
No. 2, plain, without collar..... "	.08	.10	.12	.15	.20	.25	.35	.40	.50	.65	.....	.....

PRICES, CEILING PLATES, FIG. 5791.

Size.....Inches	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Prices.....each	$0.14	$0.18	$0.24	$0.32	$0.40	$0.50	$0.75

PRICES, FLANGED FITTINGS, FIGS. 5792 AND 5793.

Size.....Inches	3	3 1/2	4	4 1/2	5	6	7	8	10	12
Flanged elbows.....	$4.00	$5.25	$7.00	$8.00	$9.00	$10.00	$13.00	$15.00	$24.00	$34.00
" tees.....	6.00	8.00	9.75	11.50	12.50	14.00	17.50	22.00	31.00	43.00
Diameter of flanges.....	8	9	10	10	11	12	13	14	16	19

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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CAST IRON FITTINGS.

FLOOR FLANGE.

PRICES, FLOOR OR RAILING FLANGES, FIG. 5794.

Sizes.... ..... Inches,	½ x 3½	¾ x 4	1 x 4	1¼ x 5	1½ x 5	2 x 6
Prices.....	$0.17	$0.21	$0.22	$0.35	$0.36	$0.55

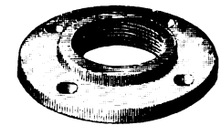


FIG. 5794.

BRANCH TEES.



FIG. 5795.



FIG. 5796.

BRANCH TEE, SIDE OUTLET.



FIG. 5797.

BRANCH TEE, BACK OUTLET.



FIG. 5798.

BRANCH TEES.

PRICES, FIGS. 5795, 5796, 5797 AND 5798.

Number of outlets....		2	3	4	5	6	7	8	9	10	12
¾ inch outlets, 2 inch center to center,	1 or 1¼ inch run	$0.50	$0.65	$0.80	$0.95	$1.10	$1.35	$1.50	$1.65	$1.85	$2.50
	1½ "	.65	.85	1.05	1.15	1.30	1.65	2.00	2.50	3.00	.....
1 inch outlets, 2½ in. center to center,	1 or 1¼ "	.70	.80	.95	1.10	1.35	2.05	2.35	2.55	2.85	3.75
	1½ "	.75	.90	1.05	1.20	1.50	2.20	2.50	2.80	3.15	4.00
	2 "	1.00	1.20	1.60	1.80	2 00	2.40	2.80	3.30	4.00	4.75
	2½ "	2.10	2.50	2.90	3.25	3.60	4.00	4.50	5.00	5.50	6.00
1¼ inch outlets, 3 inch center to center,	1½ "	1.20	1.60	2.00	2.40	2.80	3.20	3.60	4.00	4.40	4.80
	2 "	1.40	1.85	2.45	2.90	3.40	3.90	4.40	5.00	5.50	6.00
1½ inch outlets, 3½ in. center to center,	2 "	1.75	2.25	2.75	3.25	3.75	4.25	4.75	5.50	6.00	6.50

Back or side outlets charged as additional front outlets.

In ordering, be particular to state size of run required. When not ordering otherwise, all openings will be tapped right hand.

UNIVERSAL PIPE HANGERS.

NO. 1. OPENED. NO. 2.



FIG. 5799. FIG. 5800. FIG. 5801.

PRICES, FIGS. 5799 AND 5801.

Size .....Inches,	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	7	8	9	10	11	12	14
No. 1.....	$0.15	.15	.18	.18	.20	.22	.25	.30	.35	.37	.45	.55	.65	.85	.95	1.05	1.20	1.35	1.55	1.75
No. 2.....	.55	.55	.58	.58	.60	.62	.65	.70	.75	.77	.85	.95	1.05	1.25	1.35	1.45	1.60	1.75	1.95	2.15

In ordering No. 2 hangers state size of iron beam.

SPECIAL LONG TURN FITTINGS.

NO. 1. NO. 2. NO. 3.



FIG. 5802. FIG. 5803. FIG. 5804.

PRICES, FIGS. 5802, 5803 AND 5804.

Sizes. Inches.	No. 1, screwed.	No. 2, screwed.	No. 3, screwed.
1	$0.25	.....	.....
1¼	.35	.....	$0.52
1½	.45	.....	.68
2	.60	$0.90	.90
2½	1.00	1.50	1.50
3	1.50	2.25	2.25
3½	2.00	3.00	3.00
4	2.50	3.75	3.75
4½	3.50	.....	.....
5	4.50	6.75	6.75
6	6.50	9.75	9.75
7	10.00	15.00	15.00
8	14.00	21.00	21.00

MALLEABLE UNION.

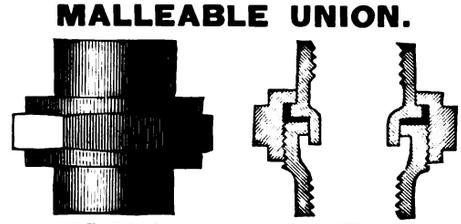


FIG. 5805. SECTION.

MALLEABLE BUSHING.



FIG. 5806.

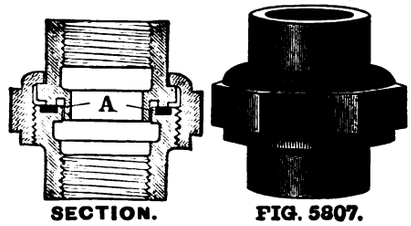
AMERICAN UNIONS.

PRICES, EACH, FIGS. 5805 AND 5806.

Size .....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Bushings.....	.....	$0.05	$0.06	$0.07	$0.09	$0.13	$0.17	$0.27	$0.42	.....	.....	.....
Unions, with lip.....	$0.15	.18	.20	.28	.34	.46	.60	.80	1.50	$2.10	$3.00	$4.00
" " galvanized...	.20	.24	.27	.37	.50	.70	.90	1.20	2.25	2.90	4.50	5.60

PRICES, EACH, FIG. 5807.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Plain	$0.20	$0.24	$0.28	$0.35	$0.40	$0.56	$0.80	$0.95	$2.00	$2.75
Galvanized.....	.24	.28	.35	.46	.55	.78	1.12	1.35	2.90	3.75
Tinned	.30	.33	.45	.55	.65	.90	1.40	1.55	.....	.....



SECTION. FIG. 5807.

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HYDRAULIC AND MALLEABLE PIPE FITTINGS.

Hydraulic fittings are made to order. Working pressure should be given in orders.

PRICES ON APPLICATION.

MALLEABLE IRON FITTINGS, PLAIN AND BEADED, FOR STEAM, GAS AND WATER.

BEADED ELBOW.



FIG. 5808.

BEADED TEE.

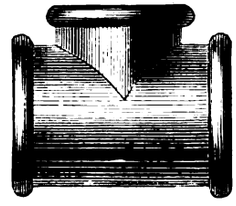


FIG. 5809.

PLAIN ELBOW.

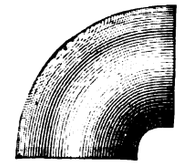


FIG. 5810.

PLAIN TEE.

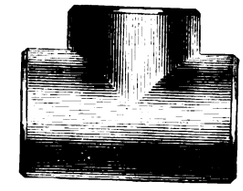


FIG. 5811.

PLAIN CROSS.



FIG. 5812.

DROP ELBOW. FEMALE.



FIG. 5813.

DROP ELBOW. FLANGE TO LEFT.



FIG. 5814.

DROP ELBOW. FLANGE TO RIGHT.



FIG. 5815.

DROP TEE. FEMALE.

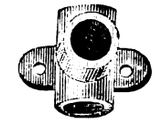


FIG. 5816.

STREET ELBOW.



FIG. 5817.

ELBOW. SIDE OUTLET.

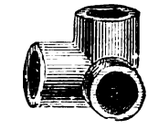


FIG. 5818.

DROP ELBOW. MALE AND FEMALE.



FIG. 5819.

DROP ELBOW. WITH LONG OUTLET PIECE.

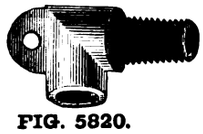


FIG. 5820.

DROP TEE. MALE AND FEMALE.

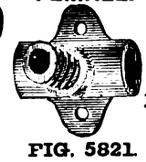


FIG. 5821.

CAP.



FIG. 5822.

LOCK-NUT.



FIG. 5823.

RETURN OPEN.

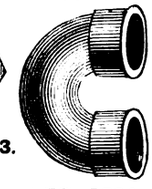


FIG. 5824.

BENDS. CLOSED.

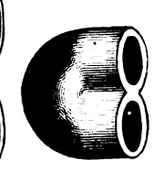


FIG. 5825.

COUPLING. RIGHT AND LEFT.



FIG. 5826.

EXTENSION PIECE. MALE AND FEMALE.



FIG. 5827.

REDUCING COUPLING.

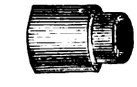


FIG. 5828.

WASTE NUT.



FIG. 5829.

CLASS A, 25 CENTS.

Elbows, 1/8, 1/4x1/8, 3/8x1/8.
Tees, 1/8, 1/8x1/4, 1/4x1/8, 3/8x1/8.
Reducing couplings, 1/4x1/8, 3/8x1/8.
Rod couplings.
R. & L. and R. W. couplings, 1/8 in.

CLASS B, 16 CENTS.

Elbows and tees, 1/4 to 1/2 in. inclusive.
Elbows, side outlets, all sizes.
Service or street ells, to 3/4 in. inclusive.
Crosses, to 1 in. inclusive.
Drop ells and tees, all sizes.
Four-way tees, "
Plugs, caps and locknuts, to 1 in. inclusive.

PRICES, FIGS. 5808 TO 5829.

Reducing couplings, 3/8x1/4 to 1 in. inclusive.
R. & L. couplings, 1/4 to 3/4 inclusive.
Extension pieces, all sizes.
R. & L. fittings, to 1 in. inclusive.
R. H. couplings, 1/4 to 3/4 inclusive.
Waste nuts.
Chandelier hooks.
Return bends, to 1 in. inclusive.
Wall plates.

CLASS C, 13 CENTS.

Elbows and tees, 3/4 to 1 in. inclusive.
Such fittings, in the class, as have smaller outlets than 3/4 to be classed "B."

Crosses, 1 1/4 and larger.
Service or street ells, 1 and larger.
Plugs, caps and locknuts, 1 1/4 and larger.
Reducing couplings, 1 1/4 and larger.
R. & L. fittings, 1 1/4 and larger.
R. H. couplings, 1 in. and 1/4 in.
Return bends, 1 1/4 in. and larger.
R. & L. couplings, 1 in. and larger.

CLASS D, 10 CENTS.

Elbows and tees, 1 1/4 and larger.
Such fittings, in this class, that have outlets smaller than 1 in. to be classed as "C."
Right-hand couplings, 1 1/2 and 2 in.

PRICES, FIGS. 5808 TO 5829, GALVANIZED.

Galvanized fittings, as per standard list: A, 35 cents per lb.; B, 23 cents per lb.; C, 20 cents per lb.; D, 17 cents per lb.
An extra charge of 10 cents per lb. will be added to price of galvanized fittings not enumerated in standard list.

ROUGH BRASS FITTINGS, IRON PIPE SIZES.

Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2
Elbows	.10	.12	.16	.25	.35	.50	.85	1.15
" 45°	....	....	.21	.30	.40	.55	.95	1.25
Tees	.15	.18	.24	.38	.50	.75	1.25	1.75
Crosses	.20	.25	.32	.50	.70	1.00	1.70	2.30
Return bends,								
" " close	....	....	....	.40	.70	.90	1.50	2.00
" " open	....	....	....	.50	.80	1.00	1.75	2.25
Couplings	.08	.10	.15	.20	.30	.40	.60	.75
" R. & L.	....	.12	.18	.25	.35	.45	.65	.80
Reducers	....	.12	.18	.25	.35	.45	.70	.90
Caps or plugs	.08	.10	.15	.20	.30	.40	.60	.75
Bushings	....	.07	.09	.11	.17	.30	.42	.50
Locknuts	....	.08	.10	.15	.20	.25	.40	.50
Nipples	.15	.20	.30	.35	.45	.60	.90	1.25

Size	2	2 1/2	3	3 1/2	4
Elbows	2.00	3.00	5.00	9.50	15.50
" 45°	2.25	3.40	6.00	10.50	17.00
Tees	3.00	4.50	6.50	12.00	19.50
Crosses	4.00	6.00	8.50	16.00	26.00
Return bends,					
" " close	3.00	6.00	9.00	18.00	29.00
" " open	3.50	7.50	11.00	21.00	31.00
Couplings	1.25	2.00	3.00	5.50	9.00
" R. & L.	1.35	2.10	3.10	5.75	9.50
Reducers	1.50	2.25	3.25	6.50	11.00
Caps or plugs	1.25	2.00	3.00	5.50	9.00
Bushings	.75	1.25	2.50	5.50	9.00
Locknuts	.90	1.75	2.75	3.75	6.00
Nipples	1.60	3.00	6.00	7.00	8.50

STANDARD ASSORTMENTS OF MALLEABLE FITTINGS SHOWN ABOVE.

Elbows.—3/8, 1/2, 1/2x3/8, 3/4, 3/4x1/2, 1, 1x3/4, 1 1/4, 1 1/4x1, 1 1/2, 1 1/2x1 1/4, 2, 2x1 1/2, 2 1/2, 3, 3 1/2, 4.
Street ells.—3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, 2.

TEES.

Size.	Size.	Size.	Size.
3/8 x 3/8 x 3/8	1 x 3/4 x 1	1 1/4 x 1 1/4 x 1/2	2 x 2 x 3/4
1/2 x 1/2 x 3/8	1 x 1 x 1/2	1 1/2 x 1 1/4 x 1 1/4	2 x 2 x 1
1/2 x 1/2 x 1/2	1 x 1 x 3/4	1 1/2 x 1 1/4 x 1 1/2	2 x 2 x 1 1/4
1/2 x 1/2 x 3/4	1 x 1 x 1	1 1/2 x 1 1/2 x 1/2	2 x 2 x 1 1/2
3/4 x 1/2 x 1/2	1 x 1 x 1 1/4	1 1/2 x 1 1/2 x 3/4	2 x 1 1/2 x 2
3/4 x 1/2 x 3/4	1 1/4 x 1 x 1	1 1/2 x 1 1/2 x 1	2 x 2 x 2
3/4 x 3/4 x 3/8	1 1/4 x 1 x 1 1/4	1 1/2 x 1 1/2 x 1 1/4	2 1/2 x 2 1/2 x 2 1/2
3/4 x 3/4 x 1/2	1 1/4 x 1 1/4 x 3/4	1 1/2 x 1 1/2 x 1 1/2	3 x 3 x 3
3/4 x 3/4 x 3/4	1 1/4 x 1 1/4 x 1	1 1/2 x 1 1/2 x 2	3 1/2 x 3 1/2 x 3 1/2
3/4 x 3/4 x 1	1 1/4 x 1 1/4 x 1 1/4	2 x 1 1/2 x 1 1/2	4 x 4 x 4
1 x 3/4 x 3/4	1 1/4 x 1 1/4 x 1 1/2	2 x 2 x 1/2	

Couplings, right hand.—1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2 and 2.
Couplings, right and left.—1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2 and 2.
Couplings, reducing.—3/4x1/2, 1x3/4, 1 1/4x1, 1 1/2x1 1/4, 2x1 1/2
Crosses, straight sizes.—1/2, 3/4, 1, 1 1/4, 1 1/2, 2.
Locknuts.—3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2 and 2.
Caps.—3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2 and 2.
Female drop elbows and tees.—1/2, 3/4.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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MALLEABLE IRON RAILING FITTINGS AND GAS FITTINGS.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

ELBOW.



FIG. 5830.

ELBOW. SIDE OUTLET.



FIG. 5831.

TEE.



FIG. 5832.

TEE. SIDE OUTLET.



FIG. 5833.

CROSS.



FIG. 5834.

CROSS. SIDE OUTLETS.



FIG. 5835.

FLOOR FLANGE.



FIG. 5836.

ACORN ORNAMENT.



FIG. 5837.

When ordering railing fittings, be careful to state whether right or left threads are wanted. Where fittings are required with right and left outlets, fully describe which are wanted right, and which left.

PRICES, FIG. 5830 TO 5837.

Pipe size	⅛	¾	1	1¼	1½	2
Elbows ..... Each	$0.10	$0.15	$0.20	$0.35	$0.45	$0.72
" side outlet ..... "	.12	.18	.25	.40	.50	.80
Tees ..... "	.12	.18	.25	.40	.50	.75
" side outlet ..... "	.15	.22	.35	.45	.55	.90
Cross ..... "	.15	.22	.35	.45	.58	1.00
" side outlet ..... "	.18	.27	.40	.50	.65	1.35
Floor flanges ..... "	.12	.12	.15	.20	.28	.30
Acorn ornament ..... "	.10	.15	.20	.25	.35	.90

GAS BRACKETS AND FITTINGS.

PRICES, PER DOZ.

TWO-LIGHT PENDANT COCK.

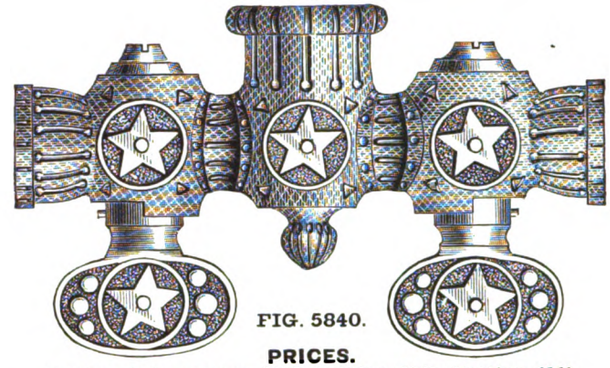


FIG. 5840.

PRICES.

⅛x⅛ iron, $8.45; ¼x⅛ iron, $8.45; ⅜x⅛ iron, $9.10; ⅜x¼ iron, $9.10.

MALE END PILLAR COCKS.

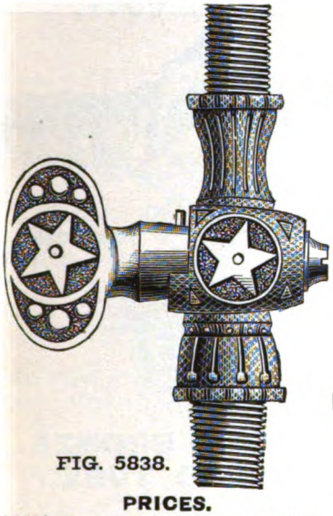


FIG. 5838.

PRICES.

⅛x⅛ iron $4.90
¼x⅛ " 5.20
⅜x⅛ " 5.20
½x⅛ " .....
¾x⅛ " .....

TWO-LIGHT BRACKET BODY.

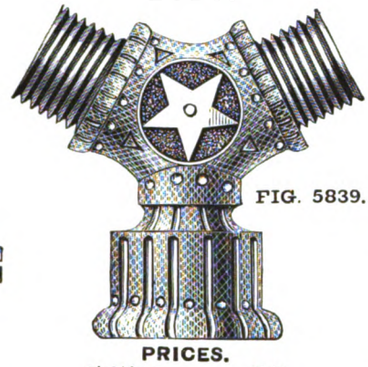


FIG. 5839.

PRICES.

⅜x⅜ iron $3.90

BRACKET SWING COCK.

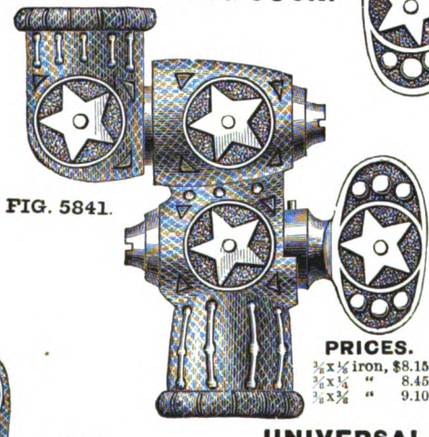


FIG. 5841.

PRICES.

⅜x¼ iron, $8.15
⅜x½ " 8.45
⅜x⅜ " 9.10

REVOLVING PENDANT COCK.

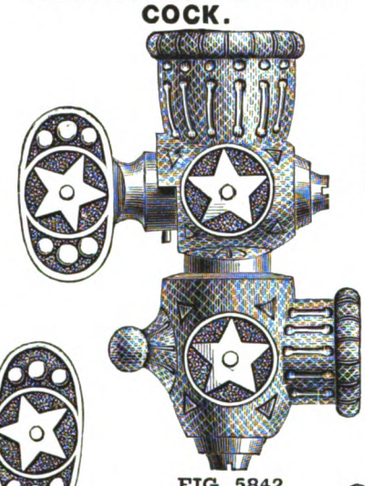


FIG. 5842.

PRICES.

¼x⅛ iron $7.15
⅜x⅛ " 7.80
¼x¼ " 7.50
⅜x¼ " 8.15

L PENDANT COCK.

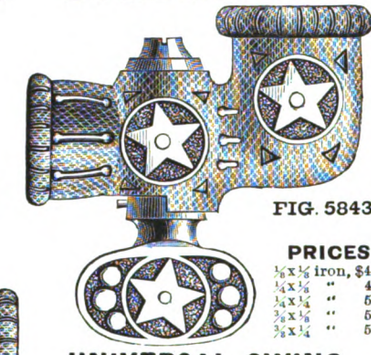


FIG. 5843.

PRICES.

⅛x⅛ iron, $4.90
¼x⅛ " 4.90
¼x¼ " 5.20
⅜x⅛ " 5.20
⅜x¼ " 5.20

UNIVERSAL BRACKET COCK.

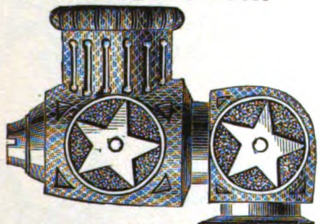


FIG. 5845.

PRICES.

⅜x¼ iron $12.05
⅜x½ " 12.35
⅜x⅜ " 13.00

UNIVERSAL SWING.

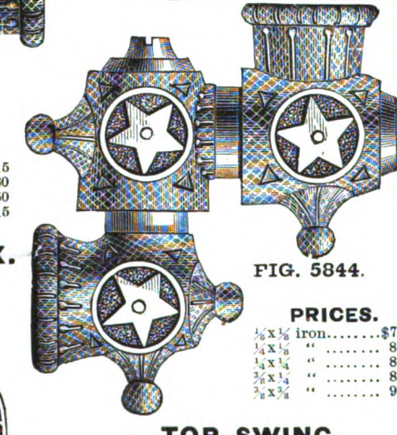


FIG. 5844.

PRICES.

⅛x⅛ iron $7.80
¼x⅛ " 8.15
¼x¼ " 8.45
⅜x¼ " 8.80
⅜x⅜ " 9.10

UNIVERSAL PENDANT COCK.

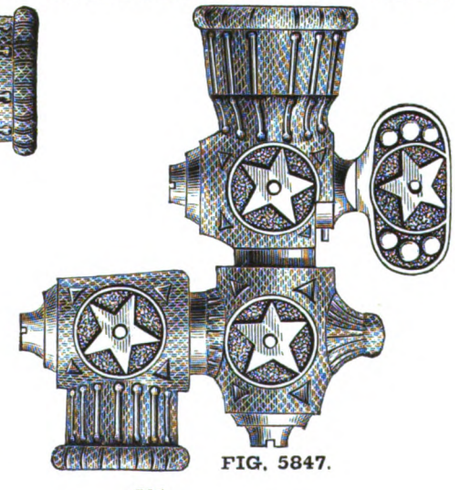


FIG. 5847.

PRICES, FIG. 5847.

¼x⅛ iron $8.80
¼x¼ " 9.10
⅜x⅛ " 9.45
⅜x¼ " 9.75

MIDDLE SWING.

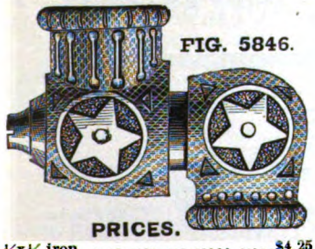


FIG. 5846.

PRICES.

⅛x⅛ iron $4.25
¼x⅛ " 4.55
¼x¼ " 4.90

TOP SWING.

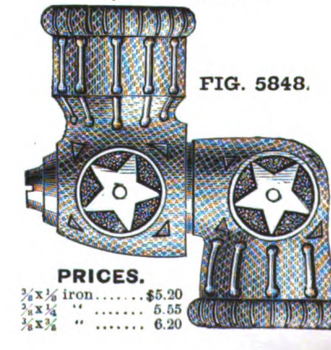


FIG. 5848.

PRICES.

⅜x⅛ iron $5.20
⅜x¼ " 5.55
⅜x⅜ " 6.20

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GAS BRACKETS AND FITTINGS.

STOP COCK.

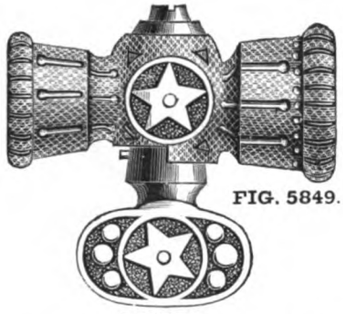


FIG. 5849.

PRICES.

⅛x⅛ iron	$3.90	⅜x⅛ iron	$4.55
¼x⅛ "	4.25	⅜x¼ "	4.55
¼x¼ "	4.55	⅜x⅜ "	4.90
5-16 brass x 5-16 brass	3.90		

MALE INDEPENDENT COCK.

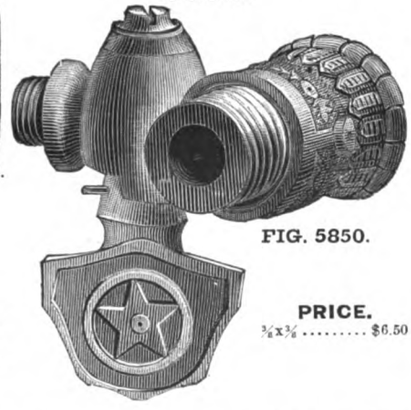


FIG. 5850.

PRICE.

⅜x⅜ $6.50

TWO-LIGHT BRACKET BODY.

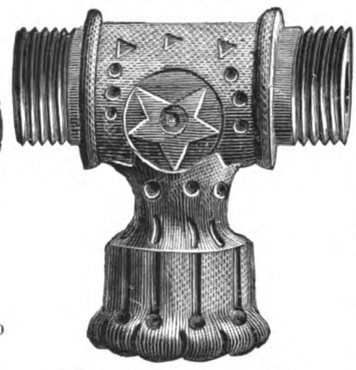


FIG. 5851. T HEAD.

PRICE, ⅜x⅜.....$3.90.

PILLAR COCK.

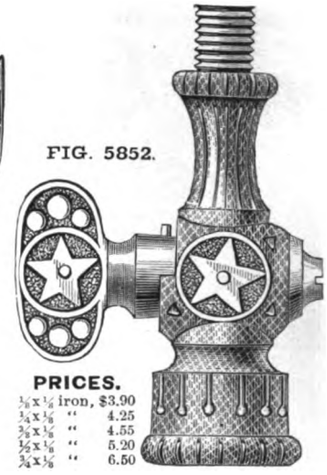
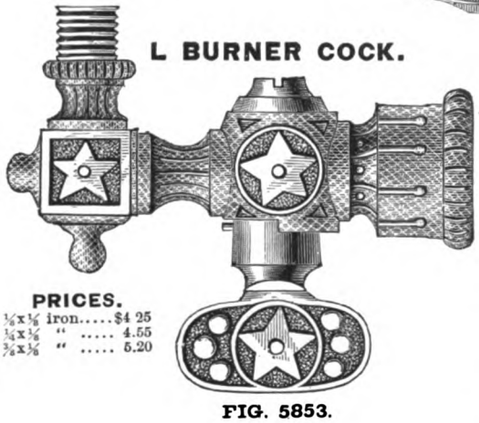


FIG. 5852.

PRICES.

⅛x⅛ iron,	$3.90	⅜x⅛ "	4.55
¼x⅛ "	4.25	½x⅛ "	5.20
¼x⅜ "	4.55	¾x⅛ "	6.50

L BURNER COCK.



PRICES.

⅛x⅛ iron	$4 25	⅜x⅛ "	4.55
¼x¼ "	4.55	⅜x⅜ "	5.20

FIG. 5853.

FEMALE HOSE COCK.

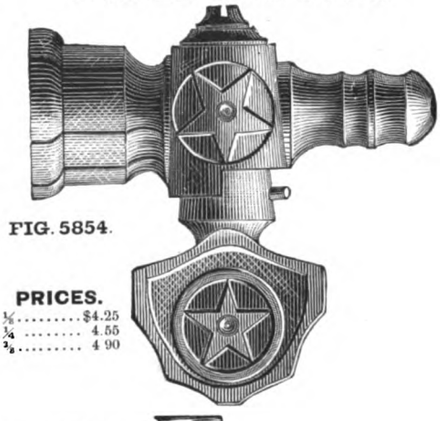


FIG. 5854.

PRICES.

⅛	$4.25
¼	4.55
⅜	4 90

MALE HOSE COCK.

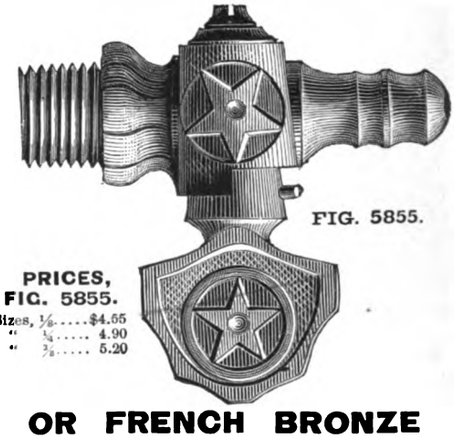


FIG. 5855.

PRICES, FIG. 5855.

Sizes, ⅛	$4.55
" ¼	4.90
" ⅜	5.20

L BURNER COCK, 4 INCHES LONG.

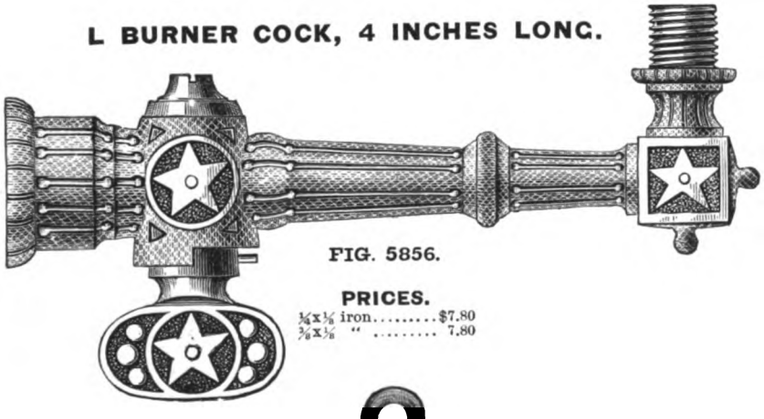


FIG. 5856.

PRICES.

⅛x⅛ iron	$7.80
⅜x⅛ "	7.80

GILT OR FRENCH BRONZE BRACKETS, ROUND TUBE.

THREE SWING.

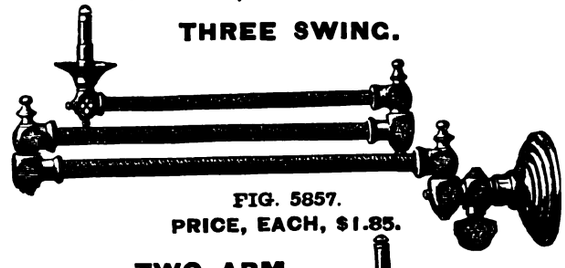


FIG. 5857.

PRICE, EACH, $1.85.

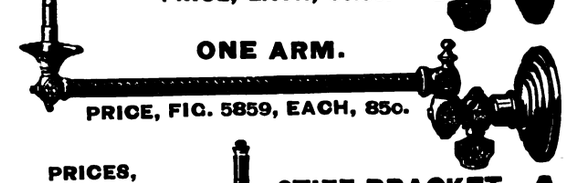
TWO ARM.



FIG. 5858.

PRICE, EACH, $1.30.

ONE ARM.



PRICE, FIG. 5859, EACH, 85c.

PRICES, FIG. 5860.

6, 7 and 8 inches long, each, 65 cents.

STIFF BRACKET.

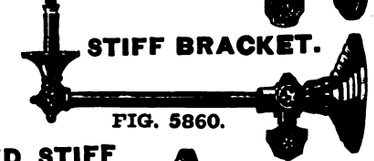


FIG. 5860.

CURVED STIFF BRACKET.

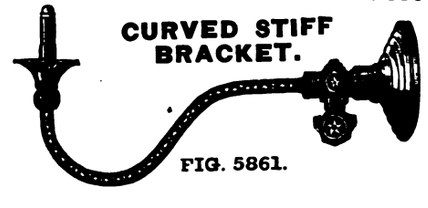


FIG. 5861.

PRICES, FIG. 5861.

7 and 8 inches long, each, 75 cents.

FLEXIBLE LIGHT HOLDER.

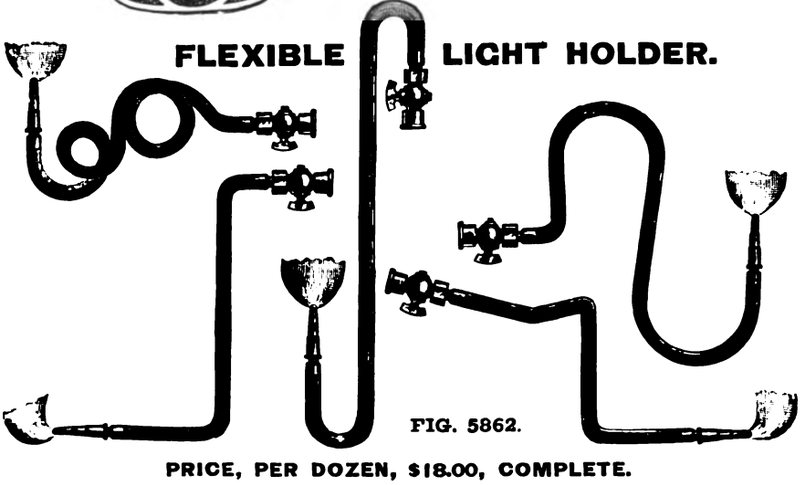


FIG. 5862.

PRICE, PER DOZEN, $18.00, COMPLETE.

For use in factory, machine shop, office, house or any place where a light is needed. It can be easily and quickly adjusted in any position, and will hold the light just where it is needed. 26 inches over all.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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VALVE RESEATING MACHINES FOR VALVES, COCKS AND FAUCETS.

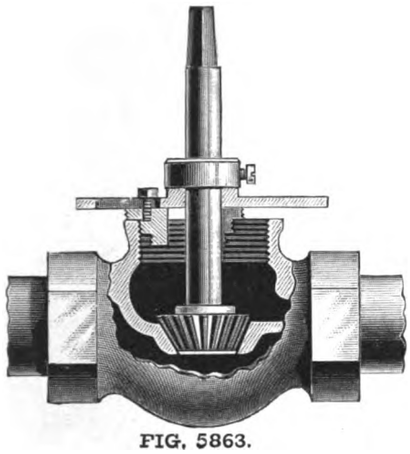


FIG. 5863.

This machine is made for the special purpose of refitting valves, cocks, faucets, etc., having either taper or flat seats. It consists of a bed plate with two standards, one of which is adjustable, as shown in Fig. 5864. It is simple, durable, is worked by hand, and it does its work neatly, quickly and perfectly.

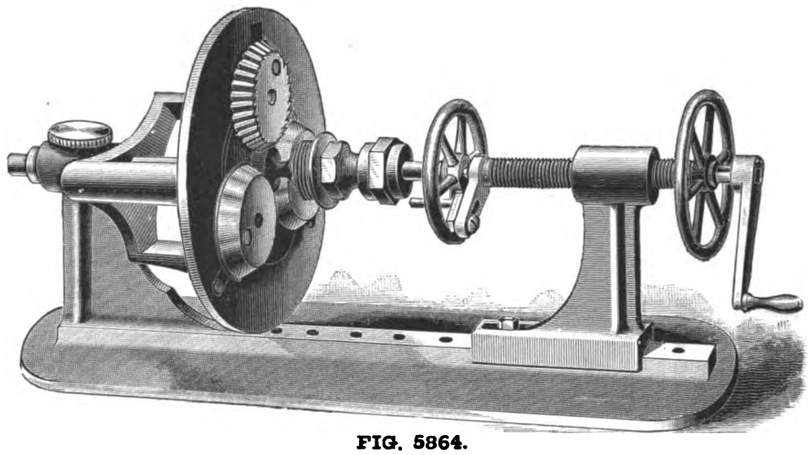


FIG. 5864.

PRICES.

No. 1.	Repairing from 3/8 to 2	inch valves	$75.00
No. 2.	" " 3/8 to 2 1/2	" "	100.00
No. 3.	" " 3/8 to 3	" "	130.00
No. 4.	" " 3/8 to 4	" "	150.00
No. 5.	" " 3/8 to 5	" "	175.00
No. 6.	" " 3/8 to 6	" "	200.00

EXTRAS FOR BLOW AND PLUG COCKS AND FAUCETS.

No. 1.	Repairing from 1/2 to 2	inch cocks	$20.00
No. 2.	" " 1/2 to 2 1/2	" "	25.00
No. 3.	" " 1/2 to 3	" "	30.00
No. 4.	" " 1/2 to 4	" "	35.00
No. 5.	" " 1/2 to 5	" "	40.00
No. 6.	" " 1/2 to 6	" "	45.00

EXTRAS FOR FLAT SEAT VALVES AND COCKS.

No. 1.	Repairing from 3/8 to 2	inch	$10.00
No. 2.	" " 3/8 to 2 1/2	"	12.00
No. 3.	" " 3/8 to 3	"	14.00
No. 4.	" " 3/8 to 4	"	16.00
No. 5.	" " 3/8 to 5	"	18.00
No. 6.	" " 3/8 to 6	"	20.00

DETAILS.

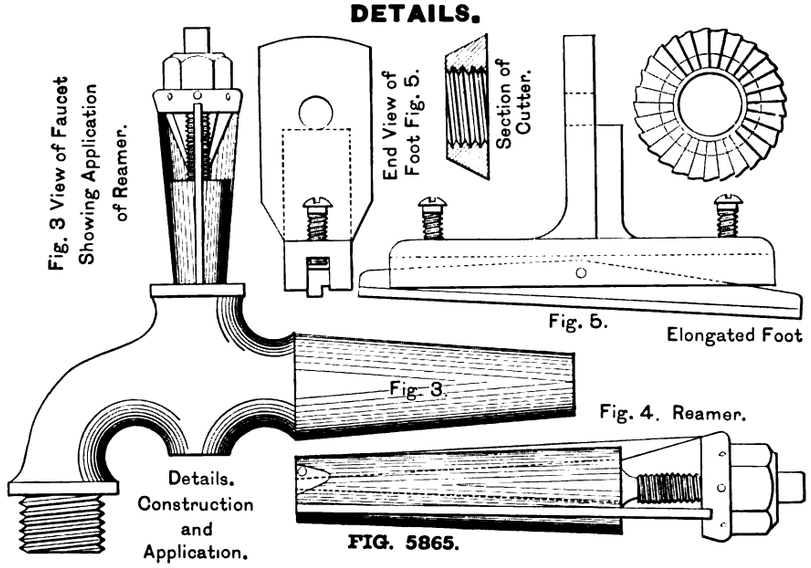


FIG. 5865.

In operation, the valve disk is placed between the centers—the standard being adjusted to length of stem—the cutter and supports put in place as shown, and by a few turns of the crank the valve is trued, it being fed up to the cutter by the hand wheel. For plug cocks, the plug is placed between centers—the inner face plate being slid back or reversed—the cutter and supports shown in Fig. 5 substituted for the others, and the former operation repeated. A valve seat is trued, as shown in Fig. 5863, the same cutter used on the disk being screwed to a spindle held in place by the device shown, the crank applied, and a few turns do the work. They are made of solid steel. In plug cock shells, the reamer shown in Fig. 4 is used, so that the taper is exactly the same as that given the plug. The elongated foot, carrying a cutter—Fig. 5—and two supports, is used on the machine in fitting a plug. Each foot is held securely in one of the radial slots in the face plate by a screw or bolt through the hole shown in end view of Fig. 5, and the angle of the cutter accurately adjusted to the taper of the reamer by means of the screws shown in the side view. For flat seat valves, flat cutters, shown in plan and section above, Fig. 5, are provided.

VALVE RESEATING MACHINES.

1. Attach the cutter, the size of the valve to be refitted, to the end of the tool shaft.

2. Adjust the jaws of the chuck to the opening of the valve casing, using care that the jaws rest squarely upon the collar of the valve to be refitted. Expand the chuck as much as possible by using the spanner—a small rod to be used as a lever—securely fastening the machine to the valve.

3. Lower the cutter so that it will barely rest upon the seat. This is done by turning the small wheel. Then screw down the check nut as tightly as possible with the hand, to give the proper friction to feed screw.

4. Slowly turn the large wheel several times. If the cutter feeds too fast, tighten the feed screw by using the spanner. Never turn the cutter spindle backwards when the machine is in position, as you might unscrew the cutter and lose it in the pipe.

In reseating the larger sizes of flat seat valves, first use the cutter next smaller than the size called for, then finish with the proper size.

To attach the machine to 1/4 inch, 3/8 inch and 1/2 inch valves, place the bushing over the end of tool shaft before screwing on the cutter; adjust and attach the inner faces of the jaws to the outside of the valve, using care to see that the collar of the valve fits squarely on the bushing.

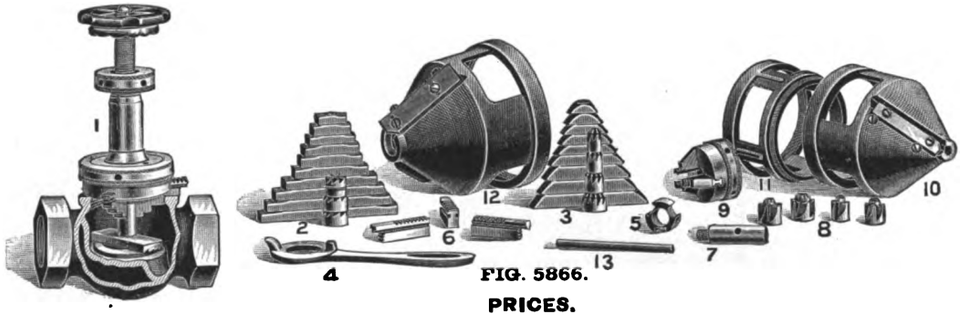


FIG. 5866.

PRICES.

No. 0.	Outfit for flat and taper seats, 1/4 to 2 inch	$50.00
No. 1.	" " " " " 1/4 to 3 "	60.00
No. 2.	" " " " " 1/4 to 4 "	76.00
No. 3.	Extra for faucet cutters	10.00

No. 2 outfit includes machine, disk cutter and holder, 26 sizes of cutters, extra 4 inch cone cutter, extra 4 inch jaws, extension cone cutter, wrench, spanner, collar, etc., in a nice case.

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ALL BRASS GLOBE ANGLE AND CROSS VALVES, SCREWED AND FLANGED.

CLOBE FANCY WHEEL.

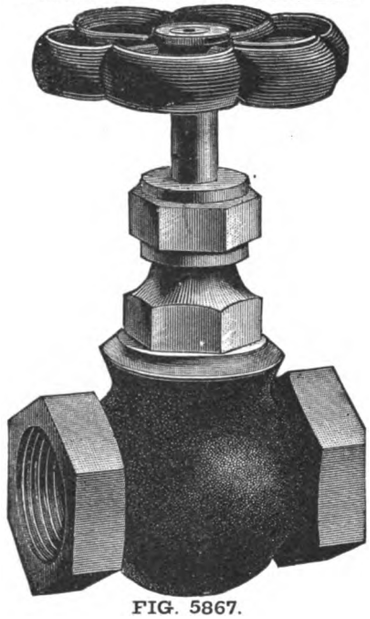


FIG. 5867.

CLOBE PLAIN WHEEL.

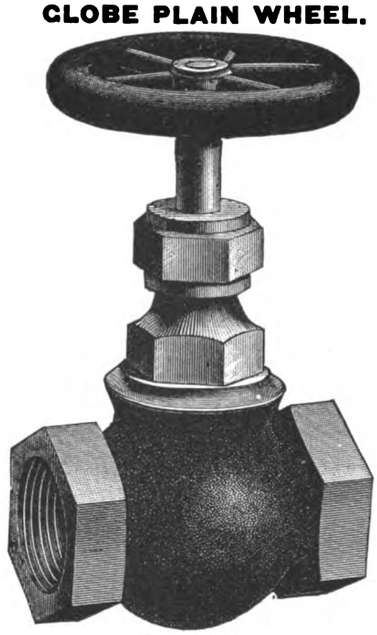


FIG. 5868.

ANGLE.

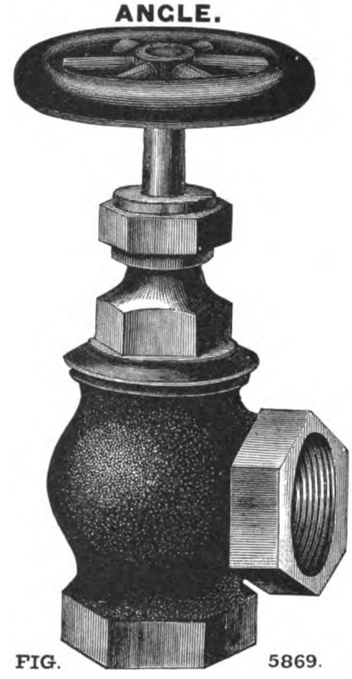


FIG. 5869.

CROSS.

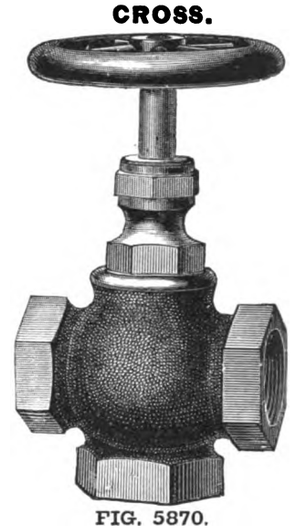


FIG. 5870.

FLANGED CLOBE.

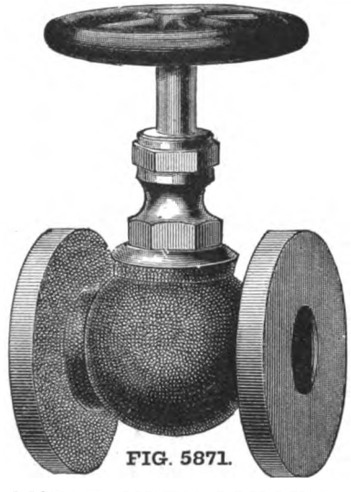


FIG. 5871.

FLANGED ANGLE.

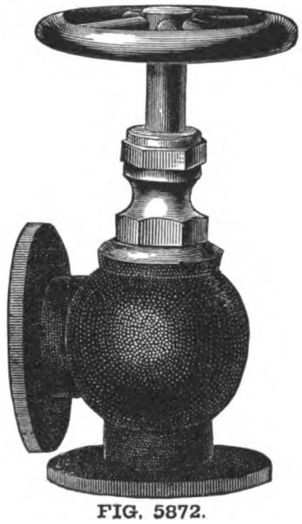


FIG. 5872.

FLANGED CROSS.

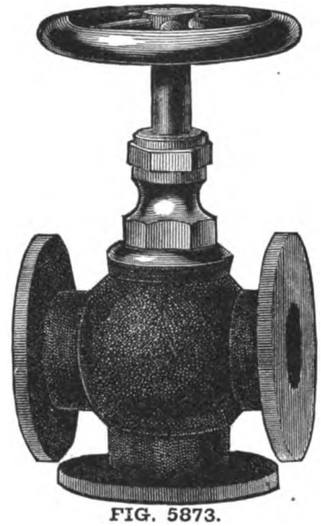


FIG. 5873.

CLOBE VALVE, WITH LARGE WHEEL FOR ROPE.

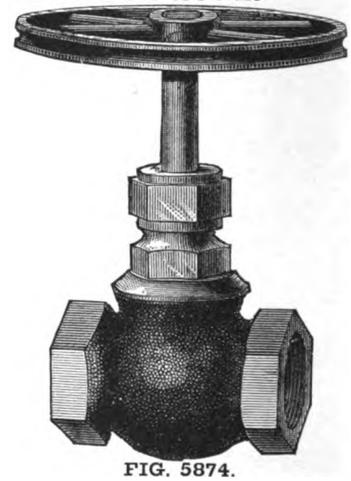


FIG. 5874.

ANGLE, WITH SQUARE HEAD OR STEM.

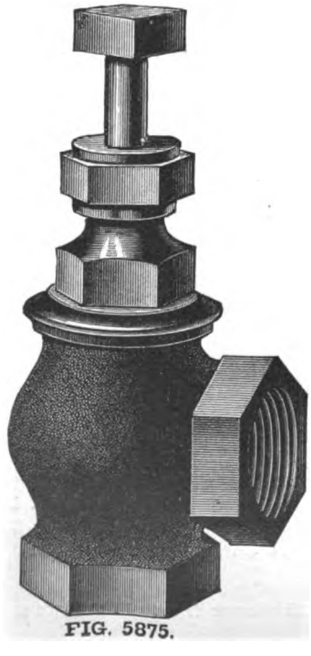


FIG. 5875.

CLOBE, WITH SQUARE HEAD OR STEM.

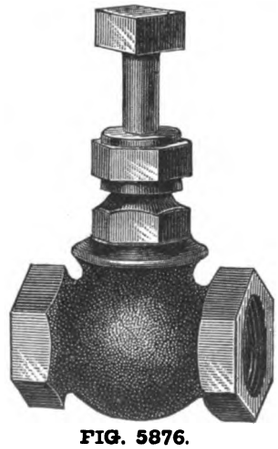


FIG. 5876.

FINISHED VALVES.

BRASS WHEEL.

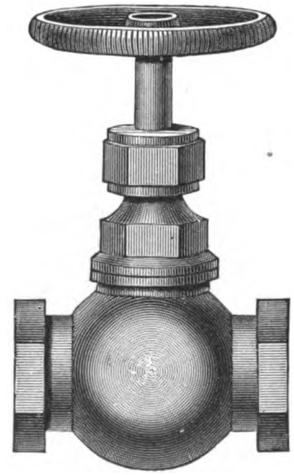


FIG. 5877.

WOOD WHEEL.

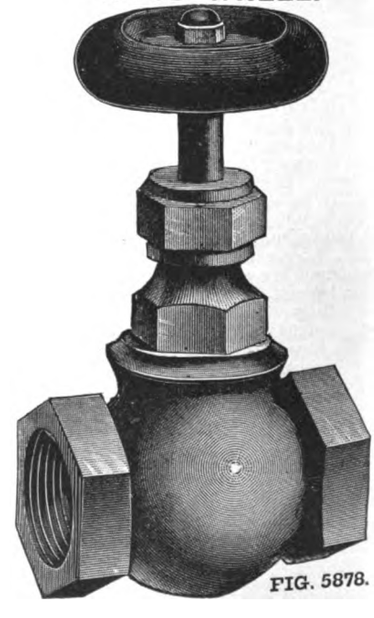


FIG. 5878.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PRICES, ALL BRASS VALVES, FIGS. 5867 TO 5876.

EITHER PLAIN OR FANCY WHEELS.

Size.....inches.	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6
Globe and angle valves.....Figs. 5867, 5868 and 5869.	$0.60	$0.60	$0.75	$1.00	$1.35	$1.80	$2.80	$3.90	$5.90	$11.25	$16.00	$30.00	$40.00	.....	.....
" " " ex. hy.. " 5867, 5868 " 5869.	.80	.80	.95	1.25	1.80	2.50	3.75	5.25	7.75	14.00	19.00	36.00	47.00	.....	.....
" " " flanged. " 5871 " 5872.	.....	.....	.....	3.50	4.00	5.00	7.00	9.00	14.00	20.00	30.00	45.00	65.00	$120.00	$180.00
Globe valves, with large wheel for rope..... " 5874.	.....	.....	.....	.....	.....	.....	4.00	5.00	7.00	.....	.....	.....	.....	.....	.....
Globe and angle valves, with square head or stem..... " 5875 " 5876.	.....	.75	.90	1.20	1.60	2.10	3.20	4.40	6.50	12.00	17.00	.....	.....	.....	.....
Cross valves, screwed..... " 5870.	.....	.85	1.00	1.50	2.00	2.50	3.50	5.00	8.00	16.00	24.00	.....	.....	.....	.....
" " flanged..... " 5873.	.....	.....	.....	.....	.....	7.00	10.00	14.00	21.00	30.00	45.00	60.00	90.00	.....	.....

PRICES, FINISHED VALVES, FIGS. 5877 AND 5878.

Brass wheel, plain.....Fig. 5877.	$1.75	$1.75	$2.00	$2.25	$2.75	$3.50	$5.00	$7.00	$10.00	.....	.....	.....	.....	.....	.....
" plated all over..... " 5877.	2.10	2.10	2.40	2.65	3.20	4.00	5.60	7.65	10.90	.....	.....	.....	.....	.....	.....
Wood wheel, plain..... " 5878.	1.30	1.30	1.60	1.85	2.15	2.85	4.00	5.50	8.50	.....	.....	.....	.....	.....	.....
" plated all over..... " 5878.	1.55	1.55	1.90	2.15	2.50	3.25	4.45	6.00	9.25	.....	.....	.....	.....	.....	.....

ROUGH AND FINISHED STEAM METAL RADIATOR VALVES.

ROUGH WOOD WHEEL.

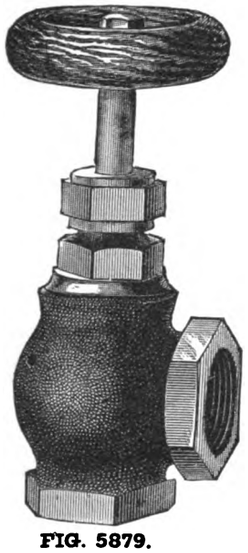


FIG. 5879.

FINISHED WOOD WHEEL.

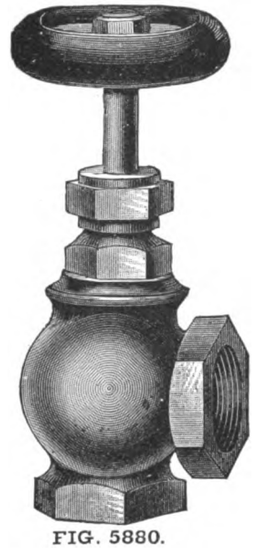


FIG. 5880.

ROUGH T HANDLE.

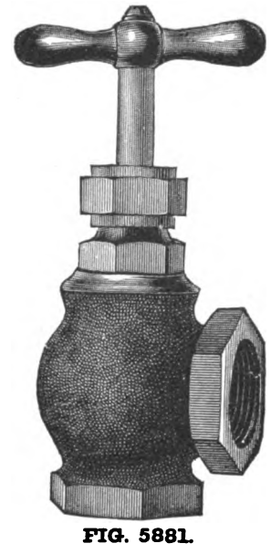


FIG. 5881.

MALE SIDE OUTLET.

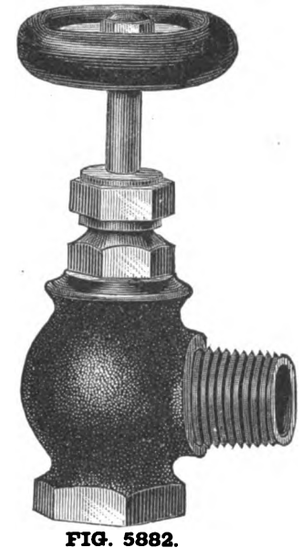


FIG. 5882.

PRICES, FIGS. 5879, 5880 AND 5881.

Size.....inches.	½	¾	1	1¼	1½	2
Rough body, plain.....	$1.35	$1.60	$2.25	$3.25	$4.50	$7.00
" " plated trimmings.....	1.55	1.85	2.50	3.50	4.80	7.50
" " plated all over.....	1.65	1.95	2.65	3.70	5.00	7.75
Finished " plain.....	1.85	2.15	2.85	4.00	5.50	8.50
" " plated all over.....	2.15	2.50	3.25	4.45	6.00	9.25

PRICES, FIG. 5882.

Size.....inches.	½	¾	1	1¼	1½	2
Rough body, plain.....	$1.45	$1.70	$2.35	$3.35	$4.60	$7.15
" " plated trimmings.....	1.65	1.95	2.60	3.65	4.90	7.65
" " plated all over.....	1.75	2.05	2.75	3.80	5.10	7.90
Finished " plain.....	1.95	2.25	2.95	4.10	5.60	8.65
" " plated all over.....	2.25	2.60	3.35	4.55	6.10	9.40

ALL BRASS GLOBE VALVES.

FEMALE AND MALE.

EITHER PIPE OR HOSE THREADS.

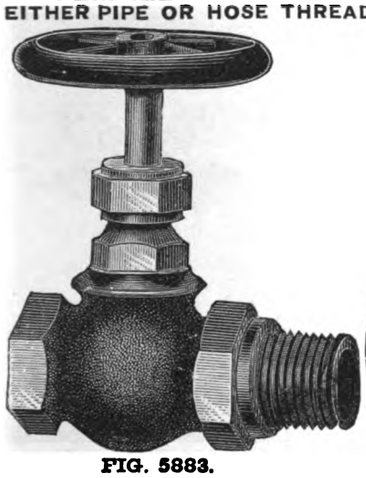


FIG. 5883.

BOTH ENDS MALE.

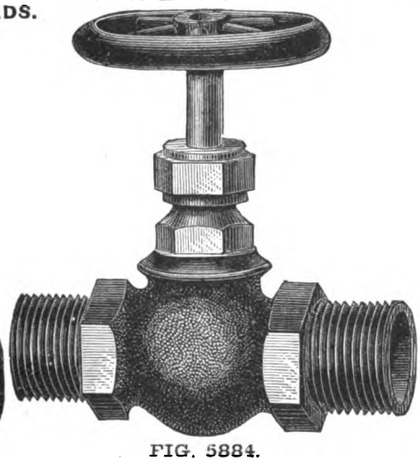


FIG. 5884.

FLANGED HOSE OUTLET.

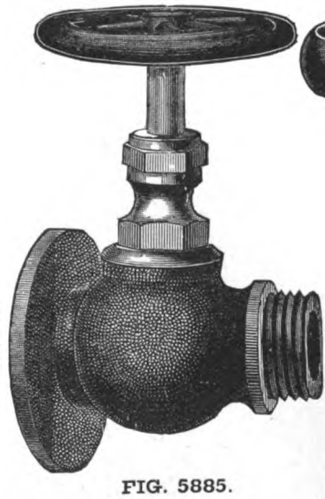


FIG. 5885.

CORNER VALVE.

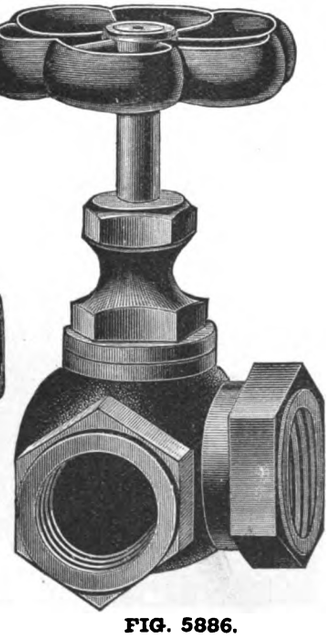


FIG. 5886.

PRICES, EITHER PLAIN OR FANCY WHEELS.

Size.....inches,	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Fig. 5883, each.....	$0.70	$0.70	$0.85	$1.15	$1.60	$2.15	$3.35	$5.00	$7.25	$13.00	$18.50
" 5884, "	.80	.80	.95	1.30	1.80	2.45	3.85	6.00	8.50	14.75	21.00
Size.....inches,	½		¾		1		1¼	1½	2	2½	3
Fig. 5885, flanged, each.....	$2.75		$4.00		$5.00		$7.00	$9.00	$14.00	$20.00	$30.00
Size.....inches,	½		¾		1		1¼				
Fig. 5886, each.....	$1.50		$2.00		$2.50		$3.50				

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ALL BRASS ANGLE VALVES.

BOTH ENDS MALE.

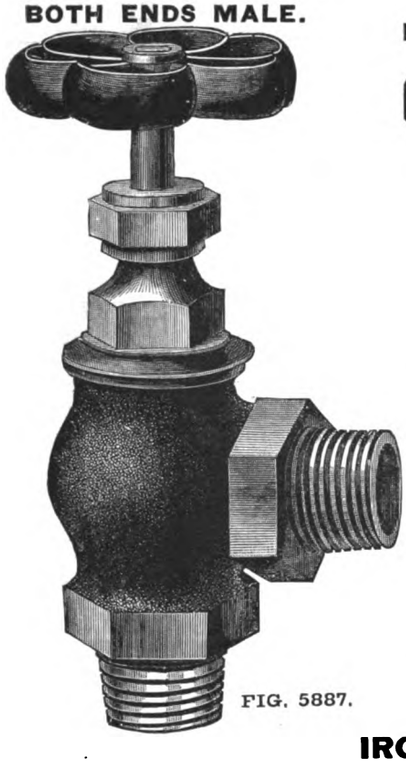


FIG. 5887.

MALE AND FEMALE.

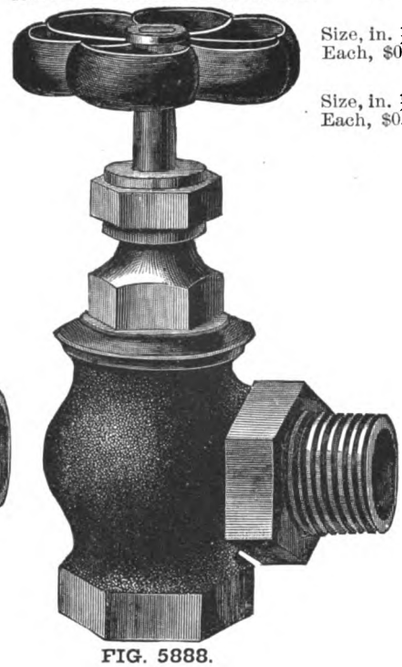


FIG. 5888.

WITH EITHER PLAIN OR FANCY WHEELS.

PRICES, FIG. 5888.

Size, in.	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Each,	$0.70	$0.70	$0.85	$1.15	$1.60	$2.15	$3.35	$5.00	$7.25	$13.00	$18.50

PRICES, FIG. 5887.

Size, in.	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Each,	$0.80	$0.80	$0.95	$1.30	$1.80	$2.45	$3.85	$6.00	$8.50	$14.75	$21.00

IRON BODY, BRASS MOUNTED.

SCREWED GLOBE.

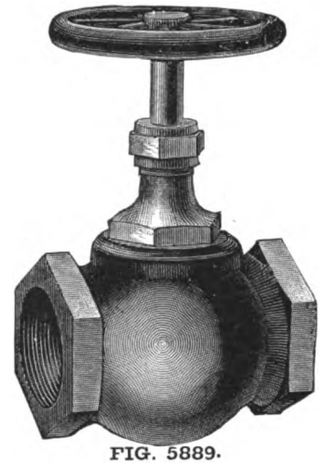


FIG. 5889.

SCREWED ANGLE.

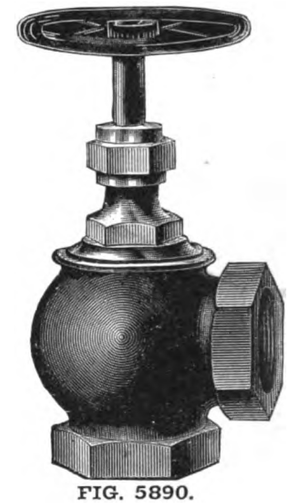


FIG. 5890.

IRON BODY, BRASS MOUNTED VALVES.

SCREWED CROSS.

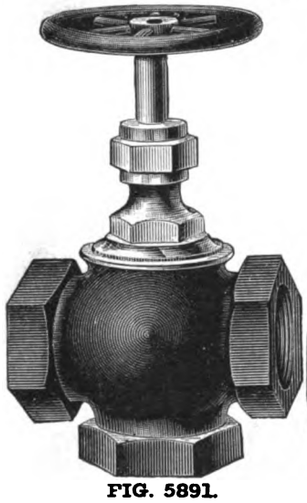


FIG. 5891.

FLANGED GLOBE.

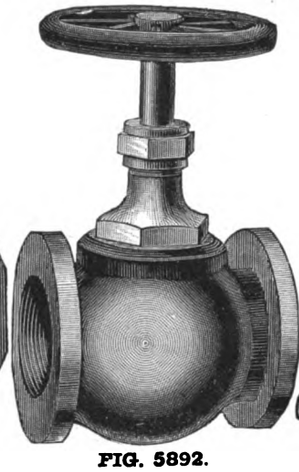


FIG. 5892.

FLANGED ANGLE.

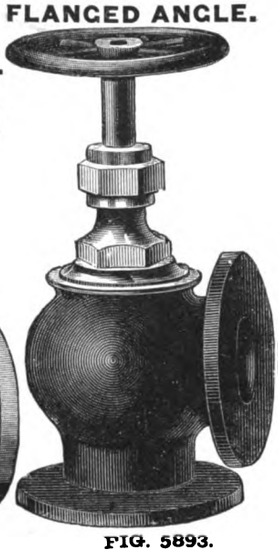


FIG. 5893.

FLANGED CROSS.

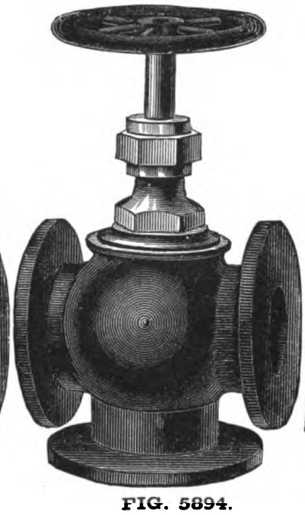


FIG. 5894.

SCREWED YOKE GLOBE.

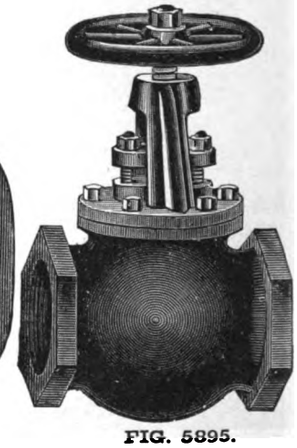


FIG. 5895.

SCREWED YOKE ANGLE.

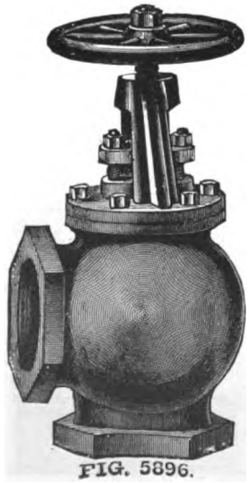


FIG. 5896.

SCREWED YOKE CROSS.

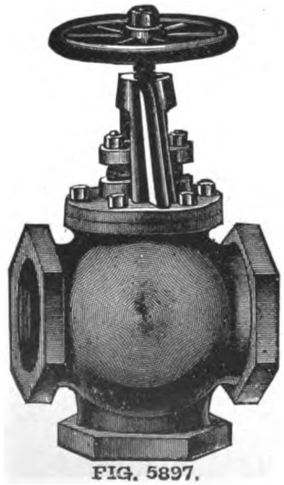


FIG. 5897.

FLANGED YOKE GLOBE.

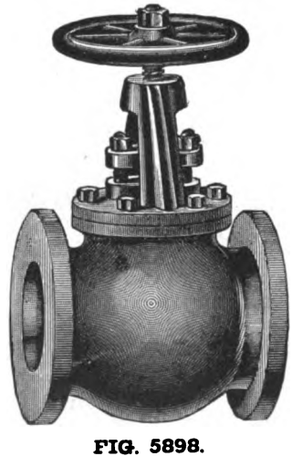


FIG. 5898.

FLANGED YOKE ANGLE.

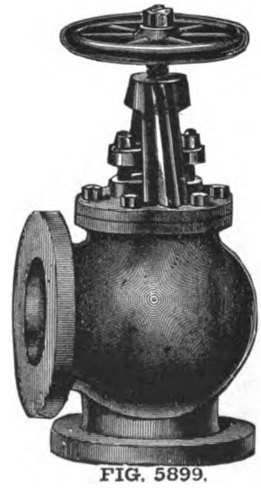


FIG. 5899.

FLANGED YOKE CROSS.

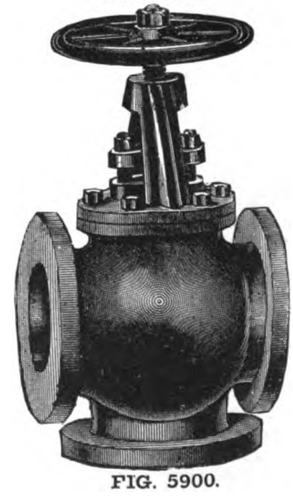


FIG. 5900.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PRICES, IRON BODY BRASS-MOUNTED VALVES, FIGS. 5889 TO 5900.

Size..... Inches,	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	10	12	14
Globe and angle valves, screwed, each, Figs. 5889 & 5890	1.75	2.00	2.50	3.50	5.00	7.50	10.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" " flanged, " " 5892 & 5893	2.50	3.00	3.75	5.00	6.75	9.50	13.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" " screwed, with yoke ..... " " 5895 & 5896	.....	.....	.....	.....	8.00	10.50	14.50	18.00	21.00	28.00	32.00	44.00	75.00	85.00	135.00	200.00	.....
Globe and angle valves, flanged, with yoke..... " " 5898 & 5899	.....	.....	.....	.....	9.75	12.50	17.50	21.50	25.00	32.00	36.00	49.00	80.00	91.00	145.00	220.00	350 00
Cross valves, screwed..... " Fig. 5891	.....	.....	.....	.....	6.50	10.00	14.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" " flanged..... " " 5894	.....	.....	.....	.....	9.00	13.00	18.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" " sc'w'd with yoke, " " 5897	.....	.....	.....	.....	9.50	13.00	18.00	23.00	27.00	35.00	40.00	54.00	90.00	105.00	175.00	260.00	.....
" " flanged, " " " 5900	..	.....	.....	.....	12.00	16.00	22.50	28.25	33.00	41.00	46.00	61.50	95.00	114.00	190.00	290 00	.....

STANDARD DIMENSIONS OF IRON BODY FLANGED VALVES.

Size..... Inches,	2	2½	3	3½	4	4½	5	6	7	8	10	12	14
Globe valves, diameter of flanges.....	6½	7	8	9	10	10	11	12	13	14	16	19	21
" " distance face to face.....	5⅝	7⅜	7½	9⅜	11	11	12	13¾	16	16½	19¾	22½	25½
Angle valves, diameter of flanges.....	6½	7	8	9	10	10	11	12	13	14	16	19	21
" " distance center to faces	3½	3¾	4⅝	5⅜	5⅞	5⅞	6⅜	7⅛	7¾	8¼	9½	11¼	12¾
Safety valves, diameter of flanges.....	6½	7	8	9	10	10	11	12	13	14	16	19	....
" " distance face to face.....	7	8½	9½	9½	11	11½	12	13¾	..	16	....	.....	....
" " " center to inlet	3½	4¼	4⅝	5	5½	5⅞	6⅜	7⅛	....	8	.....	.....	....
Jenkins' globe valves, diameter of flanges	6¼	7	8	9	10	10	11	12	13	14	16	19	....
" " " distance face to face.....	6¼	7¼	9	10	11½	12½	13	16	16	18½	21¼	24¼	....
" angle " diameter of flanges.....	6½	7	8	9	10	10	11	12	13	14	16	19	....
" " " distance center to face....	3⅞	4	4⅝	5	5⅞	6¼	6½	8	8½	9¼	11	12¼	....
" gate " diameter of flanges.....	6½	7	7	8½	9	10	10	11	12	13	16	18	....
" " " distance face to face.....	6	7¼	7⅝	7⅝	8⅜	8⅝	9½	10	11	12	14¼	14½	....
Abel's " " diameter of flanges.....	6½	7	7	8½	9	9½	10	11	....	13	16	18	....
" " " distance face to face	6½	7¼	7⅝	7⅝	8¾	9⅞	9½	10	....	12½	14⅛	14⅛	....
Hydraulic gate valves, diameter of flange.....	....	....	8½	....	10	.....	....	13	....	15	18	20¼	....
" " distance face to face..	...	...	10½	....	12	.....	....	13	....	15¼	17	19¼	....

ASBESTOS DISCS.



FIG. 5901. SECTION.

ASBESTOS DISC, COMPLETE.

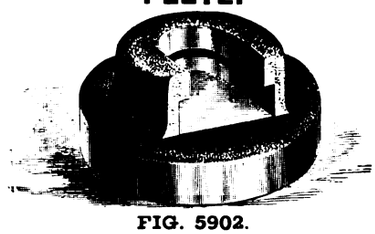


FIG. 5902.

BRASS AND IRON BODY ASBESTOS DISC GLOBE AND ANGLE VALVES.

PRICES, FIGS. 5903 AND 5902.

Sizes..... Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Globe and angle valves, brass	$1.10	1.25	1.60	2.20	2.80	4.00	5.50	8.00	15.75	22.00
Pat. asbestos discs, Fig. 5902	.06	.07	.09	.10	.12	.18	.25	.36	.48	.60
Sizes ..... Inches,	2	2½	3	3½	4	5	6	7	8	10
Globe and angle valves, iron body, brass hub, screwed..	$7.25	11.00	16.00	.....	.....	.....	.....	.....	.....	.....
Globe and angle valves, iron body, brass hub, flanged...	8.50	13.00	18.00	.....	.....	.....	.....	.....	.....	.....
Globe and angle valves, iron body, screwed, with yoke..	10.00	12.00	16.75	19.50	24.00	40.00	48.00	80.00	90.00	130.00
Globe and angle valves, iron body, flanged, with yoke...	11.75	14.00	18.50	21.50	26.00	42.00	50.00	80.00	90.00	130.00
Pat. asbestos discs, Fig. 5902	.36	.48	.60	.75	.90	1.20	1.50	1.80	2.10	2.70

CLOBE.

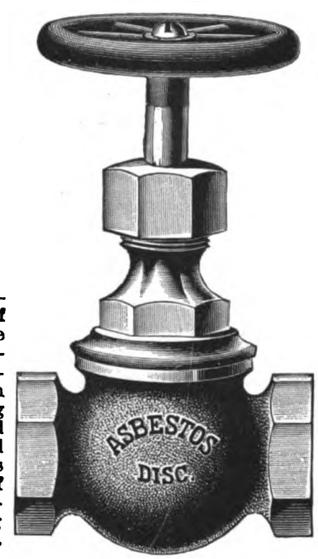


FIG. 5903.

SECTION.

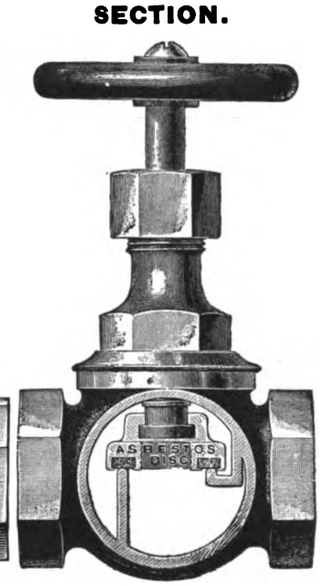


FIG. 5904.

RADIATOR CROSS VALVES. RADIATOR VALVES.

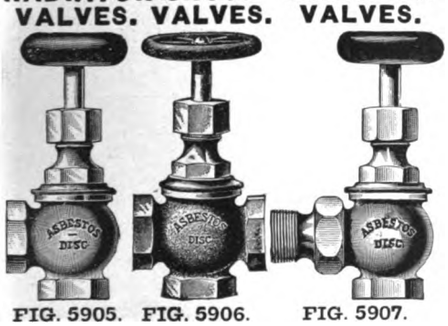


FIG. 5905. FIG. 5906. FIG. 5907.

Sizes ½ to 2 in. Sizes ¼ to 3 in. Sizes ½ to 2 in.

PRICES ON APPLICATION.

These valves are provided with vulcanized asbestos discs, composed of the fiber of asbestos, which cannot be cracked or broken. The disc is practically indestructible, being composed of a fireproof material, to which is added the waterproof vulcanizing material. The discs are furnished all complete and ready for use and may be put into one of these valves by simply unscrewing the bonnet of the valve, slipping off the old disc, replacing it by a new one, and screwing on the bonnet again, requiring only a few moments' time for the entire operation. The stuffing boxes are all packed before they leave the factory with vulcanized asbestos packing, which is very durable and cannot be blown or washed out.

LOCKE RENEWABLE DISC VALVES.

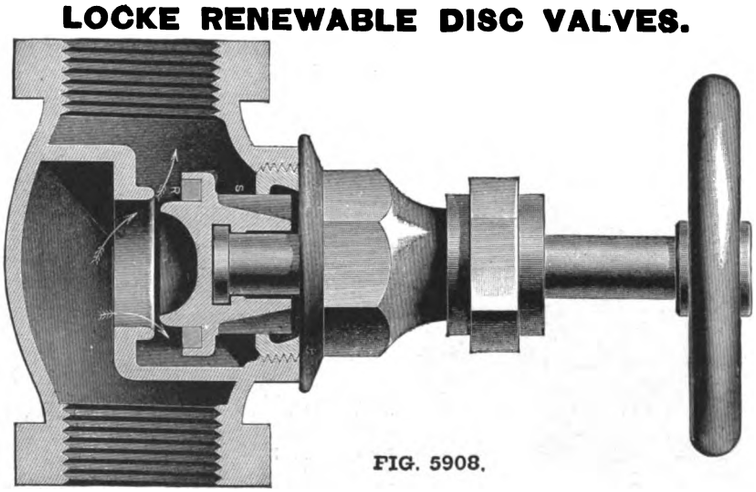


FIG. 5908.

PRICES, FIG. 5908.

ALL BRASS GLOBE AND ANGLE VALVES.

Size.....	¼	⅜	½	¾	1	1¼	1½	2
Prices	$1.10	$1.25	$1.60	$2.20	$2.80	$4.00	$5.50	$8.00

IRON BODY BRASS MOUNTED GLOBE AND ANGLE VALVES.

WITH YOKE AND OUTSIDE SCREW FOR SPINDLE.

Size.....	2½	3	4	5	6
Diam. of standard flange.....	7	8	9	10	11
Prices, screw ends	$12.00	$16.75	$24.00	$40.00	$48.00
" flange ends	14.00	18.50	26.00	42.00	50.00

DISCS FOR BRASS VALVES.

Size.....	¼	⅜	½	¾	1	1¼	1½	2
Prices.....	$0.20	$0.20	$0.25	$0.30	$0.40	$0.50	$0.65	$1.00
Refilling discs..	.08	.08	.10	.12	.15	.17	.25	.30

DISCS FOR IRON BODY VALVES.

Size.....	2½	3	4	5	6
Prices.....	$2.00	$2.50	$3.75	$5.00	$6.50
Refilling discs.....	.40	.60	.75	1.00	1.25

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JENKINS' BRASS AND IRON BODY BRASS MOUNTED VALVES.

ANGLE VALVE.



FIG. 5909.

GLOBE VALVE.

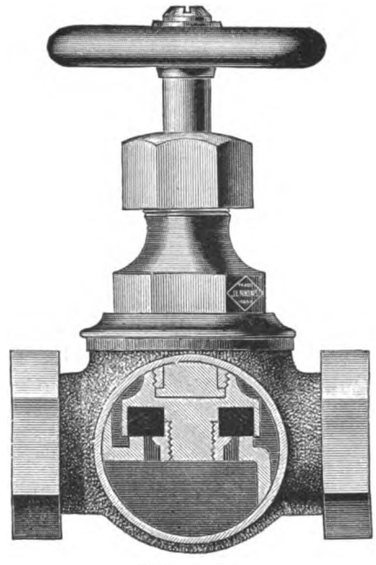


FIG. 5910.

CROSS VALVE.

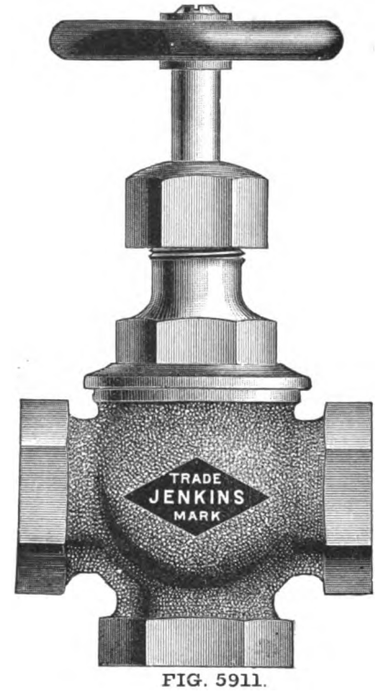


FIG. 5911.

PRICES, DISKS ONLY.

Size.	Prices.
¼	$0.03
⅜	.04
½	.04
¾	.05
1	.06
1¼	.09
1½	.12
2	.18
2½	.24
3	.33
3½	.45
4	.52
5	.68
6	.90
7	.98
8	1.05
10	1.50
12	2.00
14	3.00
16	4.00
18	5.00
20	6.00
24	9.00

PRICES, BRASS.

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Globe and angle valves, brass, screwed	$1.10	$1.25	$1.60	$2.20	$2.80	$4.00	$5.50	$8.00	$15.75	$22.00
" " " " flanged					6.00	9.00	11.00	16.50	25.00	34.00
Cross valves, brass, screwed	1.70	2.00	2.25	2.50	3.25	4.75	6.25	9.50	20.00	27.50

PRICES, IRON BODY BRASS MOUNTED VALVES.

Size	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	10	12
Globe and angle valv's, brass hub, scr'd	$2.75	$2.85	$3.85	$5.00	$7.25	$11.00	$16.00									
" " " " fl'g'd					8.50	13.00	18.00									
" " " with yoke, scr'd					10.00	12.00	16.75	$19.50	$24.00	$32.00	$40.00	$48.00	$80.00	$90.00	$130.00	$185.00
" " " " fl'g'd					11.75	14.00	18.50	21.50	26.00	34.00	42.00	50.00	80.00	90.00	130.00	185.00
Cross valves, screwed						16.00	21.00	26.00	30.00	42.00	45.00	58.00				
" " flanged						19.00	24.00	29.00	33.00	45.00	48.00	62.00				
Diam. flanges, globe and angle valves					6½	7	8	9	10	10	11	12	13	14	16	19
Face to face globe valves, scr'd and flg'd					6	7½	9¼	10	11¾	12½	13	16	16	18½	21¼	24½
Center to face angle valves					3⅞	4½	4⅝	5⅜	5⅞	6¼	6½	8	8½	9¼	11	12¾

For sizes above 12 inches we furnish net prices.

FRINK'S DISK VALVES.

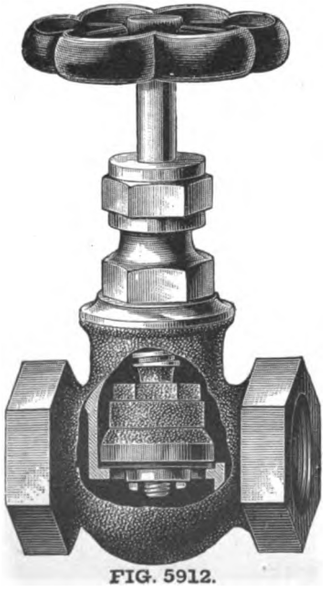


FIG. 5912.

PRICES, FIG. 5912.

PRICES, ALL BRASS.

Size	¼	⅜	½	¾	1 in.
Globe and angle valves, each,	$0.80	$1.00	$1.25	$1.75	$2.50
Size	**1¼**	**1½**	**2**	**2½**	**3 in.**
Globe and angle valves, each,	$3.35	$4.60	$7.00	$14.00	$20.00

PRICES, IRON BODY, BRASS MOUNTED.

Size	2	2½	3	3½	4 in.
Globe and angle valves, screwed, each,	$6.75	$10.00	$13.50	$21.50	$25.50
Size	**5**	**6**	**8**	**10**	**12 in.**
Globe and angle valves, screwed, each,	$38.00	$51.00	$97.00	$148.00	$215.00
Size	**2**	**2½**	**3**	**3½**	**4 in.**
Globe and angle valves, flanged, each,	$8.50	$12.00	$16.50	$25.00	$29.50
Size	**5**	**6**	**8**	**10**	**12 in.**
Globe and angle valves, flanged, each,	$42.00	$56.00	$103.00	$158.00	$235.00

PRICES, "FRINK'S" DISKS.

Size	¼	⅜	½	¾	1	1¼	1½	2	2½ in.
Each	$0.06	$0.07	$0.09	$0.10	$0.12	$0.18	$0.25	$0.36	$0.48
Size	**3**	**3½**	**4**	**5**	**6**	**8**	**10**	**12 in.**	
Each	$0.60	$0.75	$0.90	$1.20	$1.50	$2.10	$2.70	$3.00	

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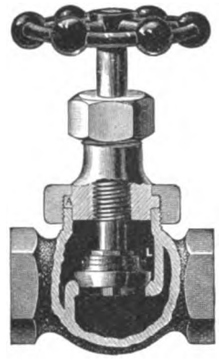
LUNKENHEIMER REGRINDING GLOBE ANGLE AND CROSS VALVES.

DESCRIPTION, FIGS. 5913 AND 5914.

These valves are made from a peculiar gun-metal composition, are heavy and strong and outlast the disk valve and can be easily re-ground. Tag, with instructions for regrinding, on each valve.

INSTRUCTIONS.

To regrind, unscrew nut and place a little powdered sand and soap on disk. Insert a wire through hole in disk to hold it to stem and regrind, leaving nut unscrewed, so that the hub rotates and guides the stem while regrinding.



Sectional.

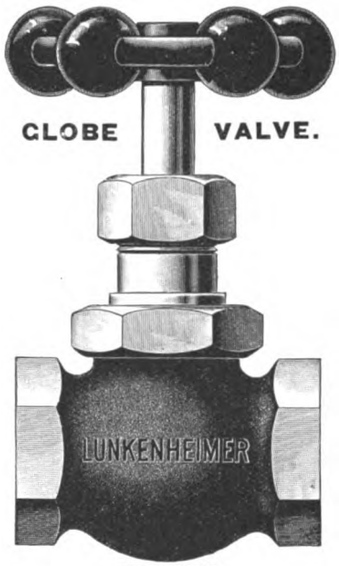


FIG. 5913.

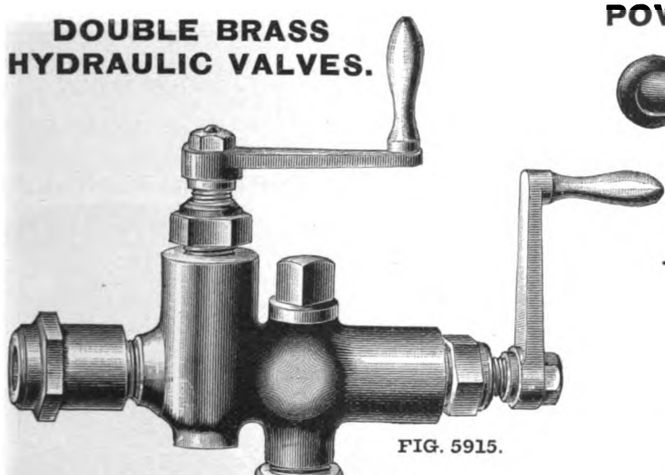


FIG. 5914.

PRICES.

Size.....inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Globe valves.....each	$0.70	$0.70	$0.85	$1.15	$1.45	$2.00	$2.80	$3.90	$6.20	$12.00	$16.50
Angle valves.....each	.70	.70	.85	1.15	1.45	2.00	2.80	3.90	6.20	12.00	16.50
Finished all over, with brass wheels.....each	1.75	1.90	2.15	2.50	3.10	3.65	5.25	7.25	10.75	22.00	33.50
Cross valves.....each	....	....	1.00	1.50	2.00	2.70	3.50	5.10	8.00	16.00	24.00

DOUBLE BRASS HYDRAULIC VALVES.

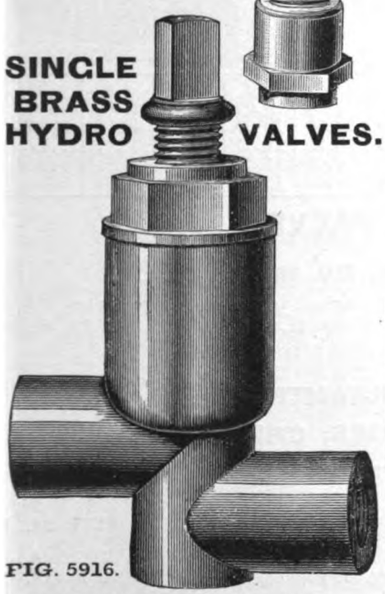

FIG. 5915.

All sizes.

PRICES ON APPLICATION.

And state pressure when ordering.

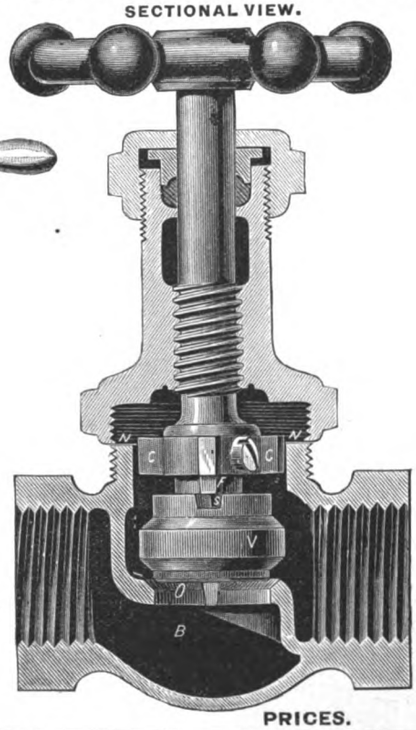
SINGLE BRASS HYDRO VALVES.


FIG. 5916.

PRICES ON APPLICATION.

POWELL'S BRASS REGRINDING STAR VALVES.

SECTIONAL VIEW.



CLOBE VALVES.

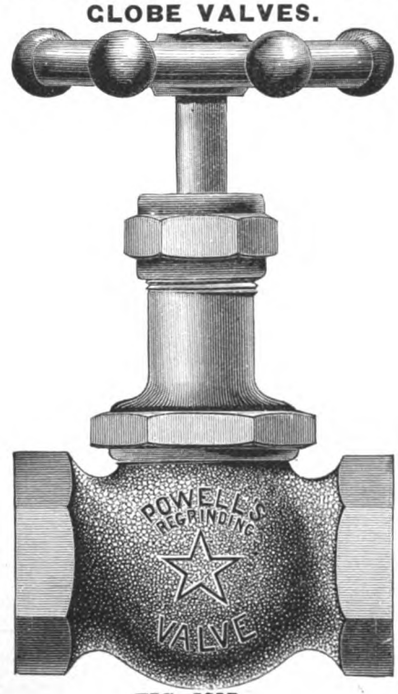


FIG. 5917.

PRICES.

Size.....inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Each.....	$0.80	$0.85	$0.90	$1.20	$1.55	$2.00	$3.00	$4.00	$6.50	$12.50	$19.00
Fin. all over, iron wheel,	1.50	1.60	1.75	2.10	2.50	3.00	4.25	5.75	9.25	20.00	31.00
Fin. all over, brass wheel,	1.75	1.90	2.15	2.50	3.10	3.65	5.25	7.25	10.75	22.00	33.50
Double male ends....	1.00	1.05	1.10	1.45	1.85	2.35	3.40	4.50	7.10	13.50	21.00
Male and female.....	.90	.95	1.00	1.35	1.70	2.20	3.20	4.25	6.80	13.00	20.00
Flanged ends.....	....	....	....	3.75	4.25	5.25	7.50	9.50	15.00	23.00	33.00
Diameter of flanges....	..	....	....	3	3½	4	4½	5	6	6½	7½

To regrind the valves.—Referring to above cut, unscrew the cap A from the neck N; the stem is then released for inspection. To lock the disk for grinding, release the wing guide CC, by giving half a turn to the screw which confines it, drop it into the slot S, and fasten it there. When the grinding is accomplished, the wing guide CC is withdrawn to its original position and fastened, to be used again when necessary.

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ADAMS' Y VALVES, ALL BRASS AND IRON BODY, BRASS MOUNTED.

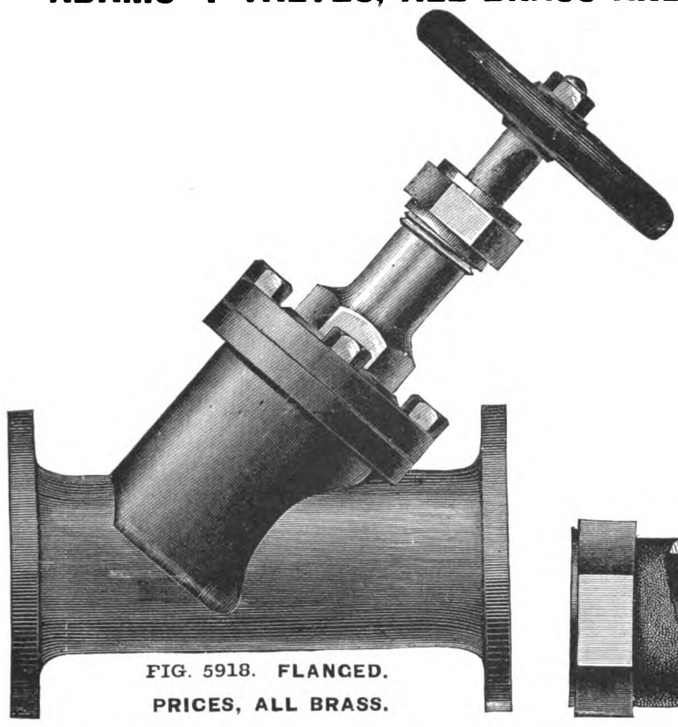


FIG. 5918. FLANGED.

PRICES, ALL BRASS.

Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4 in.
Screwed, each	$1.75	$2.50	$3.50	$4.25	$5.00	$7.00	$16.00	$22.00	$36.50	$48.00			
Flanged, "	3.00	3.75	5.00	6.50	8.00	12.00	22.00	30.00	46.50	63.00			

PRICES, ALL BRASS, JENKINS' DISKS.

Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4 in.
Screwed, each	$2.00	$3.00	$4.00	$5.00	$6.00	$8.50	$18.00	$25.00	$40.00	$52.00			
Flanged, "	3.25	4.25	5.50	7.25	9.00	13.50	24.00	33.00	50.00	67.00			

PRICES, FLANGED, I. B. B. M.

Size	2½	3	3½	4	5	6 in.
Each	$13.00	$17.50	$20.50	$23.50	$40.50	$46.50

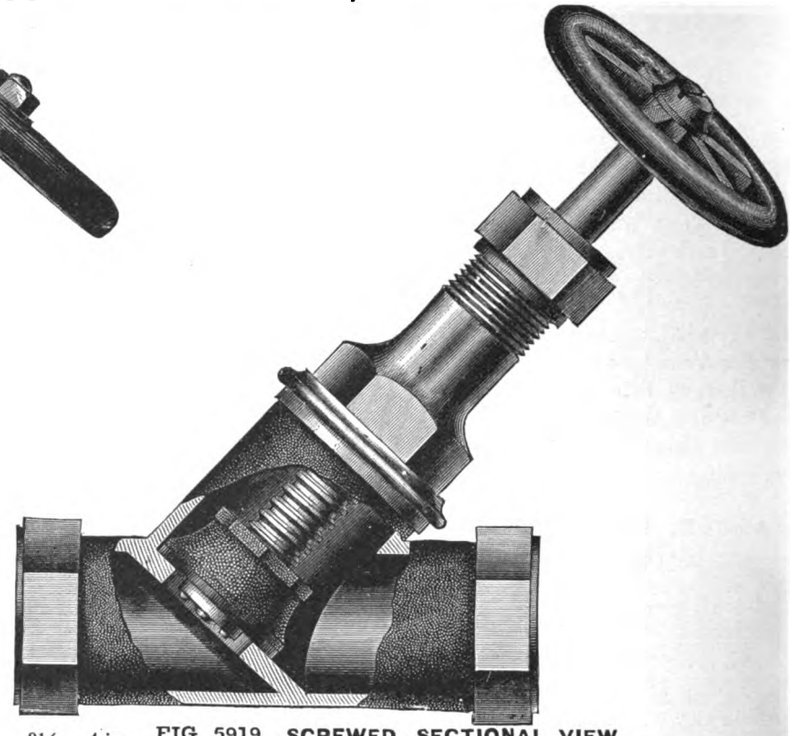


FIG. 5919. SCREWED, SECTIONAL VIEW.

PRICES, SCREWED, I. B. B. M.

Size	2½	3	3½	4	5	6 in.
Each	$11.00	$15.00	$18.00	$21.00	$38.00	$44.00

PRICES, SCREWED, I. B. B. M., JENKINS' DISKS.

Size	2½	3	3½	4	5	6 in.
Each	$13.00	$18.00	$21.50	$25.00	$42.00	$50.00

PRICES, FLANGED, I. B. B. M., JENKINS' DISKS.

Size	2½	3	3½	4	5	6 in.
Each	$15.00	$20.50	$24.00	$27.50	$42.50	$52.50

ALL BRASS CHECK VALVES.

HORIZONTAL. VERTICAL SIDE CAP. ANGLE. HORIZONTAL FLANGED. VERTICAL FLANGED.

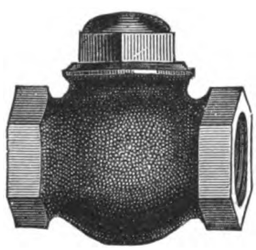


FIG. 5920.

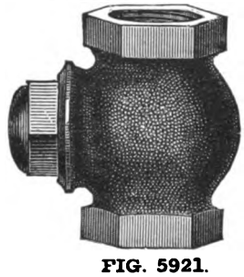


FIG. 5921.



FIG. 5922.

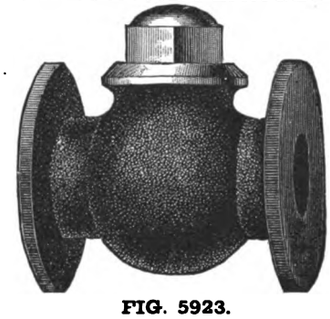


FIG. 5923.



FIG. 5924.

PRICES, FIGS. 5920 TO 5925.

Size.....inches.	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Horizontal, vertical and angle, screwed	$0.50	$0.50	$0.60	$0.85	$1.15	$1.55	$2.30	$3.25	$5.20	$10.00	$14.00	$27.00	$36.00
" " " flanged	.....	.....	.....	3.25	3.75	4.50	6.50	8.50	13.00	19.00	28.00	42.00	60.00
Horizontal and angle, extra heavy	.65	.65	.75	1.15	1.60	2.00	3.25	4.50	6.75	12.50	17.00	.....	.....
Vertical, cap on side	.....	.....	.....	1.00	1.40	1.85	2.85	4.00	6.00	11.25	16.00	.....	.....
" " " flanged	.....	.....	.....	3.25	3.75	4.50	6.50	8.50	13.00	19.00	28.00	42.00	60.00

PLAIN VERTICAL.

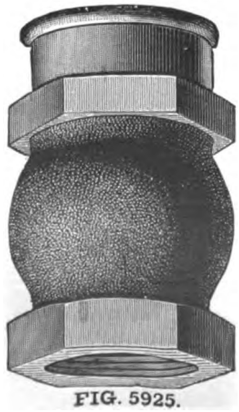


FIG. 5925.

LUNKENHEIMER BALL CHECK VALVES.

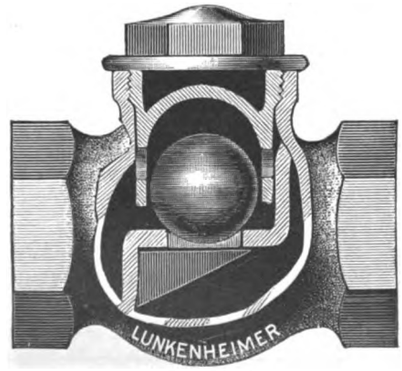


FIG. 5926.

PRICES, FIG. 5926.

Inches	⅜	½	¾	1	1¼	1½	2
Each	$1.10	$1.60	$2.30	$3.10	$4.00	$6.20	$9.40

BRASS BALLS, WARRANTED TRUE. SIZES OVER 1 1-2 INCHES, CAST HOLLOW.

PRICES.

Size.....inches,	½	¾	1	1¼	1½	2	2½
Prices, each	$0.60	$0.65	$0.75	$1.00	$1.50	$2.75	$4.50

Size.....inches,	2¾	3	3½	3¾	4	5	6
Prices, each	$5.25	$6.00	$7.00	$8.00	$9.00	$13.00	$18.50

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CHECK VALVES, IRON BODY, BRASS MOUNTED.

HORIZONTAL, SCREWED.

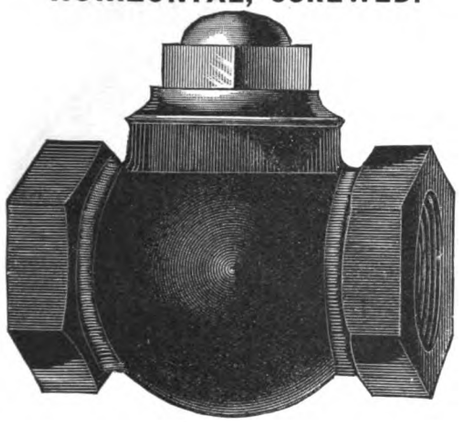


FIG. 5927.

ANGLE, SCREWED.

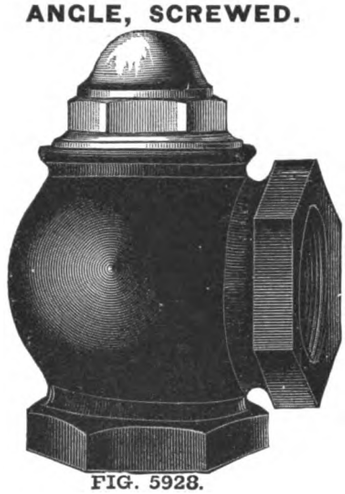


FIG. 5928.

HORIZONTAL, FLANGED.

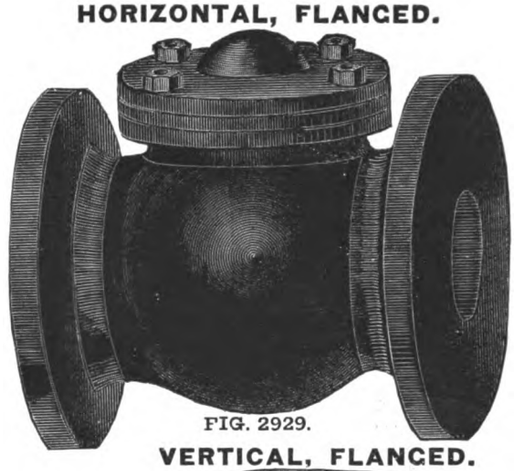


FIG. 2929.

ANGLE, FLANGED.



FIG. 5930.

VERTICAL, SCREWED.

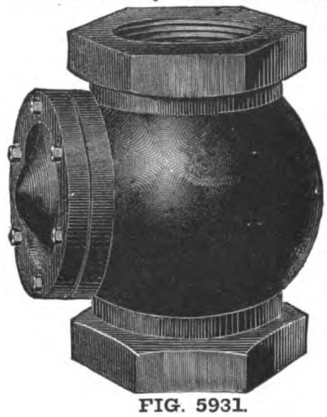


FIG. 5931.

VERTICAL, FLANGED.

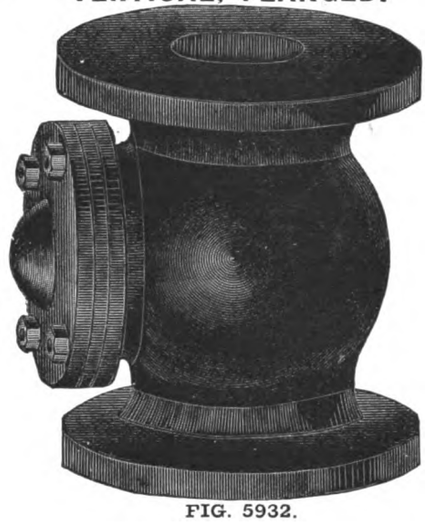


FIG. 5932.

PRICES, FIGS. 5927 TO 5932.

Size.....inches,	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	10	12	14
Horizontal and angle check valves, screwed	.....	$1.50	$2.25	$2.75	$3.75	$6.25	$9.75	$12.75	$15.00	$20.00	$24.00	$33.00	$55.00	$65.00	$110.00	$170.00	.....
Horizontal and angle check valves, flanged.	.....	2.50	3.50	4.25	5.50	8.25	12.75	16.25	19.00	24.00	28.00	38.00	60.00	71.00	120.00	190.00	$300.00
Vertical check valves, screwed.....	.....	.....	.....	.....	4.75	7.50	11.25	14.50	17.00	22.00	26.50	36.00	58.00	69.00	.....	.....	.....
Vertical check valves, flanged.....	.....	.....	.....	.....	6.50	9.50	14.25	18.00	21.00	26.00	30.50	41.00	63.00	75.00	.....	.....	.....

VERTICAL CHECK VALVES.

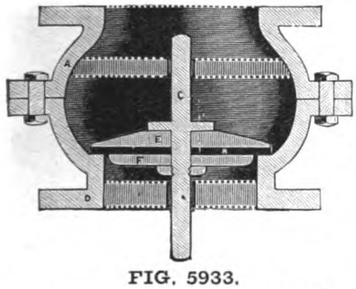


FIG. 5933.

REPRESENTS 8 INCH AND UNDER.

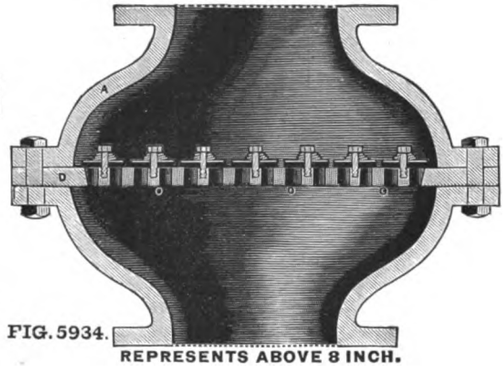


FIG. 5934.

REPRESENTS ABOVE 8 INCH.

PRICES, FIGS. 5933 AND 5934.

Check valves.				Measurements.				
Size.	Screw socket.	Flange.	Hub.	Diameter of standard flange.	Face to face of screw socket.	Face to face of flanges.	End to end of hubs.	Depth of hub.
Inches.				Inches.	Inches.	Inches.	Inches.	Inches.
2	$7.50	$8.00	$8.00	6½	7⅜	5⅛	9½	2⅛
2½	8.00	8.50	8.50	7	7⅞	5½	9¾	2⅛
3	12.70	12.70	12.70	8	8⅛	6	11	2⅛
3½	.....	.....	.....	.....	.....	.....	.....	.....
4	16.50	16.50	16.50	9	10⅛	7⅜	12½	2⅝
5	22.50	22.00	22.00	10	12⅛	9⅜	16⅜	3⅛
6	29.00	28.00	30.00	11	13½	10½	17¾	3½
7	32.50	31.50	35.00	.....	.....	.....	.....	.....
8	37.00	36.50	39.00	13	14	10⅜	19¾	4⅛
10	83.50	83.50	85.50	16	15	13	20⅜	4½
12	108.00	108.00	110.00	18	... .	14¾	21⅝	4⅝
14	.....	150.00	152.00	21	.....	17¼	25½	4¼
16	.....	200.00	203.00	23	.....	18½	27½	4¼
18	....	240.00	243.00	25	.....	20¾	29¼	4½
20	.....	275.00	278.00	27	.....	22	32	5
24	.....	420.00	425.00	31	.....	24	35	5⅝
30	.....	800.00	810.00	38	.....	28	40	6

LOCOMOTIVE INSIDE CHECK VALVE.

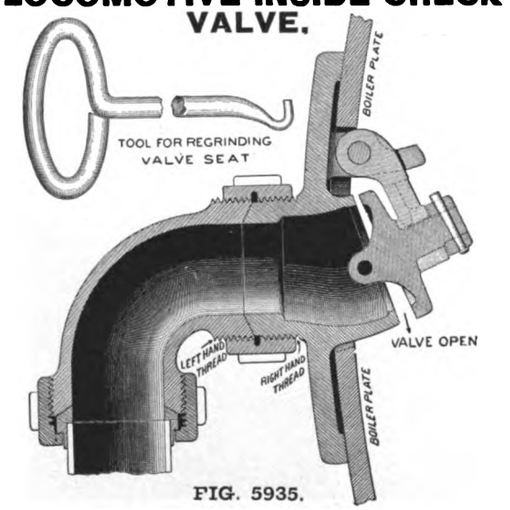


FIG. 5935.

LOCOMOTIVE SIZE. PRICE, PER PAIR, $30.00.

This valve, being located inside of the boiler, is absolutely protected in case of collision or other accident, and will be certain to prevent such loss of life as has occurred where the feed-pipe connections have been broken off.

It is always accessible, and can easily be reground when necessary.

It cannot be tampered with, or damaged by the engineer or fireman hammering on the valve chamber, as often happens when outside valves do not seat

It is made of the best steam metal.

The elbow can be turned in any direction.

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STRAIGHT WAY SWINGING CHECK VALVES.

BRASS VALVES, WITH BRASS, LEATHER OR ASBESTOS DISKS.

SECTIONAL VIEW.

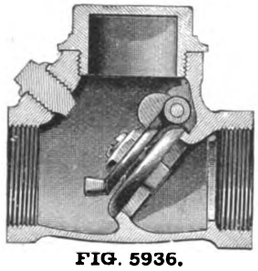


FIG. 5936.

HORIZONTAL OR VERTICAL PATTERN.

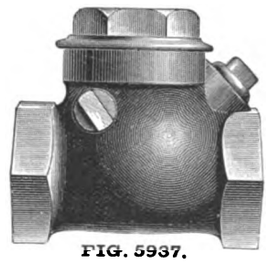


FIG. 5937.

Sizes.....In.	¼	⅜	½	¾	1
Check valves	$1.25	$1.25	$1.30	$1.75	$2.25
Brass, asbestos or leather disks	.12	.14	.18	.20	.24
Sizes.....In.	**1¼**	**1½**	**2**	**2½**	**3**
Check valves	$3.25	$4.25	$6.25	$11.50	$16.00
Brass, asbestos or leather disks	.36	.50	.75	1.00	1.25

IRON BODY, BRASS MOUNTED, SCREWED OR FLANGED.

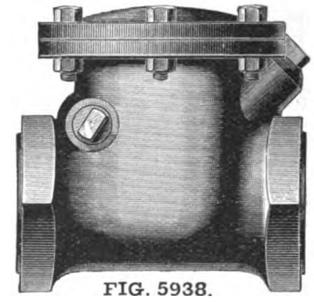


FIG. 5938.

Sizes.....In.	2	2½	3	3½	4	5
Screwed	$6.25	$10.00	$12.00	$16.00	$18.00	$25.00
Flanged	6.25	10.00	12.00	16.00	18.00	25.00
Brass, asb. or leather disks	.75	1.00	1.25	1.50	1.80	2.50
Sizes.....In.	**6**	**7**	**8**	**10**	**12**	
Screwed	$32.00	$41.00	$50.00	$65.00	$95.00	.....
Flanged	32.00	41.00	50.00	65.00	95.00	.....
Brass, asb. or leather disks	3.00	3.60	4.20	5.40	6.00	.....

BELL ENDS, IRON BODY, BRASS MOUNTED.

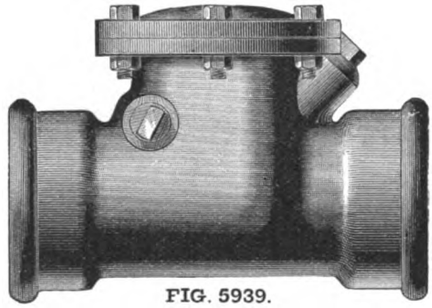


FIG. 5939.

Sizes.....In.	2	3	4	5	6
Bell ends	$6.25	$12.00	$18.00	$25.00	$32.00
Brass, asb. or leather disks	.75	1.25	1.80	2.50	3.00
Sizes.....In.	**7**	**8**	**10**	**12**	
Bell ends	$41.00	$50.00	$65.00	$95.00	.....
Brass, asb. or leather disks	3.60	4.20	5.40	6.00	.....

HORIZONTAL CHECK VALVES, SCREWED, FLANGED OR HUBBED.

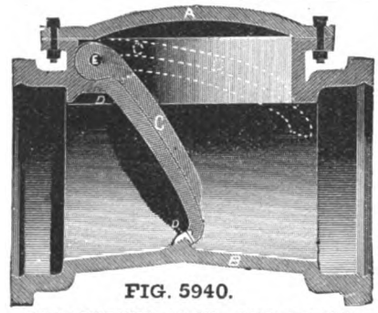


FIG. 5940.

REPRESENTS 16 IN. AND BELOW.

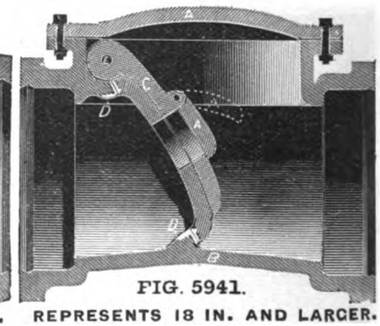


FIG. 5941.

REPRESENTS 18 IN. AND LARGER.

PRICES, FIGS. 5940 AND 5941.

Brass mounted. Size.	Screw socket.	Flange.	Hub.	Measurements. Diameter of standard flange.	Face to face of flanges.	Face to face of screw socket.	End to end of hubs.	Depth of hubs.
Inches.				Inches.	Inches.	Inches.	Inches.	Inches.
2½	$7.75	.....	.....	7	8⅝	7⅝	9½	2¼
3	9.75	$11.00	$10.25	8	9⅛	9	11¾	2¾
3½	14.50	15.50	14.25	8½	9¾	9⅜	11¾	2⅞
4	20.50	21.50	20.50	9	11¾	9⅞	13⅜	2⅞
5	25.50	27.00	25.00	10	13⅛	13	15	3
6	31.00	32.50	28.50	11	14½	13⅜	16	3
8	44.50	46.00	43.00	13	17¾	16¼	19	3¼
10	77.50	76.50	73.00	16	21½	.....	24	3½
12	97.00	95.00	92.00	18	24½	.....	26½	3¼
14	.....	150.00	146.00	21	26	.....	29	3½
16	.....	165.00	160.00	23	29	.....	31	3½
18	.....	230.00	225.00	25	31¾	.....	34½	3¾
20	.....	285.00	280.00	27	35¼	.....	38	4
24	.....	400.00	390.00	31	39¾	.....	44½	4¾
30	.....	1,200.00	1,120.00	38	59¾	.....	71	5½
36	.....	1,890.00	1,825.00	44	68	.....	79½	5½

The bottom of the case, B, is so constructed, being flattened and raised toward the seat, that it shall not serve as a pocket or receptacle for stones and gravel. Such substances are easily carried through by the current. The valve faces, D, D, are bronze. The boxes in which hinge, E, works are also bronze. The gate, C, can be taken out by removing the cover, A. Fig. 5941 shows the gate used in valves from 18 inch, inclusive, and upward, A being a secondary or relief gate, which can open before the main gate does.

These valves above 12 inch are made with by-passes.

BRASS SWING JOINTS.

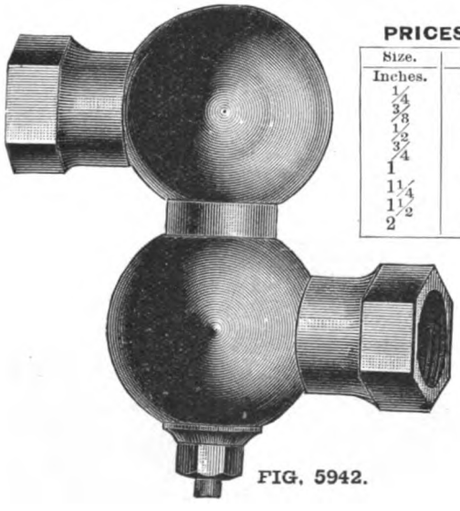


FIG. 5942.

PRICES, FIG. 5942.

Size.	Rough.	Finished.
Inches.		
¼	$1.00	$1.25
⅜	1.25	1.50
½	1.75	2.00
¾	2.40	2.75
1	3.50	4.00
1¼	4.50	5.00
1½	6.25	7.00
2	9.00	10.00

BRASS EXPANSION JOINTS.

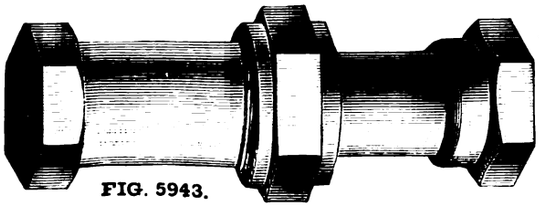


FIG. 5943.

PRICES, FIG. 5943.

Size.....In.	¼	⅜	½	¾	1
Length of traverse.....In.	1½	1½	1½	1¾	2
Each	$1.10	$1.25	$1.50	$2.00	$2.75
Size.....In.	**1¼**	**1½**	**2**	**2½**	**3**
Length of traverse.....In.	2½	2½	3	4	5
Each	$4.00	$5.50	$8.00	$16.00	$24.00

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EXPANSION JOINTS, IRON BODY, BRASS MOUNTED.

SCREWED.

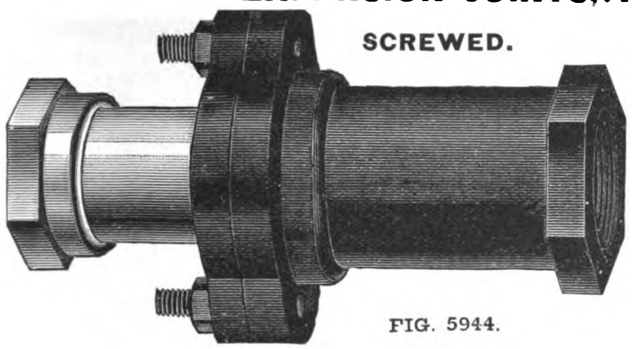


FIG. 5944.

PRICES.

Size.....inches,	1¼	1½	2	2½	3	3½
Length of traverse, inches,	3	3	3	4½	5½	5½
Each.....$	8.00	9.00	11.00	13.00	17.50	25.00

Size.....inches,	4	5	6	8	10
Length of traverse, inches,	5½	6	7	8	10
Each.....$	30.00	45.00	55.00	100.00	185.00

FLANGED.

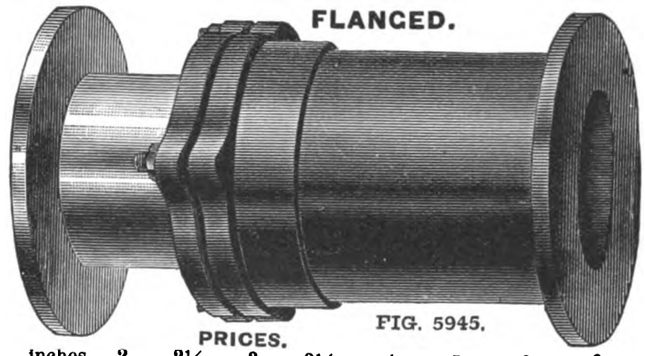


FIG. 5945.

PRICES.

Size.....inches,	2	2½	3	3½	4	5	6	8	10
Length of traverse, "	3	4½	5½	5½	5½	6	7	8	10
Each.....$	18.00	20.00	25.00	35.00	40.00	55.00	65.00	110.00	200.00

CORRUGATED COPPER EXPANSION JOINTS.

SCREWED.

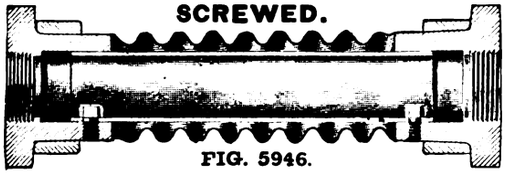


FIG. 5946.

FLANGED.

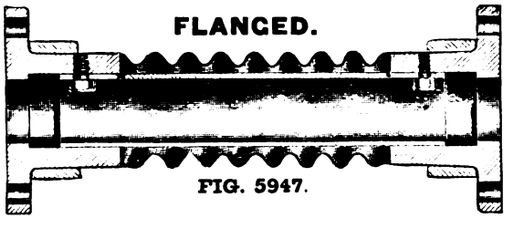


FIG. 5947.

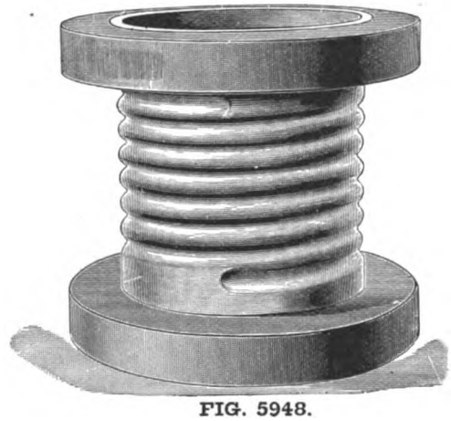


FIG. 5948.

These joints are our regular expansion joints, with soft corrugated copper tubes, which close with the expansion and open with the contraction of the line of pipe in which they are placed. They have an inside wrought iron tube used to stiffen, with 1½ inch travel at the flange heads. Made with either flange, drilled or blank, or screwed ends for standard pipe size, and are designed to overcome the expansion and contraction in 60 feet of pipe.

PRICES, FIGS. 5946 AND 5947.

Size .....inches,	1	1½	2	2½	3	4	5
Prices.....	$20.00	$25.00	$30.00	$35.00	$50.00	$65.00	$70.00

Size .... inches,	6	7	8	10	12	14
Prices...	$80.00	$100.00	$125.00	$150.00	$180.00	$200.00

Dimensions, flanged ends.							Screwed ends.		
Size of joint	Length of joint.	Diameter of flange.	Thickness of flange.	Diam. of bolt circle.	No. of bolts.	Diam. of bolts.	Size of joint.	Length of joint.	Distance across flats of head.
1½ in.	18 in.	5½ in.	⅝ in.	4½ in.	4	½ in.	½ in.	12 in.	2¼ in.
2 "	24 "	6½ "	¾ "	5¼ "	4	⅝ "	¾ "	12 "	2¾ "
2½ "	24 "	7 "	1 "	5¾ "	4	⅝ "	1 "	18 "	3¼ "
3 "	30 "	7½ "	1 "	6¼ "	4	⅝ "	1½ "	18 "	3¾ "
3½ "	30 "	8 "	1 "	6¾ "	4	⅝ "	2 "	24 "	4½ "
4 "	36 "	9 "	1¼ "	7¾ "	6	⅝ "	2½ "	24 "	5 "
4½ "	36 "	10 "	1¼ "	8¼ "	6	⅝ "	3 "	30 "	5½ "
5 "	36 "	10 "	1¼ "	8¾ "	6	⅝ "	3½ "	30 "	6¼ "
6 "	42 "	11 "	1¼ "	9¾ "	6	⅝ "	4 "	36 "	6¾ "
7 "	42 "	13 "	1½ "	11½ "	6	¾ "	4½ "	36 "	7¼ "
8 "	48 "	14 "	1¼ "	12¼ "	8	¾ "	5 "	36 "	7¾ "
10 "	48 "	17 "	1¼ "	15 "	8	¾ "	6 "	42 "	9 "
12 "	48 "	19 "	1½ "	17 "	8	1 "	7 "	42 "	10¾ "
14 "	48 "	21 "	1½ "	19¼ "	10	1 "	8 "	48 "	11¾ "
.....	.....	.....	.....	.....	.....	.....	10 "	48 "	14 "
.....	.....	.....	.....	.....	.....	.....	12 "	48 "	16 "
.....	.....	.....	.....	.....	.....	.....	14 "	48 "	18 "

DESCRIPTION, FIG. 5948.

These joints are designed for use between the cylinders of compound duplex, triple, and in fact any number of cylinder engines or pumps. They are made of seamless drawn corrugated copper tubing, fastened to heavy cast-iron heads. The tube is flanged over and turned into a groove cut in the heads, as shown in the above cut. This forms a narrow strip of copper which makes an excellent packing when the joint is bolted in place. They are used extensively by the largest manufacturers of compound cylinder pumping engines, and many others. As pumps connected with this joint are not forced out of line by the expanding and contracting of the pipes, the pipes are saved from strain or leakage by their use, and they are invaluable, both to the manufacturer and the engineer.

FOOT VALVES.

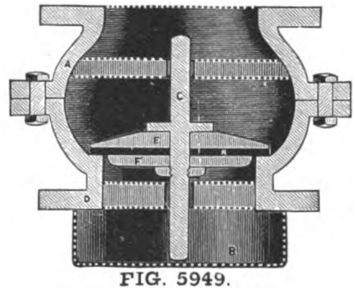


FIG. 5949.

REPRESENTS 8 INCH AND UNDER.

FOOT VALVES, ABOVE 10 INCH.

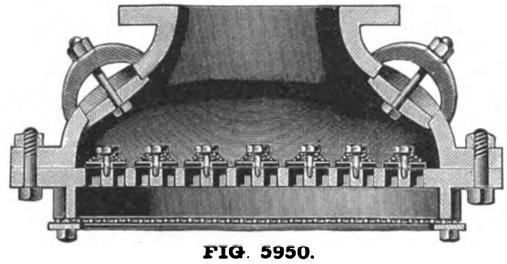


FIG. 5950.

The bolts, springs and plates in these valves are brass.

PRICES, FIGS. 5949 AND 5950.

Foot valves.				Measurements.				
Size.	Screw socket.	Flange.	Hub.	Diam. of standard flange.	Face of screw so'k't to strainer.	Face of flange to strainer.	End of hub to strainer.	Depth of hubs.
2 in.	$11.50	$11.75	.....	6½ in.	9⅛ in.	8 in.	10¼ in.	2¼ in.
2½ "	12.00	12.25	....	7 "	9¼ "	8⅝ "	10⅞ "	2¼ "
3 "	16.25	16.25	....	8 "	11 "	9¾ "	12¼ "	2½ "
4 "	20.00	20.00	.....	9 "	12⅛ "	11¼ "	13⅞ "	2⅝ "
5 "	26.25	25.75	.....	10 "	14⅝ "	13½ "	16⅝ "	3½ "
6 "	33.00	32.50	$33.25	11 "	15⅝ "	14¼ "	17¾ "	3½ "
7 "	38 50	38.00	39.00	.....	.....	.....	.....	.....
8 "	44.75	43.50	46 50	13 "	15¾ "	14½ "	18¾ "	4¼ "
10 "	82.00	82.00	83.00	16 "	.....	10 "	13¼ "	4½ "
12 "	113.00	112.00	113.00	18 "	.....	11 "	14¼ "	4¼ "
14 "	.....	145.00	147.00	21 "	.....	12¾ "	16¾ "	4¼ "
16 "	.....	190.00	193.00	23 "	.....	13¼ "	17⅝ "	4¼ "
18 "	.....	235.00	238.00	25 "	.....	13⅝ "	18⅛ "	4½ "
20 "	.....	265.00	268.00	27 "	.....	15¼ "	20¼ "	5 "
24 "	.....	400.00	405.00	31 "	.....	16⅝ "	22⅛ "	5½ "
30 "	.....	780.00	790.00	38 "	.....	21 "	27 "	6 "

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FOOT VALVES AND STRAINERS.

BRASS SCREWED.



FIG. 5951.

IRON BODY, SCREWED.

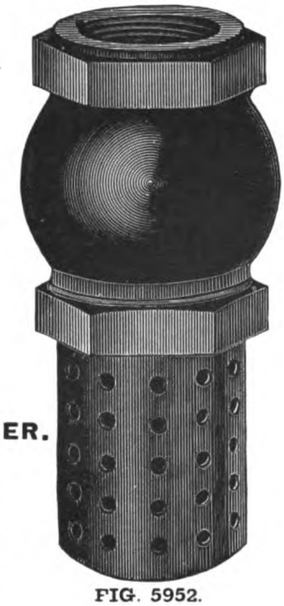


FIG. 5952.

BRASS MOUNTED, FLANGED.

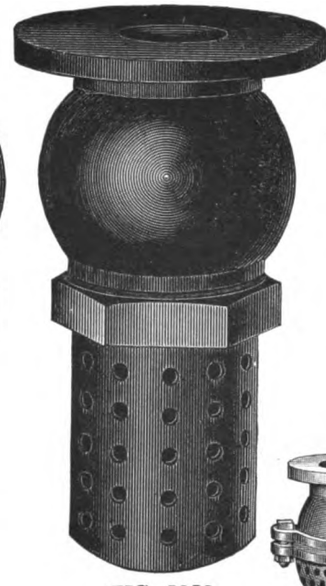


FIG. 5953.

PRICES, FIG. 5951.

Size	¾	1	1¼	1½	2	2½	3 in.
Rough, each.	$1.50	2.00	2.75	3.75	5.50	12.00	16.00

PRICES, FIG. 5952.

Size	¾	1	1¼	1½	2	2½	3 in.
Each	$1.25	1.50	1.75	2.50	3.25	4.25	5.50

Size	3½	4	4½	5	6	8 in.
Each	$7.50	10.00	12.00	13.00	24.00	50.00

PRICES, FIG. 5953.

Size	¾	1	1¼	1½	2	2½	3 in.
Each	$2.00	2.50	3.00	4.00	5.00	6.25	8.50

Size	3½	4	4½	5	6	8 in.
Each	$11.00	14.00	16.00	17.00	29.00	56.00

PRICES, EACH, FIG. 5954.

Size	1	1¼	1½	2	2½	3 in.
Plain	$0.40	.50	.75	1.00	1.50	2.00
Galvanized	.50	.75	1.00	1.50	2.00	3.00

Size	3½	4	5	6	8 in.
Plain	$3.00	3.75	4.75	6.50	13.00
Galvanized	4.50	6.00	7.00	10.00	20.00

CAST IRON STRAINER.

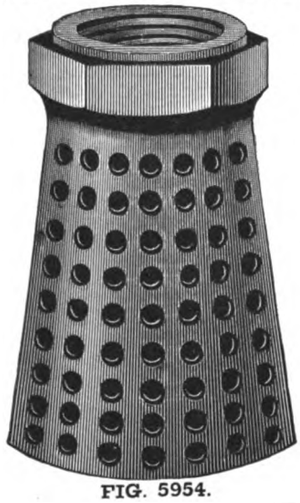


FIG. 5954.



FIG. 5955.

FLANGED FOOT VALVE AND STRAINER.

PRICES, FIG. 5955.

Size	3	4	5	6	8	10 in.
Plain	$2.85	3.75	5.10	7.65	18.48	29.40
Galvanized	4.30	5.85	8.60	12.00		

SCREWED FOOT VALVE AND STRAINER.

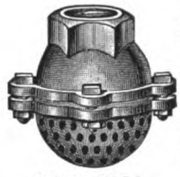


FIG. 5956.

PRICES, FIG. 5956.

Size	¾	1	1¼	1½	2	2½	3	3½	4	5	6 in.
Plain	$0.40	.42	.46	.58	.78	1.22	1.70	2.75	2.75	4.30	6.40
Galvanized.	.62	.64	.76	1.02	1.46	2.25	2.95	4.70	4.70	7.20	10.80

PRICES, EACH, FIG. 5957.

Size	3	3½	4	5	6	8 in.
Screwed.....each,	$5.50	7.50	10.00	13.00	24.00	50 00
Flanged..... "	8.50	11.00	14.00	17.00	29.00	56.00

SCREWED OR FLANGED FOOT VALVES AND STRAINERS.

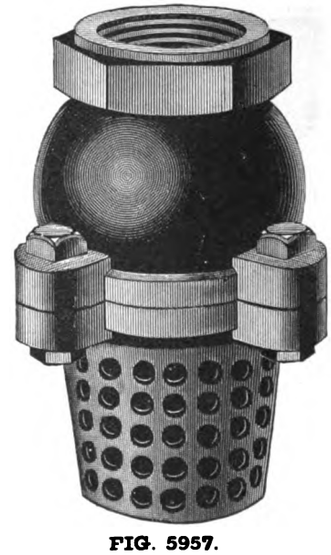


FIG. 5957.

GALVANIZED WROUGHT IRON FLANGED. STRAINERS.

SOCKET JOINT.

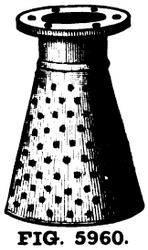


FIG. 5960.



FIG. 5961.

SCREWED.



FIG. 5962.

PRICES, FIGS. 5960 TO 5962.

Diameter suction pipe.	Prices, each. Screw nipple joint. Fig. 5962.	Flange or socket joint. Figs. 5961 & 5962.
½ inch	$0.60	$0.65
¾ "	.70	.75
1 "	.85	.95
1¼ "	1.15	1.25
1½ "	1.45	1.60
2 "	2.00	2.25
2½ "	2.85	3.40
3 "	3.45	4.25
3½ "	4.60	5.15
4 "	5.75	6.65
5 "	6.85	8.00
6 "	8.00	9.75
7 "	.....	11.45
8 "	.....	14.90
9 "	.....	20.60
10 "	.....	23.00
11 "	.....	26.30
12 "	.....	28.60

MUSHROOM STRAINERS. FOR SPIRAL RIVETED PIPE.

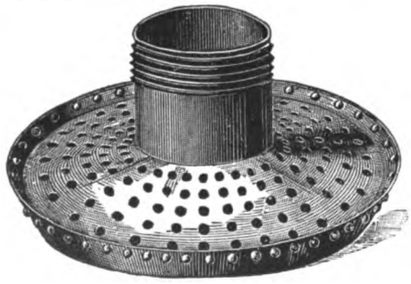


FIG. 5963.

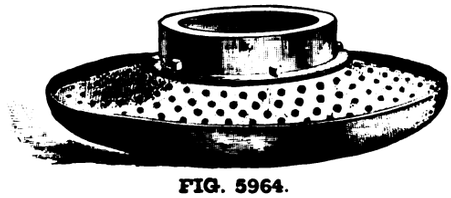


FIG. 5964.

PRICES, FIGS. 5963 AND 5964.

Diameter.	Black malleable nipple joint.	Galvanized malleable nipple joint.	Galvanized wrought iron nipple joint.
1 inch suction pipe.....each.	$0.85	$1.02	.....
1¼ " " " ..... "	1.10	1.35	.....
1½ " " " ..... "	1.25	1.50	.....
2 " " " ..... "	1.61	2.00	.....
2½ " " " ..... "	2.05	2.50	.....
3 " " " ..... "	2.75	3.41	.....
4 " " " ..... "	5.00	6.07	$9.00
5 " " " ..... "	10.00	12.54	10.50
6 " " " ..... "	11.00	13.60	12.50
7 " " " ..... "	17.32	22.26	18.00
8 " " " ..... "	18.22	23.30	21.00
9 " " " ..... "	25.23	30.00	27.00
10 " " " ..... "	26.53	32.00	37.00

Galvanized wrought iron with flange joint, 10 per cent. advance on above list.
Larger sizes made to order.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREETS, NEW YORK.

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PRESSURE REDUCING AND REGULATING VALVES.

WATSON'S PRESSURE REGULATOR.

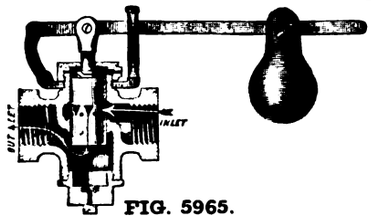


FIG. 5965.

PRICES.

Brass regulators which are made screwed ends only.

1	inch	$17.00	2½	inches	$55.00
1¼	"	22.00	3	"	70.00
1½	"	28.00	4	"	90.00
2	"	38.00			

Iron bodies, brass lined, screwed ends only.

2	inches	$38.00	2½	inches	$55.00

Iron body and brass lined, made with flanges, also tapped for screwing, and can be used either way.

3	inches	$70.00	6	inches	$150.00
4	"	90.00	7	"	180.00
5	"	110.00	8	"	230.00

In ordering regulators, if possible, state boiler pressure, and something near the pressure used on the light side; also the use to which you intend to apply the regulator.

MERRILL'S.

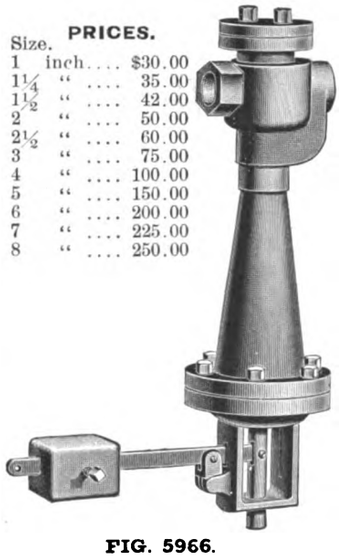


FIG. 5966.

PRICES.

Size.		
1	inch	$30.00
1¼	"	35.00
1½	"	42.00
2	"	50.00
2½	"	60.00
3	"	75.00
4	"	100.00
5	"	150.00
6	"	200.00
7	"	225.00
8	"	250.00

CURTIS PRESSURE REGULATOR.

DESCRIPTION, FIG. 5967.

This pressure regulator will automatically control the pressure of steam, water or gas, at any point desired, regardless of the variation of the initial pressure, occupying no more space than any globe valve.

PRICES.

1	inch	$22.00
1¼	"	28.00
1½	"	35.00
2	"	44.00
2½	"	57.00
3	"	72.00
4	"	100.00
5	"	135.00
6	"	180.00
7	"	225.00
8	"	275.00
9	"	350.00
10	"	425.00
12	"	600.00
14	"	800.00
15	"	900.00
16	"	1,000.00

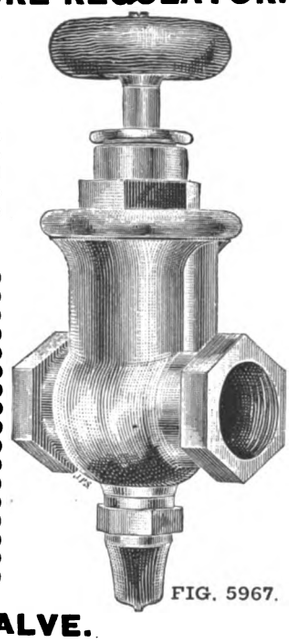


FIG. 5967.

FOSTER PRESSURE REGULATOR AND REDUCING VALVE.

FOR CAR HEATING.

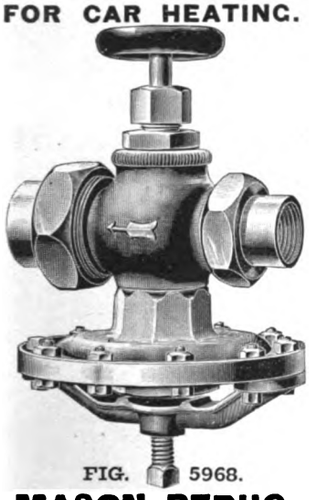


FIG. 5968.

PRICES, FIG. 5969.

Size.		
1	inch	$22.00
1¼	"	28.00
1½	"	35.00

PRICES, FIG. 5970.
FLANGED ENDS.*

2	inch	$50.00
2½	"	63.00
3	"	78.00
4	"	110.00
5	"	145.00
6	"	190.00
8	"	295.00
10	"	420.00
12	"	575.00

SCREWED ENDS.

2	inch	$47.00
2½	"	60.00
3	"	75.00
4	"	105.00
5	"	140.00
6	"	180.00

* The price of the 3½ inch, 4½ inch, 5½ inch, 7 inch and 9 inch valves is the same as that of the 4 inch, 5 inch, 6 inch, 8 inch and 10 inch respectively. Larger sizes to order.

IRON BODIES AND BRASS MOUNTED.

SCREWED.

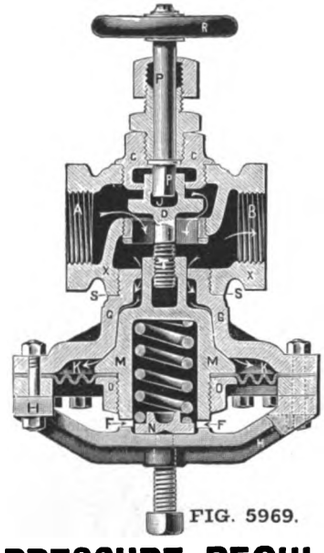


FIG. 5969.

FLANGED.

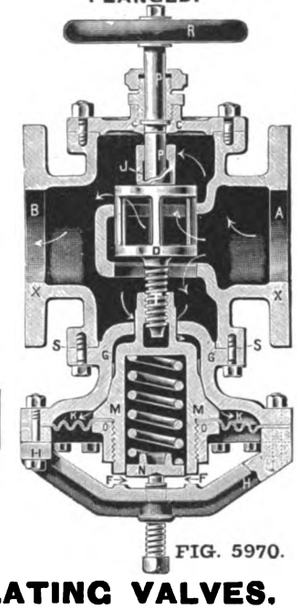


FIG. 5970.

MASON REDUCING VALVE.

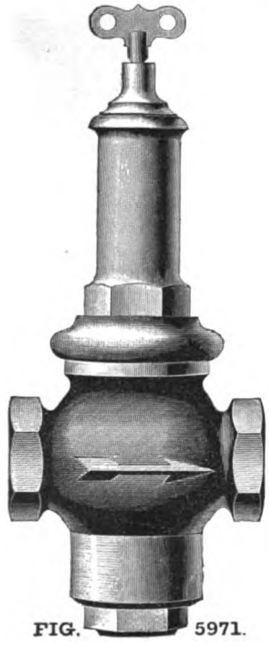


FIG. 5971.

DESCRIPTION, FIG. 5968.

For car heating from locomotive. Inlet and outlet connections made to suit.

PRICE.

All brass	$28.00

PRICES, FIG. 5971.

Size pipe.		
½	inch	$15.00
¾	"	18.00
1	"	22.00
1¼	"	28.00
1½	"	35.00
2	"	44.00
2½	"	57.00
3	"	72.00
4	"	100.00
5	"	135.00
6	"	180.00
8	"	250.00

EUREKA PRESSURE REGULATING VALVES.

DESCRIPTION, FIG. 5972.

The diaphragm is made of the most flexible and durable material in the market. The disks of the valve are so made as to produce a perfectly balanced valve. It has no waste pipe to cause extra waste of steam and water. It has no springs to get out of order. It gives the full area of the pipe. It makes little noise.

DIRECTIONS FOR CONNECTING.

Connect end of valve marked "Inlet" to the high pressure. Have the diaphragm underneath, so as to allow the water of condensation to remain on it, and also to prevent steam from coming in contact with it. Connect the short or slotted end of lever to the two lugs extending down through center of diaphragm, so that the two lugs extending down from the casing become the fulcrum. To adjust the weight so that the valve will give the desired pressure, move it in or out, as the case may demand, until the desired pressure is obtained, after which fasten the weight to the lever by setting up on the thumb-screw.

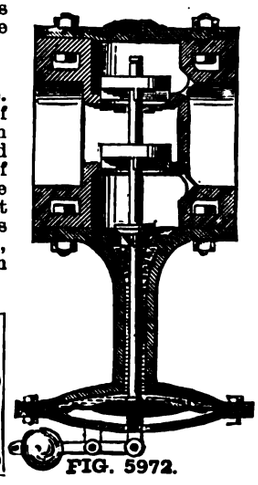


FIG. 5972.

PRICES.

Size of valve	1	1¼	1½	2	2½	3	4
Diameter of flanges	.....	.....	.....	.....	7	8	10
Distance, face to face of flgs.	.....	.....	.....	.....	7	8	10⅛
Prices	$22.00	$28.00	$35.00	$44.00	$57.00	$72.00	$100.00

Size of valve	5	6	7	8	9	10	12
Diameter of flanges	11	12	13	14	.....	16	18
Distance, face to face of flgs.	11¼	12¼	13¼	14¼	.....	16¼	18¼
Prices	$135.00	$180.00	$225.00	$275.00	$350.00	$350.00	$470.00

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PRESSURE REGULATING VALVES.

FOR LOW PRESSURE ONLY.

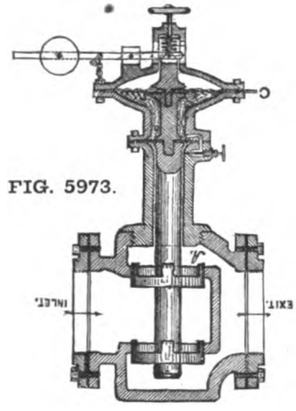


FIG. 5973.

FOR HIGH PRESSURE ONLY.

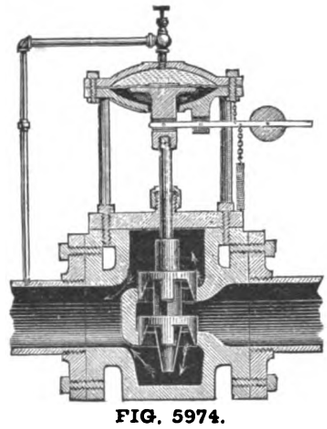


FIG. 5974.

PRICES, EITHER FIG. 5973 OR 5974.

Size, 1 inch	Price, $22.00	Size, 5 inch	Price, $135.00
" 1¼ "	" 28.00	" 6 "	" 180.00
" 1½ "	" 35.00	" 7 "	" 215.00
" 2 "	" 44.00	" 8 "	" 245.00
" 2½ "	" 57.00	" 9 "	" 280.00
" 3 "	" 72.00	" 10 "	" 335.00
" 3½ "	" 86.00	" 12 "	" 435.00
" 4 "	" 100.00	" 15 "	" 700.00
" 4½ "	" 117.00	" 18 "	" 850.00

WATER PRESSURE REGULATORS.

PRICES, FIG. 5976.

Prices, with union couplings for lead pipe.

¾ inch	$17.00
1 "	22.00
1¼ "	28.00
1½ "	35.00
2 "	44.00
2½ "	57.00
3 "	72.00

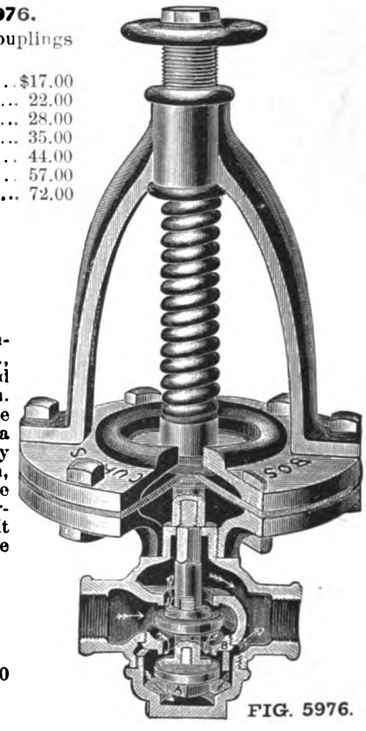


FIG. 5976.



FIG. 5975.

RICHARDSON'S WATER RELIEF VALVES, FIG. 5975.

This valve, as its title indicates, is designed to protect water chambers of steam fire engines, steam pumps, rotary pumps, fire hose, etc., from excessive pressure, due to the closing of gates or stop valves and the turning off of water at the hose nozzle while the pump is in motion. It gives the hoseman control of the stream at the end of the line, as the sudden shutting off of the water does not subject the hose or pump to a pressure greater than that at which the valve is set; thus damage by the bursting of the pipe or the hose is prevented. A night watchman, without assistance, can start a pump with safety. The outlet can be piped to the suction, making a "run around," as the valve case is watertight. By its use the needless flooding of buildings can be avoided. It is recommended and approved by all fire insurance companies. Made for either wheel or wrench adjustment on top of valve.

Will furnish valves for trial.

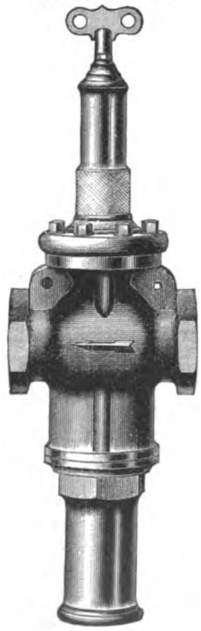
In ordering, state highest working pressure.

PRICES.

Diameter	1½ in.	2 in.	2½ in.	3 in.	3½ in.	4 in.	5 in.	6 in.
Prices	$30.00	$40.00	$55.00	$75.00	$85.00	$100.00	$125.00	$150.00

STEAM PUMP PRESSURE REGULATORS.

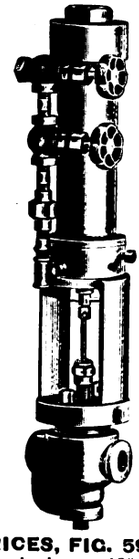
MASON'S.



PRICES, FIG. 5977.

½ inch	$17.00	2 inch	$55.00
¾ "	20.00	2½ "	68.00
1 "	25.00	3 "	85.00
1¼ "	30.00	4 "	115.00
1½ "	42.00		

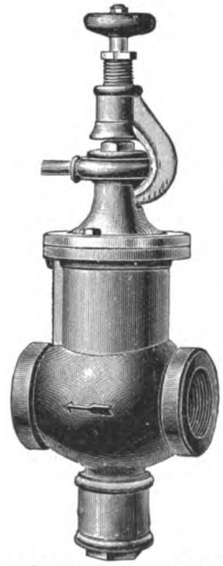
MERRILL'S.



PRICES, FIG. 5978.

1 inch	$30.00
1¼ "	35.00
1½ "	42.00
2 "	50.00
2½ "	60.00
3 "	75.00
4 "	100.00
5 "	150.00
6 "	200.00
7 "	225.00
8 "	250.00

CURTIS'S.



PRICES, FIG. 5979.

1 inch	$25.00
1¼ "	28.00
1½ "	35.00
2 "	44.00
2½ "	57.00
3 "	72.00
4 "	100.00
5 "	135.00
6 "	280.00

BALANCED PUMP REGULATORS.

PRICES, FIG. 5980.

1 inch	$7.50
1¼ "	10.00
1½ "	12.50
2 "	17.00
2½ "	22.00
3 "	31.00
3½ "	40.00
4 "	50.00
4½ "	60.00
5 "	70.00
6 "	100.00
7 "	140.00
8 "	200.00

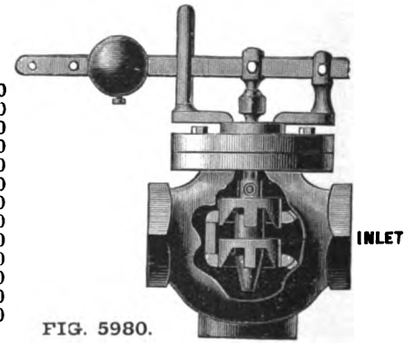


FIG. 5980.

ROBERTS' PUMP GOVERNOR.

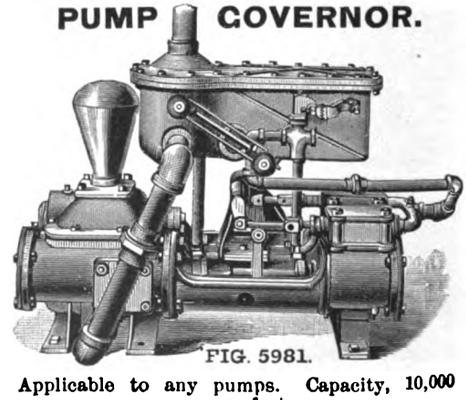


FIG. 5981.

Applicable to any pumps. Capacity, 10,000 square feet.

PRICE, $100.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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FOSTER'S AUTOMATIC PUMP GOVERNOR.

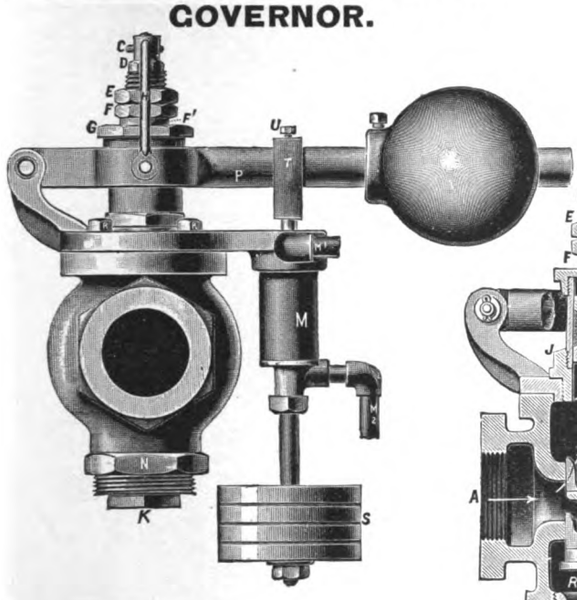


FIG. 5982.

It stops the pump by the discharged water pressure, and starts it when the pressure falls below that point. The regulator prevents the pump from "racing" under all conditions.

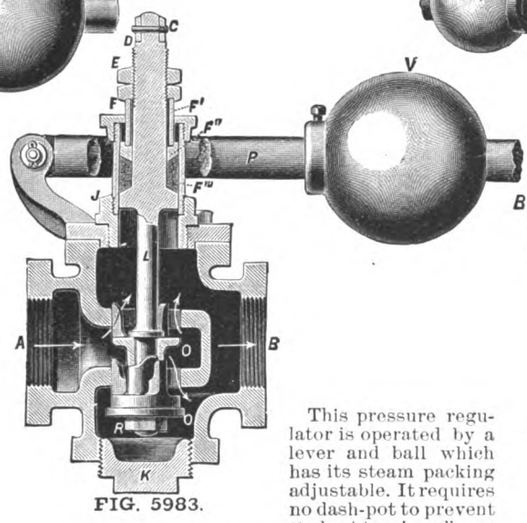


FIG. 5983.

This pressure regulator is operated by a lever and ball which has its steam packing adjustable. It requires no dash-pot to prevent "chattering" or "jumping." No drip or overflow is necessary to carry off escaping steam or water of condensation.

Adapted to 20 to 100 lbs. pressure.

FOSTER'S STEAM PRESSURE REGULATORS.

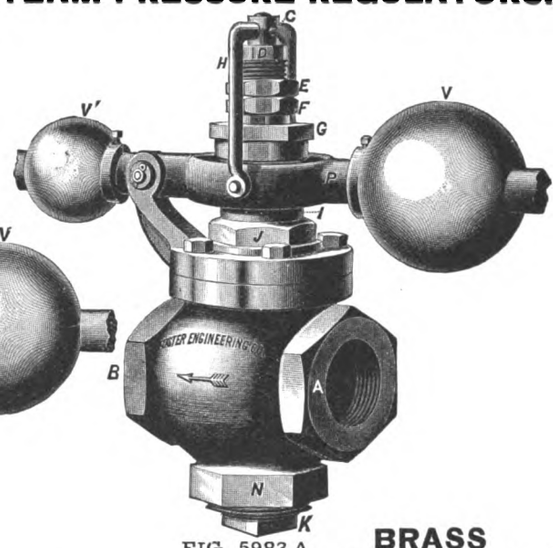


FIG. 5983 A.

Adapted exclusively for very low delivery pressures, from 0 to 30 lbs. Intended for steam heating, cooking kettles, etc. These valves are less liable to "stick" than piston valves; lever can be turned in either of four positions desired.

BRASS BALANCED VALVES.

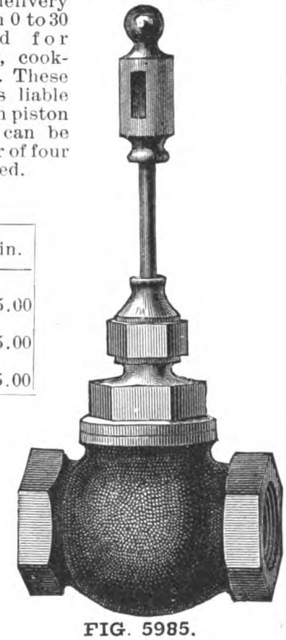


FIG. 5985.

PRICES.

Size..	1	1¼	1½	2 in.
Each.	$3.50	$5.00	$7.00	$10.00

PRICES.

Size	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	8 in.	10 in.	12 in.
Prices, Fig. 5982, screwed ends,	$30.00	$35.00	$40.00	$45.00	$55.00	$68.00	$80.00	$105.00	$145.00	$190.00			
" " " flanged "	.....	.....	.....	.....	58.00	72.00	85.00	110.00	150.00	200.00	$275.00	$400.00	$525.00
" " 5983, screwed "	.....	27.00	29.00	30.00	36.00	42.00	48.00	70.00	90.00	120.00			
" " " flanged "	.....	.....	.....	.....	38.00	44.00	50.00	73.00	95.00	125.00	200.00	300.00	385.00
" " 5983 A, screwed "	.....	30.00	33.00	35.00	42.00	48.00	55.00	80.00	100.00	135.00			
" " " flanged "	.....	.....	.....	.....	44.00	50.00	57.00	83.00	105.00	145.00	225.00	325.00	425.00

THROTTLE VALVES.

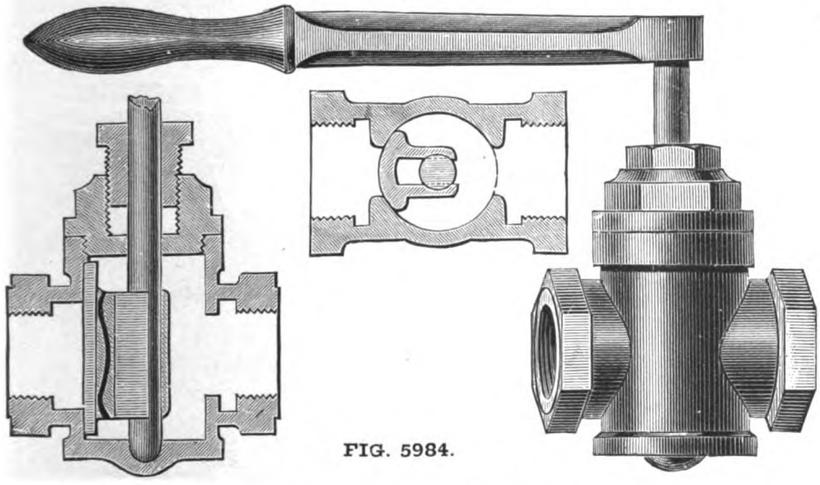


FIG. 5984.

BRASS PUMP VALVES, WITH AIR CHAMBER.

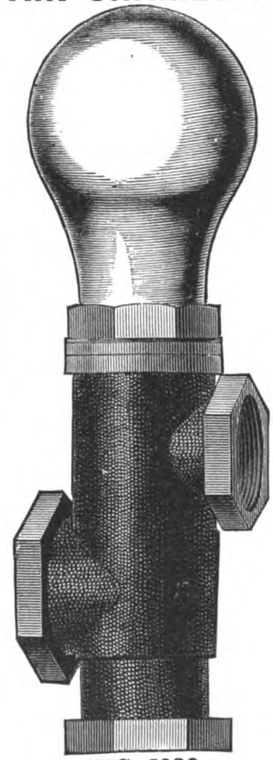


FIG. 5986.

PLAIN.

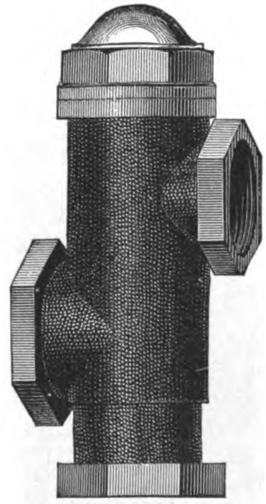


FIG. 5987.

PRICES, BRASS OR STEAM METAL.

Size.....	½	¾	1	1¼	1½	2	2½ in.
Each.....	$6.50	$7.50	$9.00	$11.00	$13.00	$20.00	$30.00

PRICES, IRON BODY, BRASS MOUNTED.

Size.....	1	1¼	1½	2	2½	3	3½	4 in.
Screwed, each,	$8.00	$10.00	$12.00	$18.00	$24.00	$32.00	$40.00	$48.00
Flanged, "	9.00	11.25	13.50	19.25	26.00	35.00	45.50	52.00

PRICES, FIGS. 5986 AND 5987.

Size	½	¾	1	1¼	1½ in.
Fig. 5987, each.....	$2.00	$3.00	$4.00	$6.00	$9.00
Fig. 5986, each, as shown or with side outlet.....	2.50	3.50	5.00	7.25	10.50

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BACK PRESSURE VALVES.

IRON BODY, BRASS MOUNTED.

SCREWED.

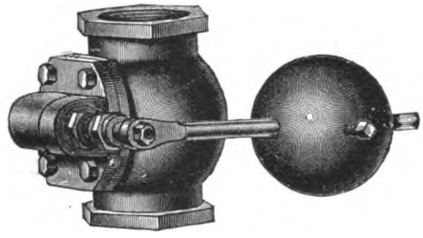


FIG. 5988.

FLANGED.

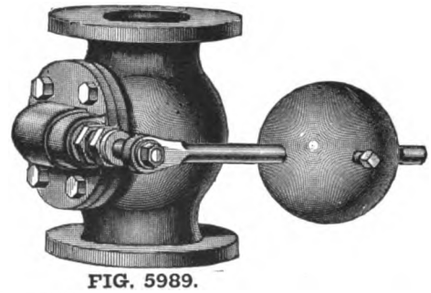


FIG. 5989.

PRICES, FIG. 5988.

Size	1½	2	2½	3	3½	4	4½ in.
Each	$7.00	$8.00	$10.50	$14.50	$18.00	$21.00	$28.00
Size		5	6	7	8	10	12 in.
Each		$32.00	$44.00	$75.00	$85.00	$135.00	$200.00

PRICES, FIG. 5989.

Size	1½	2	2½	3	3½	4	4½ in.
Each	$8.50	$9.75	$12.50	$17.50	$21.50	$25.00	$32.00
Size		5	6	7	8	10	12 in.
Each		$36.00	$49.00	$80.00	$91.00	$145.00	$220.00

PRICES, FIG. 5990.

Size	¾	1	1¼	1½	2	2½	3	3½	4	5	6 in.
Brass body, each	$3.00	$4.00	$5.00	$7.00	$10.00	$19.00	..	..	..	..	..
Iron body, each	..	..	..	..	..	$16.00	$20.00	$25.00	$30.00	$35.00	$40.00

LEVER THROTTLE VALVES.

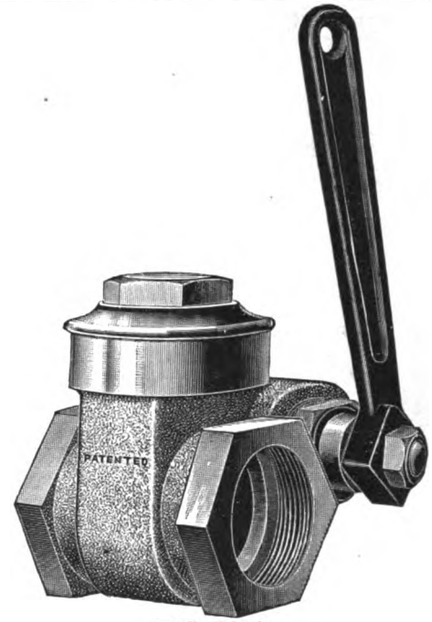


FIG. 5990.

Levers made on right or left side.

BUTTERFLY VALVES.

IRON BODY, BRASS MOUNTED.

ALL BRASS.

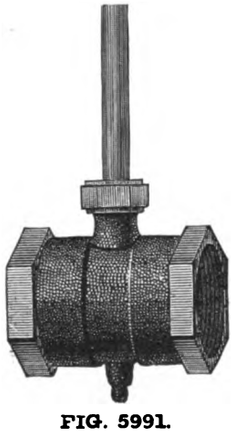


FIG. 5991.

SCREWED.

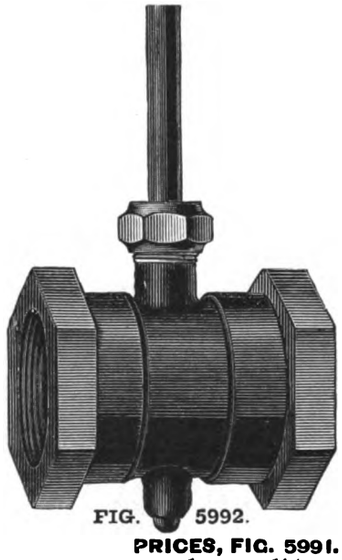


FIG. 5992.

FLANGED.

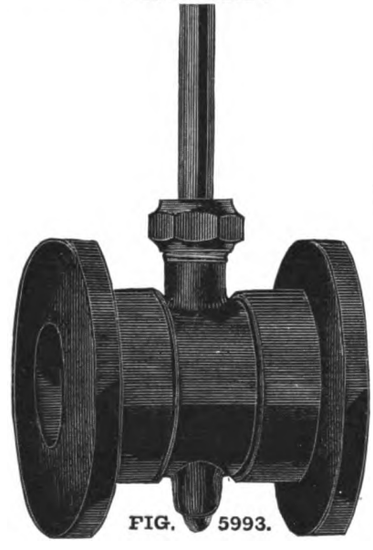


FIG. 5993.

PRICES, FIG. 5991.

Size	1	1¼	1½	2	2½	3 in.
Each	$3.50	$4.50	$5.50	$8.00	$11.00	$16.00

PRICES, FIG. 5992.

Size	1	1¼	1½	2	2½	3	3½	4 in.
Each	$3.00	$3.50	$4.50	$6.00	$8.00	$12.00	$16.00	$20.00

PRICES, FIG. 5993.

Size	1	1¼	1½	2	2½	3	3½	4 in.
Each	$4.00	$4.75	$6.00	$7.75	$10.00	$15.00	$19.50	$24.00

REGISTER VALVES.

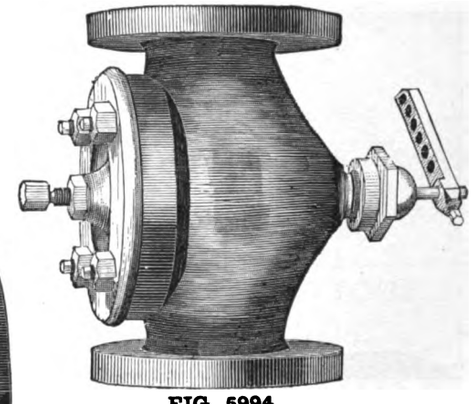


FIG. 5994.

PRICES, FIG. 5994.

Size.	Prices.	Diameter of flanges.	Length.
1½	$10.00	5½	7
2	12.00	6	8½
2½	15.00	7	9½
3	20.00	8	12
3½	24.00	9	13
4	30.00	10	14
5	40.00	11	16

1½, 2, 2½ and 3 inch, screwed or flanged.

SECTION.

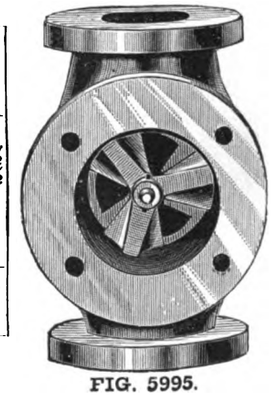


FIG. 5995.

FITTS CHRONOMETERS GOVERNOR VALVES.

PLAIN.

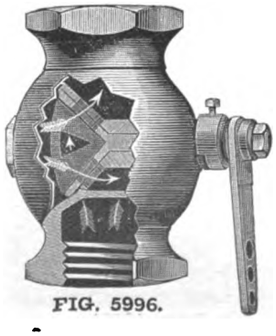


FIG. 5996.

WITH YOKE.

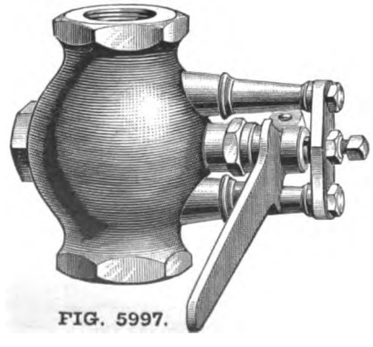


FIG. 5997.

PRICES, FIGS. 5996 AND 5997.

Sizes	¾	1	1¼	1½	2	2½	3	4	6
Iron body,	$5.50	$8.00	$11.00	$15.00	$20.00	$25.00	$35.00	$60.00	$120.00
Bronze "	7.00	10.00	14.00	20.00	28.00	37.00	55.00	.....	.....
Iron body, with yoke,	.....	.....	15.00	20.00	25.00	33.00	45.00	75.00	150.00
Bronze body, with yoke,	10.00	13.00	18.00	25.00	33.00	45.00	65.00	.....	.....

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GOLDSMITH THROTTLE VALVES, BRASS AND I. B. B. M.

STRAIGHTWAY.

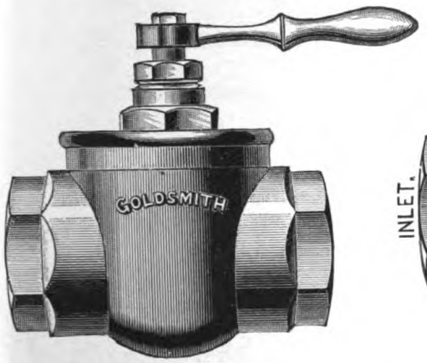


FIG. 5998.

ANGLE.

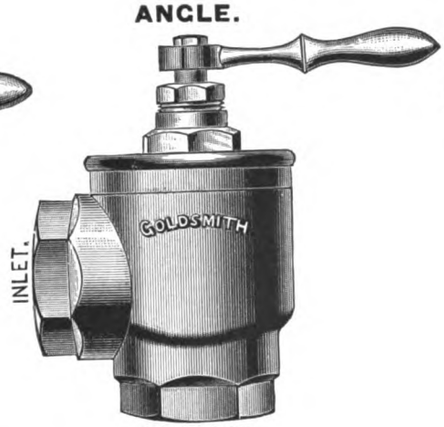


FIG. 5999.

PRICES.

Size, inches.	¾	1	1¼	1½	2	2½	3	4	5	6	7
Brass, screw ends, without auxiliary	$4.00	$6.00	$8.00	$10.00	$16.00	$26.00	$41.00	.....	.....	.....	.....
Brass, flange ends, without auxiliary	.....	.....	.....	.....	18.00	30.00	45.00	.....	.....	.....	.....
Brass, screw ends, with auxiliary	.....	.....	.....	.....	25.00	35.00	50.00	.....	.....	.....	.....
Brass, flange ends, with auxiliary	.....	.....	.....	.....	28.00	40.00	55.00	.....	.....	.....	.....
Iron body, screw ends, with auxiliary	.....	.....	.....	.....	15.00	22.00	30.00	$45.00	$75.00	$100.00	$130.00
Iron body, flange ends, with auxiliary	.....	.....	.....	.....	16.00	23.00	32.00	47.00	78.00	105.00	135.00
Distance end to end, screwed brass	3⅜	4½	5¼	5¾	7½	8½	9¾	.....	.....	.....	.....
Dis. end to end, screwed iron body	.....	.....	.....	.....	9¾	10½	12½	14½	16½	20¼	.....
Distance face to face, flanged brass	.....	.....	.....	.....	7½	9	10	.....	.....	.....	.....
Dis. face to face, flanged iron body	.....	.....	.....	.....	9½	10¾	12½	14	16	22	.....
Diameter of flanges	.....	.....	.....	.....	6	7	7½	9	10	11	13

BALANCE DISK GOVERNOR VALVE.

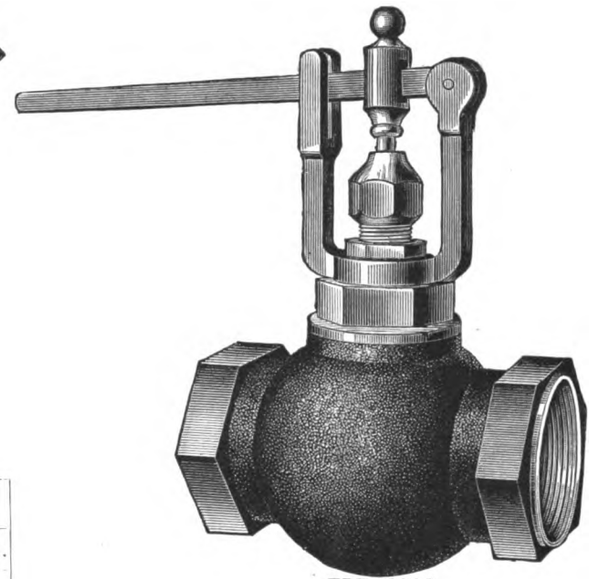


FIG. 6000.

PRICES.

Size, inches.	1	1¼	1½	2
Each, all brass	$3.00	$4.00	$5.40	$9.00

PRICES, FIG. 6001.

Size, inches.	¼	¾	1	1¼	1½	2	2½
Brass body, each	$1.60	$1.80	$2.50	$3.50	$5.00	$7.50	$13.50
Iron body, brass mounted, each	.....	.....	.....	.....	.....	9.00	12.00
All iron, each	.....	.....	.....	4.50	6.00	9.00	12.00

Size, inches.	3	3½	4	4½	5	6	8
Brass body, each	$19.00	$36.00	$60.00	$75.00	$96.00	$120.00	$175.00
Iron body, brass mounted, each	15.00	18.00	21.00	25.00	30.00	35.00	65.00
All iron, each	15.00	18.00	21.00	25.00	30.00	35.00	65.00

These valves are threaded for casing pipe and can be furnished in acid metal at special discount from above prices.

HANDY GATE VALVES.

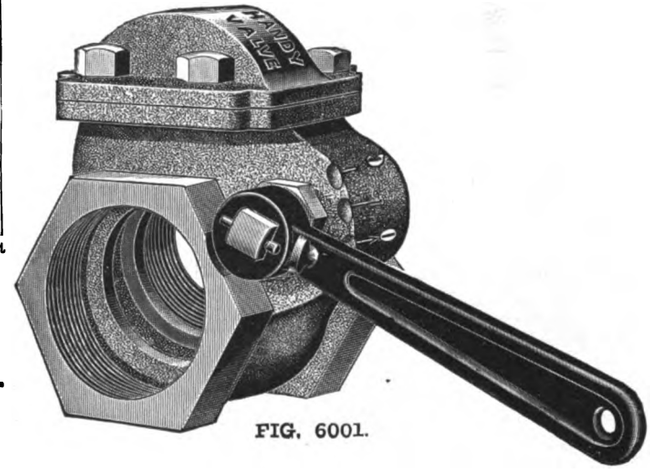


FIG. 6001.

LEVER CAM.

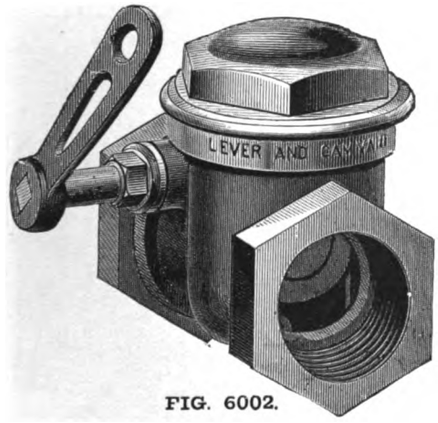


FIG. 6002.

PRICES.

BEST STEAM METAL.							
¼	⅜	1	1¼	1½	2	2½	3
$1.40	$1.80	$2.40	$3.00	$4.25	$6.50	$12.00	$17.00

IRON VALVES, BRASS MOUNTED.			
Size, inches.	2½	3	4
With screwed ends	$10.00	$17.50	$25.00
With flange ends	11.50	19.00	26.50

GATE VALVES.

BRASS HOSE VALVE.

DOUBLE GATE, WITH CAP AND CHAIN.

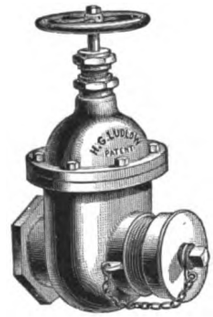
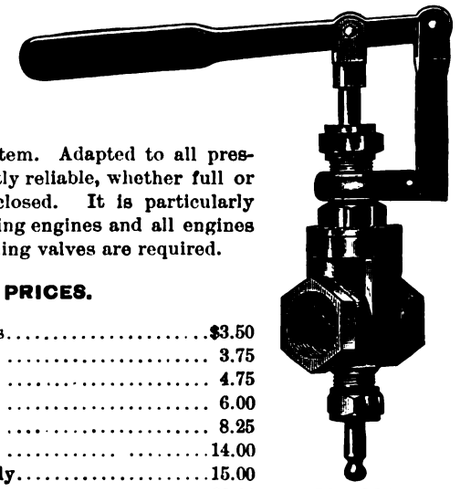


FIG. 6003.

PRICES.

Size, inches.	Double gate.	
	With cap and chain.	Without cap and chain.
1½	$7.00	$6.00
2	9.25	7.75
2½	14.50	13.00
2½	Heavy	pattern.

ROSS QUICK-OPENING LEVER VALVES.



With double stem. Adapted to all pressures and perfectly reliable, whether full or partly open or closed. It is particularly adapted for hoisting engines and all engines where quick-opening valves are required.

PRICES.

¾	inch,	all brass	$3.50
1	"	"	3.75
1¼	"	"	4.75
1½	"	"	6.00
2	"	"	8.25
2½	"	"	14.00
3	"	iron body	15.00
4	"	"	20.00

FIG. 6004.

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LUDLOW'S GATE VALVES.

ALL BRASS SCREWED OR FLANGED.

DOUBLE GATE.

1-2 TO 2 1-2.



FIG. 6005.

2 1-2 AND LARCER.

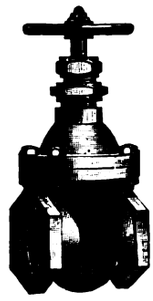


FIG. 6006.

SLIDE STEM AND LEVER.

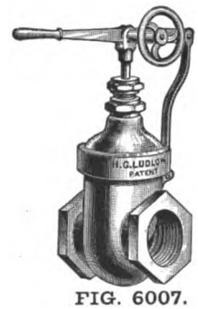


FIG. 6007.

PRICES, ALL BRASS, FIGS. 6005 TO 6007.

Size.	Screw socket.	Flange.	Diameter standard flange.	Face to face of screw socket.	Face to face of flanges.	Extra for slide stem and lever.
Inches.			Inches.	Inches.	Inches.	
¼	$1.40	.....	.....	2¼	.....	$0.80
¾	1.80	.....	.....	2½	.....	.80
1	2.35	.....	4	2⅞	3	.80
1¼	3.40	$5.70	4⅜	3⅜	3⅜	1.00
1½	4.40	7.40	5	3¾	3⅞	1.00
1¾	.....	.....	5¾	.....	4⅛	1.00
2	6.25	11.00	6	4⅛	4⅝	1.25
2½	13.75	18.75	6½	4⅝	5⅜	1.75
3	15.50	21.50	7	5	6¼	2.00
3½	23.50	30.50	7½	5⅝	6⅞	2.00
4	34.00	43.00	9	6¼	7⅛	2.00
4½	45.00	55.00	9½	7	7⅝	2.25
5	52.00	64.00	10	7½	8⅛	2.25
6	76.00	88.00	11	7⅞	9	2.25

IRON BODY, BRASS MOUNTED.

SINGLE GATE.

SCREWED, FLANGED, HUB AND SPIGOT.

FLANGED.

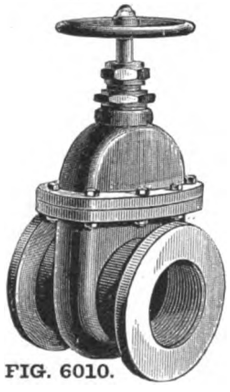


FIG. 6010.

The valves in this list, being single gate, should be so placed in the pipe that the pressure will be on the back of the gate, especially in sizes above 4 inches.

Valves made entirely of iron should not be used for water.

Brass mounted valves, screw socket and flange, up to 6 inches, inclusive, have brass stuffing boxes.

PRICES.

PRICES, BRASS MOUNTED.						MEASUREMENTS.				
Size.	Screw socket.	Flange.	Hub.	Spigot.	Extra for slide stem and lever.	Diameter standard flange.	Face to face of flanges.	Face to face of screw socket.	End to end of hubs.	Depth of hub.
Inch.						Inches.	Inches.	Inches.	Inches.	Inch.
1½	$5.00	$5.75	.....	.....	$1.00	5⅛	5⅛	4	.....	.....
2	6.00	6.75	$6.50	$6.75	1.25	6⅛	5⅝	4¾	7	2⅛
2½	8.75	9.50	9.00	9.25	1.75	7	6⅛	5⅜	7¾	2¼
3	11.00	12.00	11.00	11.50	2.00	8	6⅞	5⅝	8⅜	2½
3½	15.00	15.75	14.50	15.00	2.00	8¼	8¼	7.	9¼	2⅝
4	16.25	17.25	16.00	16.50	2.00	9	8¼	7¼	9⅝	2¾
5	23.75	24.00	22.75	23.25	2.25	10	10⅜	11	12	3⅛
6	28.00	28.50	26.00	26.75	2.25	11	11⅛	11¼	12⅜	3⅞
7	35.25	35.75	34.00	35.00	2.25	12	11¾	11½	13⅛	4
8	40.00	40.00	38.50	39.75	2.25	13	11	12½	14⅛	4
10	58.00	58.50	54.00	56.50	3.25	16	12¾	12⅝	14⅜	4
12	74.00	73.00	67.00	70.50	4.00	18	12⅞	13¼	14¼	4
*8	13.00	13.50	13.00	13.50	2.00	8	8	7⅜	10	2⅛
*6	18.00	17.50	17.00	17.50	2.00	9	8⅜	7⅞	10⅛	3

* Extra heavy.

IRON BODY, BRASS MOUNTED, HEAVY PRESSURE EITHER SIDE OF GATE.

DOUBLE GATE.

HUB VALVE.

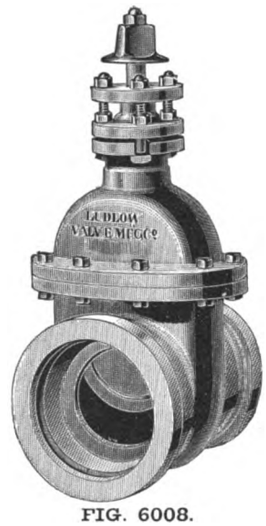


FIG. 6008.

FLANGE VALVE.

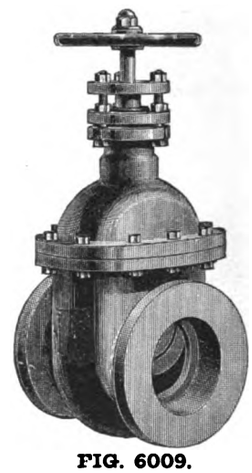


FIG. 6009.

PRICES, BRASS MOUNTED.						MEASUREMENTS. BRASS MOUNTED, OR ALL IRON.				
Size.	Screw socket.	Flange.	Hub.	Spigot.	Extra for slide stem and lever.	Diameter standard flange.	Face to face of flanges.	Face to face of screw socket.	End to end of hubs.	Depth of hubs.
Inch.						Inches.	Inches.	Inches.	Inches.	Inch.
1	$5.00	.....	.....	.....	.....	.....	.....	3¼	.....	.....
1¼	5.50	.....	.....	.....	.....	.....	.....	3¾	.....	.....
1½	6.00	$6.25	.....	.....	$1.00	5⅛	5⅛	4	.....	.....
2	7.00	7.50	$7.00	$7.25	1.25	6⅛	5⅜	4⅞	7	2⅛
2½	10.25	10.75	10.00	10.25	1.75	7	6⅛	5⅜	7¾	2¼
3	12.25	13.25	14.50	15.00	2.00	8	6⅞	5⅝	8⅜	2½
3½	16.50	17.50	16.00	16.50	2.00	8¼	8¼	7	9⅛	2⅝
4	18.00	18.50	17.00	17.50	2.00	9	8¼	7¼	9⅜	2¾
4½	23.00	23.50	22.00	22.50	2.25	9½	9¼	9⅛	.....	.....
5	25.00	25.50	24.00	24.50	2.25	10	10⅜	11	12	3⅛
6	30.50	31.00	28.00	28.75	2.25	11	11⅛	11¼	12⅜	3⅞
7	38.00	38.00	37.00	38.00	2.25	12	11¾	12	13⅞	.....
8	45.00	43.50	42.00	43.25	2.25	13	11	12½	14⅛	4
10	64.00	64.50	60.00	62.50	3.25	16	13¾	13⅜	14⅜	4
12	82.50	80.00	76.00	79.50	4.00	18	14½	13⅞	15	4

SAME TO HAVE EXTRA HEAVY PRESSURE EITHER SIDE OF GATE.

PRICES, BRASS MOUNTED.						MEASUREMENTS.				
Size.	Screw socket.	Flange.	Hub.	Spigot.	Extra for slide stem and lever.	Diameter standard flange.	Face to face of flanges.	Face to face of screw socket.	End to end of hubs.	Depth of hubs.
Inch.						Inches.	Inches.	Inches.	Inches.	Inch.
3	$15.00	$16.00	$14.50	$15.00	$2.00	8	8	7¾	10	2⅜
3½	16.50	17.50	16.00	16.50	2.00	8½	8¼	7	9⅜	2⅝
4	19.00	20.00	18.00	18.50	2.00	9	8½	7⅞	10⅛	3
4½	23.00	23.50	22.00	22.50	2.25	9½	9¼	9½	11	3¼
5	25.00	25.50	24.00	24.50	2.25	10	10¾	11	12	3½
6	32.50	33.00	31.50	32.25	2.25	11	11⅛	11¾	13¼	3⅝
7	38.00	38.00	37.00	38.25	2.25	12	11¼	12	13⅞	4
8	48.00	47.00	45.00	47.50	2.25	13	13¼	13⅛	14	4¼
9	62.00	62.00	58.00	60.50	3.25	15	13	13	15½	4¼
10	70.00	70.00	63.00	65.50	3.25	16	15	.....	14⅞	4½
12	88.00	88.00	83.00	86.00	4.00	18	15½	.....	15¾	4½

These valves are tested 300 lbs., water pressure, and are used for water, oil and medium pressure steam.

ALL IRON SINGLE GATE.

PRICES, FIG. 6010.

PRICES, ALL IRON.						MEASUREMENTS.				
Size.	Screw socket.	Flange.	Hub.	Spigot.	Extra for slide stem and lever.	Diameter standard flange.	Face to face of flanges.	Face to face of screw socket.	End to end of hubs.	Depth of hubs.
Inch.						Inches.	Inches.	Inches.	Inches.	Inch.
1½	$5.00	$5.75	.....	.....	$1.00	5⅛	5¼	4	.....	.....
2	6.00	6.75	$6.00	$6.25	1.25	6⅛	5⅜	4⅜	7	2⅛
2½	8.25	9.00	8.25	8.50	1.75	7	6⅛	5⅜	7⅜	2¼
3	9.50	10.50	9.50	10.00	2.00	8	6⅞	5⅝	8⅜	2½
3½	13.25	14.50	13.00	13.50	2.00	8¼	8¼	7	9⅜	2⅝
4	13.50	15.00	13.50	14.00	2.00	9	8¼	7¼	9⅝	2¾
5	21.50	22.00	20.50	21.00	2.25	10	10¾	11	12	3⅛
6	25.50	26.00	24.00	24.75	2.25	11	11⅛	11¼	12⅜	3⅞
7	31.00	31.50	30.00	31.00	2.25	12	11¼	11⅝	13⅞	4
8	34.00	33.50	32.00	33.25	2.25	13	11	12½	14½	4
10	53.00	52.00	48.00	50.50	3.25	16	12¾	12¼	14½	4
12	64.50	63.00	63.00	66.50	4.00	18	12⅞	13¼	14¼	4

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OUTSIDE SCREW AND YOKE.

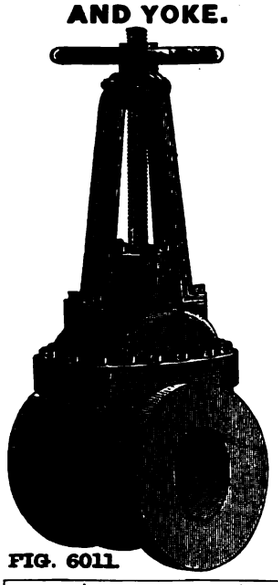


FIG. 6011.

GATE VALVES.

LUDLOW IRON BODY, BRASS MOUNTED.

TO HAVE EXTREME PRESSURE EITHER SIDE OF GATE.

SPECIALLY ADAPTED FOR STEAM.

Valves are tested at 600 pounds, water pressure.

Loose flanges made to order.

PRICES, FIGS. 6011 AND 6012.

FLANGE.

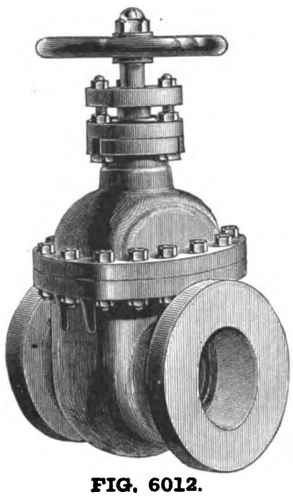


FIG. 6012.

CHAPMAN'S BRASS HOSE VALVES.

WITH AND WITHOUT CAP AND CHAIN FOR HOSE END.

Unless otherwise ordered, we shall cut thread on hose end, our standard, full V, as follows:

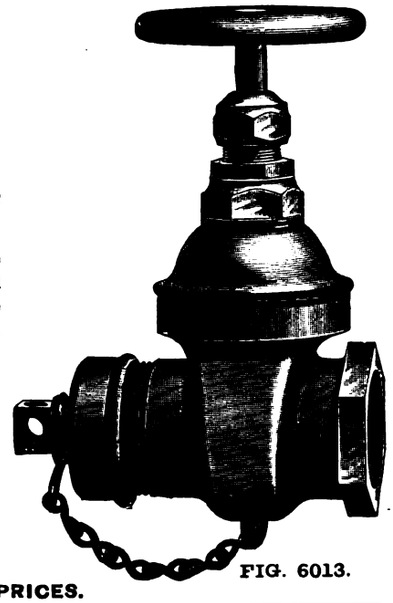


FIG. 6013.

Size.	Brass mounted.		All iron.		Measurements.		
	Screw socket.	Flange.	Screw socket.	Flange.	Diameter standard flange.	Face to face of flanges.	Face to face of screw socket.
2 in.	.....	.....	.....	.....	6½ in.	7¼ in.	6¼ in.
2½ "	.....	.....	.....	.....	7 "	8 "	6½ "
3 "	.....	.....	.....	.....	8 "	9½ "	8½ "
4 "	$22.00	$24.50	.....	.....	9 "	9½ "	8¾ "
5 "	36.00	39.00	.....	.....	11 "	12⅛ "	10½ "
6 "	44.00	47.00	.....	.....	12 "	13 "	12 "
7 "	.....	.....	.....	.....	13 "	13¾ "	.....
8 "	.....	67.00	.....	.....	14 "	14¼ "	.....
10 "	.....	.....	.....	.....	17 "	16¼ "	.....
12 "	.....	.....	.....	.....	19 "	17½ "	.....

PRICES.

Diameter of opening, inches,	¾	1	1¼	1½	2	2½	3
Outside diam., th'd on hose end,	1 1/16	1 1/2	1 11/16	1 31/32	2 3/8	3 1/16	3 5/8
Diam. bottom, th'd on hose end,	7/8	1 1/32	1 25/64	1 57/64	2 3/16	2 13/16	3 3/8
No. threads per inch hose end,	11	11	11	11	7½	7	7
Without cap and chain,	$1.75	$2.25	$3.25	$4.25	$6.25	$11.50	$16.00
Finished brass cap and chain, extra,	1.00	1.25	1.35	1.50	1.75	2.50	3.50

SLIDING LEVER VALVE.

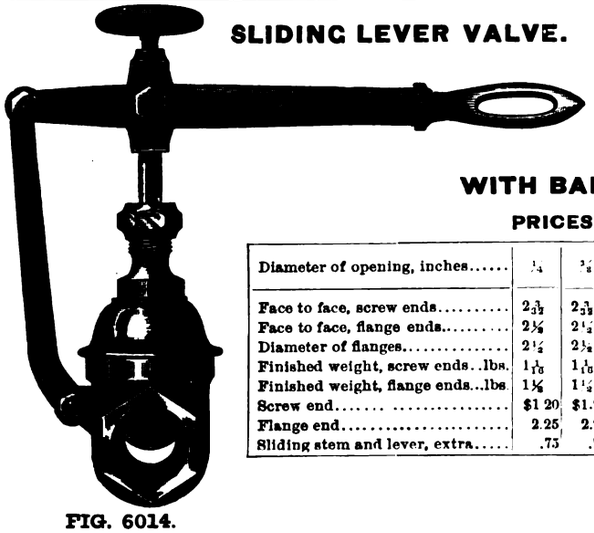


FIG. 6014.

CHAPMAN COMPOSITION STEAM AND WATER VALVES.

WITH BABBITT METAL SEATS.

PRICES, FIGS. 6014 AND 6015.

Diameter of opening, inches.....	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Face to face, screw ends.....	2 3/32	2 3/32	2 3/16	2 3/4	3 3/16	3 11/16	4 1/2	4 3/4	5 9/16	6 5/16	8 3/16	8 11/16
Face to face, flange ends.....	2 1/8	2 1/2	2 9/16	3	3 9/16	3 15/16	4 5/16	5 1/4	5 1/4	7	8 1/4	8 7/8
Diameter of flanges.....	2½	2½	3	3	4	4½	5	6	7	7	8½	9
Finished weight, screw ends..lbs.	1 1/16	1 1/16	1½	2¼	3¼	4¾	6	9¾	16	22½	40	54
Finished weight, flange ends...lbs.	1⅝	1⅝	2¼	3¼	4¾	7¼	9	14½	22	29½	50	63
Screw end.....	$1.20	$1.20	$1.30	$1.75	$2.25	$3.25	$4.25	$6.25	$11.50	$16.00	$30.00	$38.00
Flange end.....	2.25	2.25	2.50	3.00	4.00	5.00	7.50	10.00	16.00	20.00	39.00	46.00
Sliding stem and lever, extra.....	.75	.75	1.00	1.20	1.40	1.60	1.80	2.00	2.25	2.50	2.75	3.00

SCREWED AND FLANCED.

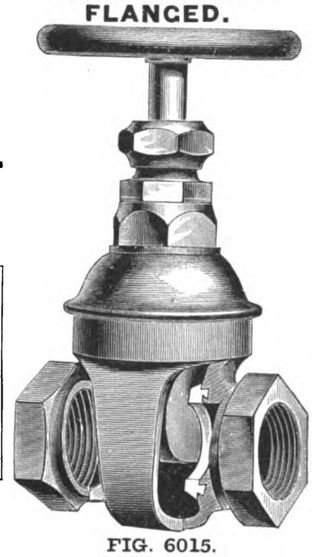


FIG. 6015.

CHAPMAN IRON BODY, BOLTED TOP STEAM AND WATER VALVES.

SPECIAL BABBITT METAL SEATS. COMPOSITION MOUNTINGS. SCREW OR FLANCED END.

Sizes, 2½ to 48 inches, inclusive.

PRICES, FIGS. 6016 AND 6017.

Diameter of opening, inches,	2½	3	3½	4	4½	5	6	7	8	9	10	12	14	15	16	18	20	24
Face to face, screw ends,	6⅝	7½	8⅜	9⅝	9¾	10¼	11⅜	12⅛	12½	.....	.....	.....	.....	.....	.....	.....	.....	.....
Face to face, flange ends,	7⅞	8¼	8⅞	9⅜	10¼	9⅝	10⅞	11¼	11⅞	12⅞	13⅛	14⅜	15⅞	16⅛	18⅜	20	21	24
Diameter of flanges,	7	7	8½	9	9½	10	11	12	13	15	16	18	21	22	23	25	27	31
Finished weight, screw ends, lbs.	28	40	55	71	90	120	166	225	270	.....	.....	.....	.....	.....	.....	.....	.....	.....
Finished weight, flange ends, lbs.	40	49	71	82	90½	132	183	235	266	385	442	620	870	1,000	1,140	1,525	1,925	3,159
Screw ends.....$	10.00	13.00	16.50	19.00	23.00	25.00	32.00	38.00	48.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Flange ends.....$	10.00	13.00	17.00	18.50	22.00	24.00	31.00	37.00	45.00	61.00	64.00	86.00	.....	.....	.....	.....	.....	.....
Sliding stem and lever, extra, $	2.25	2.50	2.75	3.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

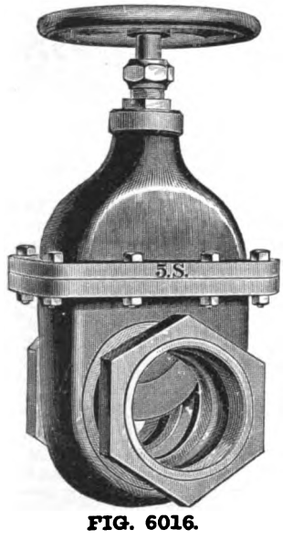


FIG. 6016.

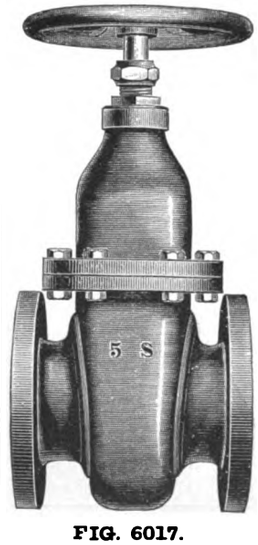


FIG. 6017.

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CHAPMAN GATE VALVES, IRON BODY VALVES FOR WATER AND STEAM.

WITH OUTSIDE SCREW AND YOKE. WITH SPECIAL BABBITT SEATS.

Sizes, 2½ to 48 inches, inclusive.

PRICES, FIGS. 6018 AND 6019.

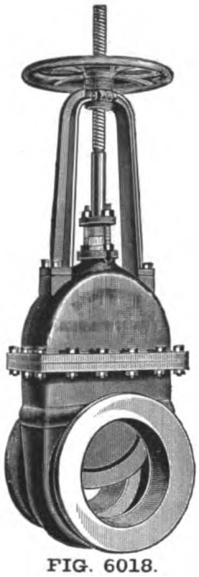


FIG. 6018.

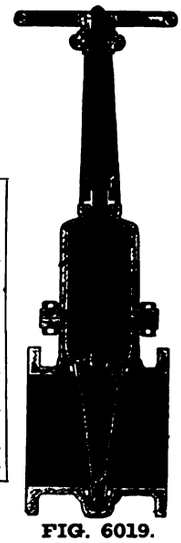


FIG. 6019.

Diameter of opening, inches,	2½	3	3½	4	4½	5	6	7	8	9	10	12	14	15	16	18	20	24
Face to face, screw ends,	6⅝	7½	8⅜	9⅝	9¾	10¼	11⅜	12⅛	12½	...	.....	.....	....	....	....	...	...	...
Face to face, flange ends,	7⅞	8¼	8⅞	9⅜	10¼	9⅝	10⅞	11½	11⅞	12⅞	13⅝	14⅝	15⅞	16⅝	18¾	20	21	24
Diameter of flanges,	7	7	8½	9	9½	10	11	12	13	15	16	18	21	22	23	25	27	31
Finished weight, screw ends,	41 lbs.	52	70	89	147	156	197	258	340	....	.....	.....	....	....	....	...	...	...
Finished weight, flange ends	52 "	61	86	100	139	168	214	268	336	457	514	667	934	1,112	1,276	...	...	...
Screw ends.....	$ 20.75	23.75	28.75	33.50	40.50	46.75	55.75	65.50	83.00	....	....	.....	....	....	...	...	...	...
Flange ends.....	$ 20.75	23.75	29.25	33.00	39.50	45.75	54.75	64.50	80.00	96.00	110.00	135.00	....	....	...	...	...	..

IRON BODY GAS GATES.

BOLTED TOP, BELL OR SPICOT ENDS.

For street mains without gearing.

PRICES, FIG. 6020.

REGULAR BELL ENDS.

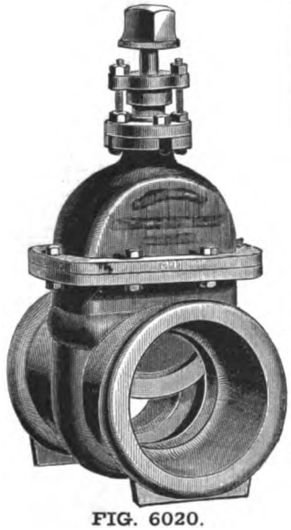


FIG. 6020.

Diameter of opening, inches.....	2	3	4	5	6	8	10	12	14	16	18	20	24
End to end of pipe when laid in bell	3⅜	3⅞	4¾	5	5½	6½	7	7⅜	8¼	8⅝	9⅛	10⅛	11⅜
Diameter of bell socket.	3⅛	4¾	5¾	7	8	10	12⅛	14½	16¾	18¾	20⅞	23	27
Finished weight, bell ends.....	30 lbs.	55	87	120	154	223	369	513	675	800	1,075	1,260	2 147
Finished weight, spigot ends....	30 lbs.	67	82	120	148	226	378	567	750	890	.....	.....	.....
Bell or spigot end.....	$8.00	$10.00	$14.50	$20.00	$24.00	$34.00	$47.00	$62.00	.....	.....	.....	.....	.....

IRON BODY, STEAM AND WATER VALVES, WITH INDICATOR.

BOLTED TOP. STEAM BABBITT SEATS.

PRICES, FIG. 6021.

Diameter of opening, inches.....	2½	3	3½	4	4½	5	6	7	8	9	10	12
Face to face, screw ends.....	6⅝	7½	8⅜	9⅝	9¾	10¼	11⅜	12⅛	12½	13½		
Face to face, flange ends	7⅞	8¼	8⅞	9⅜	10¼	9⅝	10⅞	11½	11⅞	12⅞	13⅝	14⅝
Diameter of flanges.....	7	7	8½	9	9½	10	11	12	13	15	16	18
Height, center port to top wheel.....	13	14¼	15⅜	16½	19½	21⅝	23¾	25 5/16	28 5/16	29 7/16	32¼	36⅛
Finished weight, screw ends.....	32	44	58	77	105	128	174	234	280	.....	.....	.....
Finished weight, flange ends.....	44	52	74	88	97	136	195	244	276	393	453	633
Screw ends..	$17.00	$20.25	$24.00	$27.00	$31.50	$33.50	$41.25	$48.00	$58.00	.....	.....	.....
Flange ends.....	17.00	20.25	24.50	26.50	30.50	32.50	40.25	47.00	55.00	$73.50	$76.50	$98.50

In ordering, state distinctly whether valves are to be used on steam, water or gas, etc., and what pressure.

PEET DOUBLE GATE VALVES.

IRON BODY, BRASS-MOUNTED.

WATER GATES.

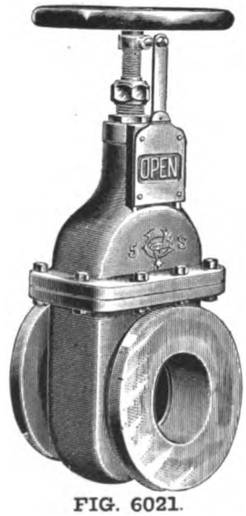


FIG. 6021.

FLANGED.

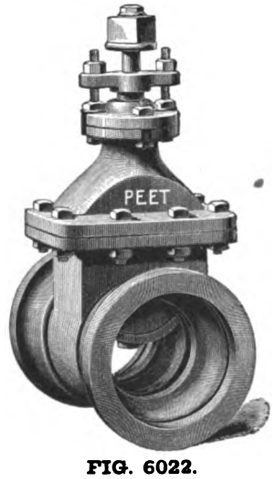


FIG. 6022.



FIG. 6023.

SCREWED.



FIG. 6024.

ALL WORKING PARTS OF BRASS.

When ordering gates, be sure and state whether hub or spigot ends are wanted, and whether the screw is to turn to the right or left in opening. Unless otherwise specified, we make them to open to the left. Prices on gates above 12 inches furnished upon application.

Larger sizes geared when required.

PRICES, FIGS. 6023 AND 6024.

BEST COMPOSITION. STEAM METAL.			IRON BODY. COMPOSIT'N MOUNTED.		
Size.	Prices. Flange ends.	Prices. Screw ends.	Size.	Prices. Flange ends.	Prices. Screw ends.
¼ in.	.....	$1.00	2½ in.	$12.00	$12.00
⅜ "	.....	1.00	3 "	15.00	15.00
½ "	.....	1.20	3½ "	18.00	18.00
¾ "	.....	1.75	4 "	20.00	20.00
1 "	.....	2.50	4½ "	23.00	23.00
1¼ "	.....	3.50	5 "	25.00	25.00
1½ "	.....	5.00	6 "	30.00	30.00
2 "	$14.00	7.50	7 "	40.00	43.00
2½ "	24.00	14.00	8 "	50.00	53.00
3 "	27.00	19.50	10 "	65.00	70.00
.....	.....	.....	12 "	90.00	95.00

PRICES, FIG. 6022. ALL WORKING PARTS BRASS.

Size.	Distance from end to end of bells.	Length of bells.	Inside diameter of bells.	Prices.
3 inch.	11½ inches.	3 inches.	4⅜ inches.	$15.00
4 "	13 "	3½ "	5¾ "	20.00
6 "	14½ "	3¾ "	8 "	30.00
8 "	16 "	3¾ "	10¼ "	50.00
10 "	17 "	4 "	12¼ "	65.00
12 "	18½ "	4¼ "	14¼ "	90 00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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KENNEDY'S IRON BODY, BRASS MOUNTED BOLTED TOPS. STEAM AND WATER VALVES.

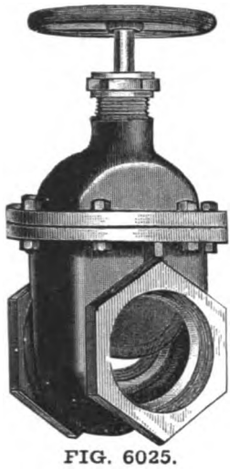


FIG. 6025.

TO BEAR HEAVY PRESSURE EITHER SIDE OF GATE.



FIG. 6026.

SCREW OR FLANGED ENDS.

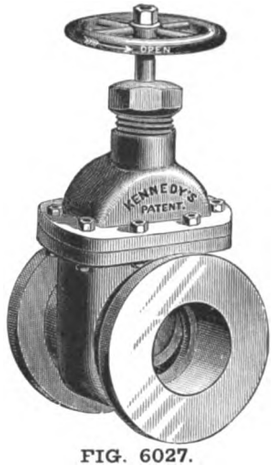


FIG. 6027.

The bodies, caps and wheels of these valves are made of cast iron. The gates are also of cast iron, faced with best steam metal. The seats are of best steam metal, and firmly held to the body in a manner found by experience to be the best. The body is made with a heavy flange, and the cap with a corresponding flange, which, when bolted together, make a very strong, serviceable valve and can be easily taken apart to remove any obstruction that may collect. The larger sizes can be fitted with either upright or bevel gearing, as desired.

The larger sizes are fitted with bolt gland stuffing boxes.

PRICES.

Diameter of opening, inches	2	2½	3	3½	4	4½	5	6	7
Face to face, screw ends	5⅛	6	6⅛	6¾	7⅛	7½	8	8¾	10
Face to face, flange ends	5⅞	6⅛	7½	7½	8⅛	8½	9⅛	9⅞	9½
Diameter of flanges	6	7	8	8½	9	9½	10	11	12
Screw ends, Fig. 6025	$8.50	$12.00	$15.00	$18.00	$20.00	$22.50	$25.00	$30.00	$40.00
Flange ends, Fig. 6027	9.00	12.50	15.50	19.00	21.00	24.00	27.00	32.00	40.00
Sliding stem and lever, screw ends, Fig. 6026	11.00	14.75	18.00	21.50	24.00	.....	.....	.....	.....
Sliding stem and lever, flange ends	11.50	15.25	18.50	22.50	25.00	.....	.....	.....	.....

Diameter of opening, inches	8	10	12	14	16	18	20	24	.....
Face to face, screw ends	10¼	.....	.....	.....	.....	.....	.....	.....	.....
Face to face, flange ends	11	12⅛	13⅛	13¾	14	14⅞	15½	17	.....
Diameter of flanges	13	16	18	20	23	25	27	31	.....
Screw ends, Fig. 6025	$50 00	$65.00	$90.00	.....	.....	.....	.....	.....	.....
Flange ends, Fig. 6027	50.00	65.00	90.00	.....	.....	.....	.....	.....	.....
Sliding stem and lever, screw ends, Fig. 6026	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sliding stem and lever, flange ends	.....	.....	.....	.....	.....	.....	.....	.....	.....

Prices on all size valves from 12 to 48 inches given on application.

MOBILE WEDGE GATE VALVES.

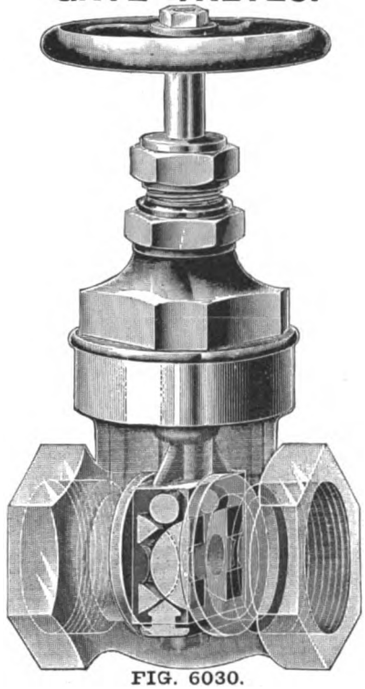


FIG. 6030.

PRICES, BRASS VALVES, EXTRA HEAVY, MADE OF THE BEST STEAM METAL.

Size, in inches.	Screw socket.	Flange.	Extra for sliding stem and lever.
1	$2.25	.....	$1.00
1¼	3.25	.....	1.10
1½	4.25	.....	1.15
2	6.25	$11.50	1.25
2½	12.00	19.00	1.25
3	16.00	22.00	2.00

PRICES, I. B. B. M., EXTRA HEAVY.

Size, in inches.	Screw socket or flange.	Bell or spigot.	Extra for sliding stem and lever.
2	$7.00	$10.00	$1.25
2½	10.50	.....	.....
3	13.50	15.00	2.00
4	18.00	19.00	2.00
5	25.00	.....	.....
6	31.00	31.00	.....
8	46.00	46.00	.....
10	62.00	62.00	.....
12	85.00	85.00	.....

Bell or spigot valves for water work are made to open by turning to right or left, as desired.

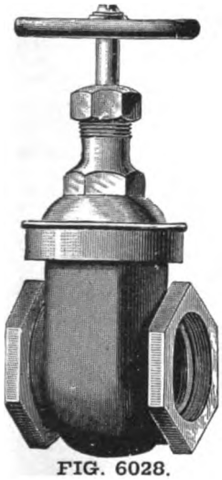


FIG. 6028.

DOUBLE GATE STEAM AND WATER VALVES. STEAM METAL.

TO BEAR HEAVY PRESSURE EITHER SIDE OF GATE, WITH SCREW OR FLANGE ENDS. EITHER RISING OR STATIONARY SPINDLE.

These valves are double-faced, parallel, and closely fitted, and in exact line with the spindle, which prevents the swift flowing water from moving the gates out of line and bending the spindle.

Either end may be used for inlet or outlet. All parts are interchangeable and made of best steam metal. Valves from one-half inch to two and one-half inches have screwed top, and three inches and above have bolted tops.

PRICES, FIG. 6028.

Diameter of opening, inches	½	¾	1	1¼	1½	2	2½	3	3½	4
Face to face, screw ends	2¼	2⅝	3	3¼	3½	4⅛	4¾	4⅞	5¾	6
Face to face, flange ends	.....	3	3	3½	4	4¾	5½	6	6¼	7
Diameter of flanges	3	3	4	4½	5	6	7	7	7½	9
Screw ends	$1.20	$1.75	$2.50	$3.50	$5.00	$7.50	$14.00	$20.00	$32.00	$40.00
Flange ends	2.75	3.50	4.50	5.50	7.50	12.00	18.00	25.00	40.00	48.00

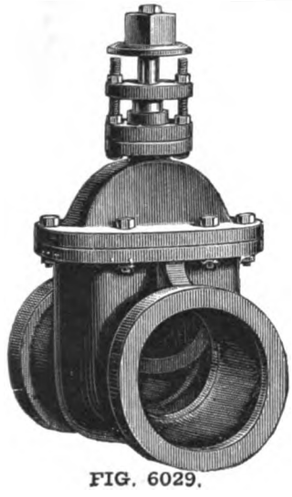


FIG. 6029.

ALL IRON DOUBLE GATE GAS VALVES, BOLTED TOP.

HUB OR SPIGOT ENDS FOR STREET MAINS.

These valves have two-inch square nut on top of spindle and open by turning to the left, unless otherwise ordered.

They are made with cast-iron bodies, caps and gates, and wrought-iron spindles.

Larger sizes can be furnished with bevel or upright gearing if desired.

PRICES, FIG. 6029.

Diameter of opening, inches	2	3	4	5	6	8	10
End to end of pipe when laid in hubs	2½	3¼	4	5	5	5¾	5¾
Diameter of hub socket	3⅛	4⅝	5¾	6⅞	7⅞	10	12
Hub or spigot end	$7.65	$13.50	$18.00	$22.50	$27.00	$45.00	$58.00

Diameter of opening, inches	12	14	16	18	20	24	.....
End to end of pipe when laid in hubs	7¼	8	6½	6	9	10	.....
Diameter of hub socket	14⅛	16¼	18½	20⅝	22½	26½	.....
Hub or spigot end	$80.00	.....	.....	.....	.....	.....	.....

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EDDY DOUBLE GATE VALVES.

CLASS 2, FLANGED OR SCREWED.

CLASS 1, ALL BRASS.



FIG. 6031.

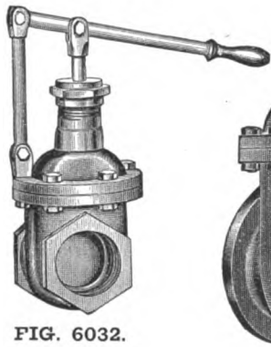


FIG. 6032.

CLASS 3, HUB.

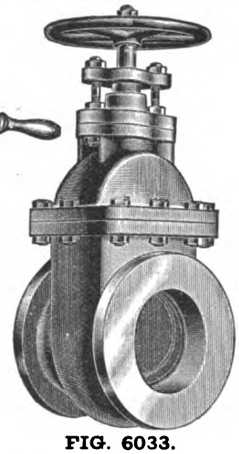


FIG. 6033.

CLASS 4, HUB. SECTIONAL.

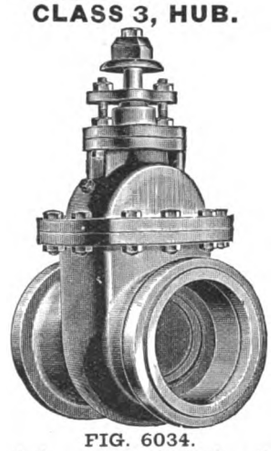


FIG. 6034.

CLASSES 5 AND 6.

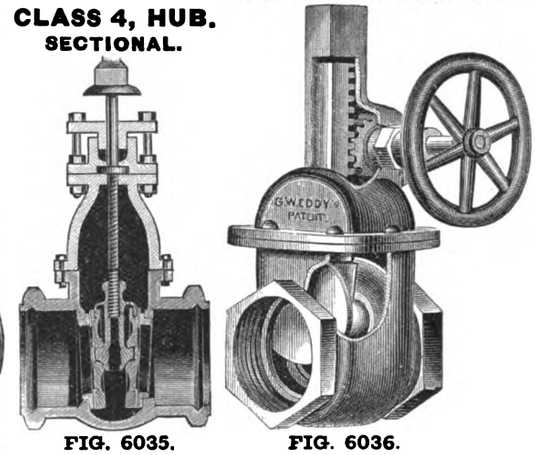


FIG. 6035.

FIG. 6036.

When ordering valves, give full description in every respect, and also specify which class they are in.

Class. **DESCRIPTION.**

1. All brass, screw and flange ends. These can have sliding stem and lever, if so ordered.
2. Iron body—brass-mounted; and all iron; screw and flange ends. These can have sliding stem and lever, if so desired. Special sizes made if ordered.
3. Hub valves, all iron, for gas mains.
4. Hub valves, brass-mounted, for water mains.
5. Quick-opening valves, with rack and pinion stem, iron body, brass-mounted; and all iron; screw, flange and hub ends.
6. Quick-opening valves, rack and pinion stem, all brass, screw ends.

PRICES.

Size, in Inches.	Class 1. Brass valves screw ends steam metal	Class 1. Add for sliding stem and lever.	Class 2. Iron, brass-mounted. Screw ends.	Class 2. Iron, brass-mounted. Flange ends.	Class 2. Iron, brass-mounted. Add for S.S.&L.	Class 3. All iron for gas, hub ends
½	$1.30	.....	.....	.....	.....	.....
¾	1.70	$1.00	.....	.....	.....	.....
1	2.20	1.00	.....	.....	.....	.....
1¼	3.20	1.00	.....	.....	.....	.....
1½	4.20	1.00	.....	.....	.....	.....
2	6.20	$9.00 1.30	$7.00	$7.00	$1.20	$8.00
2½	11.50	15.00 1.30	10.50	10.50	1.30	.....
3	16.00	20.00 1.30	13.00	13.00	1.40	10.00
3½	22.00	28.00 1 60	16.50	16.50	1.50	.....
4	35.00	42.00 2.00	18.00	18.00	1.70	15.00
4½	.....	..... 3.00	22.00	22.00	1.80	.....
5	50 00	60.00 4.00	25.00	25.00	2.00	20.00
6	80.00	90.00 5.00	31.00	31.00	2.30	25.00
7	.....	....	37.00	37.00	2.70	30.00
8	130.00	130.00 7.00	45.00	45.00	3.00	35.00
10	.....	Flange	60.00	60.00	3.50	48.00
12	.....	ends.	80.00	80.00	4.00	65.00

Size, in inches.	Class 4. Water works valves, hub ends.	Class 5. Quick-opening valves with rack and pinion stem. Iron, brass-mounted. Hub ends.	Class 5. Screwed.	Class 5. Flanged.	Class 6. All brass.
1	.....	.....	.....	.....	$3.50
1¼	.....	.....	.....	.....	4.50
1½	.....	.....	.....	.....	5.40
2	$10.00	$10 00	$9.00	$9.00	7.80
2½	.....	15.00	14.00	14.00	13.60
3	15.00	20.00	17.00	17.00	20.50
3½	.....	25.00	21.00	21.00	.....
4	18.00	30.00	25.00	25.00	.....
4½	.....	.....	.....	.....	.....
5	25 00	35.00	31.00	31.00	.....
6	31.00	40.00	37.00	37.00	.....
7	37.00	.....	.....	.....	.....
8	45.00	55.00	55.00	55.00	.....
10	60.00	.....	.....	.....	.....
12	80.00	.....	.....	.....	.....

All iron valves, classes 2 and 5, 10 per cent. less than brass-mounted.

LUDLOW HYDRANTS.

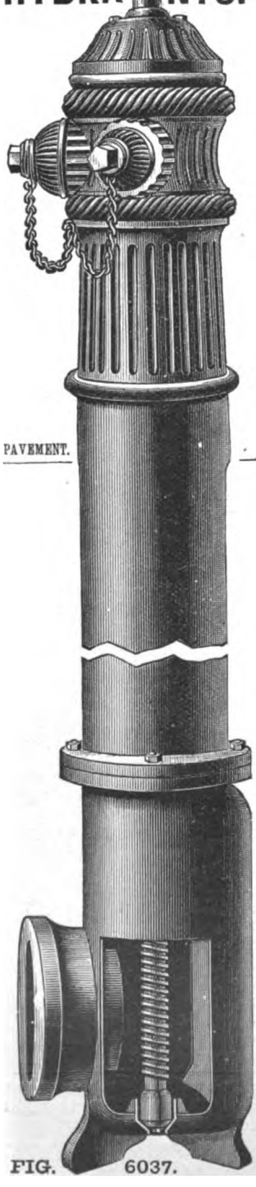


FIG. 6037.

WATER CRANE FOR SPRINKLING CARTS.

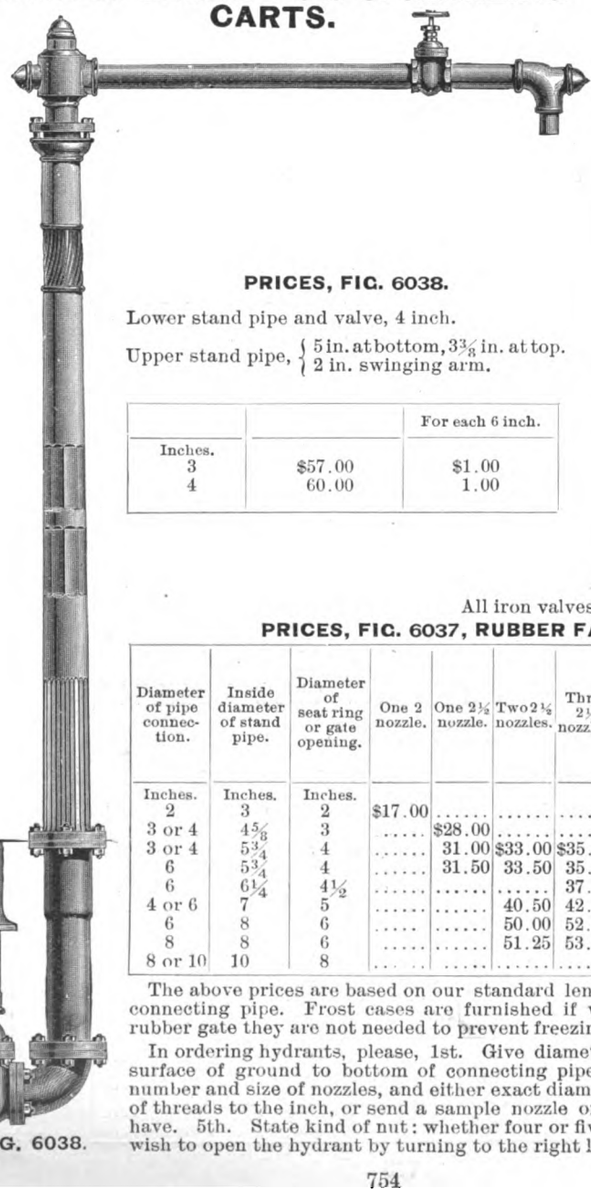


FIG. 6038.

PRICES, FIG. 6038.

Lower stand pipe and valve, 4 inch.

Upper stand pipe, { 5 in. at bottom, 3⅜ in. at top. / 2 in. swinging arm.

		For each 6 inch.
Inches.		
3	$57.00	$1.00
4	60.00	1.00

PRICES, FIG. 6037, RUBBER FACED SLIDE GATE FIRE HYDRANT.

Diameter of pipe connection.	Inside diameter of stand pipe.	Diameter of seat ring or gate opening.	One 2 nozzle.	One 2½ nozzle.	Two 2½ nozzles.	Three 2½ nozzles.	One steamer nozzle.	One steamer and one 2½ nozzle.	One steamer and two 2½ nozzles.	Frost case, standard length.	For each 6 inches more or less than standard length of stand pipe, add to or de duct from list.	For each 6 inches more or less than standard length of frost case, add to or deduct from list.
Inches.	Inches.	Inches.										
2	3	2	$17.00	.....	.....	.....	.....	.....	.....	.....	$0.45	.....
3 or 4	4⅝	3	.....	$28.00	.....	.....	.....	.....	.....	$4.50	.60	$0.44
3 or 4	5¾	4	.....	31.00	$33.00	$35.00	$33.00	$35.00	$37.00	5.00	.75	.50
6	5¾	4	.....	31.50	33.50	35.50	33.50	35.50	37.50	5.00	.75	.50
6	6¼	4½	.....	.....	.....	37.50	35.50	37.50	39.50	5.60	.80	.58
4 or 6	7	5	.....	.....	40.50	42.50	40.50	42.50	44.50	6.50	.85	.70
6	8	6	.....	.....	50.00	52.00	50.00	52.00	54.00	7.50	1.00	.90
8	8	6	.....	.....	51.25	53.25	51.25	53.25	55.25	7.50	1.00	.90
8 or 10	10	8	.....	.....	.....	.....	.....	.....	.....	11.00	2 25	1.30

The above prices are based on our standard length, viz., five feet from ground surface to bottom of connecting pipe. Frost cases are furnished if wanted, though experience has shown that with our rubber gate they are not needed to prevent freezing.

In ordering hydrants, please, 1st. Give diameter of stand pipe. 2d. Give length of hydrant from surface of ground to bottom of connecting pipe. 3d. Give size of bottom connection. 4th. Give number and size of nozzles, and either exact diameter at top and bottom of nozzle thread, and number of threads to the inch, or send a sample nozzle or nozzle cap; or refer to some standard that we may have. 5th. State kind of nut: whether four or five sided, and length of side. 6th. State whether you wish to open the hydrant by turning to the right like the hands of a watch, or to the left.

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CHAPMAN GATE FIRE HYDRANT.

Post hydrants. Metal gate to bear heavy pressure. Composition mounted. Water babbitt seats. Independent valve for each hydrant.

Standard dimensions.	Without frost case.		Frost case additional.		Each hose nozzle additional.		Each steamer nozzle additional.		Each foot in length of stand pipe. Add or deduct.		Each foot in length of frost case. Add or deduct.	
	Weight.	List.	Weight.	List.	Weight.	List.	Weight.	List.	Weight.	List.	Weight.	List.
3 in. hydrant. Diameter of stand pipe, 3¼ in. Length, pavement to bottom, 5 ft. One 2½ in. hose nozzle.	243 lbs.	$25.00	68 lbs.	$4.10	6 lbs.	$1.45	17 lbs.	$3.50	20 lbs.	$0.90	12 lbs.	$0.60
4 in. hydrant. Diameter of stand pipe, 4¼ in. Length, pavement to bottom, 5 ft. Two 2½ in. hose nozzles.	340 lbs.	$31.85	81 lbs.	$4.75	6 lbs.	$1.45	17 lbs.	$3.50	29 lbs.	$1.35	20 lbs.	$1.00
5 in. hydrant. Diameter of stand pipe, 5¼ in. Length, pavement to bottom, 5 ft. Two 2½ in. hose and one steamer nozzle.	425 lbs.	$41.00	88 lbs.	$5.15	6 lbs.	$1.45	17 lbs.	$3.50	34 lbs.	$1.65	22 lbs.	$1.10
6 in. hydrant. Diameter of stand pipe, 6¼ in. Length, pavement to bottom, 5 ft. Two 2½ in. hose and one steamer nozzle.	560 lbs.	$51.35	114 lbs.	$6.60	6 lbs.	$1.45	17 lbs.	$3.50	40 lbs.	$1.90	28 lbs.	$1.40

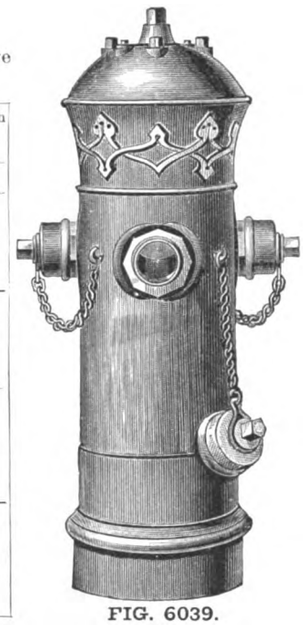


FIG. 6039.

In ordering, state size and form of nut to open hydrant; number of hose nozzles; number of steamer nozzles, with or without frost cases; length from pavement to bottom; size of connection to main; bell, screw, flange or spigot connection. Do not fail to send gauge to cut thread on nozzles by. We prefer one of your hose couplings, but, if not convenient, send nozzle cap off one of your hydrants.

ALL BRASS STEAM COCKS.

SQUARE HEAD, SCREWED.

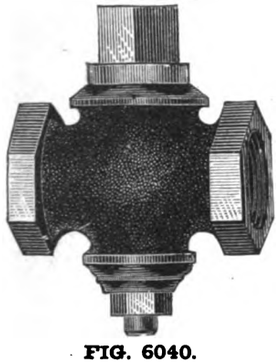


FIG. 6040.

FLAT HEAD, SCREWED.

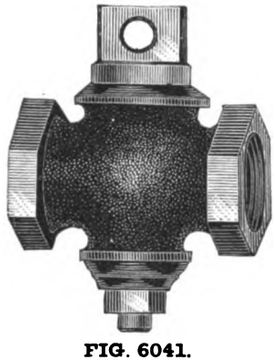


FIG. 6041.

SQUARE HEAD, FLANGED.

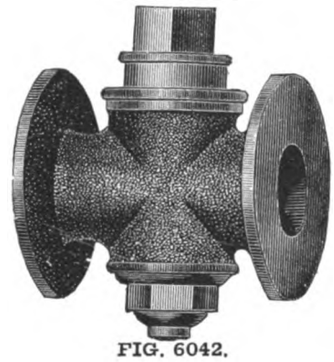


FIG. 6042.

3-WAY, FLAT HEAD, SCREWED.

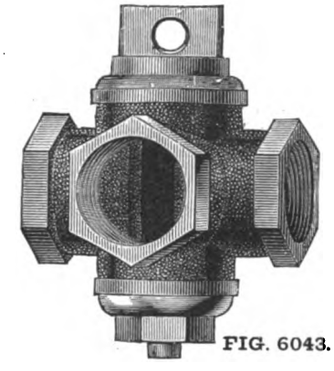


FIG. 6043.

3-WAY, SQUARE HEAD, FLANGED.

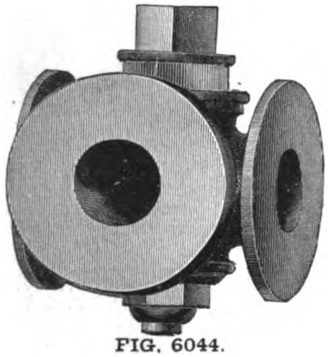


FIG. 6044.

3-WAY, SCREWED STOP ON KEY.

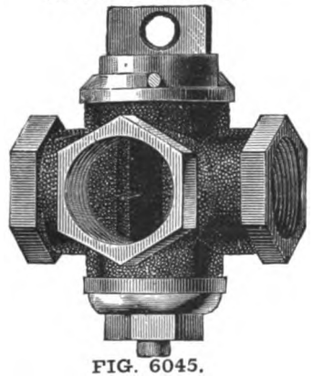


FIG. 6045.

3-WAY, FLANGED STOP ON KEY.

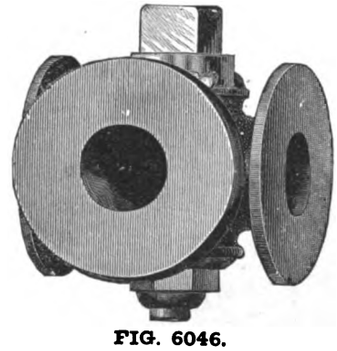


FIG. 6046.

SERVICE COCKS, SQUARE HEAD.

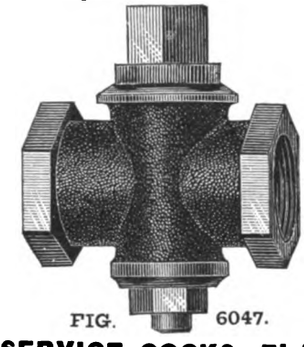


FIG. 6047.

SERVICE COCKS, FLAT HEAD.

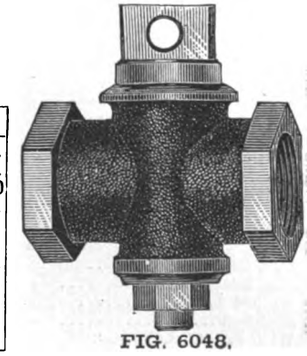


FIG. 6048.

Size..... in...	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6
Prices, Fig. 6040. Each,	$0.70	$0.70	$0.75	$1.10	$1.50	$2.25	$3.75	$4.80	$7.25	$14.00	$20.00	$36.00	$50.00	.....	.....
" " 6041. "	.70	.70	.75	1.10	1.50	2.25	3.75	4.80	7.25	14.00	20.00	.....	.....	.....	.....
" " 6042. "	.....	.....	... ..	3.50	4.50	5.50	8.00	10.00	15.00	22.00	32.00	53.00	75.00	120.00	170.00
" " 6043. "	.....	. ....	... ..	1.65	2.25	3.40	5.50	7.00	10.00	18.00	26.00	45.00	65.00	.....	.....
" " 6044. "	.....	.....	.....	5.25	6.50	7.75	10.00	14.00	22.00	31.00	39.00	70.00	100.00	.....	.....
" " 6045. "	.....	.....	.....	1.75	2.40	3.60	5.75	7.30	10.40	18.50	26.75	.....	.....	.....	.....
" " 6046. "	.....	.....	....	5.35	6.65	7.95	10.25	14.30	22.40	31.50	39.75	.....	.....	.....	.....
" " 6047. "	.55	.55	.65	.75	1.00	1.40	2.20	3.00	5.00	10.00	15.00	.....	.....	.....	.....
Extra heavy. "	.65	.65	.75	.85	1.20	1.70	2.60	3.60	6.00	11.50	17.00	28.00	40.00	.....	.....
Prices, Fig. 6048. "	.55	.55	.65	.75	1.00	1.40	2.20	3.00	5.00	10.00	15.00	.....	.....	.....	.....
Extra heavy. "	.65	.65	.75	.85	1.20	1.70	2.60	3.60	6.00	11.50	17.00	28.00	40.00	.....	.....

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IRON COCKS, WITH BRASS PLUGS.

SQUARE HEAD, SCREWED.

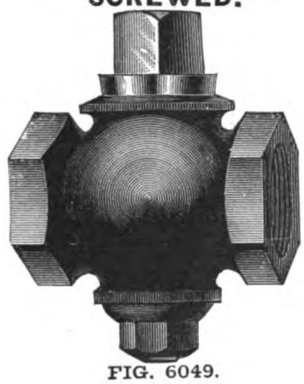


FIG. 6049.

FLAT HEAD, SCREWED.

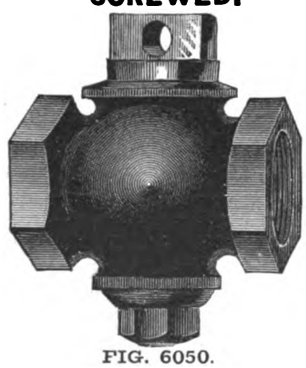


FIG. 6050.

SQUARE HEAD, FLANGED.



FIG. 6051.

FLAT HEAD, FLANGED.

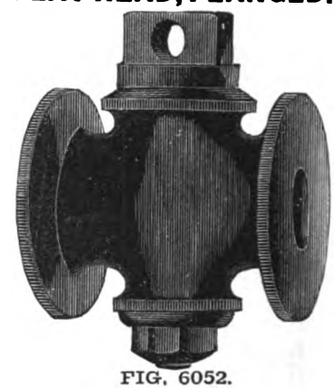


FIG. 6052.

3-WAY COCKS, SCREWED AND FLANGED.

SQUARE HEAD.

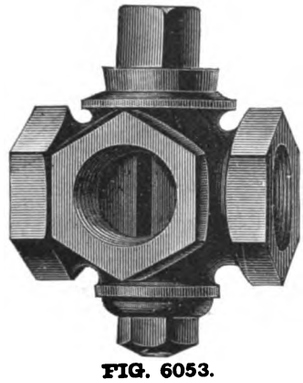


FIG. 6053.

FLAT HEAD.

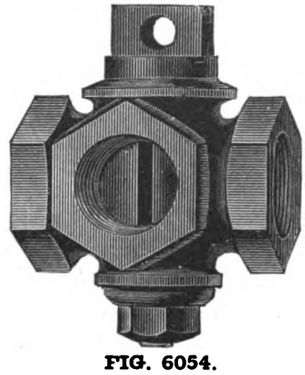


FIG. 6054.

SQUARE HEAD.

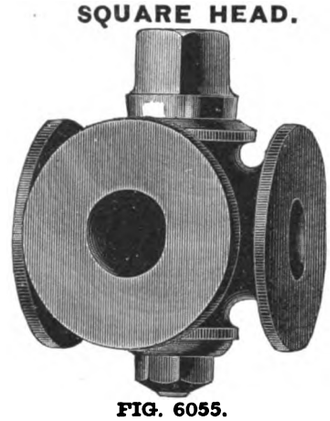


FIG. 6055.

FLAT HEAD.

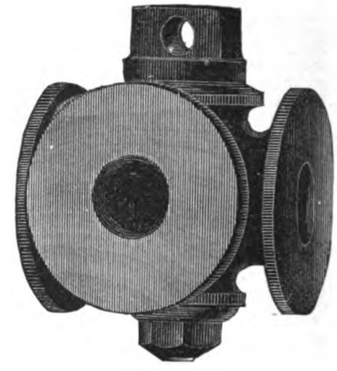


FIG. 6056.

ALL IRON COCKS, STRAIGHT AND 3-WAY.

STRAIGHT, SCREWED, OR FLANGED.

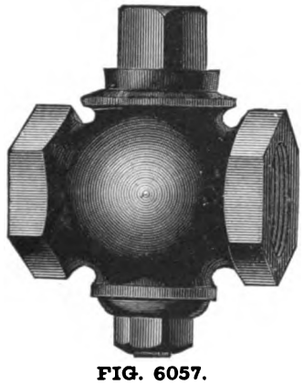


FIG. 6057.

3-WAY, SQUARE HEAD.

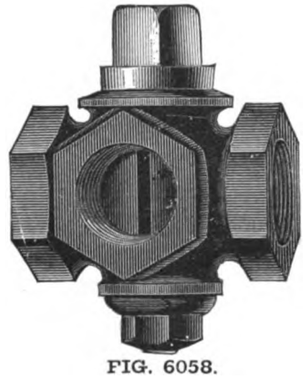


FIG. 6058.

3-WAY, FLAT HEAD.

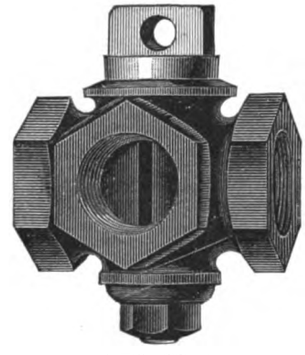


FIG. 6059.

SQUARE HEAD OR FLAT HEAD.

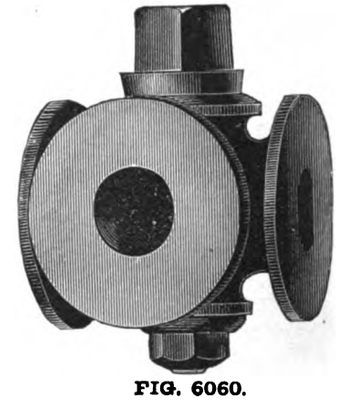


FIG. 6060.

PRICES.

Size			1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6
Square head	Fig. 6049,	each	$1.00	$1.10	$1.20	$1.60	$2.00	$2.75	$4.00	$5.00	$9.50	$13.50	$30.00	$40.00	.....	.....	.....
Flat head	Fig. 6050,	"	1.00	1.10	1.20	1.60	2.00	2.75	4.00	5.00	9.50	13.50	30.00	40.00	.....	.....	.....
Square head	Fig. 6051,	"	.....	.....	.....	2.35	3.00	4.00	5.50	6.75	11.50	16.50	33.50	44.00	.....	.....	.....
Flat head	Fig. 6052,	"	.....	.....	.....	2.35	3.00	4.00	5.50	6.75	11.50	16.50	33.50	44.00	.....	.....	.....
Square head	Fig. 6053,	"	.....	.....	.....	2.00	2.50	3.25	4.75	6.50	11.00	15.50	33.00	44.00	.....	.....	.....
Flat head	Fig. 6054,	"	.....	.....	.....	2.00	2.50	3.25	4.75	6.50	11.00	15.50	33.00	44.00	.....	.....	.....
Square head	Fig. 6055,	"	.....	.....	.....	3.00	4.00	5.00	7.00	9.00	14.00	20.00	38.25	50.00	.....	.....	.....
Flat head	Fig. 6056,	"	.....	.....	.....	3.00	4.00	5.00	7.00	9.00	14.00	20.00	38.25	50.00	.....	.....	.....
All iron, screwed	Fig. 6057,	"	.70	.75	.80	.90	1.25	1.50	2.00	2.60	4.50	6.50	12.00	16.00	28.00	33.00	45.00
Distance from end to end	Fig. 6057,	inch	.....	2 3/8	2 3/4	3 3/8	3 5/8	4	4 3/4	5 3/4	6 1/2	7 3/8	8 1/4	9 1/8	.....	11 3/8	13 1/2
All iron, flanged	Fig. 6057,	each	.....	.....	.....	1.65	2.25	2.75	3.50	4.35	6.50	9.50	15.50	20.00	32.00	37.00	50.00
Distance from face to face of flanges	Fig. 6057,	inch	.....	.....	.....	.....	4	4 3/8	4 3/4	5 5/8	6 1/4	7 1/8	8 1/4	8 7/8	.....	11 7/8	13 3/8
Diameter of flanges	Fig. 6057,	"	.....	.....	.....	3 1/2	4	4 1/2	5	6	7	8	9	10	....	11	12
With brass washers, add to list	Fig. 6057,	each	.10	.10	.10	.10	.15	.25	.25	.40	.50	1.00	2.00	3.50	5.00	6.00	8.00
Square head	Fig. 6058,	"	.....	.....	.....	1.30	1.75	2.00	2.75	4.00	6.00	8.50	15.00	20.00	.....	40.00	55.00
Flat head	Fig. 6059,	"	.....	.....	.....	1.30	1.75	2.00	2.75	4.00	6.00	8.50	15.00	20.00	.....	40.00	55.00
Square head	Fig. 6060,	"	.....	.....	.....	2.30	3.25	3.75	5.00	6.50	9.00	13.00	20.25	26.00	.....	46.00	61.00
Flat head	Fig. 6060,	"	.....	.....	.....	2.30	3.25	3.75	5.00	6.50	9.00	13.00	20.25	26.00	.....	46.00	61.00
With brass washers, add to list	Fig. 6060,	"	.....	.....	.....	.10	.15	.25	.25	.40	.50	1.00	2.00	3.50	.....	6.00	8.00

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ASBESTOS PACKED COCKS, IRON AND BRASS.

ALL IRON OR ALL BRASS.

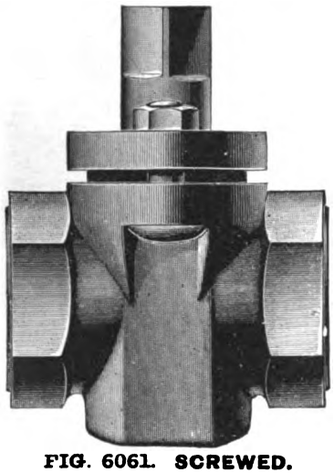


FIG. 6061. SCREWED.

ALL IRON.

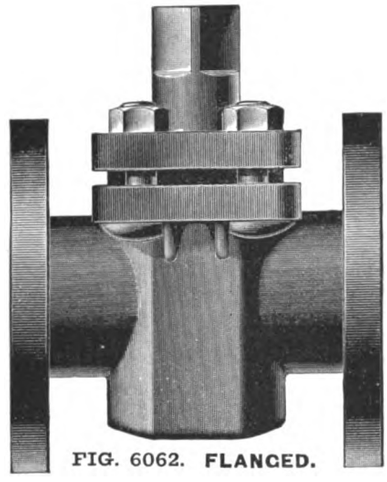


FIG. 6062. FLANGED.

EXTRA HEAVY, ALL IRON.

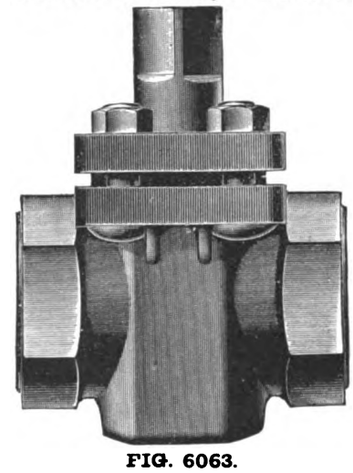


FIG. 6063.

PRICES, ALL IRON, FIGS. 6061 AND 6062.

Sizes.....inches,	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
Screw ends.....	$1.30	1.45	1.60	2.10	2.50	3.50	4.75	7.00	12.00	18.00	27.00	30.00	45.00	60.00	.....
Flanged ends.....	.....	....	....	....	....	....	4.75	7.00	12.00	18.00	27.00	30.00	45.00	60.00	.....
Wrenches for cocks.....	.10	.10	.10	.20	.20	.30	.40	.50	1.00	1.50	1.60	1.75	.....	.....	.....

PRICES, ALL BRASS, FIG. 6061.

Sizes.....inches,	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Prices.....	$2.00	2.25	2.50	3.15	4.20	6.00	7.75	12.00	20.00	28.00		

PRICES FOR AMMONIA, FIG. 6061.

Prices.....	$1.30	1.45	1.60	2.10	2.50	3.50	4.75	7.00	12.00	18.00	27.00	30.00

PRICES, EXTRA HEAVY, FIG. 6063.

Screwed or flanged.....	$1.45	1.60	2.10	2.50	3.50	4.75	7.00	12.00	18.00	27.00	30.00	45.00

PRICES, FIG. 6064.

Prices.....	$1.45	1.60	2.10	2.50	3.50	4.75	7.00	12.00	18.00	27.00		

AMMONIA COCKS, WITH GLAND ENDS.

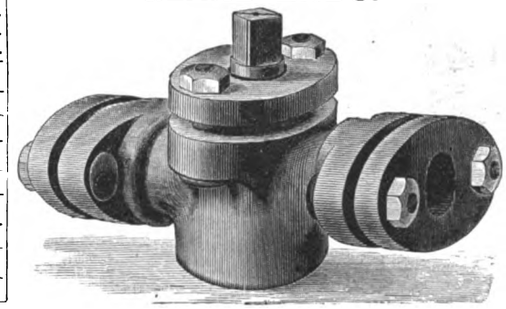


FIG. 6064.

ALL BRASS AIR COCKS, FULL SIZE.

BIBB NOZZLE, SINGLE THREAD. COMPRESSION.

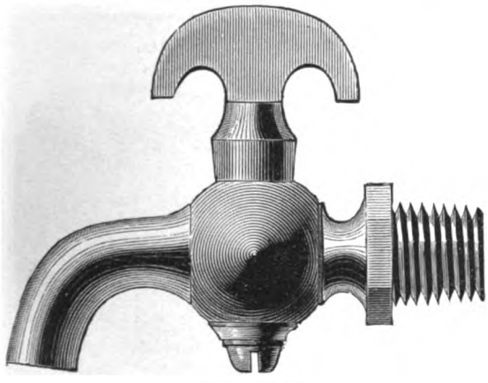


FIG. 6067.

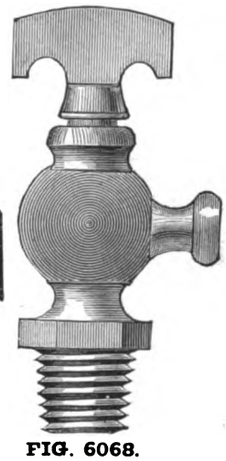


FIG. 6068.

SINGLE THREAD. DOUBLE THREAD.

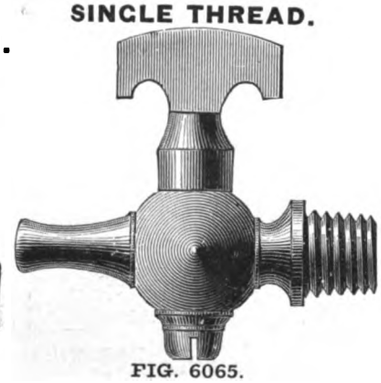


FIG. 6065.

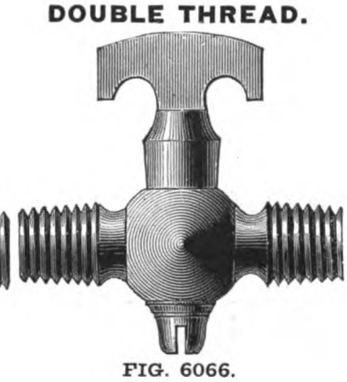


FIG. 6066.

PRICES, FIGS. 6065 TO 6070.

Size.....inches,	1/8	1/4	3/8	1/2
Single thread, Fig. 6065.....each,	$0.40	$0.45	$0.50	$0.60
Double " " 6066..... "	.45	.50	.60	.80
Bibb nozzle, single thread, Fig. 6067 "	.65	.70	.75	.85
" double " " 6069 "	.70	.90	1.00	1.25
Compression..... " 6068 "	.50	.55	.60	1.00
Double female, finished.. " 6070 "	.65	.70	....	....

BIBB NOZZLE, DOUBLE THREAD.

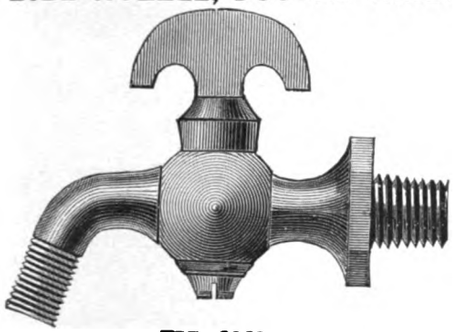


FIG. 6069.

DOUBLE FEMALE ENDS.

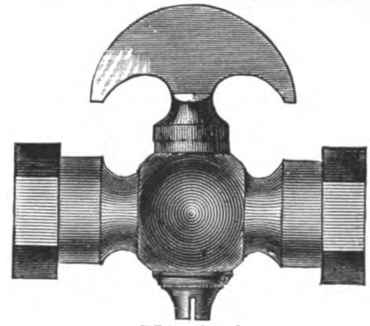


FIG. 6070.

SIDE NOZZLE AIR COCKS.

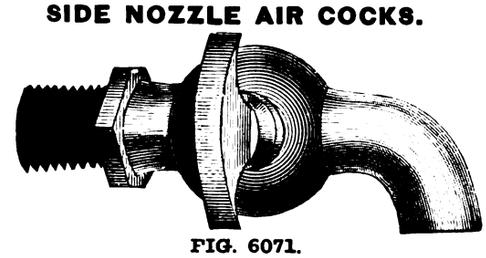


FIG. 6071.

PRICES.

Sizes....inches,	1/8	1/4	3/8	1/2
Finished ..each,	$0.65	$0.70	$0.75	$0.85
Rough.... "	.60	.65	.70	.80

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AIR COCKS, LEVER HANDLES, FULL SIZE, ALL BRASS.

SINGLE THREAD.

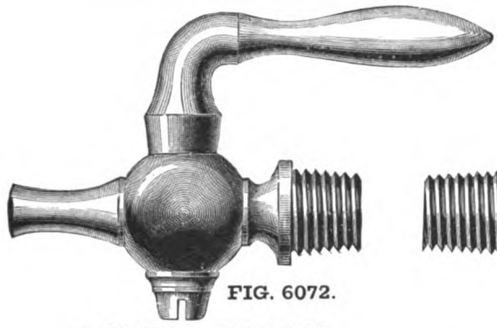


FIG. 6072.

DOUBLE THREAD.

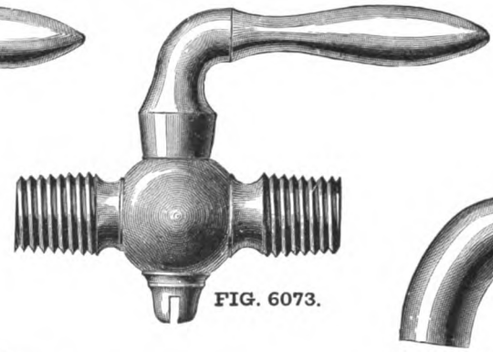


FIG. 6073.

SINGLE THREAD.

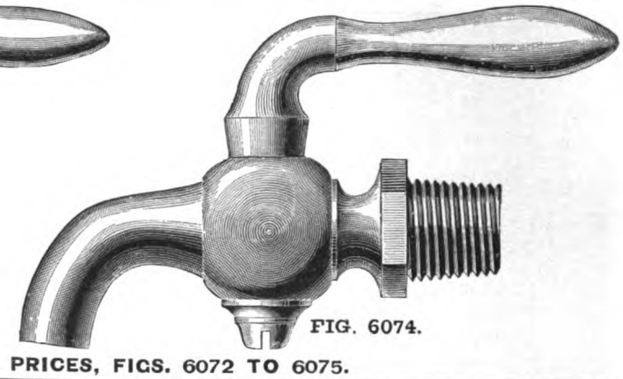


FIG. 6074.

DOUBLE THREAD.

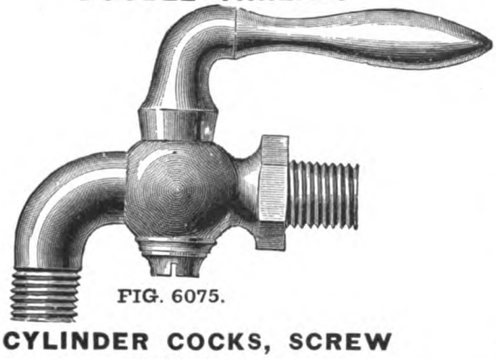


FIG. 6075.

PRICES, FIGS. 6072 TO 6075.

Size.....Inches,		⅛	¼	⅜	½
Single thread,	Fig. 6072.....Each,	$0.55	$0.60	$0.65	$0.75
Double "	Fig. 6073..... "	.60	.65	.75	.95
Bibb nozzle, single thread,	Fig. 6074..... "	.80	.85	.90	1.00
" double "	Fig. 6075..... "	.85	1.05	1.15	1.40

PRICES, FIGS. 6076, 6077 AND 6078.

Size.....Inches,		⅛	¼	⅜	½	⅝	¾	⅞	1
Screw shank,	Fig. 6076..Each,	.....	$0.95	$1.00	$1.15	.....	$1.75	.....	$2.50
Long " blank,	Fig. 6077.. "	.....	.90	.95	1.00	$1.10	1.50	$2.00	2.25
" " "	Fig. 6078.. "	$0.75	.80	.90	1.00	.....	.....	.....	.....
Finished long shank blank,	Fig. 6078 . "	.....	.....	1.25	1.35	.....	1.50	.....	.....

CYLINDER COCKS, BIBB NOZZLES.

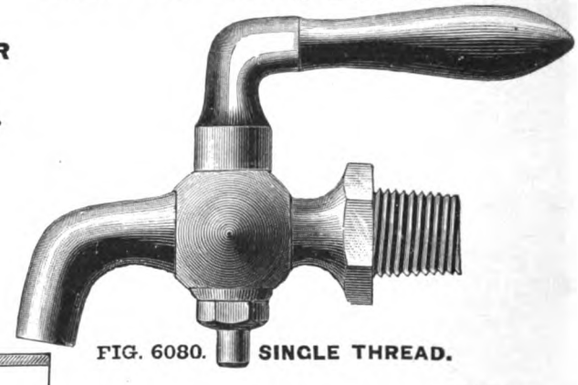


FIG. 6080. SINGLE THREAD.

CYLINDER COCKS, SCREW SHANKS.

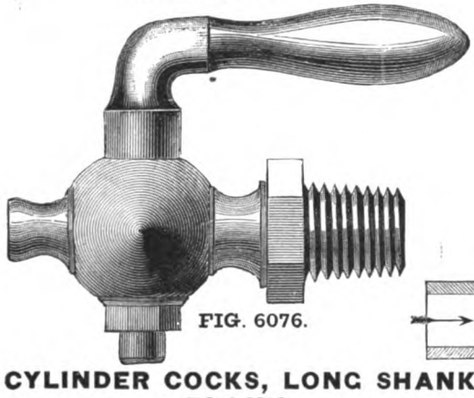


FIG. 6076.

AUTOMATIC CYLINDER COCKS.

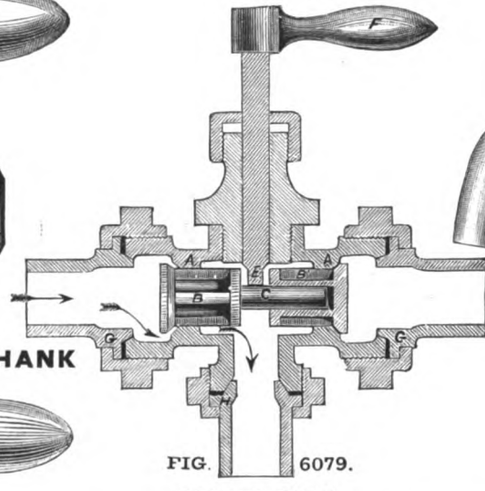


FIG. 6079.

CYLINDER COCKS, LONG SHANK BLANK.

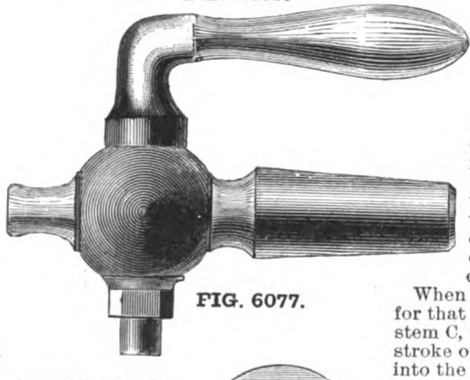


FIG. 6077.

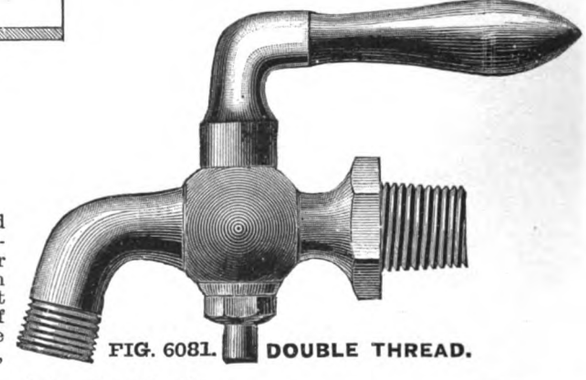


FIG. 6081. DOUBLE THREAD.

CYLINDER COCKS, T HANDLE BLANK.

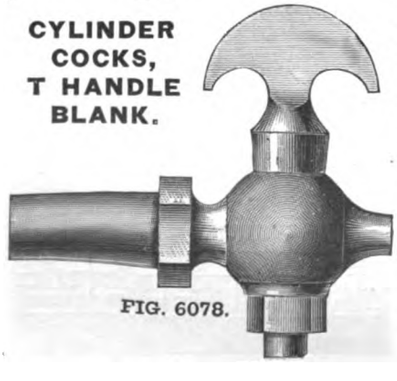


FIG. 6078.

DESCRIPTION.

It consists of two simple, winged check valves B B, which close alternately against seats A A, with a lever E F, which can be turned to hold both valves open; union joints G to connect with the drip pipe from both ends of cylinder, and H with pipe leading the drip away, all arranged in a compact, convenient form.

When steam is admitted to one end of the cylinder, the valve B for that end closes under pressure, and forces open, by means of stem C, the valve for the other end, holding it open for the whole stroke of piston, and allowing the water of condensation to flow out into the drain pipe. This action is reversed when steam enters the other end of cylinder, and so on, alternately, always leaving the exhaust end of cylinder open for the escape of water.

If desired, both valves can be held open by turning lever F.

PRICES.

Size..	⅛ in.	¼ in.	⅜ in.	½ in.	¾ in.	1 in.	1¼ in.
Adapted to cylinder.	Up to 6 in. in diam.	From 6 to 10 in. in diam.	From 10 in. to 14 in.	From 14 in. to 20 in.	From 20 in. to 30 in.	From 30 in. upward.	
Price	$4.00	7.20	9.00	12.00	18.00	28.00	40.00

PRICES, FIGS. 6080 TO 6082.

Size.....Inches,		¼	⅜	½
Short shank	.....Each,	$1.20	1.40	1.80
" "	double thread.. "	1.25	1.50	2.00
Long "	blank ... . "	1.10	1.10	1.25

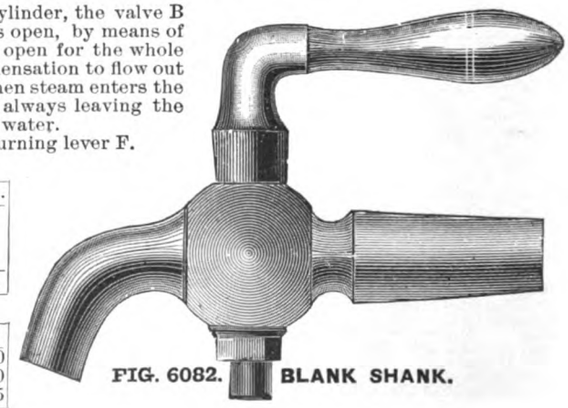


FIG. 6082. BLANK SHANK.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ALL BRASS CYLINDER COCKS.

WITH SINGLE STRAIGHT COUPLING.

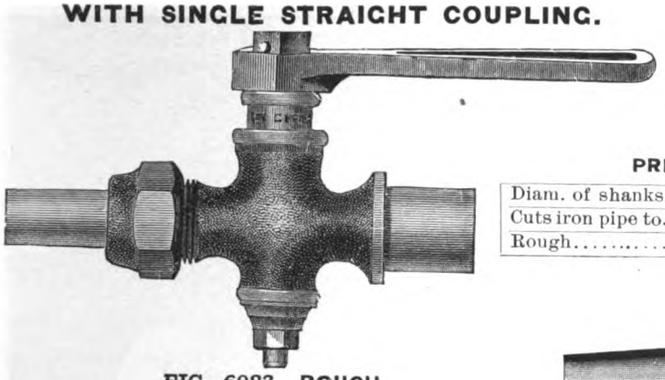


FIG. 6083, ROUGH.

FULL SIZE, SQUARE HEAD.

PRICES, FIG. 6084.

Diam. of shanks...In.	5/8	3/4	7/8	1 1/8
Cuts iron pipe to... "	3/8	3/8	1/2	3/4
Rough.....Each	$3.00	$3.25	$3.50	$4.00

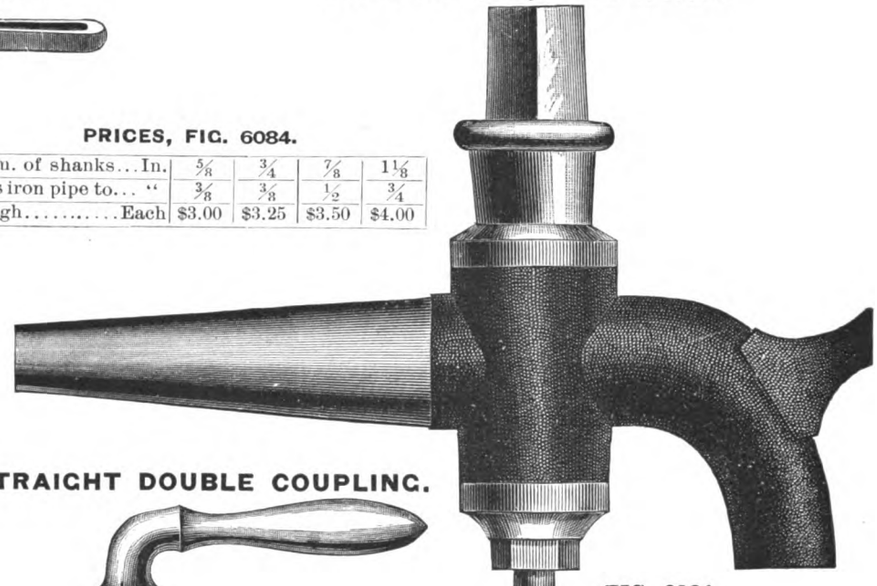


FIG. 6084.

STRAIGHT DOUBLE COUPLING.

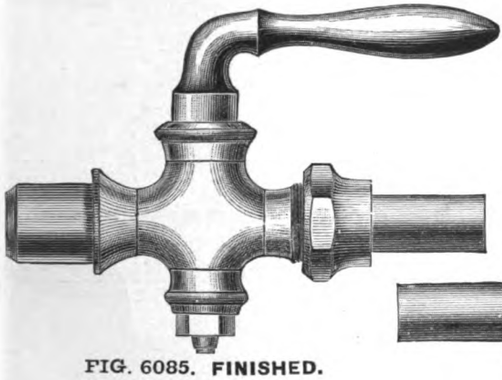


FIG. 6085. FINISHED.

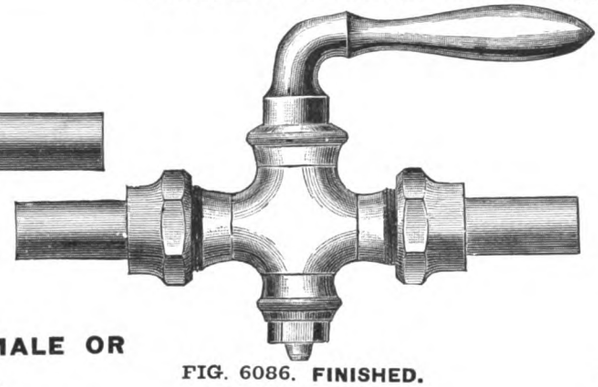


FIG. 6086. FINISHED.

FULL SIZE, WITH HOSE COUPLING.

LEVER HANDLE, WITH MALE OR FEMALE UNION.

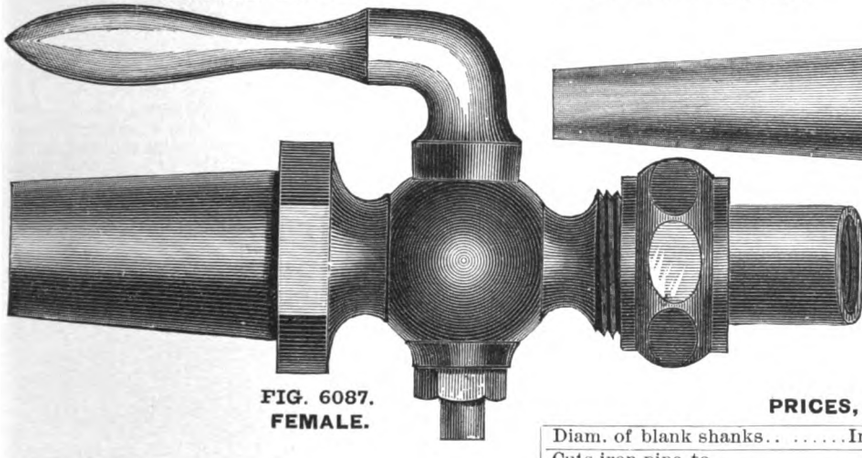


FIG. 6087. FEMALE.

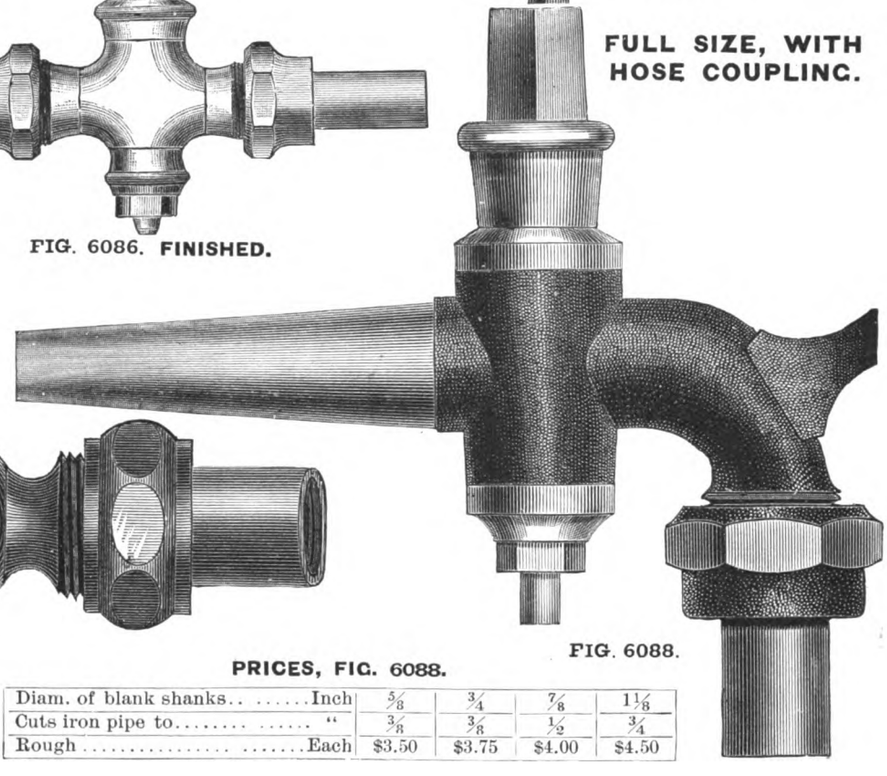


FIG. 6088.

PRICES, FIG. 6088.

Diam. of blank shanks.. .....Inch	5/8	3/4	7/8	1 1/8
Cuts iron pipe to..... ..... "	3/8	3/8	1/2	3/4
Rough ....Each	$3.50	$3.75	$4.00	$4.50

PRICES, FIGS. 6083, 6085, 6086 AND 6089.

Diam. of opening.....Inch	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	2
Diam. of blank shanks.... "	3/4	7/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1 7/8	2	2 3/8
Cuts iron pipe to.... ..... "	3/8	1/2	1/2	3/4	3/4	3/4	1	1 1/4	1 1/2	2
Rough.....Fig. 6083, each	$1.50	$1.75	$2.00	$2.50	$3.25	$4.00	$5.00	$8.00	$12.00	$18.00
Finished.....Fig. 6085, "	1.75	2.00	2.50	3.00	3.75	4.50	6.00	9.00	14.00	21.00
" .....Fig. 6086, "	2.00	2.25	3.00	3.50	4.25	.....	7.00	10.00	16.00	24.00
Rough .....Fig. 6089, "	1.75	2.00	2.50	3.00	3.75	.....	6.00	9.00	14.00	21.00

STRAIGHT HANDLE DOUBLE COUPLING.

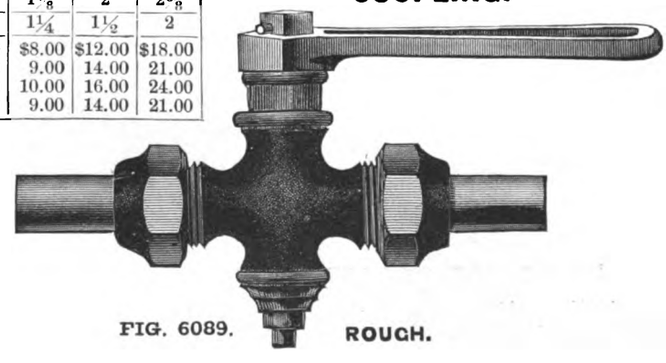


FIG. 6089. ROUGH.

PRICES, FIG. 6087.

Diam. of blank shanks.....Inch	3/8	1/2	5/8	3/4	7/8	1 1/8
Cuts iron pipe to..... "	1/8	1/4	3/8	3/8	1/2	3/4
Finished, with male union..Each	$1.40	$1.50	$1.60	$1.75	$2.25	$3.00
" " female " .. "	1.40	1.50	1.60	1.75	2.25	3.00

All cylinder cocks will be furnished with blank shanks, unless ordered threaded.

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ALL BRASS STEAM BIBBS.

THREADED FOR IRON PIPE.
ROUGH AND FINISHED.



FIG. 6090.

THREADED FOR IRON PIPE, WITH COUPLING.

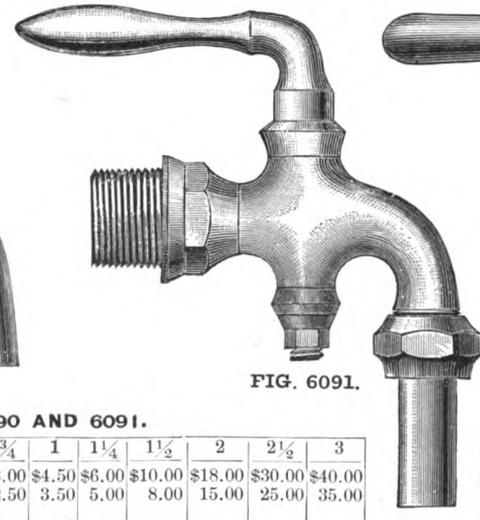


FIG. 6091.

PRICES, FIGS. 6090 AND 6091.

Size.....Inch	¼	⅜	½	⅝	¾	1	1¼	1½	2	2½	3
Finished.....Each	$1.25	$1.50	$2.00	$2.25	$3.00	$4.50	$6.00	$10.00	$18.00	$30.00	$40.00
Rough..... "	1.00	1.25	1.50	1.75	2.50	3.50	5.00	8.00	15.00	25.00	35.00
With coupling on nose, finished, "	1.50	1.75	2.50	2.75	3.50	5.50	7.00	12.00	20.00	.....	.....
rough.. "	1.25	1.50	2.00	2.25	3.00	4.50	6.00	10.00	18.00	.....	.....

FLANCED BIBB.
ROUGH AND FINISHED.

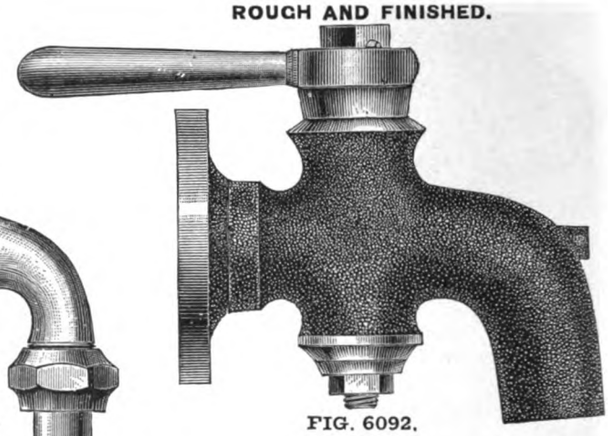


FIG. 6092.

PRICES.

Size.....Inch	1	1¼	1½	1¾
Rough.....Each	$5.00	$8.00	$10.00	$14.00
Finished..... "	6.00	9.00	12.00	17.00
Size.....Inch	2	2½	3	
Rough.....Each	$20.00	$30.00	$42.00	.....
Finished..... "	23.00	35.00	47.00	.....

ASHCROFT'S SELF-CLEANING WOOD HANDLE GAUGE COCKS, FINISHED.

WITH NICKEL SEAT.

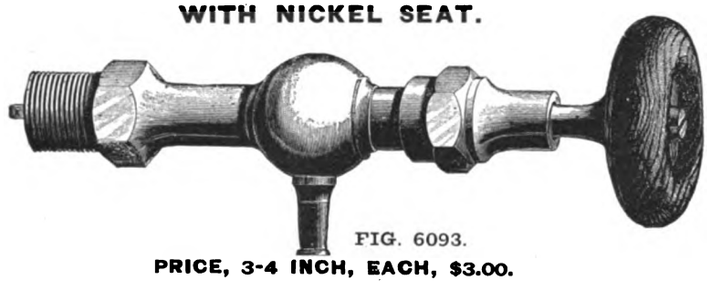


FIG. 6093.

PRICE, 3-4 INCH, EACH, $3.00.

This cock is made heavy and strong, and is fitted with a nickel seat and plug.

The nickel, being very hard and non-corrosive, insures a tight seat and renders the gauge cock practically indestructible.

WITH BRASS SEATS.

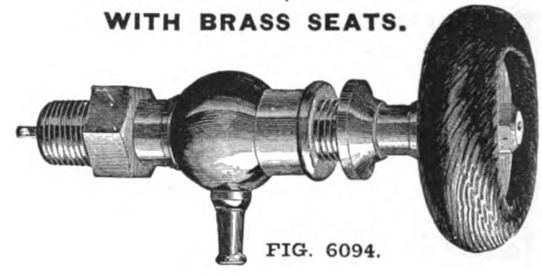


FIG. 6094.

PRICES.

⅜ inch, each	$2.00
½ " "	2.25
¾ " "	2.50

The self-cleaning attachment, A, is a flattened rod extending through the body of the gauge cock and into the boiler, and, being secured to the handle, when it turns, the self-cleaner turns and disturbs all accumulation of sediment which blows out when cock is opened, thus a free passage for steam or water is always secured.

COMPRESSION GAUGE COCKS.
WITH PLAIN WOOD WHEEL.

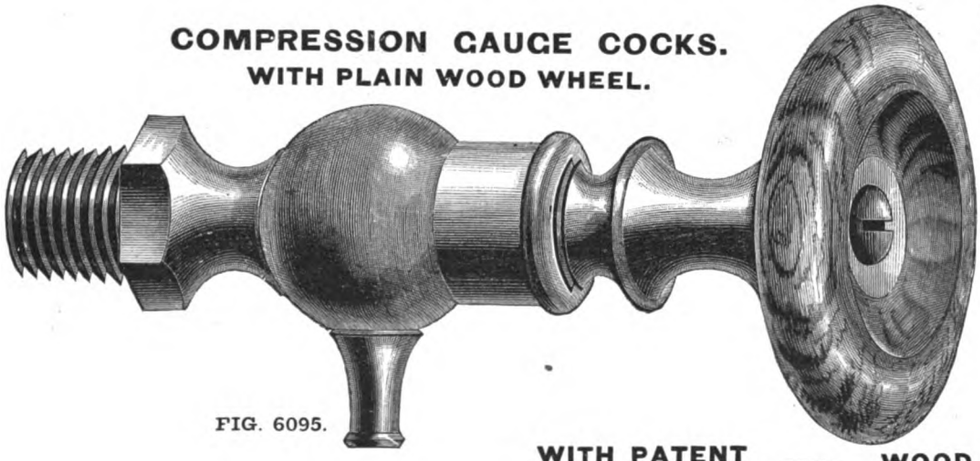


FIG. 6095.

The cocks Figs. 6095 and 6096 are full size.

WITH PATENT WOOD WHEEL.

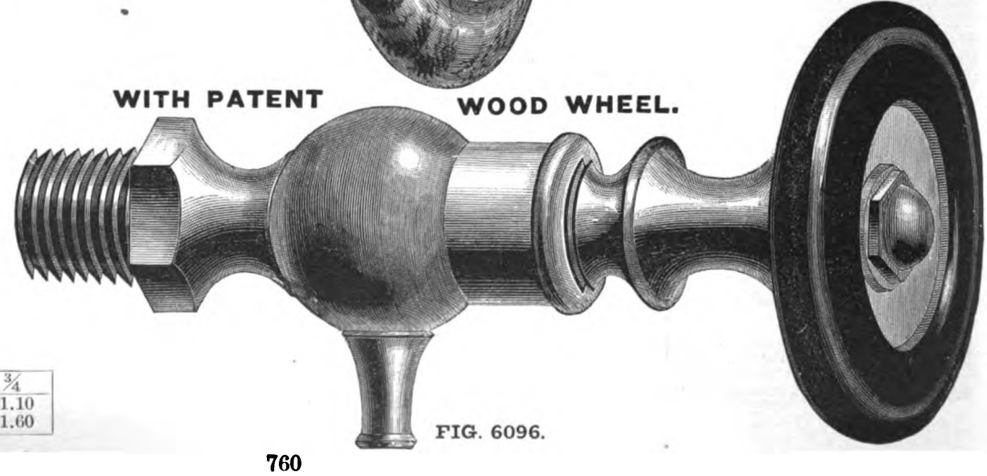


FIG. 6096.

PRICES, FIGS. 6095 AND 6096.

Size.....Inch	⅜	½	¾
Fig. 6095..... Each	$0.95	$1.00	$1.10
Fig. 6096..... "	1.45	1.50	1.60

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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COMPRESSION CAUCE COCKS, CUTS ALL FULL SIZE.

WOOD WHEEL AND STUFFING BOX.

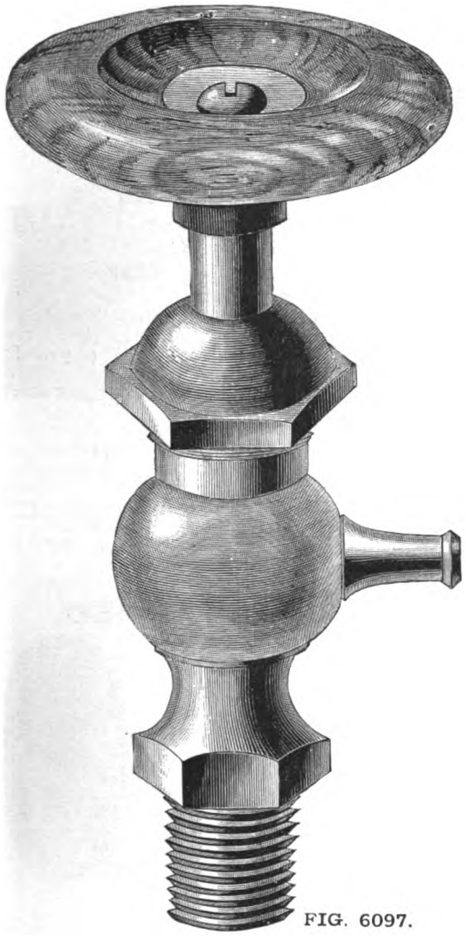


FIG. 6097.

PATENT WOOD WHEEL AND STUFFING BOX.

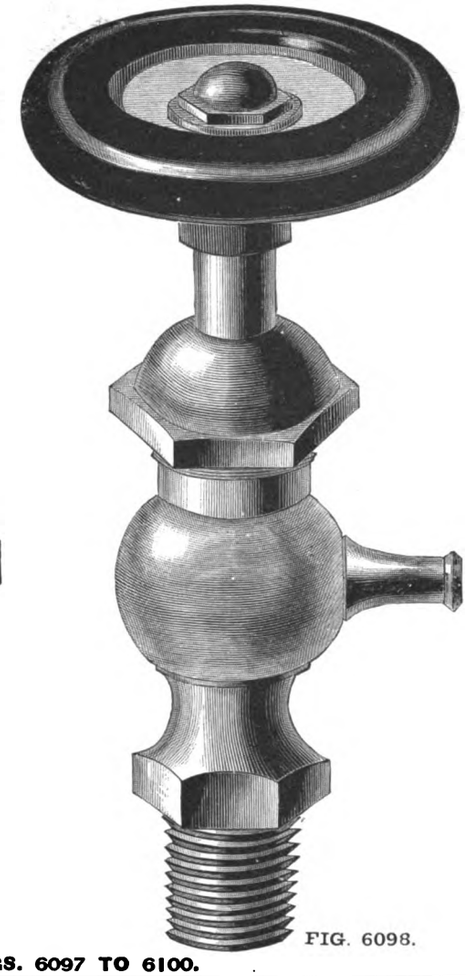


FIG. 6098.

WOOD WHEEL, LOOSE SEAT.

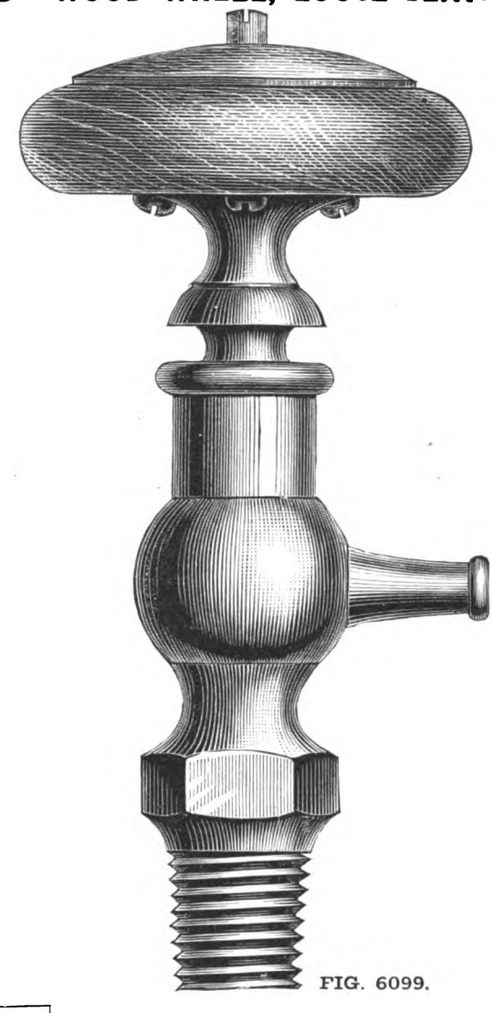


FIG. 6099.

PRICES, FIGS. 6097 TO 6100.

Size ..... Inches			⅜	½	¾
Fig. 6097.	Wood wheel,	No. 1, with stuffing box..... Each	$1.10	$1.15	$1.25
Fig. 6098.	" "	No. 1, " " " ..... "	1.60	1.65	1.75
Fig. 6100.	" "	No. 3..... "	.80	.85	.95
Fig. 6099.	" "	with loose seat to grind..... "	1.25	1.75	2.00

PLAIN WOOD WHEEL.

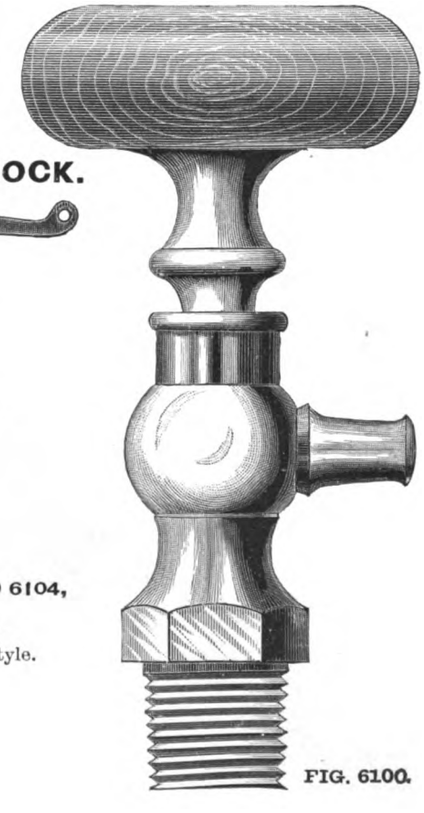


FIG. 6100.

SELF-CLEANING CAUCE COCKS.

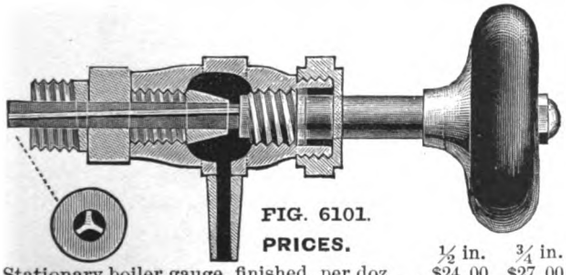


FIG. 6101.

PRICES.

	½ in.	¾ in.
Stationary boiler gauge, finished, per doz....	$24.00	$27.00
Locomotive " " " " " ...	30.00	33.00

Specify whether bronze or soft metal seats are wanted.

FREE-SEATED TRY COCK.

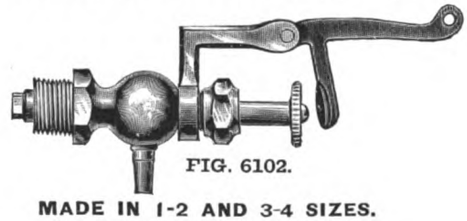


FIG. 6102.

MADE IN 1-2 AND 3-4 SIZES.
PRICE, $2.00 EACH.

ROTATING CAUCE COCK, SELF-GRINDING.

LEVER COCK, 1-4 SIZE.



FIG. 6103.

MISSISSIPPI STYLE, 1-2 SIZE.

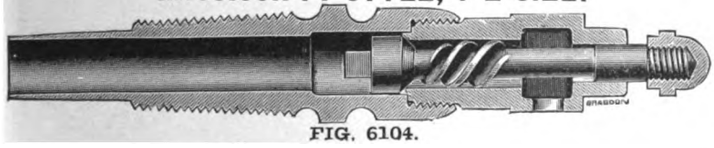


FIG. 6104.

PRICES, FIGS. 6103 AND 6104,
$16.00 PER DOZ.
For any size or either style.

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GAUGE COCKS.

DUPLEX COCKS.

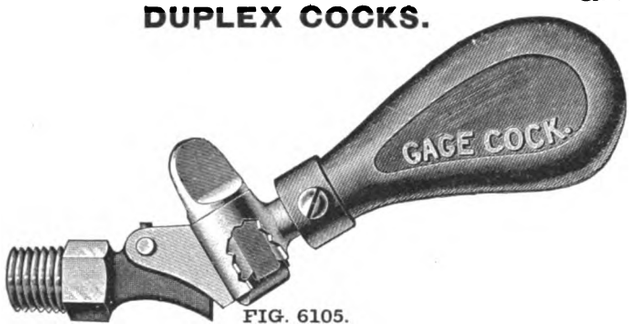


FIG. 6105.

PRICE, per dozen, threaded for ⅜, ½ and ¾, $12.00.

RECESTER COCKS.



FIG. 6106.

PRICES, per dozen, screwed for ⅜, ½ and ¾, $12.00; ⅞ inch blank, $12.00.

PENNA. GAUGE COCKS.

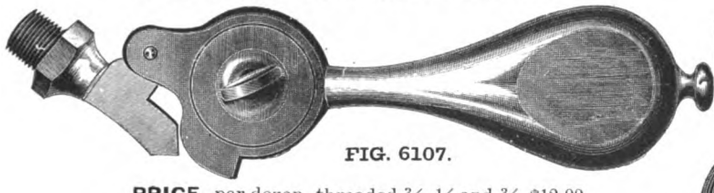


FIG. 6107.

PRICE, per dozen, threaded ⅜, ½ and ¾, $12.00.

BALL GAUGE COCKS.

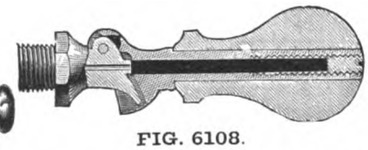


FIG. 6108.

Each one has four inches of patent packing, tested to resist the action of steam at 200 pounds pressure.

One packing, with proper care, will last for years. As the packing wears it can be set up by screw, and when worn out can be easily replaced while steam is on. This gauge cock saves engineers from all the annoyance to which they are subjected from leaky cocks, burned fingers in replacing rubber seats, etc. The cost of a set of these gauge cocks on a boiler is but little above that of the cheapest, and the difference in cost is soon saved.

PRICE, EACH, $1.50.

PAINTER'S GAUGE COCKS.

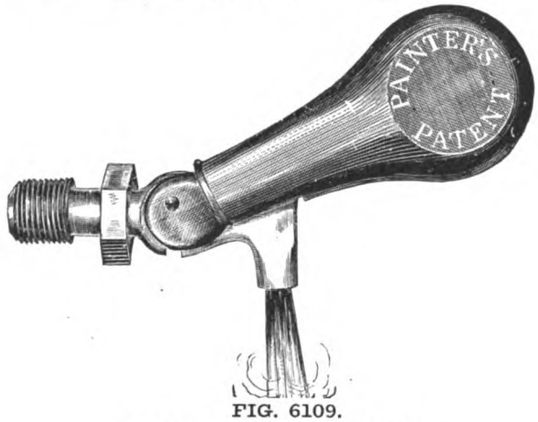


FIG. 6109.

PRICE, PER DOZEN, $12.00.

LEVER HANDLE, ALL BRASS, GAUGE COCK.

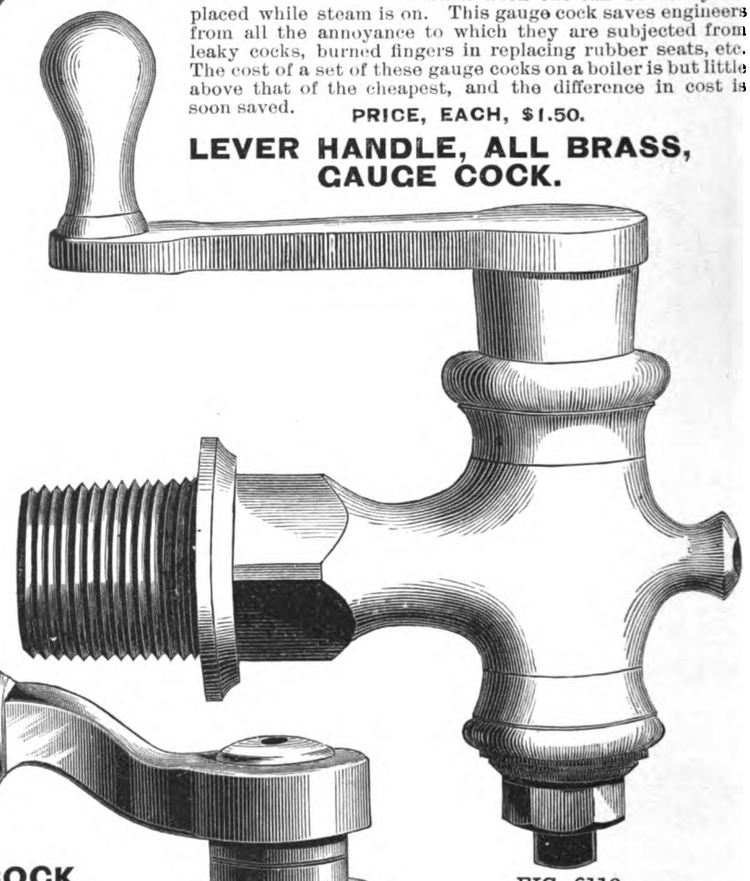


FIG. 6110.

Full size.

WOOD LEVER HANDLE GAUGE COCK.

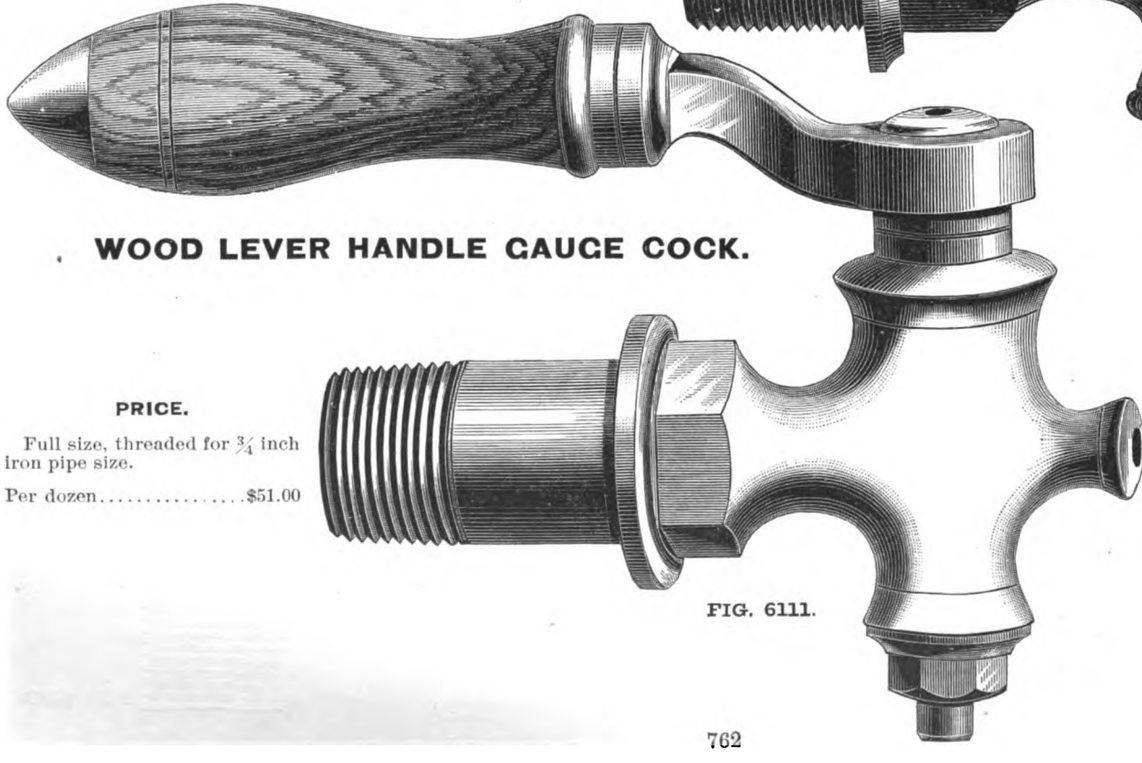


FIG. 6111.

PRICE.

Full size, threaded for ¾ inch iron pipe size.

Per dozen.....$51.00

PRICE.

Threaded for ¾ inch iron pipe.

Per dozen.....$42.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ALL BRASS GAUGE COCKS.
COMPRESSION LEVER HANDLE GAUGE COCKS, LOOSE SEAT.

COMPRESSION COCKS, WITH LEVER HANDLE.

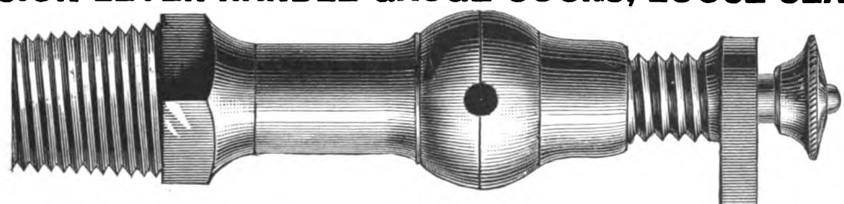


FIG. 6113.

PRICES, THREADED OR BLANK.

Size, inches,	3/8	1/2	3/4
Prices,	$1.10	$1.50	$1.75

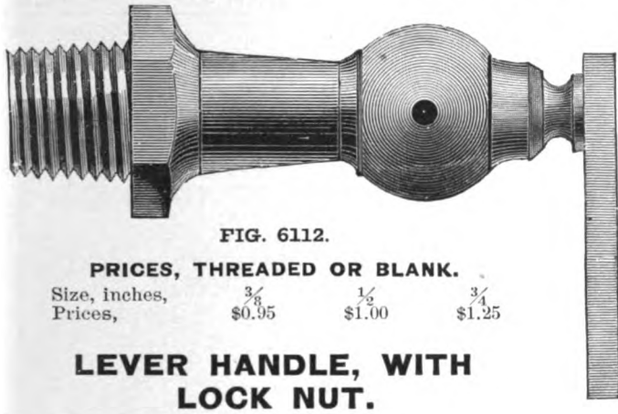


FIG. 6112.

PRICES, THREADED OR BLANK.

Size, inches,	3/8	1/2	3/4
Prices,	$0.95	$1.00	$1.25

LEVER HANDLE, WITH LOCK NUT.

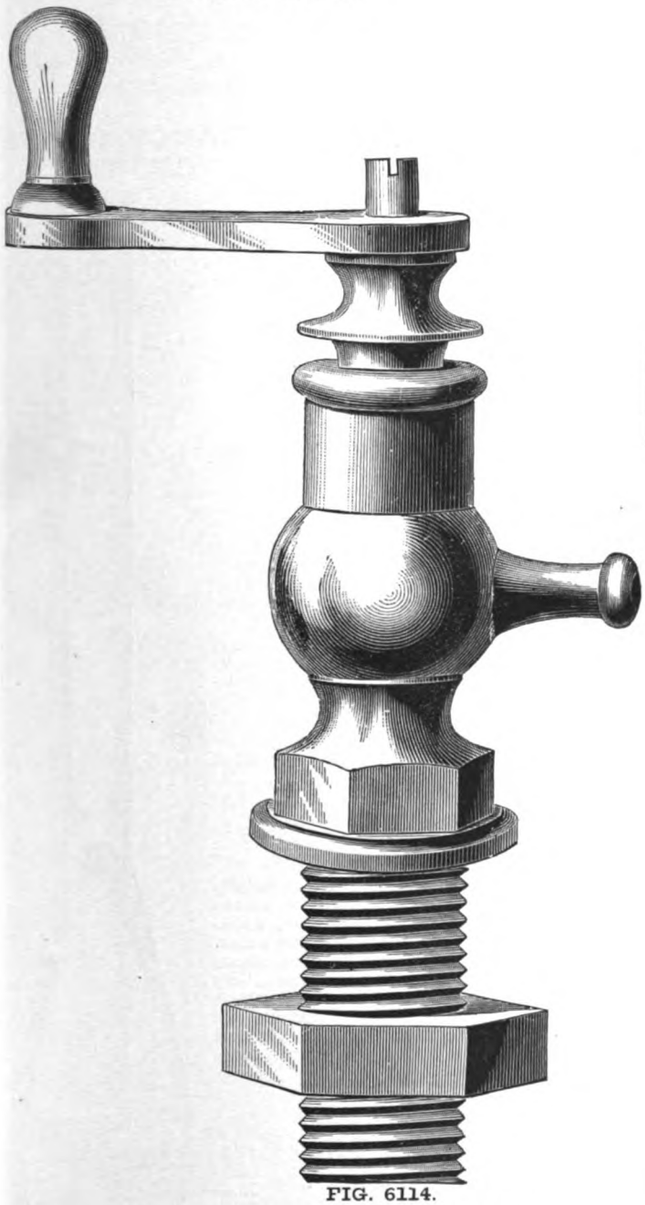


FIG. 6114.

PRICE, PER DOZ., $42.00.

MISSISSIPPI GAUGE COCKS. WITH SPRING.

CUT. PLAIN.



FIG. 6115. 3-4 FULL SIZE.

FIG. 6116. 7-8 FULL SIZE.

FIG. 6117. 7-8 FULL SIZE.

PRICES.

Size, blank shank.....inches.	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4
Plain or cut.....each,	$0.60	$0.75	$1.00	$1.25	$1.50	$2.00	$2.50
With spring..... "	.70	.85	1.15	1.45	1.75	2.35	3.00

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GENUINE SCOTCH GLASS TUBES FOR WATER GAUGES.

PRICES.

External diameter.	Length, in inches.																	
	10	11	12	13	14	15	16	17	18	19	20	22	24	30	36	48	60	72
½ inch.....	$4.80	$4.80	$5.40	$5.40	$6.00	$6.60	$7.20	$7.80	$8.40	$9.00	$9.60	$10.80	$12.00	$16.00	$20.00	$30.00	$45.00	$65.00
⅝ "	4.80	4.80	5.40	5.40	6.00	6.60	7.20	7.80	8.40	9.00	9.60	10.80	12.00	16.00	20.00	30.00	45.00	65.00
¾ " Tubes shorter than 14 in $6.60 p. dz.				6.60	7.20	7.20	7.80	8.40	9.00	9.60	10.20	11.40	12.60	20.00	25.00	35.00	50.00	70.00
⅞ " " " " 15 " 8.40 "				.....	8.40	9.00	9.60	10.20	10.80	11.40	12.00	15.00	18.00	25.00	30.00	45.00	60.00	80.00
1 " " " " 17 " 10.80 "				.....	.....	.....	10.80	11.40	12.00	13.20	15.00	18.00	24.00	35.00	40.00	60.00	80.00	100.00

TRADE-MARK.

ASHCROFT MFG. CO. GENUINE GAUGE GLASS A.M. Co. EXPRESSLY FOR STEAM USE SOLE AGENTS FOR U.S.

FIG. 6118.

Sizes over 24 inches long, special discount.

These glasses are neatly put up in bundles, with label on end and top stating diameter and length.

Caution—Never allow a glass tube to come in contact with any metal, as it makes it liable to break into atoms. This may occur immediately or not for days afterward.

Enameled tubes and fused-end tubes sold on the above list at special discount. Rubber washers for gauge glasses ½ or ⅝ inch, 3 cents each; ¾ inch, 5 cents each; larger sizes, $2.00 per lb.

NEW TRIPLEX MAGNIFYING GLASSES FOR WATER GAUGES.

These glasses have two bands of white enamel glass drawn in the tube, and by their magnifying effects you have three distinct views of the height of the water, one in front and one from each side.

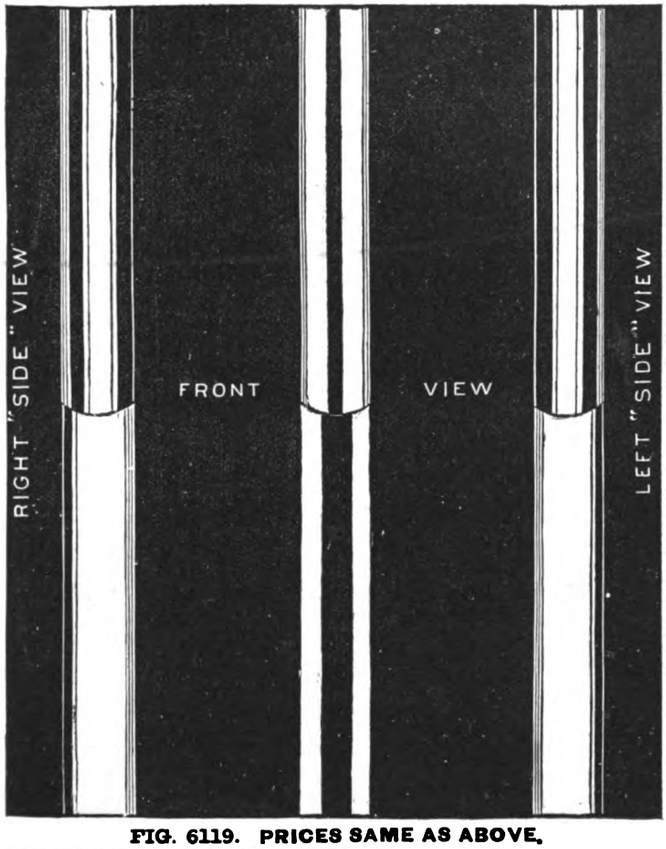


FIG. 6119. PRICES SAME AS ABOVE.

GAUGE GLASS CUTTERS.

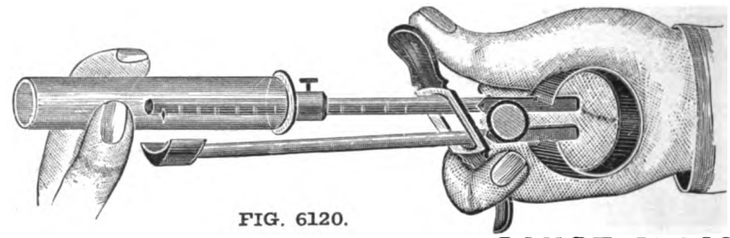


FIG. 6120.

GAUGE GLASS CUTTER.

In this cutter the sliding lever can be placed close to the work, and thus more power is obtained, and the steel cutting-wheel can be used much longer than in any other cutter.

PRICE, NICKEL-PLATED, EACH, $2.00.

SIMPLEX GAUGE GLASS CUTTER.



FIG. 6121.

PRICE, EACH, 25 CENTS.

DESCRIPTION, FIG. 6122.

FOR CUTTING GAUGE GLASSES TO LENGTH.

One arm has a scale in inches and fractions of an inch, a slide stop with set screw, and a rotary cutter at the end. This arm is inserted in the end of the glass tube to the required distance, against the slide stop or gauge, the outside of the glass tube resting in the circled end of the other arm. With a slight pressure of one hand on the handles, and a rotation of the glass with the other hand, the rotary cutter makes an even cut around the inside of the tube, and a very little pressure breaks it off.

No. 1 has a scale up to 5 inches.....Price, $2.50 each.
No. 2 " " " 7 " ..... " 3.00 "
Extra cutter wheels..... " .10 "

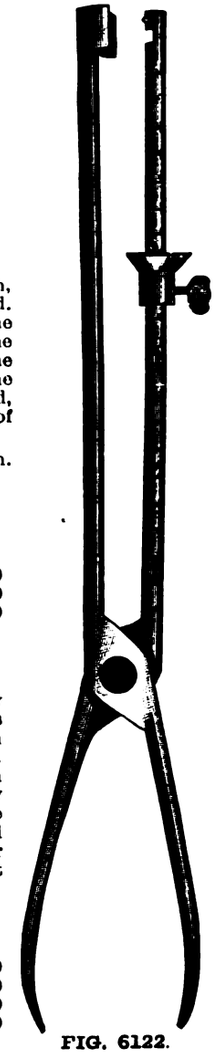


FIG. 6122.

AUTOMATIC VALVE.

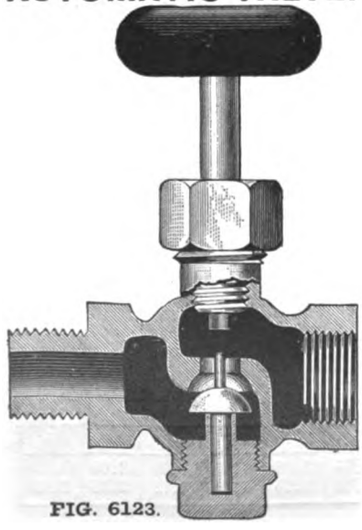


FIG. 6123.

STRAIGHT AUTOMATIC GAUGE.

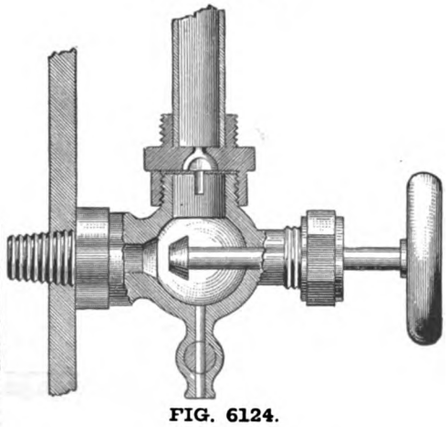


FIG. 6124.

PRICES, FIG. 6123.

Three-eighths inch, per set.....$4.50
One-half inch, " " 5.00
Three-fourths inch, " " 6.00
Nickeled, 50 cents extra.

DESCRIPTION, FIG. 6124.

This gauge was gotten up especially for high boilers, and when a glass breaks the valve shuts the water off only, which is perfect protection from scalding water.

When a glass is put in, open steam valve first, then open the pet cock. By shutting the water-stop valve at any time and opening the pet cock, you can tell whether the valve is doing its duty or not, as all the pressure is on the front side of it.

PRICES.

Three-eighths inch straight gauges, $7.00
One-half inch " " 8.00
Three-fourths inch " " 10.00
Extra heavy " " 14.00
Nickeled, 75 cents extra.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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KEYSER'S WATER GAUGES.

CLOSES AUTOMATICALLY WHEN GLASS BREAKS.

SECTIONAL CUT.

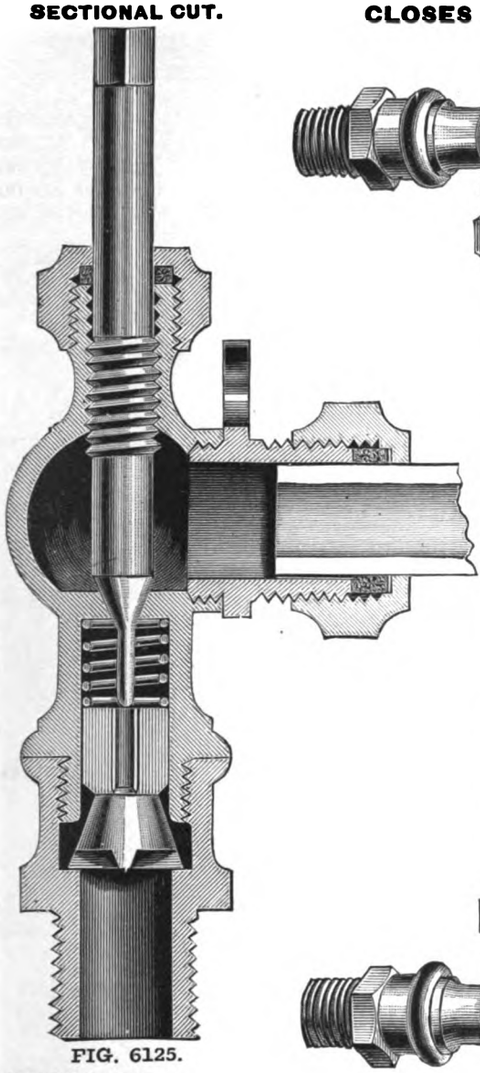


FIG. 6125.

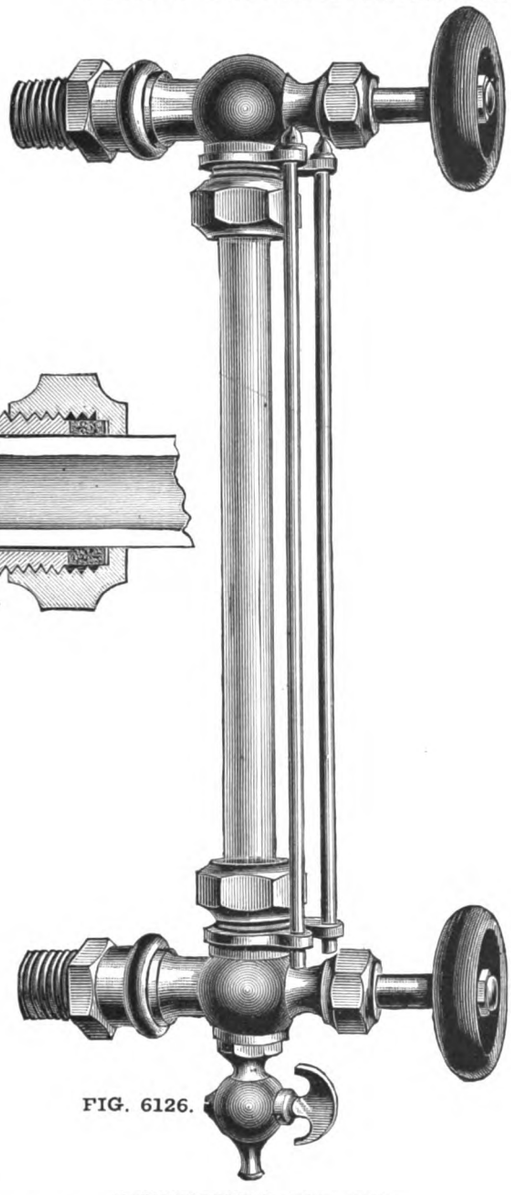


FIG. 6126.

PRICES, FIG. 6126.

With patent wood wheels, glass ½ or ⅝ x 12 to 15 in. long, screwed for ½ iron pipe, each.....$10.00
With patent wood wheels, glass ¾ or ⅞ x 16 to 24 in. long, screwed for ¾ iron pipe, each.....$12.00

ROUGH BODY, BRONZED.

FINISHED BODY.

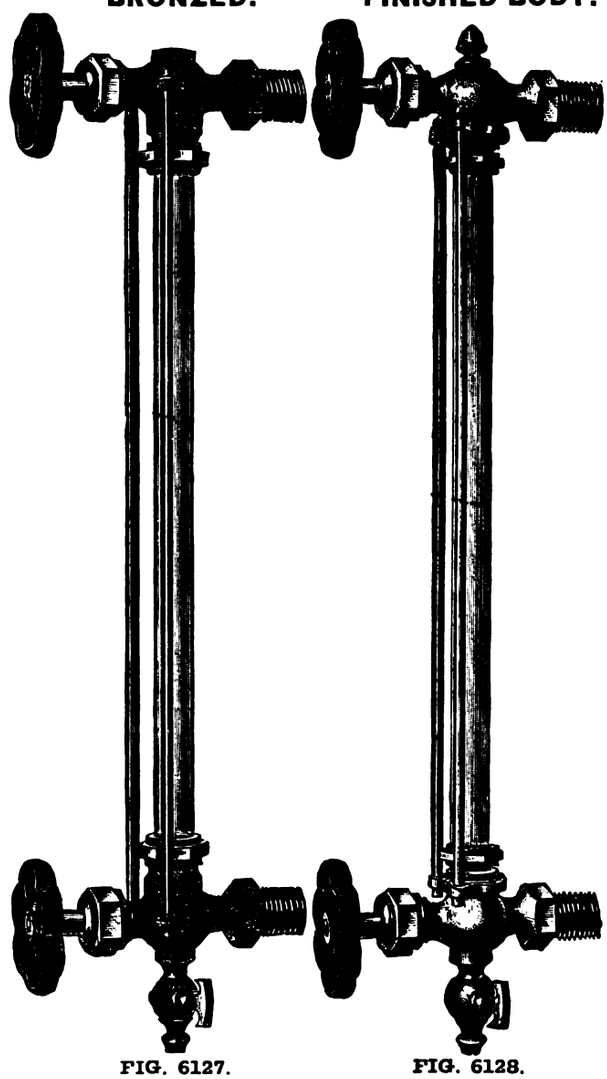


FIG. 6127.

FIG. 6128.

PRICES, IRON WHEEL.

Fig. 6127, thread ½ in., glass ⅝ x 12.....$3.00
Fig. 6128, " ⅜ " " ½ x 12..... 3.50
Fig. 6128, " ½ " " ⅝ x 12..... 3.50
Fig. 6128, " ¾ " " ¾ x 12..... 5.00

WATER GAUGE.

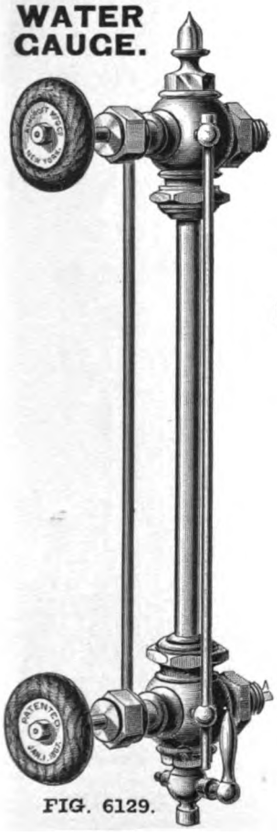


FIG. 6129.

DESCRIPTION, FIG. 6129.

This water gauge is made from an extra heavy pattern and has the self-cleaner, patent wood handle, brass work all finished, and is made with ¾ connections to boiler and for ¾ diameter glass.

PRICE, EACH, $16.00.

PERPENDICULAR.



FIG. 6130.

L. & N. WATER GAUGES.

PRICES, FIG. 6130.

¾ glass, ¾ shank, plain.....$9.00
¾ " ¾ " finished.....10.00
¾ " ¾ " plated.....12.00
⅝ " ½ " plain..... 7.50
⅝ " ½ " finished..... 9.00
⅝ " ½ " plated..... 10.00

In packing the stuffing box, of self-acting stems, do not screw them up too tight, as it will prevent the automatic action. Leave them free to act with about five pounds' pressure.

Those made in plain style have bodies painted black, with iron wheels.

The finished and plated have wood wheels.

The glass tube stuffing boxes are of the ordinary kind with space for gasket inside.

PRICES, FIG. 6131.

¾ glass, ¾ shank, plain.....$11.00
¾ " ¾ " finished..... 13.00

The same design, specially made for locomotives, is very heavy, weighs 8½ pounds finished, handles of stems project from boiler front 8 inches; made for ¾ glass and ¾ shank, with following gland on glass gasket, with 4 guard rods; finished and wood handles.

PRICE, $18.00.

Made in two sizes—one of them very heavy for locomotives, by special orders, the other for general purposes. These are made with following glands on the water glass gaskets.

HORIZONTAL.



FIG. 6131.

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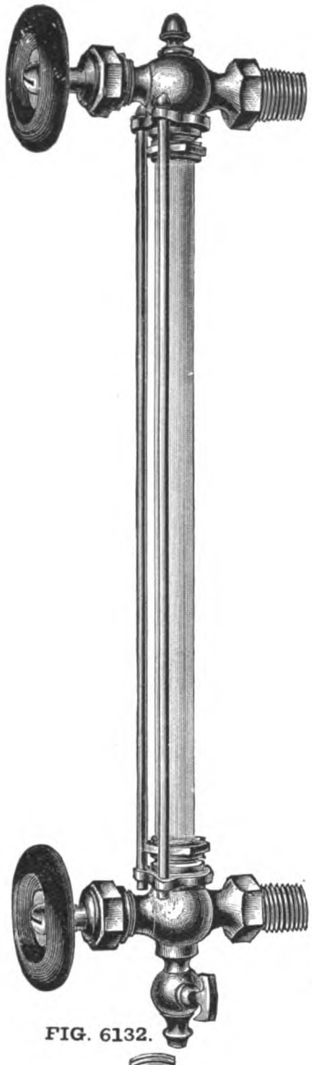


FIG. 6132.

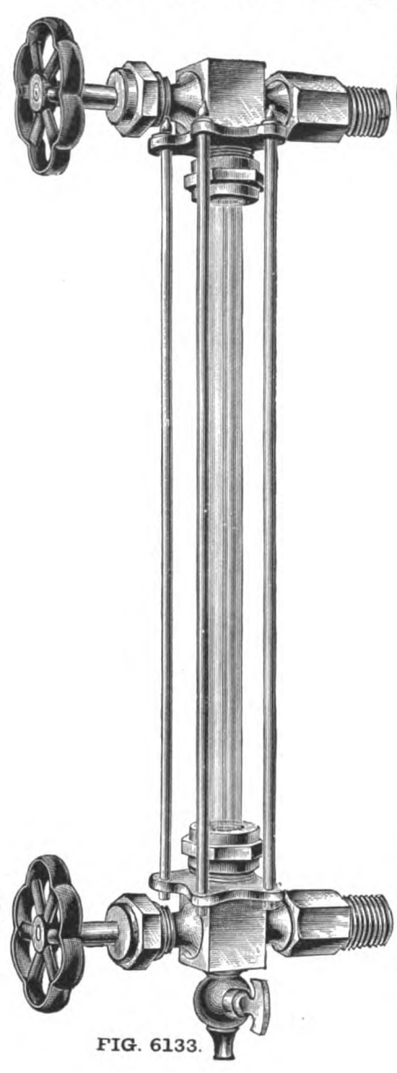


FIG. 6133.

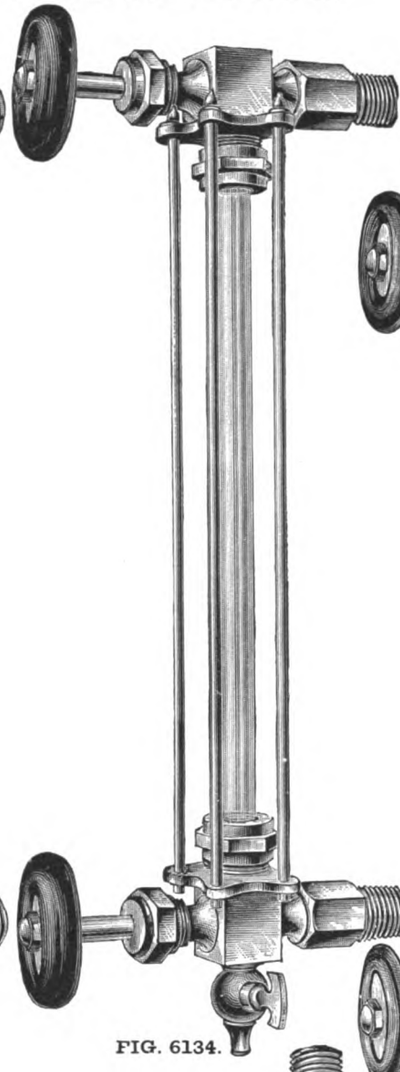


FIG. 6134.

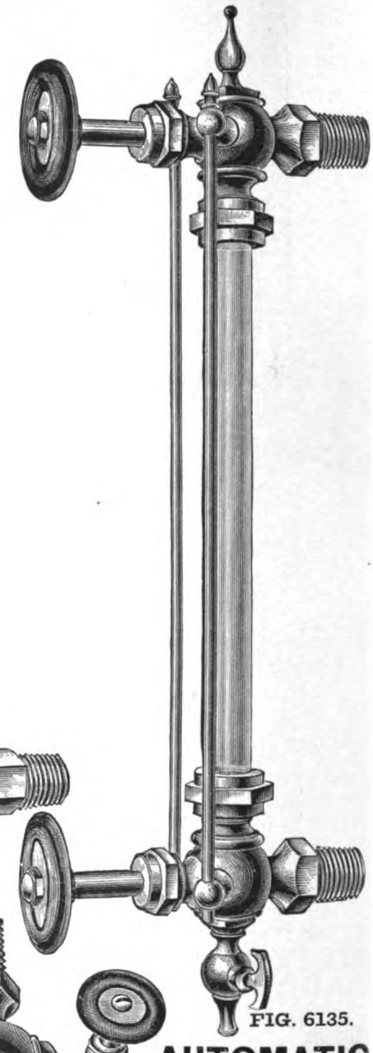


FIG. 6135.

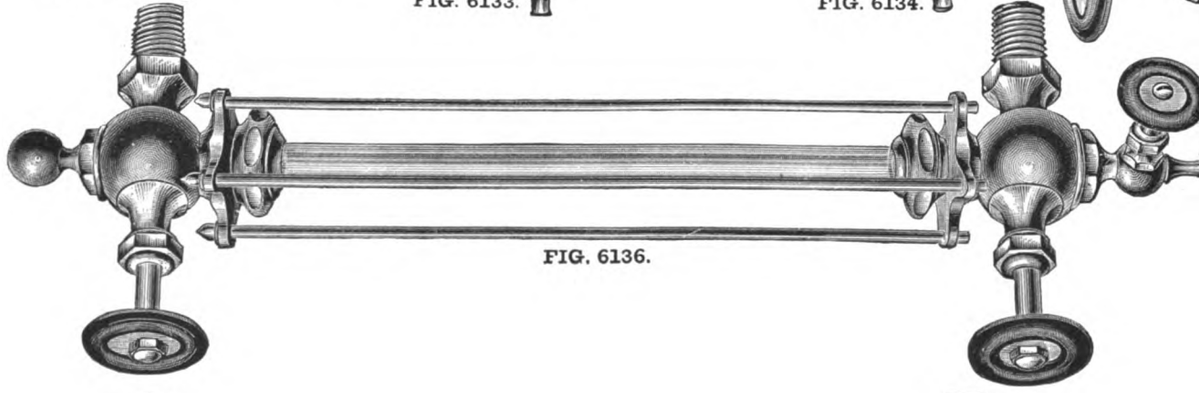


FIG. 6136.

AUTOMATIC GAUGE.

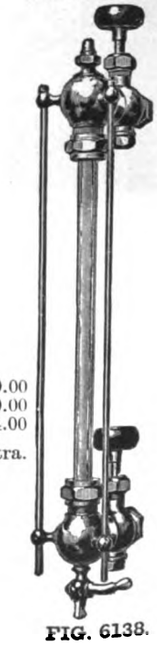


FIG. 6138.

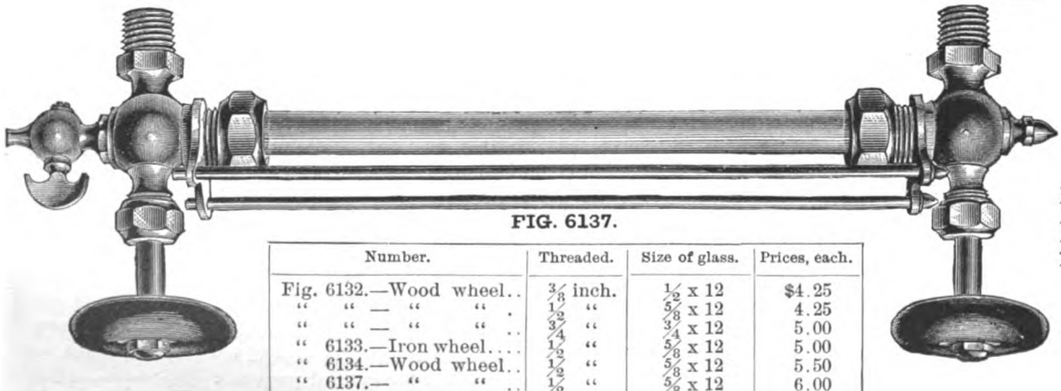


FIG. 6137.

PRICES.

3/8 inch	$9.00
1/2 "	10.00
3/4 "	14.00

Nickeled, 75c. extra.

Number.	Threaded.	Size of glass.	Prices, each.
Fig. 6132.—Wood wheel	3/8 inch.	1/2 x 12	$4.25
" " — " "	1/2 "	5/8 x 12	4.25
" " — " "	3/4 "	3/4 x 12	5.00
" 6133.—Iron wheel	1/2 "	5/8 x 12	5.00
" 6134.—Wood wheel	1/2 "	5/8 x 12	5.50
" 6137.— " "	1/2 "	5/8 x 12	6.00
" 6135.— " "	1/2 "	5/8 x 12	7.00
" 6136.— " "	3/4 "	3/4 x 16	15.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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WATER AND AMMONIA GAUGES.

BRASS WATER GAUGES.

IRON AMMONIA GAUGES.

ASBESTOS PACKED.

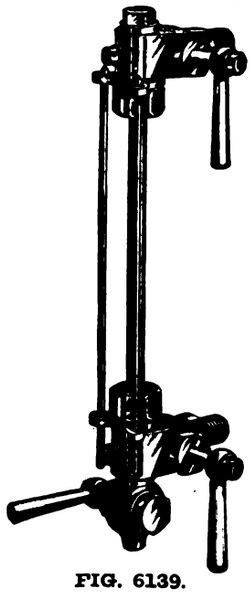


FIG. 6139.

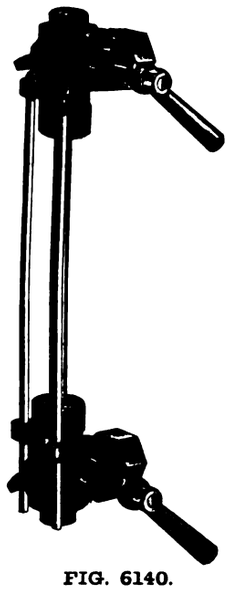


FIG. 6140.

PRICES, FIG. 6141.

COMBINATION NO. 1.

With one 5½ inch iron case steam gauge, three ⅜ wood handled gauge cocks, one iron wheel, rough body water gauge. Round body.....$20.00

COMBINATION NO. 2.

With one 6 inch iron case steam gauge, three ½ wood handled gauge cocks, one wood wheel, finished body water gauge. Round body.... 25.00

COMBINATION NO. 3.

With one 6 inch brass case steam gauge, three ½ wood handled gauge cocks, one No. 1 water gauge, one low water detector. Combination square body..... 50.00

Low water detector extra for No. 1 or No. 2 combination..... 15.00

COMBINATION COLUMN.

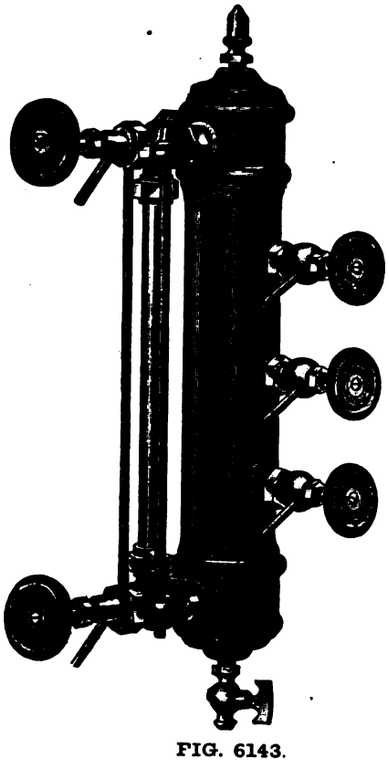


FIG. 6143.

BRASS AUTOMATIC WATER GAUGES.

PRICES, FIG. 6139.

	⅜	½	¾
Brass	$11.00	$12.00	$16.00
Nickel-plated	12.00	13.00	17.00

ALL IRON AMMONIA GAUGES.

PRICES, FIG. 6140.

½ in. pipe..	$16.00	¾ in. pipe..	$16.00
⅝ " glass		⅝ " glass	
½ " pipe..		¾ " pipe..	
¾ " glass		¾ " glass	

NO. 1 HEXAGON COLUMN ONLY.

PRICES, FIG. 6142.

Tapped for	Center to center.	Prices.
½ in. water gauge	12 in.	$2.50
⅜ " gauge cocks	12 "	
¾ " boiler connection.	12 "	

NO. 2 HEXAGON COLUMN ONLY.

Tapped for	Center to center.	Prices.
½ in. water gauge	14⅛ in.	$4.00
½ " gauge cocks	14⅛ "	
1 " boiler connection.	14⅛ "	

SAFETY COMBINATION.

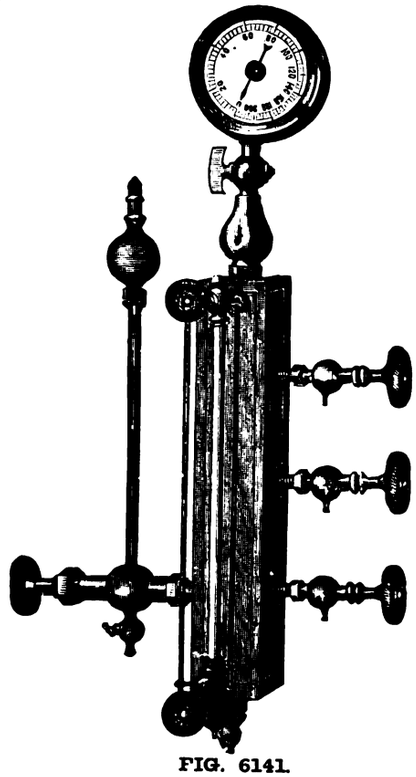


FIG. 6141.

COMBINATION WATER COLUMN.

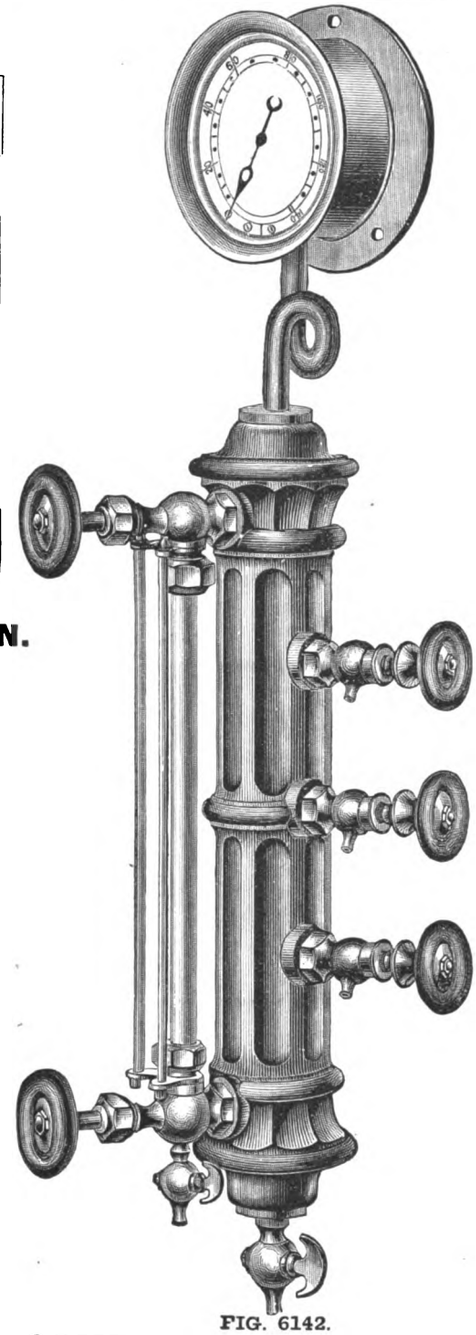


FIG. 6142.

COMBINATION COLUMNS.

PRICES, FIG. 6143.

Size of boiler connection	½	¾
Complete	$14.50	$19.50
For column only	2.50	4.00
For 3 gauge cocks	2.25	3.00
For 1 pet cock	.75	1.40
For one brass plug	.10	.10
For 2 brass unions to connect boiler	1.50	2.00
For water gauge	7.50	9.00

PRICES, FIG. 6144.

No.	1	2	3
Size of water gauge openings	½ in.	½ in.	¾ in.
Size of gauge cock openings	⅜ "	½ "	¾ "
Size of boiler connection	¾ "	1 "	1¼ "
Length of column	15 "	18 "	24 "
Inside of body	2 "	4 "	4 "
Price, without trimmings	$1.25	$2.50	$3.50

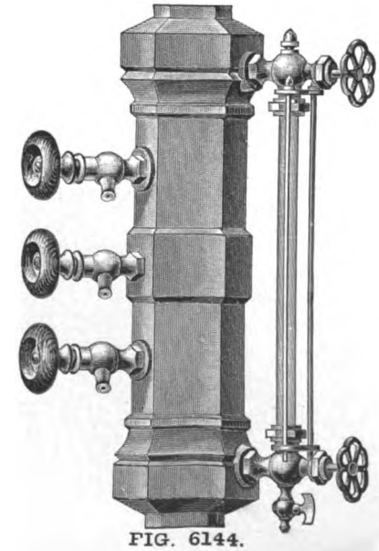


FIG. 6144.

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RELIANCE SAFETY WATER COLUMN.

COMPLETE. **SECTIONAL VIEWS.**

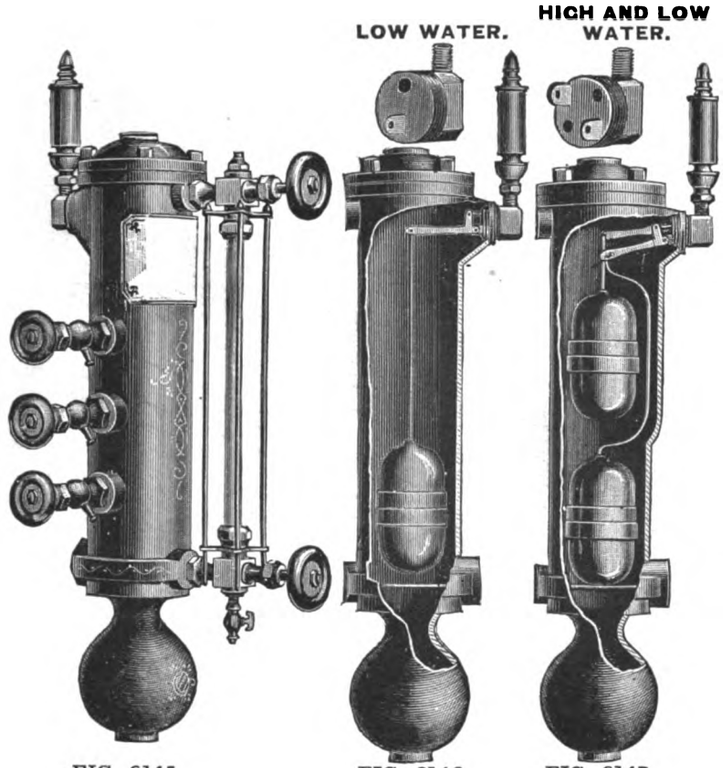


FIG. 6145. FIG. 6146. FIG. 6147.

PRICES, FIG. 6145.

Number.	Kind of alarm.	Dimensions over all, in inches.	Diameter of boiler and steam pressure, in lbs. Up to	Up to	Size of boiler connections.	Variation between alarms.
1	H. & L.	3¾ x 23	54 in.	80 in.	1 in.	6
1½	H. & L.	4⅞ x 28	54 "	150 "	1¼ "	6
2	Low.	3¾ x 23	60 "	100 "	1 "	....
5	H. & L.	4½ x 29½	Any	Any	1¼ "	8
6	Low.	4½ x 27	diam.	press.	1¼ "	....

Number.	Length glass.	Distance bet. G. cocks.	Size trimmings.	Japanned. Without G. cocks or W. gauge.	Japanned. With G. cocks and W. gauge.	Finished brass. Without G. cocks or W. gauge.	Finished brass. With G. cocks and W. gauge.
1	12 in.	3	½ in.	$28.00	$35.00	$70.00	$85.00
1½	12 "	3	½ "	28.00	35.00	.....	.....
2	12 "	3	½ "	25.00	32.00	65.00	80.00
5	16 "	4	¾ "	30.00	40.00	80.00	100.00
6	14 "	4	¾ "	28.00	37.00	75.00	95.00

Columns made with any variation from 6 in. to 36 in. between the alarms for Hazleton, Corliss and similar boilers and for special purposes.

ASHCROFT'S SPRING BALANCE.

PRICES, FIG. 6148.

For locomotive and portable engine safety valves. Every balance carefully tested before being sent out.

Portable engine.....each, $6.00
Locomotive..... " 12.00

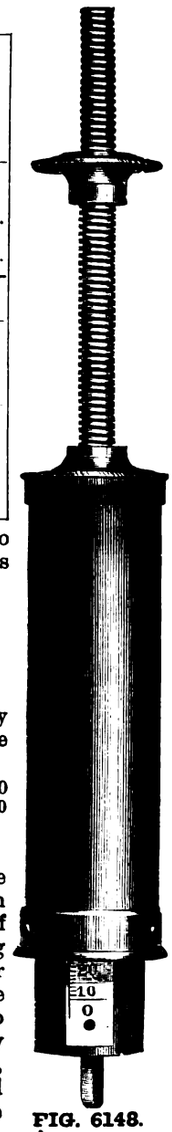


FIG. 6148.

BLACKALL RELIEF VALVE FOR LOCOMOTIVES.

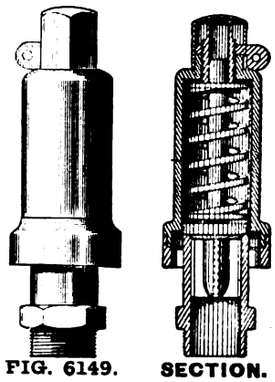


FIG. 6149. SECTION.

This valve is placed on a locomotive at any point between the throttle valve and slide valve, preferably upon the steam chest, where it will have a free and open communication with the steam pipes of the engine only. It is designed to prevent the accumulation of pressure in the pipes or boiler of a locomotive if engine is suddenly reversed while moving forward, as is frequently the case. The valve is adjusted to open at a slightly higher pressure than the maximum pressure carried on the boiler, but below the degree of pressure required to produce a rupture of the parts, and will permit the excess of air pressure to escape from the steam pipes and thereby prevent any undue pressure being generated by the cylinders. A uniform pressure of air will be maintained within the limit of safety, which will supply resistance to the pistons, and overcome the momentum of the train, and perform the functions of an automatic air brake on the drivers and stop the train. By the use of this device engines can be reversed suddenly while running at a high rate of speed, without strain or damage to any portions of the machinery or boiler.

PRICES.

1 valve for locomotive, 1¼ or 1½ bottom discharge..... $20.00
2 valves for one locomotive, 1¼ or 1½ bottom discharge..... 35.00

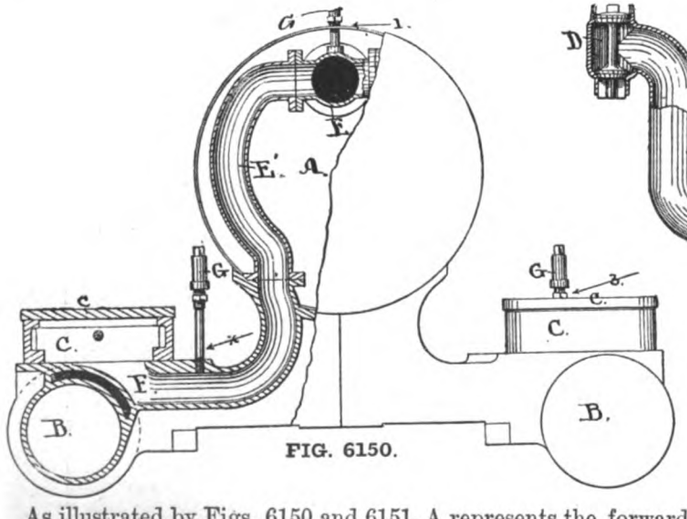


FIG. 6150.

ILLUSTRATION OF PLACES WHERE THE BLACKALL RELIEF VALVE MAY BE ATTACHED ON LOCOMOTIVES.

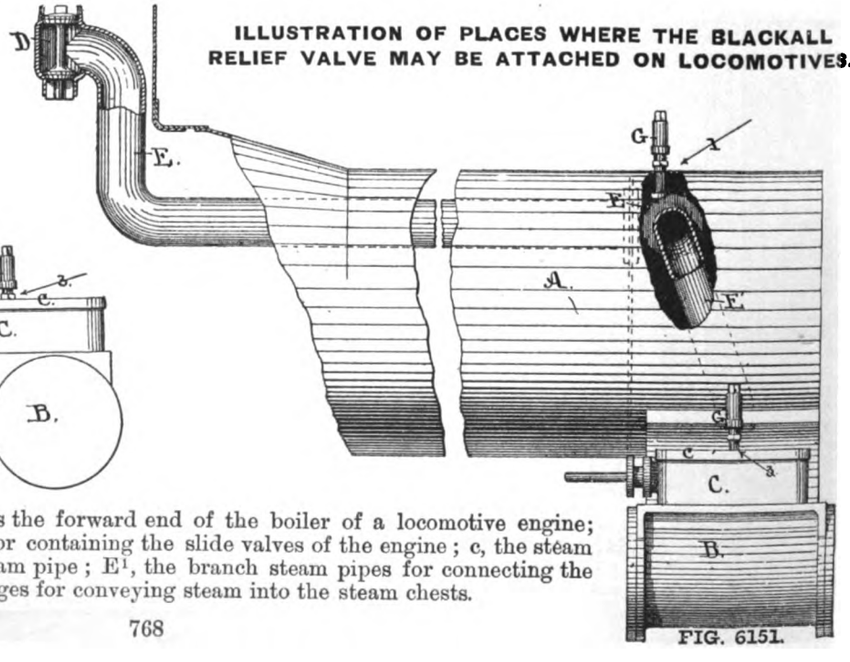


FIG. 6151.

As illustrated by Figs. 6150 and 6151, A represents the forward end of the boiler of a locomotive engine; B, the cylinders of the engine; C, the steam chests for containing the slide valves of the engine; c, the steam chest covers; D, the throttle valve; E, the main steam pipe; E^1, the branch steam pipes for connecting the pipe E with the cylinders B; and F, the steam passages for conveying steam into the steam chests.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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RICHARDSON'S FARM ENGINE AND YACHT POP SAFETY VALVES.

PRICES, FIG. 6152.

Size.	Size steam connection.	Height.	Largest diameter.	Horse power.	Prices.
¾ inch.	¾ inch.	6⅛ inch.	2 3/16 inch.	8	$8.00
¾ "	1 "	6⅛ "	2 3/16 "	10	8.00
1 "	1 "	7½ "	2 7/16 "	12	10.00
1 "	1¼ "	7½ "	2 7/16 "	15	10.00
1¼ "	1¼ "	8½ "	2 7/8 "	18	15.00
1¼ "	1½ "	8½ "	2 7/8 "	20	15.00
1½ "	1½ "	9⅜ "	3⅜ "	20	20.00
1½ "	2 "	9⅜ "	3⅜ "	25	20.00
2 "	2 "	11 "	4 1/16 "	30	30.00
2½ "	2½ "	13 "	5¼ "	40	40.00



FIG. 6152.

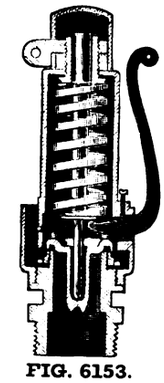


FIG. 6153.

Connect valve as close to boiler as possible. When pipe connections are used, have them full diameter of valve or larger and as short and free from bends as possible.

In ordering, state horse power or size of boiler and highest working pressure.

Fig. 6153 shows section of valve with lock-up attachments, which is to prevent tampering with the valve and carrying too much pressure with stationary outlet.

SIDE OUTLET VALVES.

WITH STATIONARY OUTLET.



FIG. 6154.

Fig. 6154 is made with outlet stationary on the valve case.

PRICES, ALL BRASS.

Diameter..	¾ in.	1 in.	1¼ in.	1½ in.
Prices.....	$10.00	$13.00	$18.00	$23.00

WITH SWING SIDE OUTLET.

The valve, Fig. 6155, is similar to the portable valve, Fig. 6154, with the addition of an outside brass shell made with a side outlet. The shell is so fitted on the valve case that the outlet can be turned in any circular direction for piping away the escaping steam.

PRICES, ALL BRASS.

Diameter..	1 in.	1¼ in.	1½ in.	2 in.
Prices....	$15.00	$20.00	$25.00	$30.00

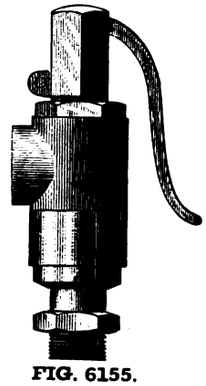


FIG. 6155.

CAR HEATING VALVES.

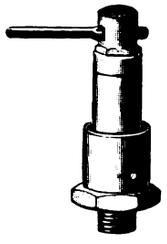


FIG. 6156.

This valve is especially adapted for car heating, and can be adjusted from the outside through the slot, as shown in Fig. 6156, from pressures 5 lbs. and up.

PRICE.

½ inch, measuring 4¾ inches high, and largest space it will occupy 1¾ inch diameter.....$6.00

SNIFTING VALVES.

This valve applied to each end of a steam cylinder will always allow of the escape of all water of condensation and thus prevent the blowing off of heads. We make them of various styles, so that they may be applied in awkward places. They may be used for a water relief valve.

PRICES, ALL BRASS.

Size.....	1 in.	1¼ in.	1½ in.	2 in.
Prices....	$12.00	$16.00	$20 00	$25.00

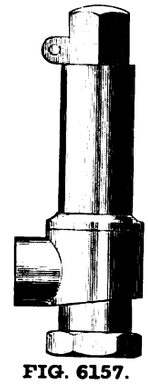


FIG. 6157.

SPRINGS FOR RICHARDSON'S LOCOMOTIVE SAFETY VALVES.

SEE PAGE 772.



FIG. 6158.

These springs are made of the very best selected steel, and great care is used in their construction and tempering.

The springs for our encased locomotive valves have concave, balled ends to fit the ball socket on spindle and compression screw, which insures perfect, straight line pressure on the valve and prevents any cocking, or tilting, of the valve spring.

The springs for the open locomotive valve are carefully ground on top and bottom, which insures a true fit when the required compression is on.

PRICES.

Locomotive springs for open "pop" valves, japanned.....$1.50
Locomotive springs for encased valve, balled ends..... 2.00
Locomotive springs for encased valve, balled ends, nickel-plated..... 2.25

In ordering springs state whether they are for encased or open locomotive valves.



FIG. 6159.

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THE CONSOLIDATED SAFETY VALVE CO.,

MANUFACTURERS OF

RICHARDSON'S PATENT SOLID NICKEL-SEATED POP SAFETY VALVES, WITH ADJUSTABLE SCREW RINGS.

FLANGED OR SCREWED.



FIG. 6160.

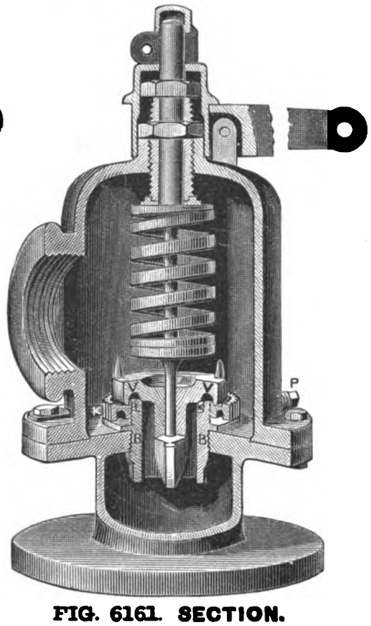


FIG. 6161. SECTION.

FOR STATIONARY OR MARINE BOILERS.

Made with either flanged or screw base connection as ordered.

SOLID CAST NICKEL RING FOR SEATS.



FIG. 6162.

This cut represents the solid nickel casting used for the valve seat of our patent nickel-seated safety valves. The thread on the outside is for screwing into the brass base of the valve. The valve head is made of a homogeneous bronze-like gun or steam metal, and the metal of contact being of different character, their chemical properties prevent any corrosion from the action of water, steam, fatty acids of oils, or the saline matter in the water.

We find from our long experience in the manufacture of "pop" safety valves, and after a series of exhaustive experiments, that the action of steam is more destructive to the valve seat than to the valve head, therefore the greater need of the nickel armor being applied to the lower part of the ground joint.

Caution.—In ordering valves be particular to specify that the valve seat be of solid nickel, and head of valve gun or steam metal, thereby insuring your getting what the latest modern practice proves is the best, and preventing being imposed upon by some imitators of the genuine solid nickel-seated safety valve.

Great care should be used in making joints, to not use red lead, as it gets on the valve seat and prevents its closing tight.

This valve has beveled seats at an angle of 45 degrees to its center line of axis, and for marine boilers the lever is arranged to "lift the valve off its seat one-eighth the diameter of the valve opening," as required by the United States Board of Supervising Inspectors of Steam Vessels. These valves are allowed a government rating 50 per cent. higher than the standard lever safety valve.

In ordering, state size of boiler and highest working pressure, and whether for marine or stationary boilers.

These valves are made with solid nickel seat, which cannot corrode or stick. The valve never fails to open at the pressure it is set to blow at. The lock-up attachment prevents its being tampered with. With this valve attached to a boiler, the pressure cannot rise above the point that it is set to blow at. The solid nickel seat is made according to our patent September 1st, 1885, and does not wear or cut by the action of the steam.

The spring, being a vital factor in all spring loaded safety valves, is most carefully selected, and the greatest care is used in coiling, tempering and testing them; they are nickel-plated to protect them from rusting. The points of bearing, top and bottom, are ball and socket, preventing any tendency to tilt to one side and bind the spindle through which the pressure to hold the valve on to its seat is transmitted, and makes the valve thoroughly reliable.

Adjustment.—All valves are fitted with Richardson's adjustable screw ring, so the popping point can be changed without removing valve and while steam is on the boiler.

PRICES, FIG. 6160.

Size.	Diameter of base flange.	Diameter of side outlet.	Distance from base flange to center of side outlet.	Total height of valve, including lock-up caps.	Distance from center of valve to outside of outlet.	Largest diameter of valve or space occupied.	For boilers, h. p.	Prices.
1 inch.	Screwed.	1¼ in. screwed.	4 inch.	9⅞ inch.	2⅜ inch.	4½ inch.	8 to 10	$15.00
1¼ "	"	1½ " "	4 11/16 "	11 1/16 "	2⅝ "	5 "	10 " 15	20.00
1½ "	"	2 " "	5½ "	12 "	2⅞ "	6¼ "	20 " 30	30.00
2 "	"	2½ " "	6 "	14¼ "	3½ "	7⅝ "	35 " 50	40.00
2½ "	9 1/16 inch.	3 " "	7¾ "	17¼ "	4¼ "	8¾ "	60 " 75	55.00
3 "	9 1/16 "	3½ " "	8½ "	18 "	5 "	9⅝ "	75 " 100	75.00
3½ "	10¼ "	4 " "	9⅛ "	20¾ "	5⅝ "	10⅝ "	100 " 125	87.00
4 "	11 3/16 "	4 " "	9¼ "	21¼ "	6 "	11⅛ "	125 " 150	100.00
4½ "	12 1/16 "	8½ " flanged.	10 "	22 "	6 "	12 "	150 " 175	125.00
5 "	13 1/16 "	9 1/16 " "	10 "	23 "	6¼ "	12¾ "	175 " 200	150.00
5½ "	13 1/16 "	10 1/16 " "	11 "	36 "	12 "	19 "	200 " 275	165.00
6 "	13 1/16 "	10 1/16 " "		40 "	14¾ "	22¼ "		175.00

5½ in. and 6 in. are made with same style cases as Fig. 6160, and with flanged outlets and with lever so arranged that it will swing around the valve in any desired position.

All flanged valves, 3 in. to 6 in., are threaded regular iron pipe sizes of same diameter as valves; above 4 in., excepting 6 in., are threaded for iron pipe sizes, one-half inch smaller than diameter of valve; 6 in. are tapped 6 in. straight thread, 8 threads to the inch. All flanged bases are threaded for our own convenience in testing and setting the valves under steam pressure at factory, and we recommend attaching all flanged valves to boilers by bolting through the flanges and not by the screw connections.

Connect valve as close to boiler as possible. When pipe connections are used, have them full diameter of valve or larger and as short and free from bends as possible.

Great care should be used in making joints with red lead, as it gets on the valve seat and prevents its closing tight.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

BRASS-SEATED POP SAFETY VALVES, WITH ADJUSTABLE SCREW RINGS.

FOR STATIONARY AND MARINE BOILERS.

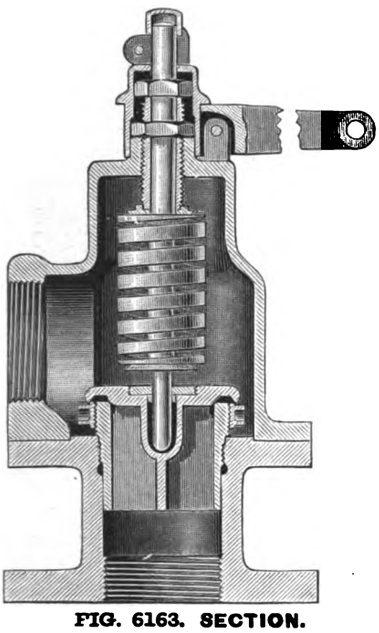


FIG. 6163. SECTION.

Made with either flanged or screwed base connection.

This valve has beveled seats at an angle of 45 degrees to its center line of axis, and for marine boilers the lever is arranged to "lift the valve off its seat one-eighth the diameter of the valve opening," as required by the United States Board of Supervising Inspectors of Steam Vessels. These valves are allowed a government rating 50 per cent. higher than the standard lever safety valve, and are a great saving in weight and consequently reduce the strain on pipe connections.

In ordering, state size of boiler and highest working pressure, and whether for marine or stationary boilers.

These valves are intended to meet the demand for a reliable spring-loaded safety valve, at a less price than the solid nickel seat valves.

The material and workmanship of these valves is first-class, and in capacity to relieve a boiler they are superior to any other brass-seated valve made. All valves are fitted with Richardson's adjustable screw ring, so the popping point can be changed while steam is on the boiler, without breaking any joints.

Outlets all ½ inch larger than inlet pipe.

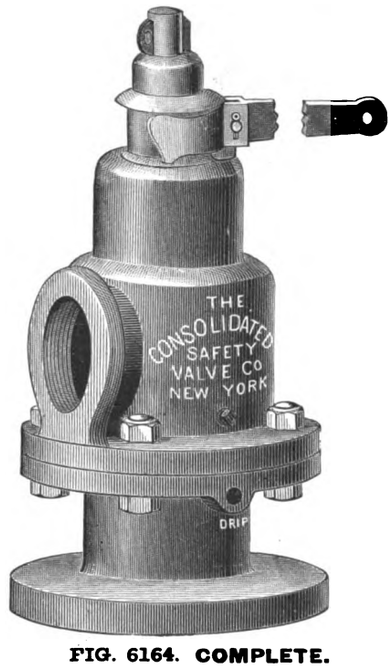


FIG. 6164. COMPLETE.

PRICES, FIG. 6164.

Sizes.	Center of valve to end of outlet.	Size of flange outlet.	Total height.	Center of outlet to bottom of flange.	Diameter of flange.	Center of valve to end of lever.	Largest diameter of valve or space occupied.	For boilers, H. P.	Prices.
2 inches.	3¼ inches.	.....	13¾ inches.	4⅞ inches.	No flange screw. Bot. flange.	9¼ inches.	6½ inches.	35 to 60	$35.00
2½ "	3¾ "	.....	17¼ "	7⅜ "	9⅜ inches.	12¼ "	9⅜ "	60 " 75	45.00
3 "	4¼ "	.....	18 "	7⅞ "	9⅜ "	12¼ "	9⅜ "	75 " 100	60.00
3½ "	4¾ "	.....	21⅛ "	8½ "	10⅜ "	15 "	10⅜ "	100 " 125	75.00
4 "	5⅜ "	.....	21⅛ "	9 "	11⅜ "	15 "	11⅜ "	125 " 150	90.00
4½ "	5⅞ "	9⅛ inches.	21⅛ "	9¾ "	12 "	20¼ "	12 "	150 " 175	95.00
5 "	6¼ "	9⅛ "	21⅛ "	10¼ "	13⅛ "	20¼ "	13⅛ "	175 " 200	100.00
5½ "	6¾ "	10⅛ "	24 "	10¾ "	13¼ "	20¼ "	13¾ "	200 " 275	125.00
6 "	6⅞ "	10⅛ "	24⅜ "	10¾ "	13¼ "	20¼ "	13¾ "	300	150.00

All flanged valves, 3 in. to 6 in., are threaded regular iron pipe sizes of same diameter as valves; above 4 in., excepting 6 in., are threaded for iron pipe sizes, one-half inch smaller than diameter of valve; 6 in. are tapped 6 in. straight threads, 8 threads to the inch. All flanged bases are threaded for our own convenience in testing and setting the valves under steam pressure at factory, and we recommend attaching all flanged valves to boilers by bolting through the flanges and not by the screw connections.

Connect valve as close to boiler as possible. When pipe connections are used, have them full diameter of valve or larger and as short and free from bends as possible.

Great care should be used in making joints with red lead, as it gets on valve seat and prevents its closing tight.

RICHARDSON'S NICKEL-SEATED MARINE POP VALVES, WITH SCREW RING.

BOARD OF TRADE STANDARD.

This valve has beveled seats at an angle of 45 degrees to its center line of axis, and the lever is arranged to lift the valve off its seat one-eighth the diameter of the valve opening, as required by the rules and regulations of the United States Board of Supervising Inspectors of Steam Vessels. These valves are allowed a government rating 50 per cent. higher than the standard lever safety valve.

This valve derives its name from the fact that it was constructed to comply with the rules made by the Board of Trade of Great Britain, and is so arranged that the valve head can be turned on its seat, by the handles shown above the lock-up cap, while the steam pressure is on, thus crushing any scale or sediment that may lodge on the seat. The lever is arranged to lift the valve from its seat, as required by recent rules of the United States Board of Supervising Inspectors of Steam Vessels. These valves are allowed for marine use on a basis of one square inch valve area to three square feet of grate surface, and approved as the working valve, and are allowed a government rating 50 per cent. higher than the standard lever safety valve.

PRICES.

Sizes.	Height.	Distance from base flange to outlet.	Distance from center of valve to end of lever.	Diameter of base flange.	Diameter of outlet flange.	Prices.
2½ inches.	19 inches.	5⅜ inches.	16 inches.	9⅜ inches.	8 inches.	$55.00
3 "	22¾ "	6 "	15 "	10¼ "	9⅛ "	75.00
3½ "	22¾ "	6 "	15 "	10¼ "	9⅛ "	87.00
4 "	25 "	7¾ "	16½ "	12 "	9⅛ "	100.00
4½ "	25 "	7¾ "	16½ "	12 "	9⅛ "	125.00
5 "	31 "	7¾ "	22 "	13 "	10 "	150.00
5½ "	31 "	8¼ "	22 "	13¼ "	11⅛ "	165.00
6 "	31 "	8¼ "	22 "	13¼ "	11⅛ "	175.00



FIG. 6165.

The lever is arranged to lift the valve off its seat one-eighth the diameter of the valve opening, as required by the United States Board of Supervising Inspectors of Steam Vessels.

In ordering, state square feet of grate surface and highest working pressure.

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RICHARDSON'S PATENT OPEN LOCOMOTIVE POP SAFETY VALVES, WITH SCREW RINGS.

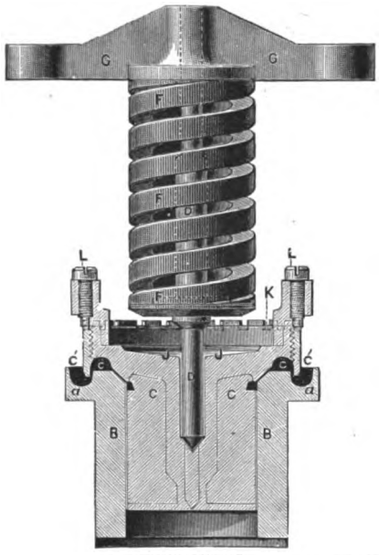


FIG. 6166.

These valves are usually put on in pairs. They are all made 2¼ inch diameter of opening.

PRICES.

	EACH.
Valve, including bush, spring, spindle and cross bar	$20.00
Valve, including bush, spring, spindle and cross bar and nickel seat	25.00

PRICES OF EXTRA PARTS FOR LOCOMOTIVE SAFETY VALVES.

1 spring	$2.00
1 spindle	1.50
1 cross bar	1.00
1 valve to fit any bush of our make	5.00
1 valve with adjustable lip to fit any bush of our make	7.50
1 valve seat or bush	7.50

In ordering, state outside diameter of bush to press into dome cap.

DIRECTIONS FOR SETTING THE ADJUSTABLE LIP.

If the valve reduces the pressure in the boiler too much, loosen the set screw and turn the ring up a notch at a time; if it reduces the pressure too little, turn the ring down a notch at a time, until the desired pressure is reached, and then turn down the set screw.

RICHARDSON'S ENCASED LOCOMOTIVE POP SAFETY VALVE.

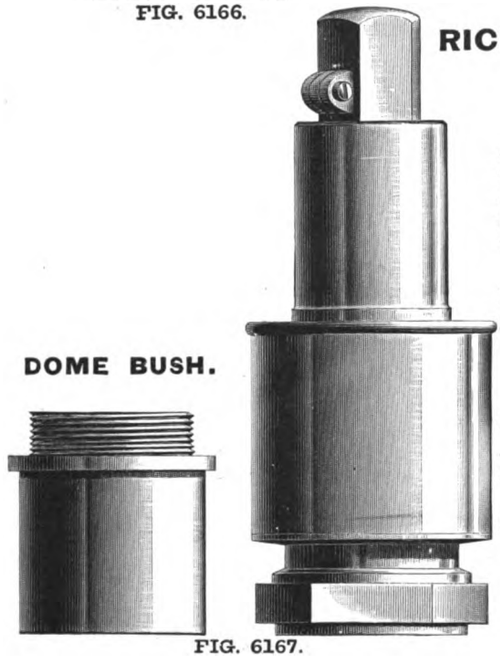


FIG. 6167.

This valve has our patent adjustable ring, by the use of which the point of closing can be easily regulated, while steam pressure is on the boiler. The lock-up device prevents tampering with the valve. The form of the case greatly reduces the noise of the escaping steam. The spring has ball and socket bearing, top and bottom, which insures its pressure in a direct line without friction. The spring is heavily nickel-plated to prevent corrosion.

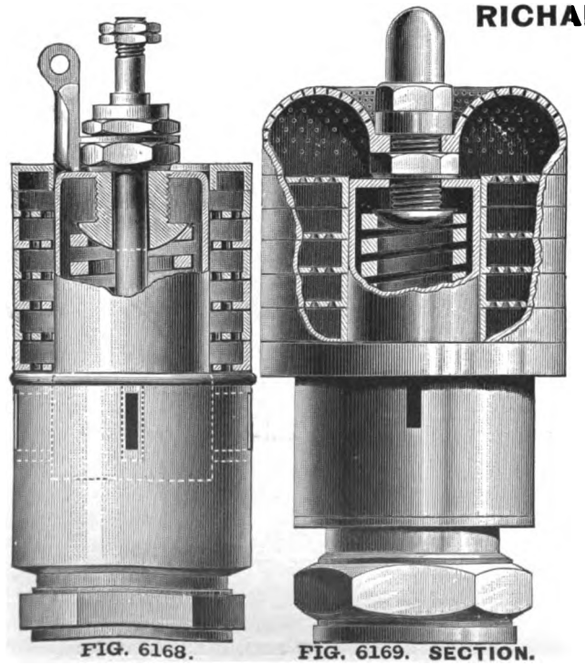
2 and 2½ in. valves have largest outside diameter, 4⅜ inches. Height over all, 11 inches. Bush to press into dome cap is made to finish $3\frac{1}{16}$ diameter by 3⅜ long. Other sizes of bushes to order, 3 inch; largest outside diameter, 5¼ inches. Height over all, 11¾ inches.

PRICES.

2¼ inch valve complete, with lock-up attachment, and bush to press into dome cap	$25.00
2½ inch valve complete, with lock-up attachment, and bush to press into dome cap	30.00
3 inch valve complete, with lock-up attachment, and bush to press into dome cap	40.00

In ordering, be very particular to state pressure to set valve at and diameter of bush.

RICHARDSON'S ENCASED POP SAFETY VALVE, WITH MUFFLER ATTACHMENT.


FIG. 6168. FIG. 6169. SECTION.

One of the cuts shows a section of valve, the other shows valve with attachment for lever. It softens the sharp report of escaping steam from the pop valve, and will prevent the frightening of horses and the shock to people near the valve when it "pops." It discharges the steam directly upward and with sufficient force to direct the current above the top of the cab, and so it does not trail on to the engine or in the train windows, as is the case with other mufflers.

DIMENSIONS, VALVES.

Largest outside diameter of 2¼ and 2½ is 4½ inches. Height over all, 11 inches. Bush to press into dome cap is made to finish $3\frac{1}{16}$ diameter by 3⅜ long. Other sizes of bushings to order. Of the 3 and 3½ inch; largest outside diameter, $6\frac{9}{16}$ inches. Height over all, 11¾ inches.

PRICES.

2¼ inch valve and muffler complete, with lock-up attachment, and bush to press into dome cap	$35.00
2½ inch valve and muffler complete, with lock-up attachment, and bush to press into dome cap	40.00
3 inch valve and muffler complete, with lock-up attachment, and bush to press into dome cap	50.00
3½ inch valve and muffler complete, with lock-up attachment, and bush to press into dome cap	60.00

In ordering, state pressure valve shall be set at and size of bush.

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SAFETY VALVES.

BRASS, LOW PRESSURE.

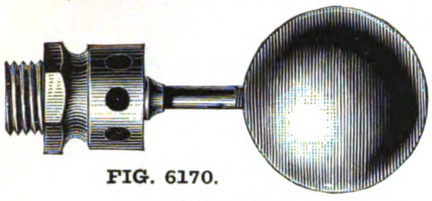


FIG. 6170.

PRICES.

1 in., $3.00; 1¼ in., $4.00; 1½ in., $5.00.

BRASS, GLOBE PATTERN.

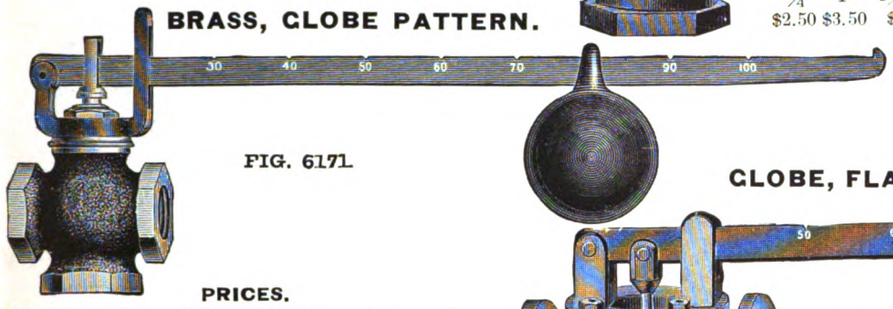


FIG. 6171.

PRICES.

Size, in.,	½	¾	1	1¼	1½	2
Prices..	$2.75	$3.50	$5.00	$7.00	$8.50	$12.00

BRASS, ANCLE PATTERN.

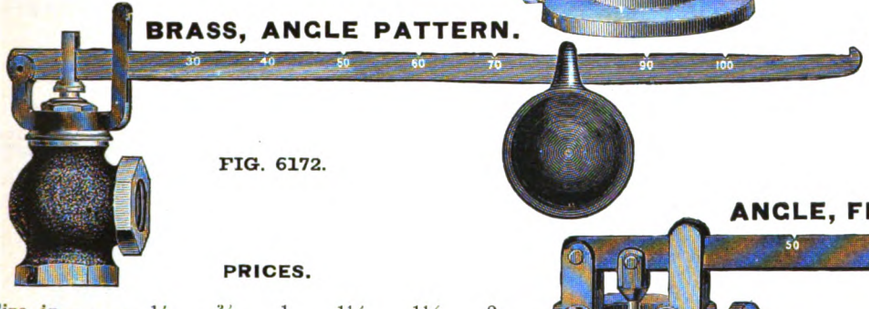


FIG. 6172.

PRICES.

Size, in.....	½	¾	1	1¼	1½	2
Prices.....	$2.75	$3.50	$5.00	$7.00	$8.50	$12.00

BRASS, LOW PRESSURE, WITH BALANCE WEIGHT.

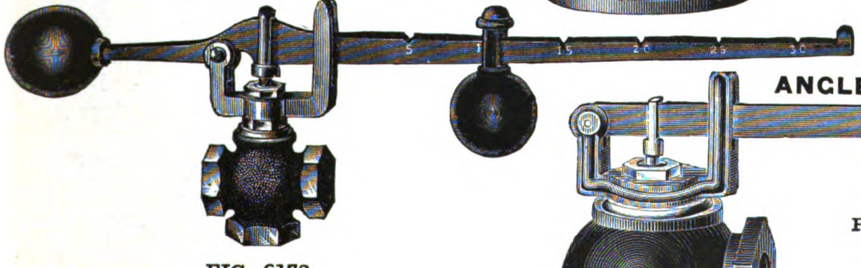


FIG. 6173.

PRICES.

Size, in.....	½	¾	1	1¼	1½	2
Prices.....	$3.00	$3.75	$5.50	$7.75	$9.50	$12.35

CLOBE, SCREWED.

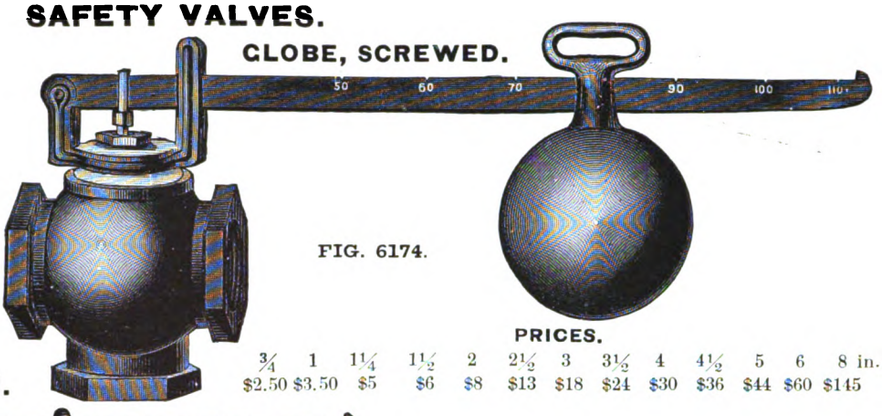


FIG. 6174.

PRICES.

¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	8 in.
$2.50	$3.50	$5	$6	$8	$13	$18	$24	$30	$36	$44	$60	$145

CLOBE, FLANCED.

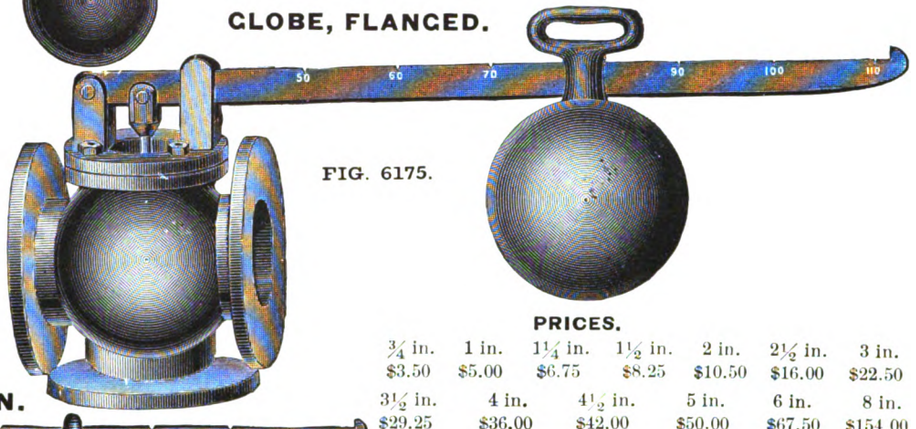


FIG. 6175.

PRICES.

¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
$3.50	$5.00	$6.75	$8.25	$10.50	$16.00	$22.50

3½ in.	4 in.	4½ in.	5 in.	6 in.	8 in.
$29.25	$36.00	$42.00	$50.00	$67.50	$154.00

ANCLE, FLANCED.

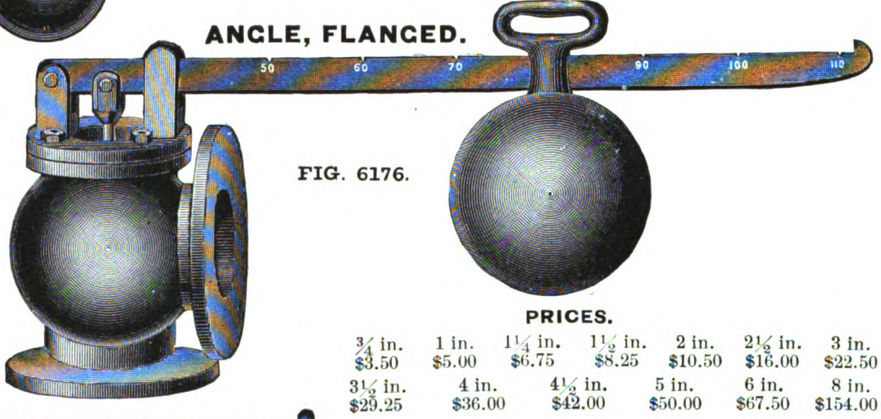


FIG. 6176.

PRICES.

¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
$3.50	$5.00	$6.75	$8.25	$10.50	$16.00	$22.50

3½ in.	4 in.	4½ in.	5 in.	6 in.	8 in.
$29.25	$36.00	$42.00	$50.00	$67.50	$154.00

ANCLE, SCREWED.

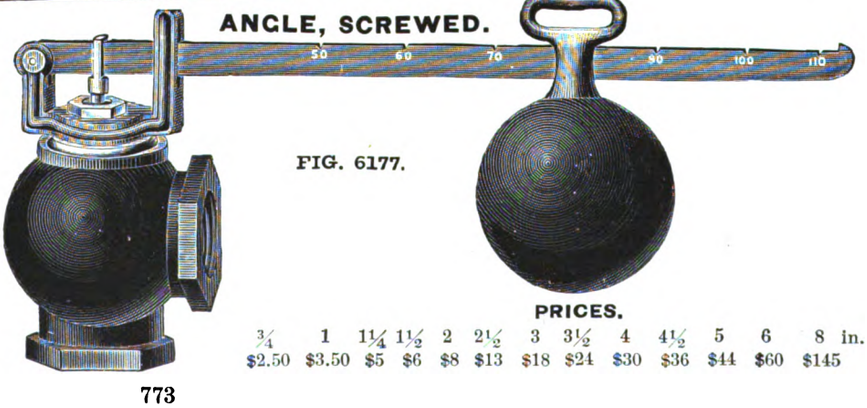


FIG. 6177.

PRICES.

¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	8 in.
$2.50	$3.50	$5	$6	$8	$13	$18	$24	$30	$36	$44	$60	$145

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ROYLE'S SELF-CLEANSING STEAM TRAPS.

For permitting air and water of condensation to escape from steam pipes without loss of steam.

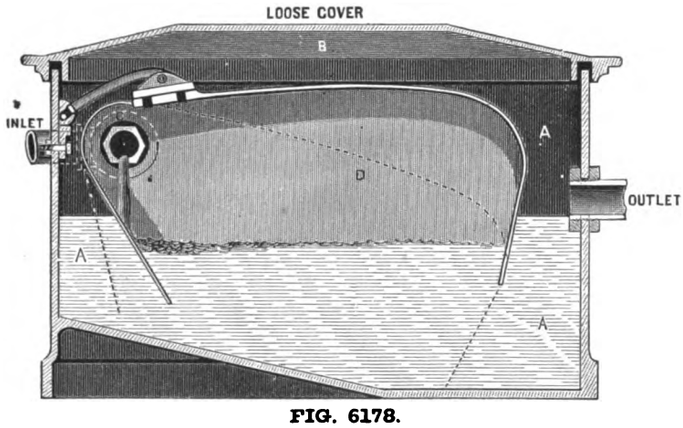


FIG. 6178.

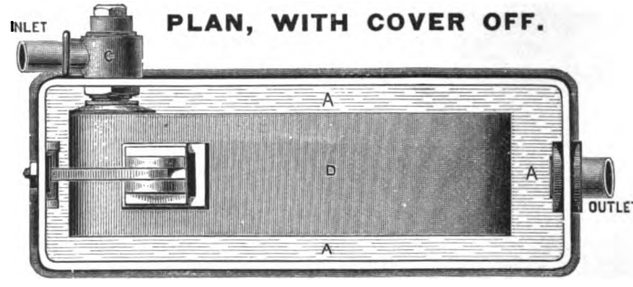


FIG. 6179.

Applicable for high and low pressure steam heating, steam presses, steam hammers, drying cylinders, dressing machines, steam worms, sugar pans, combing machines, wool driers, and steam apparatus generally. Light, simple and durable. Equally adapted for high or low pressure. Absolutely sure and positive in action. Can lift off cover for examination of trap at any time. Send for one on trial. No rubber packing required. No red lead joints needed. No bolts and nuts to remove. No unequal expansion or contraction. Can be attached in ten minutes.

PRICES.

Number of trap	1	2	3
Size of pipe connection, inlet	½ inch.	1 inch.	1½ inch.
Size of pipe connection, outlet	¾ inch.	1¼ inch.	2 inch.
Number of feet 1 inch pipe each trap will drain	3,000	5,000	8,000
Prices	$18.00	$25.00	$36.00

THE McCRACKEN PATENT STEAM TRAPS.

For removing the water of condensation from steam pipes.



FIG. 6180.

This trap is positive in action, it is durable, it is simple in construction, the parts are easily replaced and adjusted and they are all interchangeable ; it occupies but little space and can be set in any position. It has no diaphragm, float, cock or spring, but depends for its action upon the alternate expansion and contraction of a piece of straight brass tubing secured at one end, closing and opening on a soft metal seat at the other end, thus allowing the water of condensation to escape, and closing the outlet when the steam enters the brass tube.

DIRECTIONS FOR SETTING AND WORKING.

To the steam pipe to be drained attach the trap by the tapped hole in the upper ball. The outlet may discharge into the air, into a closed vessel or under water, as desired.

To adjust the trap, remove the brass cap and open the adjusting screw, which has a hole in the head, until the steam blows freely from the outlet, thus giving the brass tube, running through the inside of the trap, an opportunity to expand ; then turn the adjusting screw down until the outflow of steam is stopped, and secure the screw in this position with the jam nut.

As the water of condensation accumulates in the brass tube, the water being cooler than the steam will cause the brass tube to contract and open the outlet, allowing the water to escape, and as the steam follows it will again close and be securely trapped. The adjustment admits of variation in the temperature of the water delivered from 140° to 210°.

To test the trap when the outlet discharge is not visible, put a drop of water on the discharge pipe close to the trap, and if it boils, the adjusting screw needs to be set down, as the trap is letting steam escape.

If after long use the adjusting screw fails to close the trap, cut off the steam and unscrew the chamber, holding the soft metal seat in front of the adjusting screw. The seat will then drop out and can be reversed, and after both sides are cut it may be re-faced with a file. Under ordinary conditions one adjustment should answer for a long time.

The opening in the side of the first ball is intended to give access to the interior for the removal of any foreign substance that may pass the strainer. If desired, a blow-off valve may be used in place of the plug sent with each trap to stop the opening.

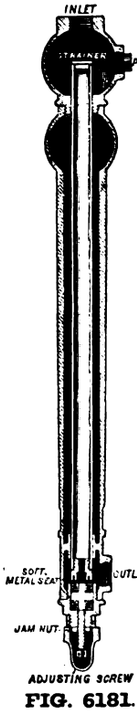


FIG. 6181.

PRICES.

Size number.	Number of feet of 1 inch pipe it will drain.	Size of inlet pipe.	Size of outlet pipe.	Length over all.	Diameter of largest part.	Prices, each.
1	2,000	¾ inch.	½ inch.	27 inches.	3¼ inches.	$16.00
2	4,000	1 "	¾ "	33¼ "	3⅞ "	20.00
3	8,000	1¼ "	1 "	40¾ "	4½ "	30.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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HAWES' STEAM TRAPS.

PRICES, FIG. 6182.

No. 1	is tapped for	½	in.	pipe; it drains	500	feet	1 in. pipe	$11.00
" 2	"	¾	"	"	1,000	"	"	16.00
" 3	"	1	"	"	2,000	"	"	21.00
" 4	"	1¼	"	"	4,000	"	"	26.00
" 4½	special,	1¼	"	"	10,000	"	"	with 2 diaphragms 35.00
" 5	is tapped for	1½	"	"	20,000	"	"	50.00
" 00	"	¼	"	"	100	"	"	glue pots and radiators 6.00

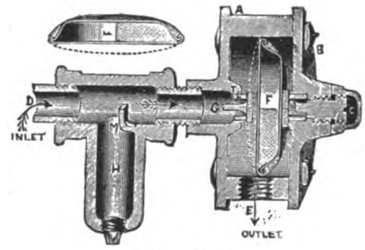


FIG. 6182.

BLAKE'S POSITIVE STEAM TRAPS.

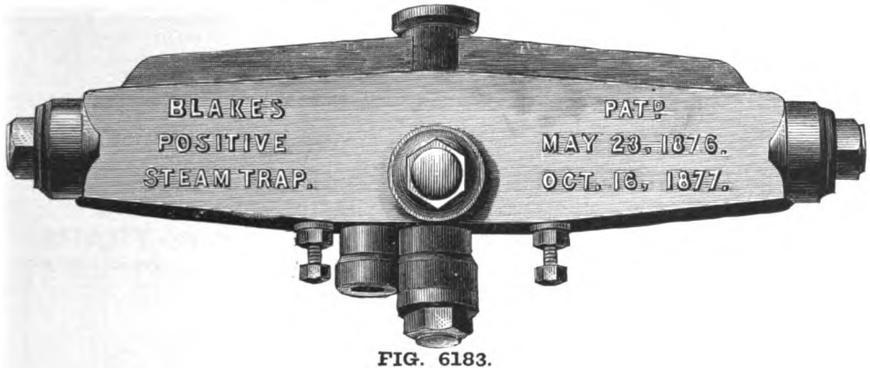


FIG. 6183.

PRICES.

No.	Dimension.			Capacity.	Inlet.	Outlet.	Prices.
	Length.	Height.	Thickness.				
1	17 in.	6 in.	2½ in.	2,000 ft. 1-in. pipe.	½ inch.	⅜ inch.	$10.00
2	2 ft.	9½ "	3 "	3,500 " "	1 "	¾ "	15.00
4	2 ft. 3 in.	11½ "	3½ "	7,000 " "	1½ "	1½ "	25.00

NASON STEAM TRAPS.



FIG. 6184.

SECTIONAL NASON TRAP.

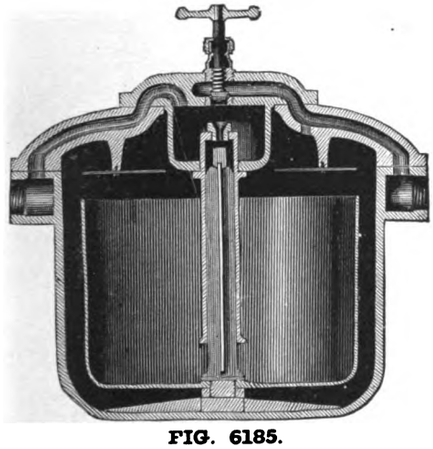


FIG. 6185.

PRICES, FIG. 6184.

Number of steam trap	1	2	3	4	5
Size of pipe connections, inches	½	⅜	1	1¼	1½
Diameter of cylinder, inches	8	10½	12	14	18
Height to top of cover, inches	8	10	12	14	15½
Greatest number of square feet of surface to which it should be applied.	350	900	1,400	2,000	3,500
Prices	$16.00	$20.00	$27.50	$42.50	$70.00

Improved steam trap, especially designed for low pressure, $12.00 each.

PRATT'S RETURN STEAM TRAPS.

For automatically draining the water of condensation from steam radiators, drying pipes, drying cylinders, boiling pans, etc., or wherever condensation occurs in steam pipes under pressure, and returning the same to boiler. All the possible waste of steam and heat that would otherwise occur is avoided, as there is no outlet for the steam or water from the pipes, etc., except back again to boilers, therefore there is no loss; and heating, drying, etc., can be done at a low expenditure of steam. This return trap will work on reduced steam pressure and maintain its full capacity.

PRICES.

Size of pipe connections.				The service of the trap depends on circumstances, but the following estimate is a safe one:			
Sizes.	Inlet.	Outlet.	Steam.	Sizes.	Will drain 1 inch pipe.	Water delivery, per hour.	Prices.
No. 1..	1 inch.	1½ inch.	¾ inch.	No. 1..	4,000 to 5,000 ft.	200 gallons.	$100.00
No. 2..	1¼ "	2 "	1 "	No. 2..	8,000 to 10,000 ft.	350 "	150.00
No. 3..	1½ "	2 "	1¼ "	No. 3..	15,000 to 20,000 ft.	550 "	200.00
No. 4..	2 "	2½ "	1½ "	No. 4..	30,000 to 40,000 ft.	800 "	300.00

Receivers extra.—No. 1, $12.00; No. 2, $15.00; No. 3, $18.00. Check and globe valves extra.

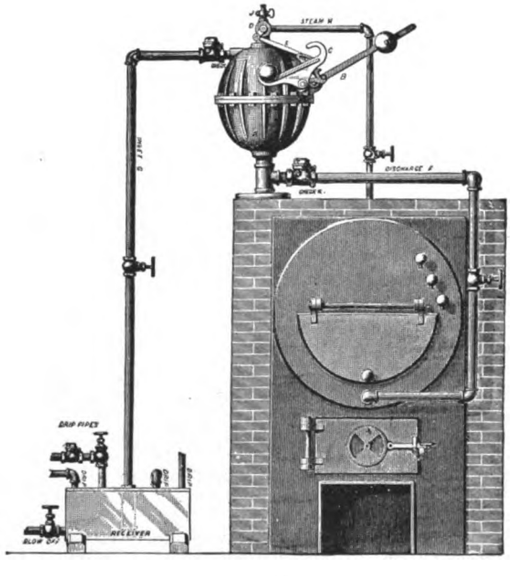


FIG. 6186.

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CURTIS AUTOMATIC RETURN TRAPS.

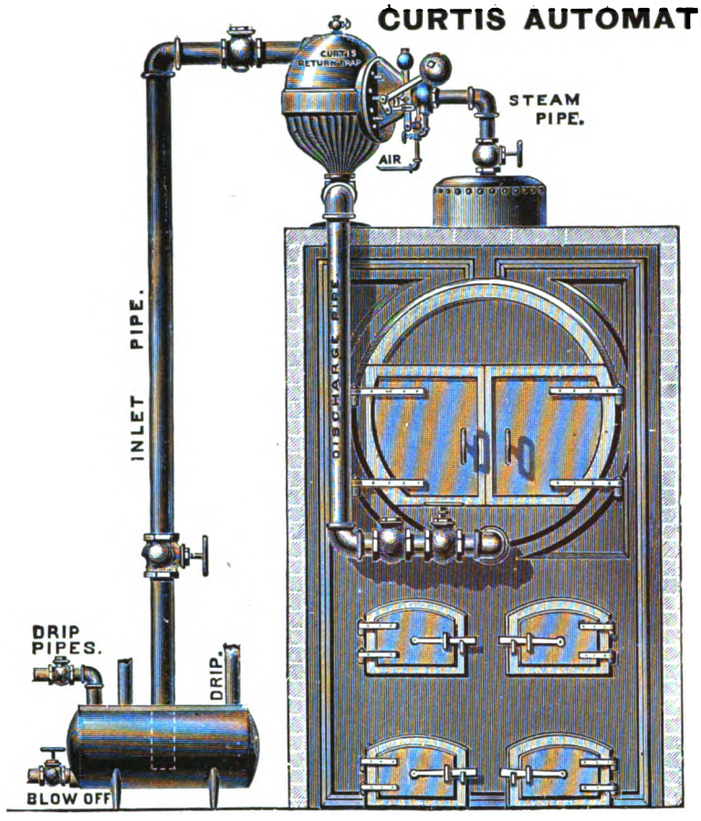


FIG. 6187.

DESCRIPTION, FIG. 6187.

For draining the condensation automatically, direct back to boiler from heating coils, steam radiators, drying pipes, evaporating pans, paper driers, etc., whether above or below the water level of boiler.

PRICES.

No. 1, capacity	5,000	feet of 1 in.	pipe, without	receiver	$100.00
" 2, "	10,000	"	"	"	150.00
" 3, "	20,000	"	"	"	200.00
" 4, "	25,000	"	"	"	250.00
No. 1, receiver, extra					$10.00
" 2, "					12.00
" 3, "					15.00

SIZE OF PIPE CONNECTIONS FOR EACH SIZE TRAP.

	Steam pipe.	Inlet pipe.	Outlet pipe.
No. 1	1 inch	1 inch	1¼ inch.
" 2	1 "	1¼ "	1½ "
" 3	1 "	1½ "	2 "

SIZES OF PIPE CONNECTIONS FOR EACH SIZE RECEIVER.

No. 1, four inlets, each	1 inch	one outlet,	1 inch.
" 2, six "	1 "	"	1¼ "
" 3, eight "	1 "	"	1½ "

CHAMPION RETURN TRAPS AND BOILER FEEDER.

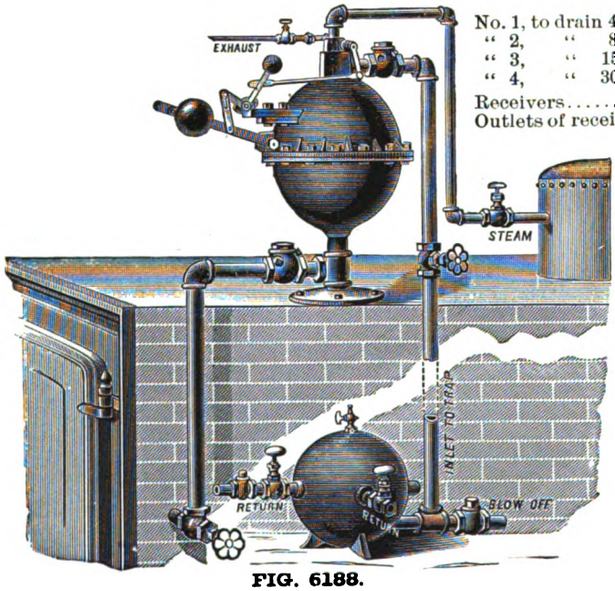


FIG. 6188.

PRICES.

	Pipe.	Inlet	Discharge.	Prices.
No. 1, to drain 4,000 to 5,000 ft.	1 in.	1 in.	1½ in.	$100.00
" 2, " 8,000 " 10,000 "	1 "	1¼ "	2 "	150.00
" 3, " 15,000 " 20,000 "	1 "	1½ "	2½ "	200.00
" 4, " 30,000 " 40,000 "	1 "	2½ "	3 or 4 "	300.00
Receivers	$5.00	$8.00	$12.00	and $20.00
Outlets of receivers	1 in.	1¼ in.	1½ in.	2½ in.

DESCRIPTION, FIG. 6190.

The gravitating return trap is so named because its action is dependent upon the gravity of the water of condensation in the "gravitating sphere," to counterbalance the weight at the other end of the lever, opposite to the end supporting this sphere, and to cause the same to fall sufficiently to work a device called the "equalizing valve," which, opening a communication directly with the steam space of the boiler, establishes equilibrium of pressures, and allows water, by its own gravity, to descend through the check valve, from the gravitating sphere into the boiler.

BAIRD'S AUTOMATIC STEAM TRAPS.

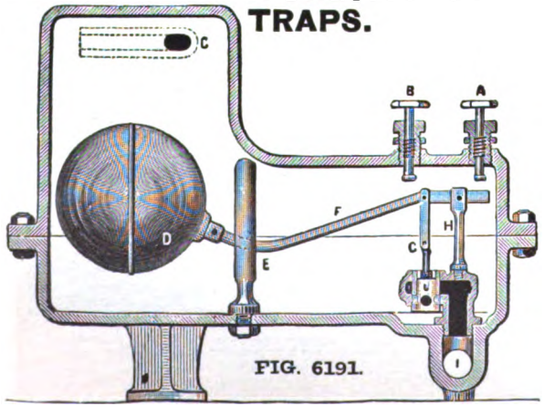


FIG. 6191.

PRICES, FIG. 6191.

Particularly adapted for marine and naval use, on steam jackets, evaporators, steam radiators, etc.

No. 1,	inlet and outlet for	1	inch	pipe.
" 2,	" " "	1¼	"	

CAPACITY.

No. 1,	drains	5,000	feet of 1	inch pipe.
" 2,	"	8,000	" 1	"

PRICES.

No. 1 size	$35.00
" 2 "	60.00

ALBANY SPECIAL RETURN STEAM TRAPS.

DESCRIPTION, FIG. 6188.

For returning condensation to boilers, from steam-heaters of all kinds, drying cylinders, evaporating pans, brewing kettles, paper driers, etc.; whether above or below the boiler. State if for high or low pressure.

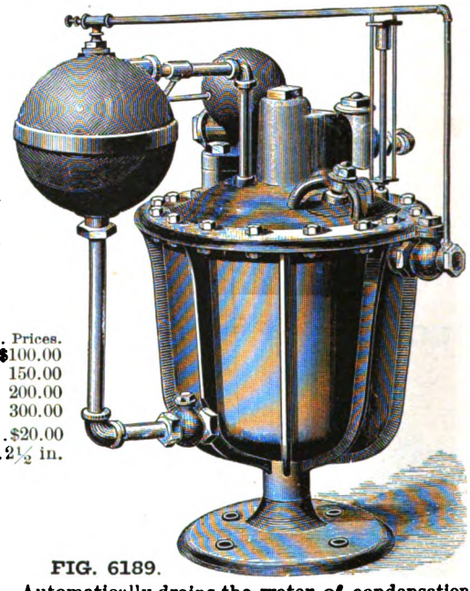


FIG. 6189.

Automatically drains the water of condensation from all heating apparatus and returns it to the boiler, whether coils are above or below the water level in boilers.

PRICES.

Size trap.	Capacity of one inch pipe.	Prices.	Prices, drip tanks.
No. A 1	15,000 to 20,000 ft.	$200.00	$10.00
" 1	8,000 " 10,000 "	150.00	10.00
" 2	4,000 " 5,000 "	100.00	10.00
" 3	1,000 " 1,500 "	75.00	10.00

The above prices include the two check valves, automatic air valve and strainer.

GRAVITATING RETURN TRAP.

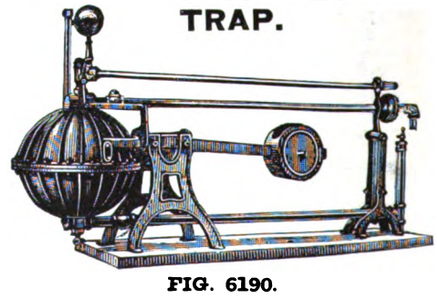


FIG. 6190.

PRICES.

Size trap.	Capacity one inch pipe.	Prices.	Equalizing valves.
No. 1	8,000 to 10,000 ft.	$150.00	$10.00
" 2	4,000 " 5,000 "	100.00	10.00

A steam trap will pay for itself in a short time. Write for information.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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STEAM TRAPS AND WHISTLES.

SELF-REGULATING TRAPS.

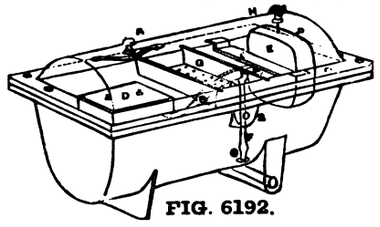


FIG. 6192.

PRICES.

No.	Inlet and outlet, inch.	Will drain feet 1 inch pipe.	Prices.
1	1	1,500	$25.00
2	1¼	3,000	35.00
3	1½	7,000	60.00
4	2	10,000	70.00

These traps will stand work up to 75 lbs. pressure. In ordering, state if for use on 30 lbs. or less pressure.

PRICES, FIG. 6195.

No.	Prices.	Will drain feet 1 inch pipe.
1	$35.00	1,500
2	40.00	3,000
3	60.00	7,000
4	75.00	10,000

WHISTLE CHIMES.



FIG. 6196.

Three or more whistles of any size, to order.

3 WHISTLE CHIMES.

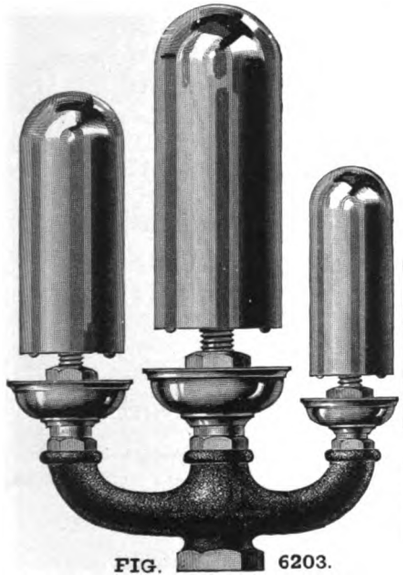


FIG. 6203.

Chimes are correctly tuned. Whistle valves are extra. However, chimes will always be sent with valve unless otherwise ordered.

FOR DESCRIPTION OF DESIGN, SEE FIG. 6204.

McDANIELS' NO. O TRAP.

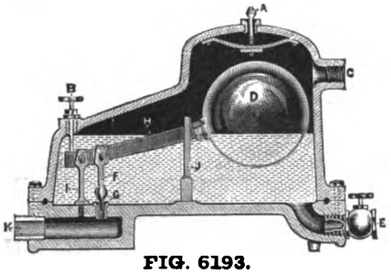


FIG. 6193.

PRICE.

Inlet and outlet, ¾ inch, will drain 1,000 feet of 1 inch pipe.....$12.00

JONES' SELF-REGULATING TRAPS.

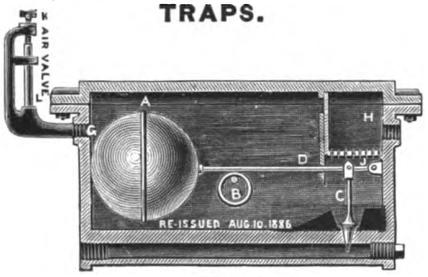


FIG. 6195.

McDANIELS' SPECIAL TRAPS.

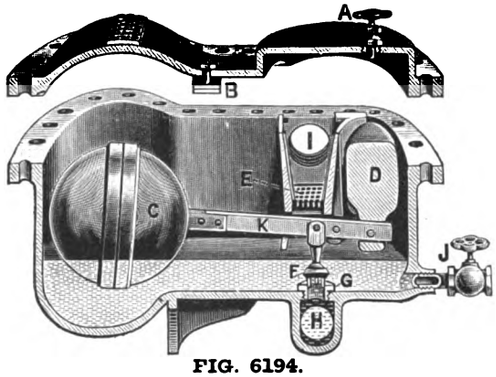


FIG. 6194.

PRICES.

No. 1. Inlet and outlet. 1 in. standard gas thread. Drains 3,500 feet of 1 in. pipe.....$30.00
No. 2. Inlet and outlet. 1¼ in. standard gas thread. Drains 7,000 feet of 1 in. pipe.....$40.00
No. 3. Inlet and outlet. 1½ in. standard gas thread. Drains 14,000 feet of 1 in. pipe.....$65.00
No. 4. Inlet and outlet. 2 in. standard gas thread. Drains 20,000 feet of 1 in. pipe.....$75.00

The shells will stand 250 lbs. pressure, but where the steam pressure on the trap is above 100 lbs. it is best to state so in ordering, so that the valve in the bottom of the trap can be so adjusted as to make it work freely at the desired pressure.

STEAM WHISTLES.

NO. 1. NO. 1 1-2. NO. 2. NO. 3.



FIG. 6197.

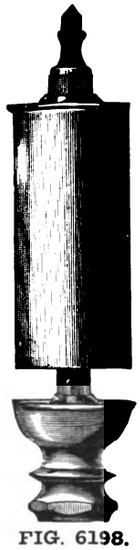


FIG. 6198.

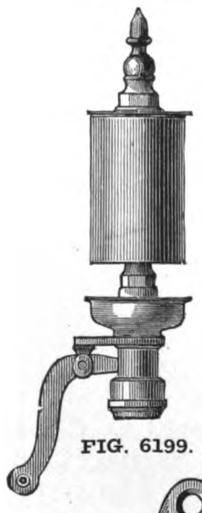


FIG. 6199.

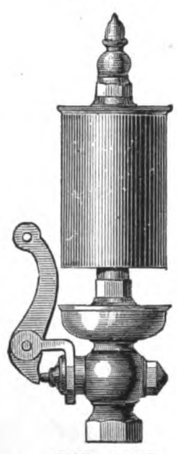


FIG. 6200.

NO. 4 REVERSIBLE LEVER.

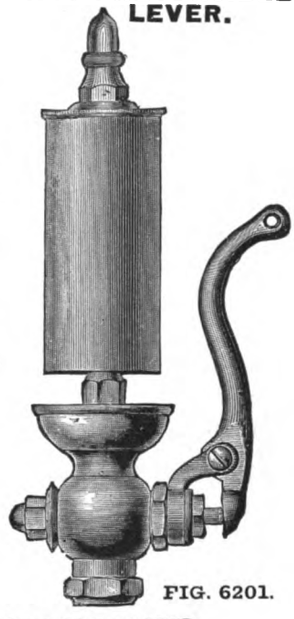


FIG. 6201.

WHISTLE VALVES.

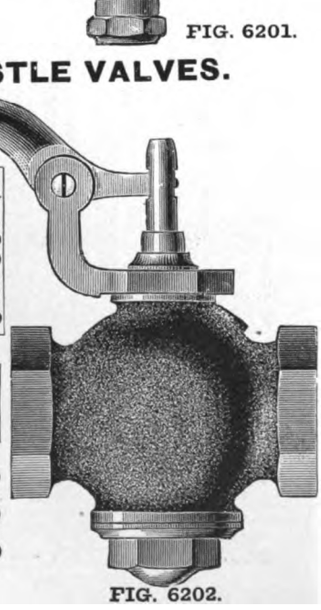


FIG. 6202.

PRICES, FIGS. 6197 TO 6201.

Diam. of bell....	1	1½	2	2½	3	3½	4	5	6	8	10	12
Screwed for pipe.	½	½	½	¾	1	1	1¼	1½	2	2½	3	3
No. 1.....	$1.70	$2.50	$3.25	$4.50	$6.00	$8.50	$11.00	$18.00	$24.00	$65.00	$125.00	$250.00
No. 1½, long bell.	1.70	2.50	3.25	4.50	6.00	8.50	11.00	18.00	24.00	65.00	125.00	250.00
No. 2.....	.....	4.00	4.75	6.50	8.00	11.00	14.00	22.00	30.00	.....	.....	.....
No. 3.....	.....	4.60	5.50	7.00	9.00	12.50	15.00	23.00	33.00	70.00	130.00	.....
No. 4, rev. lever..	3.50	4.00	4.75	6.50	8.00	11.00	14.00	22.00	30.00	80.00	175.00	350.00

PRICES, FIG. 6202.

Size.....inches.	½	¾	1	1¼	1½	2	2½	3
Prices, rough.....each.	$2.25	$2.75	$3.25	$4.00	$5.50	$9.50	$20.00	$30.00
" finished.. "	3.00	3.50	4.25	5.25	7.00	11.50	23.00	35.00

PRICES, FIG. 6203.

No. 1. Composed of one each 1½, 2 and 2½ inch whistles.....$22.00
Size pipe connection, 1 inch.
No. 2. Composed of one each 3½, 4 and 5 inch whistles.....$40.00
Size pipe connection, 1½ inch.
No. 3. Composed of one each 5, 6 and 8 inch whistles.....$109.00
Size pipe connection, 2½ inch.

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IMPROVED STEAM WHISTLES.

PLAIN.



FIG. 6204.

WITH VALVE.

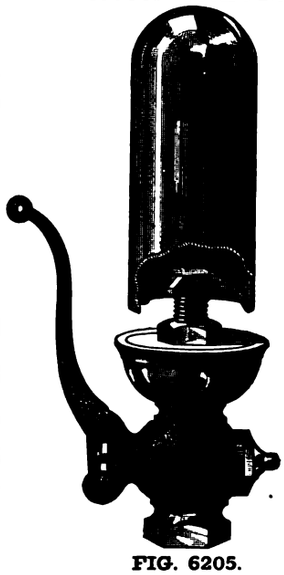


FIG. 6205.

The bell is dome-shaped at its upper end and at its lower securely supported by a three-armed spider, the stem of which is adjustably screwed into the whistle base and fastened by a jam nut (E). Owing to this construction the lower edge of the bell is always exactly in line with the slot in the base through which the steam escapes, therefore insuring best results and a perfect clear and loud tone. The bell is raised or lowered to suit steam pressure by screwing it up or down, and when properly set is fastened by jam nut (A).

PRICES, FIGS. 6204 AND 6205.

Diameter of bells, inches,	1	1¼	1½	2	2½	3	3½	4	5	6	8	10
Size of pipe connection, inches.	¼	¼	⅜	½	¾	¾	1	1¼	1½	2	2	2½
Brass whistles, with adjustable lever, each...	$3.50	$3.75	$4.00	$4.75	$6.50	$8.00	$11.00	$14.00	$22.00	$30.00	$80.00	$175.00
Brass whistles, without valve, each.....	1.70	2.00	2.50	3.25	4.50	6.00	8.50	11.00	18.00	24.00	65.00	125.00
Brass long bell whistles, without valve, each...	.....	.....	.....	.....	.....	7.50	10.25	13.50	22.00	31.00	80.00	145.00
Iron base whistles, without valve, each.	.....	.....	.....	.....	.....	5.50	7.25	10.00	16.00	23.00	55.00	100.00
Iron base whistles, long bell, without valve, ea.	.....	.....	.....	.....	.....	7.00	9.00	12.50	20.00	30.00	70.00	120.00
All iron whistles, ex. long bell, without valve, ea.	...	.....	....	.....	...	.....	.....	.....	.....	.....	50.00	75.00

Bells on long bell whistles are about three times the diameter.

FIRE ALARM WHISTLES.

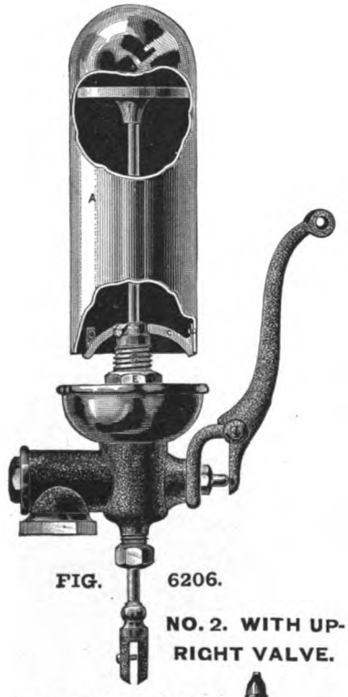


FIG. 6206.

This whistle is designed to answer both the purpose of an ordinary whistle as well as that of a fire alarm. It is provided with a piston that can be moved up or down within the bell or tube, thus changing the interior length of same and consequently also the sound of the whistle. When the piston is not operated the whistle gives but one sound, like any ordinary whistle, but when pulled up and down a howling penetrating noise is produced. When placed above the roof of a building, an extension rod should be coupled to the piston stem and a rope or wire to the whistle valve lever.

PRICES, FIG. 6206.

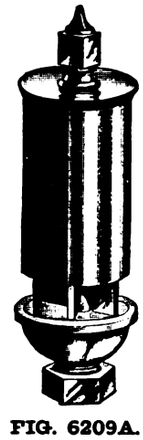
Diameter of bells..... inches	2½	3½	5	8
Size pipe connection..... inches	¾	1	1½	2
With whistle valve complete.. .....each	$15.00	$20.00	$23.00	$55.00

DESCRIPTION, FIGS. 6209A AND 6209B.

Producing three distinct tones, musical and harmonious. The bell is of seamless brass tubing, which, being of equal thickness and absolutely smooth on inside, produces a uniform vibration, giving a clear and resonant tone. It can be heard at a greater distance than the common whistle.

The bell can be raised or lowered to conform to the steam pressure under which the whistle is used. It is well known that a whistle made to blow at a low pressure, will become shrill and discordant under high pressure. By the movable bell, it can be set at a point to produce a clear full tone under any pressure, thus avoiding the disagreeable screeching not uncommon in many whistles.

NO. 1. WITHOUT VALVE.



NO. 3. WITH VALVE.

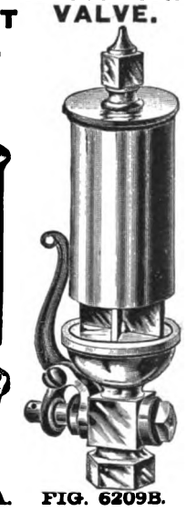


FIG. 6209A. FIG. 6209B.

SINGLE BELL CHIME STEAM WHISTLES.

NO. 2. WITH UPRIGHT VALVE.

NO. 3. WITH SIDE VALVE.

NO. 2. VALVE AND TOP LEVER.

NO. 1. WITHOUT VALVE

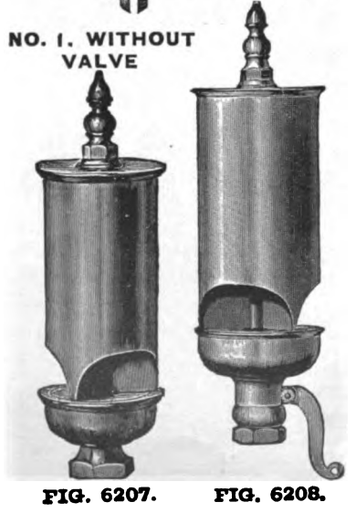


FIG. 6207. FIG. 6208.

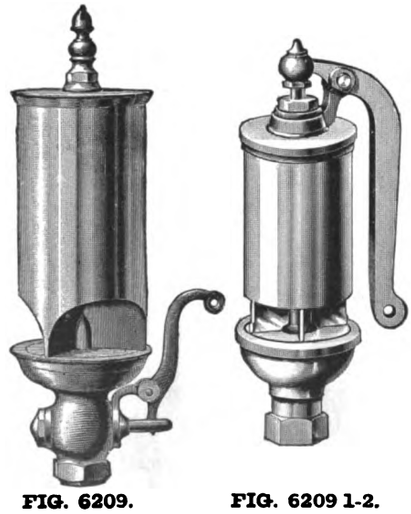


FIG. 6209. FIG. 6209 1-2.

PRICES, FIGS. 6207 TO 6209B.

Diam. bell.	Size of steam pipe.	No. 1.	No. 2.	No. 3.
2 inch.	½ inch.	$5.00	—	$7.00
2½ "	½ "	7.00	—	9.00
3 "	¾ "	8 00	—	11.00
4 "	1 "	14.00	$18.00	18.00
5 "	1¼ "	22.00	28.00	28.00
6 "	1½ "	30.00	38.00	38.00
8 "	2 "	70.00	—	90.00
10 "	2½ "	110.00	—	140.00
12 "	3 "	150.00	—	200.00
14 "	3 "	Prices on application.		
16 "	3 "			
18 "	4 "			
20 "	4 "			

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STEAM GONGS.

12 INCH. 3 BELLS. 3 IN. SUPPLY PIPE.

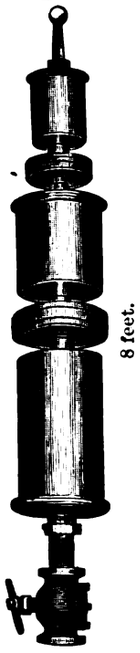


FIG. 6210.

12 INCH. 3 IN. SUPPLY PIPE.

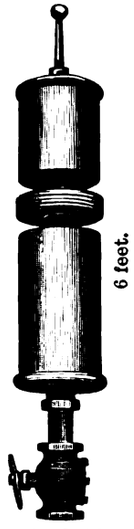


FIG. 6211.

8 INCH. 2 IN. SUPPLY PIPE.

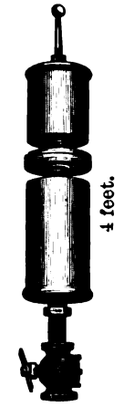


FIG. 6212.

6 INCH. 1 1-2 IN. SUPPLY PIPE.

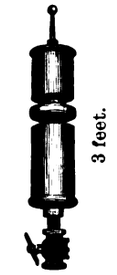


FIG. 6213.

The patent steam gong is used for fire alarm and fog signals, and as a call to the factory. Six sizes are manufactured. Its construction is novel and peculiar—entirely unlike the ordinary steam whistle. It has two bells instead of one, as in the steam whistle. These bells are so adjusted and tuned as to produce a musical fifth chord, or, with the addition of a third bell, a fifth and eighth. This entirely obviates the harsh sound of the whistle, and by following the law of atmospheric harmonic vibration, while their tones are soft and pleasant near by, their power of sound is immensely increased. The different sizes are toned to different notes of the musical scale, and by various combinations may be varied in pitch to a limited extent. They have been heard thirty miles, thus showing their vast powers of sound. It can be applied to any common boiler, as the quantity of steam required to sound it is trifling.

DIRECTIONS FOR CONNECTING GONG TO BOILER.

Connect to the main pipe, or to the boiler itself, in such a manner that the water from the condensed steam will run back into the boiler.

Carry your pipe to the top of the buildings, place the gong upon it, with the valve as near the gong in all cases as practicable.

Be careful to keep all red lead and other foreign substances from the pipe in putting it up.

PRICES, INCLUDING VALVE.

6 inch	$60.00	12 inch	$115.00
8 "	75.00	12 " 3 bells harmonized	150.00
10 "	100.00		

MOCKING BIRD WHISTLE.

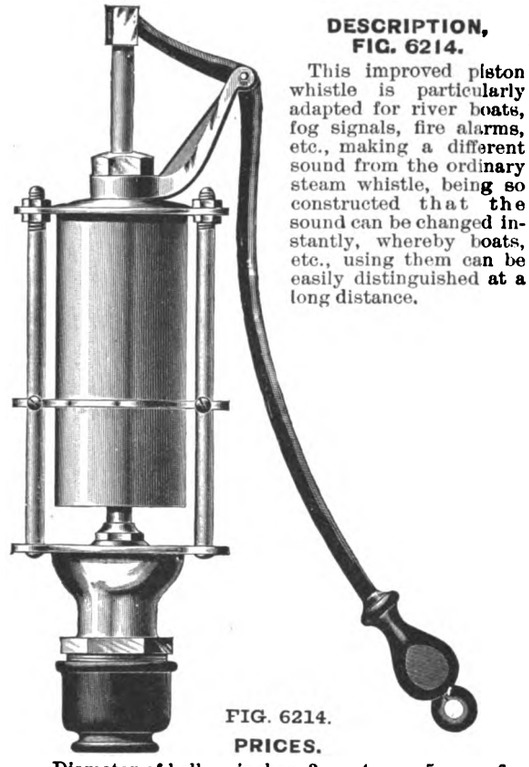


FIG. 6214.

DESCRIPTION, FIG. 6214.

This improved piston whistle is particularly adapted for river boats, fog signals, fire alarms, etc., making a different sound from the ordinary steam whistle, being so constructed that the sound can be changed instantly, whereby boats, etc., using them can be easily distinguished at a long distance.

PRICES.

Diameter of bell....inches,	3	4	5	6
Length of bell..... "	7	9	11	13
Size of pipe..... "	1	1¼	1½	2
Prices.....each,	$40.00	$53.00	$70.00	$95.00

POLISHED BELLS, WITH COIL SPRINGS.

PRICES.

5 in. dia., $2.50; with springs, $3.50
6 " " 3.65 " " 5.15
7 " " 5.75 " " 7.75
8 " " 7.25 " " 9.60

For hose carts and hose wagons.

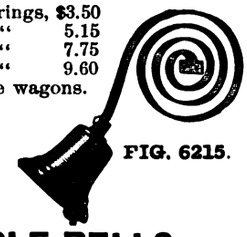


FIG. 6215.

TRIP GONG BELLS. OUTSIDE STRIKER.

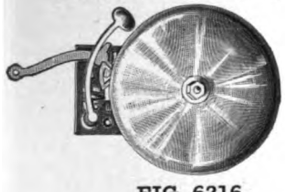


FIG. 6216.

PRICES, FIG. 6216.

6 inch, plain, each	$2.95	; polished,	$3.70
7 " " "	3.70	"	4.60
8 " " "	4.60	"	5.60
9 " " "	5.60	"	6.70
10 " " "	6.70	"	7.90
11 " " "	7.90	"	9.25
12 " " "	9.25	"	11.00
13 " " "	11.00	"	12.90
14 " " "	12.90	"	15.00
15 " " "	15.00	"	18.50
16 " " "	18.50	"	23.00

BELL CRANKS, END.

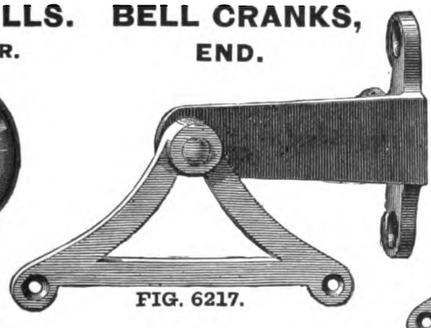


FIG. 6217.

BELL CRANKS, SIDE.

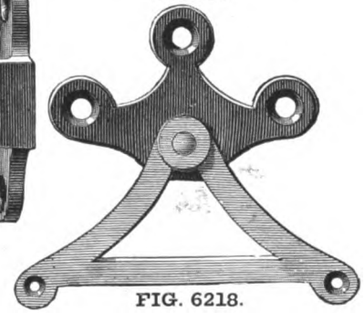


FIG. 6218.

JINGLE BELLS.

PRICES, FIG. 6219.

Sizes.	Prices.
3	$2.25
3½	2.50
4	2.75
4½	3.50
5	4.50
6	6.50

PRICES, FIGS. 6217 AND 6218.

	Per dozen.
Small	$2.00
Large	3.00
Extra, to order	5.00

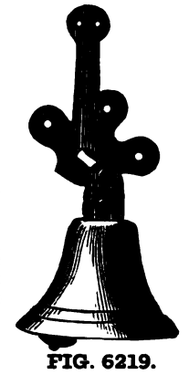


FIG. 6219.

CONC PULLS.



FIG. 6220.

PRICES.

Small pulls, each	$0.40	; medium,	$0.85
Large " "	1.75	; extra large,	2.25

PRICES, FIG. 6221.

11 inch, plain, each	$9.25	; polished,	$11.00
12 " " "	11.00	"	12.90
15 " " "	18.00	"	22.50
17 " " "	23.00	"	28.00

TRIP GONG BELLS. WITH INSIDE STRIKER.

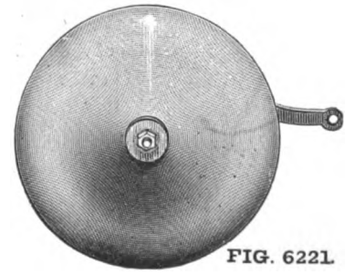


FIG. 6221

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CONGS AND BELLS.

COMMON CONG.

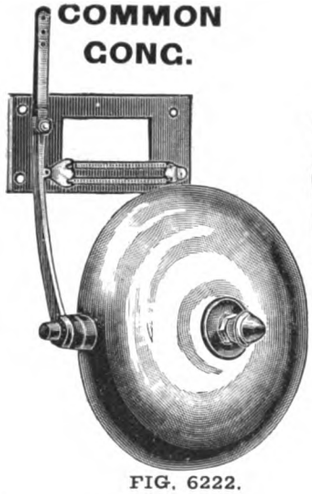


FIG. 6222.

In.	Prices.	In.	Prices.
3.	Each..$1.00	9.	Each..$5.00
4.	" .. 1.15	10.	" .. 5.85
5.	" .. 1.50	13.	" ..14.40
6.	" .. 2.25	15.	" ..19.80
7.	" .. 3.15	18.	" ..27.00
8.	" .. 4.00	25..	..to order.

TRIP CONG.

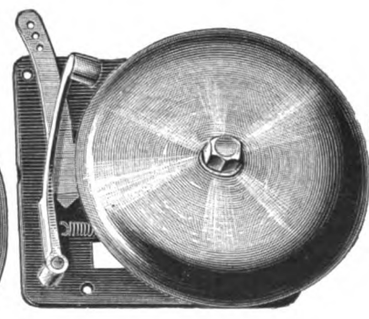


FIG. 6223.

In.	Prices.
3.	Each.....$1.20
4.	" 1.30
5.	" 1.75
6.	" 2.50
7.	" 3.50
8.	" 4.50
9.	" 5.50
10.	" 6.50

LOCOMOTIVE CONG.

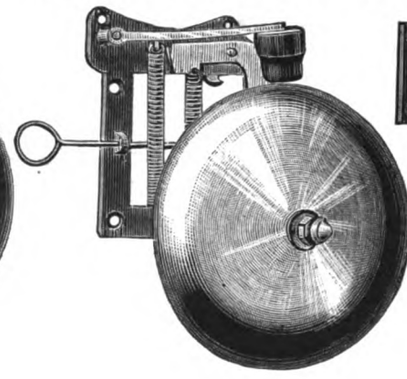


FIG. 6224.

In.	Prices.
6.	Each.....$2.50
7.	" 3.50
8.	" 4.50
9.	" 5.50
10.	" 6.50

DOUBLE HAMMER CONG.

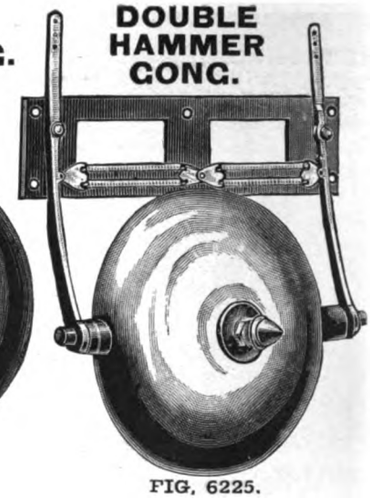


FIG. 6225.

In.	Prices.
8.	Each $6.00
9.	" 7.00
10.	" 9.00
13.	" 21.00
15.	" 26.00
18.	" 34.00

BELLS AND MOUNTINGS.



FIG. 6227.

Our church bell mountings consist of a yoke, frame, wheel and tolling-hammer. Our rotary yoke is made of the best machinery cast iron, and the poise is adjusted with the greatest care, in order to make the oscillation of the bell conform properly to its weight. The smaller the bell, the more rapidly it moves while being rung, and vice versa.

Its rotary feature consists in that it so holds and sustains the bell as to admit of the latter being turned about, at pleasure, so as to cause the clapper to strike in a new place, thus diminishing the liability of breaking.

SILVER-STEEL CONGS.

PRICES.

Sizes, from 8 to 14 inches.

Price, 60 cents per inch diameter.

Every method for striking.

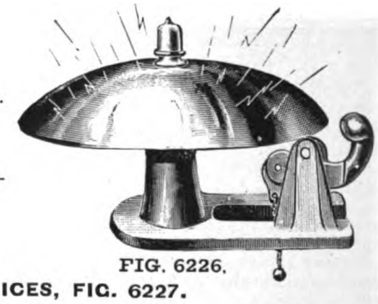


FIG. 6226.

PRICES, FIG. 6227.

Bell.			Mountings.		
Weight.	Medium tone.	Diameter.	Size of frame, outside.	Diameter of wheel.	Price of mountings.
400 lbs.	D	27 in.	3 ft. 6 in. x 3 ft. 6 in.	4 ft. 4 in.	$30.00
450 "	C sharp.	28 "	3 " 6 " x 3 " 6 "	4 " 4 "	30.00
500 "	C sharp.	29 "	3 " 9 " x 3 " 11 "	4 " 9 "	35.00
550 "	C sharp.	30 "	3 " 9 " x 3 " 11 "	4 " 9 "	35.00
600 "	C	31 "	3 " 9 " x 3 " 11 "	4 " 9 "	35.00
650 "	C	32 "	3 " 9 " x 3 " 11 "	4 " 9 "	35.00
700 "	B	33 "	4 " 1 " x 4 " 5 "	5 " 6 "	40.00
750 "	B	33 "	4 " 1 " x 4 " 5 "	5 " 6 "	40.00
800 "	B	34 "	4 " 1 " x 4 " 5 "	5 " 6 "	40.00
900 "	B flat.	36 "	4 " 5 " x 4 " 7 "	5 " 9 "	45.00
1,000 "	B flat.	37 "	4 " 5 " x 4 " 7 "	5 " 9 "	45.00
1,100 "	A	38 "	4 " 8 " x 4 " 11 "	6 " 3 "	45.00
1,200 "	G sharp.	39 "	4 " 8 " x 4 " 11 "	6 " 3 "	55.00
1,300 "	G sharp.	40 "	4 " 8 " x 4 " 11 "	6 " 3 "	55.00
1,400 "	G sharp.	41 "	5 " 0 " x 5 " 3 "	6 " 6 "	70.00
1,500 "	G	42 "	5 " 0 " x 5 " 3 "	6 " 6 "	70.00
1,600 "	G	43 "	5 " 0 " x 5 " 3 "	6 " 6 "	70.00
1,700 "	F sharp.	44 "	5 " 5 " x 5 " 8 "	7 "	90.00
1,800 "	F sharp.	45 "	5 " 5 " x 5 " 8 "	7 "	90.00
2,000 "	F sharp.	46 "	5 " 5 " x 5 " 8 "	7 "	90.00
2,100 "	F	47 "	5 " 5 " x 5 " 8 "	7 "	90.00
2,300 "	F	49 "	5 " 5 " x 6 " 1 "	7 " 6 "	115.00
2,500 "	E	50 "	5 " 5 " x 6 " 1 "	7 " 6 "	115.00
2,800 "	E	52 "	6 " 2 " x 6 " 9 "	8 "	130.00
3,000 "	E flat.	53 "	6 " 2 " x 6 " 9 "	8 "	130.00
3,500 "	D	56 "	6 " 2 " x 6 " 9 "	8 " 6 "	140.00
4,000 "	D	59 "	6 " 2 " x 6 " 9 "	8 " 6 "	140.00
4,500 "	C sharp.	62 "	6 " 2 " x 6 " 9 "	8 " 6 "	140.00
5,000 "	C	64 "	7 " 2 " x 7 " 8 "	9 "	165.00
5,500 "	C	66 "	7 " 2 " x 7 " 8 "	9 "	165.00
6,000 "	B	67 "	7 " 2 " x 7 " 8 "	9 "	190.00

PRICES ON APPLICATION.

AMALGAM BELLS.



FIG. 6228.

No.	Diameter.	Weight, bell only.	Prices.
1	15½ in.	38 lbs.	$4.80
2	16½ "	51 "	6.00
2½	17½ "	57 "	7.00
3	18½ "	65 "	7.75
4	21 "	80 "	10.00
5	24 "	134 "	14.00
6	28 "	247 "	30.00
7	30 "	325 "	36.00
8	33 "	414 "	55.00

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SCHOOL AND CHAPEL.



FIG. 6229.

BELLS AND MOUNTINGS.

SHIP AND STEAMBOAT.



FIG. 6230.

DESCRIPTION, FIG. 6229.

Ranging in weight from 100 pounds to 375 pounds; mounted with rotary yoke, which permits the bell to be turned in a moment so as to cause the clapper to strike in a new place when desired; frame, consisting of iron uprights, bolted to platform of timber; and iron wheel. Steel clapper springs attached.

Bells of these weights are often used for small churches; also for factories, etc.

PRICES OF BELLS ON APPLICATION.

DESCRIPTION, FIG. 6230.

Ranging from 100 pounds to 700 pounds, mounted with rotary yoke and lever arm attached, by which the bell is made to revolve in the usual manner of steamboat ringing, and, being attached outside of the bearing, the rope is not liable to get foul of the frame. Polished bells furnished to order.

PRICES OF BELLS ON APPLICATION.

STEEL AMALGAM BELLS.



FIG. 6231.

They are well adapted to farms, school-houses, factories, or any place where a cheap but serviceable bell can be used.

PRICES, FIG. 6229.

Bell.		Mountings.		Bell.		Mountings.	
Weight.	Diameter.	Size of frame, outside.	Prices, m'tgs.	Weight.	Diameter.	Size of frame, outside.	Prices, m'tgs.
100 lbs.	17 in.	2 5 x 2 8	$13.00	225 lbs.	22 in.	2 8 x 3 1	$20.00
125 "	18½ "	2 6 x 2 8	13.00	250 "	23 "	3 0 x 3 2	23.00
150 "	19½ "	2 6 x 2 8	15.00	300 "	24½ "	3 1 x 3 4	25.00
175 "	20½ "	2 8 x 3 1	20.00	350 "	26 "	3 1 x 3 4	27.00
200 "	21½ "	2 8 x 3 1	20.00	375 "	27 "	3 1 x 3 4	27.00

Note.—Bells of these weights are cast with the ordinary plain round tapering shank. Shanks of any desired shape will be cast upon these bells in order to fit old yokes.

PRICES, FIG. 6230.

Weight.	Prices of yokes.	Weight.	Prices of yokes.	Weight.	Prices of yokes.
100 lbs.	$12.00	250 lbs.	$20.00	450 lbs.	$25.00
150 "	12.00	300 "	20.00	500 "	30.00
175 "	17.00	350 "	20.00	600 "	30.00
200 "	17.00	400 "	25.00	700 "	30.00

PRICES, FIG. 6231.

No.	Diameter.	Weight, complete.	Prices.
A 1	15 in.	40 lbs.	$4.00
A 2	17 "	60 "	5.00
A 3	19 "	75 "	7.50
A 4	21 "	100 "	10.00

PLANTATION AND FARM BELLS.

Ranging from 15 lbs. to 80 lbs., mounted with yoke and tail, the rope being attached to a lever tail instead of a wheel.

Weight.	Prices, mountings.	Weight.	Prices, mountings.	Weight.	Prices, mountings.
15 lbs.	$2.50	30 lbs.	$3.00	60 lbs.	$4.00
20 "	2.50	40 "	3.50	70 "	4.00
25 "	3.00	50 "	3.50	80 "	4.50

PRICES, FIG. 6232.

No.	Dia.	Weight, bell only.	Weight complete.	Prices.
1	15½ in.	38 lbs.	62 lbs.	$6.00
2	16½ "	51 "	77 "	8.00
2½	17½ "	57 "	86 "	9.00
3	18½ "	65 "	102 "	10.00
4	21 "	80 "	132 "	12.00
5	24 "	134 "	180 "	20.00

STEEL AMALGAM BELLS.



FIG. 6232.

COOK'S AUTOMATIC BELL RINGER, FOR LOCOMOTIVES.

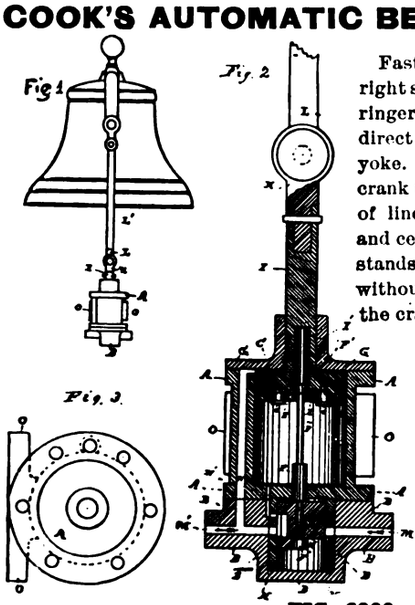


FIG. 6233.

Fasten angle iron to boiler on right side of bell frame. Place the ringer as low as possible and in direct line with the center of bell yoke. Place the lower end of the crank three-eighths of an inch out of line with center of bell yoke and center of piston when the bell stands plumb, thereby starting bell without using bell rope. Key and pin the crank to prevent working loose. The connection should be as long as possible, the inside piece not less than five inches inside of hollow part of connection. The nuts are used to adjust the stroke of the bell. If the ringer works too strong, shorten the connection by lowering the nuts; if not strong enough, lengthen by raising the nuts. Use a three-eighths inch globe valve for a throttle, placed so it will be handy for the engineer. The steam must be shut off to stop the bell. Where steam is used a small lubricator must be used, as it is necessary to keep the ringer well oiled. Let the exhaust pipe go down outside of the boiler, below the frame. It will stop up if put in smoke arch. Where engines have air, would use that in preference to steam. When using air a small oil cup can be placed near the ringer; when using steam, would be best placed in cab.

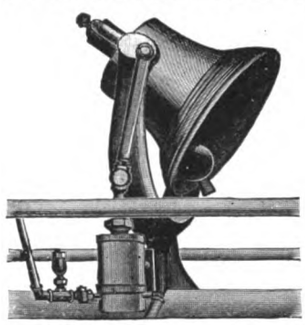


FIG. 6234. APPLIED.
PRICE, $12.00 EACH.

LARGE STEEL AMALGAM BELLS.

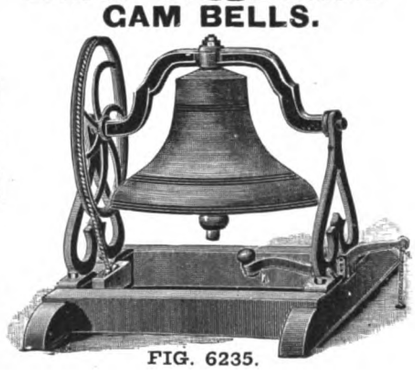


FIG. 6235.

PRICES.

Diam.	Weight of bell only.	Weight complete.	Size of frame.	Prices.
18½ in.	65 lb.	172 lb.	27 x 41½ in.	$16.00
21 "	80 "	186 "	30 x 41½ "	20.00
24 "	134 "	240 "	32½ x 41½ "	25.00
28 "	247 "	396½ "	36 x 48 "	40.00
30 "	325 "	487 "	36 x 48 "	50.00
33 "	414 "	689½ "	38 x 48 "	75.00

We put tolling attachment, as shown in cut, on Nos. 6 and 7 at $4.00 extra and on No. 8 at $5.00, extra list.

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WEST'S LOCOMOTIVE STEAM BELL RINGER.

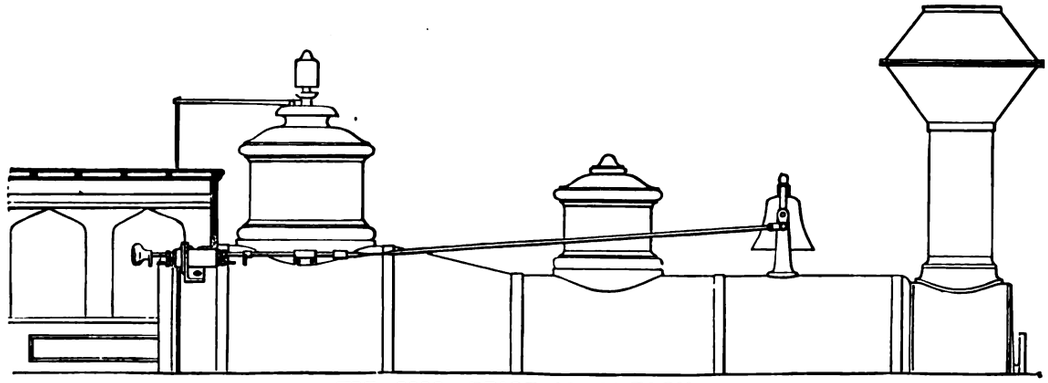


FIG. 6236. PRICE, $35.00 EACH.

DETAILS.

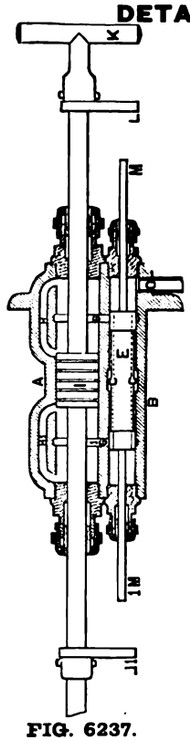


FIG. 6237.



FIG. 6238.

The object of this invention is to ring a bell by steam, without any rigidity of moving parts, allowing the bell to oscillate freely, the same as if operated by hand with a cord, and to impart an easy and uniform motion to the bell under any variation of steam pressure.

The ringer consists of a steam cylinder, A, steam chest, B, with balanced valve, E, operated by the tablets, L L, on the piston rod. The bell rod is a continuation of the piston rod, and attached to bell crank. The valve, E, receives steam in the center and exhausts at the ends. H H are relief passages, allowing the air or vapor in the end of cylinder to escape around the piston, I, and, by removing the resistance, allow the piston freedom to follow the momentum of the bell until it stops.

SALINOMETERS, THERMOMETERS AND HYDROMETERS.

LONG SALINOMETER POT.

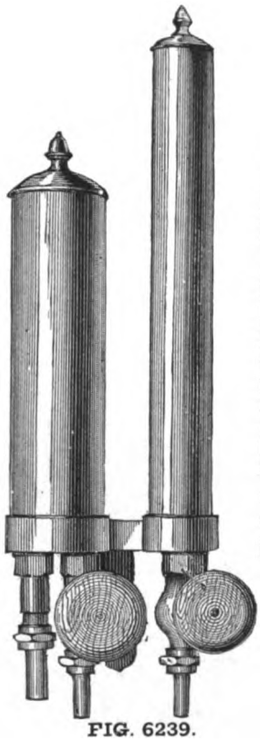


FIG. 6239.

Long salinometer pot, including one thermometer and one glass hydrometer.

PRICE, $40.00 EACH.

HIGH GRADE THERMOMETER.



FIG. 6240.

PRICE, $15.00 EACH.

HOT WELL THERMOMETER.



FIG. 6241.

With shield.

PRICE, $25.00 EACH.

UPTAKE THERMOMETER.



FIG. 6242.

PRICE, $7.50 EACH.

COMMON TIN THERMOMETER.

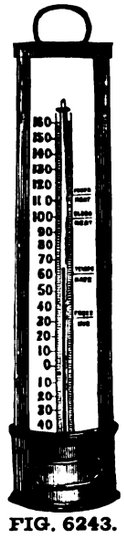


FIG. 6243.

PRICES, PER DOZ.

7 inch	$5.00
8 "	5.50
10 "	6.50
12 "	8.00

BAROMETER.

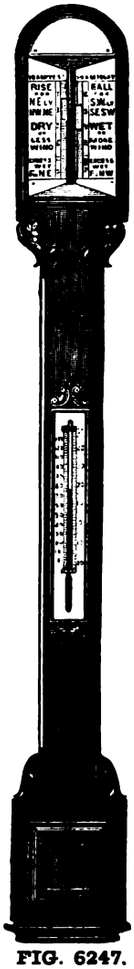


FIG. 6247.

PRICES.

Round top, carved.....$35.00

Sea-coast barometer, enameled or porcelain scales, metal pointers, rack pinion and thermometer.

SALINOMETER THERMOMETER.



FIG. 6244.

PRICE, $1.50 EACH.

SALINOMETER HYDROMETER.



FIG. 6245.

PRICES.

Glass ..$1.50 each.
Copper.. 6.00 "

THERMOMETER.

BRASS CASE AND EXTENSION.

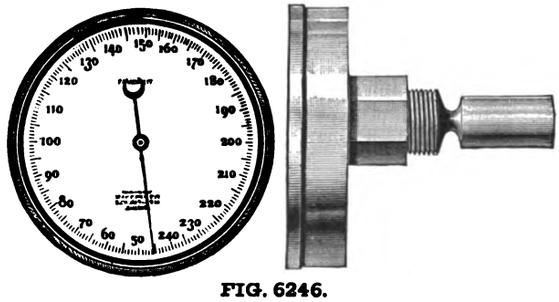


FIG. 6246.

Four inch metal dial. Two and one-half extension. For use in hot water and steam pipes. ¾ inch pipe fitting.

Range 50 degrees to 250 degrees Fahrenheit.

PRICE, $5.00 EACH.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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THERMOMETERS, BAROMETERS AND PYROMETERS.

THERMOMETERS, FIGS. 6248 AND 6249, BRASS CASE AND EXTENSION.

Four-inch metal dial. Six-inch extension. ¾ inch pipe fitting. For use in sugar boilers, hot water and steam, and places where liquids are heated.

No. 25,	range	100	degrees	to	300	degrees	Fahrenheit	Prices, either size or style, $14.00 each.
No. 26,	"	50	"	"	250	"	"	
No. 27,	"	–50	"	"	150	"	"	
No. 30,	"	0	"	"	400	"	"	
No. 31,	"	50	"	"	250	"	"	
No. 32,	"	–50	"	"	150	"	"	

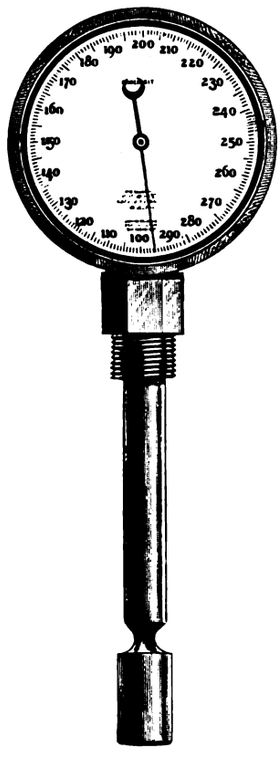


FIG. 6248.

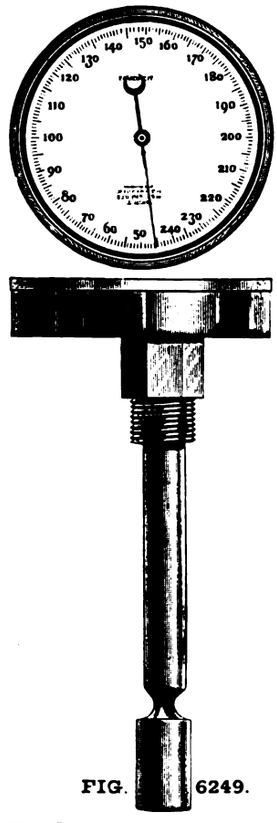


FIG. 6249.

ANEROID BAROMETERS.

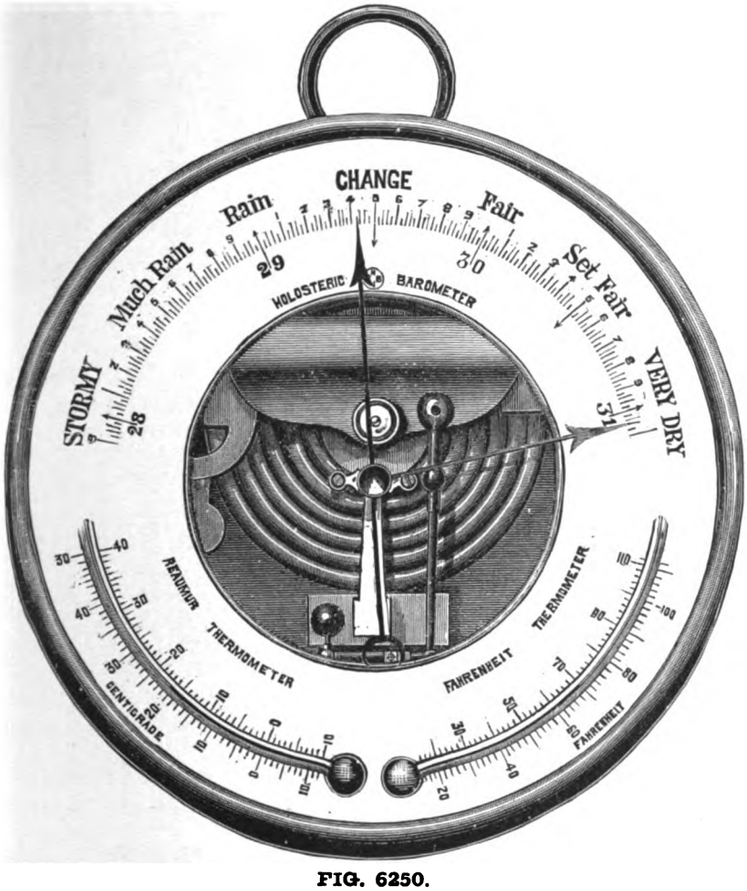


FIG. 6250.

PRICES.

No.		Each.
1.	Aneroid barometer, 8 inch lacquered metal case with suspensory ring, open silvered metal dial, two curved thermometers reading to scales of Fahrenheit, Reaumur, and Celsius, beveled glass front, in velvet-lined case. See cut	$24.00
2.	Aneroid barometer, 6½ inch, as above	18.00
3.	" " 5 inch, with but one thermometer, similar to preceding	15.00
4.	Aneroid barometer, 5 inch, as above, without thermometer	13.50
5.	" " 5 inch lacquered metal case, with suspensory ring, open card dial	12.00
6.	Aneroid barometer, similar to preceding, closed card dial	10.00
7.	" " 5 inch lacquered metal case, with suspensory ring, closed black enameled metal dial with gilt figures	8.75
8.	Aneroid barometer, 4¾ inch metallic case, with ring, card dial, attached thermometer, in case	7.00
9.	Aneroid barometer, as above, without thermometer	5.50
10.	Aneroid barometer, 6½ inch nickel-plated case, with suspensory ring, open card dial	7.75
11.	Aneroid barometer, 4 inch nickel-plated case, with ring for suspension, and feet to stand on mantel, open card dial	4.25
12.	Aneroid barometer, 2¾ inch, as above	3.25
13.	" " nickel-plated square metallic case, 3½ x 2¾ inches, with thermometer and countersunk compass in top	5.00

The above instruments are superior to all others in workmanship, finish and reliability, and are recommended as the most trustworthy and efficient barometers in the hands of observers of the weather. Each instrument bears the trade-mark shown within the ring of above cut.

PYROMETERS.

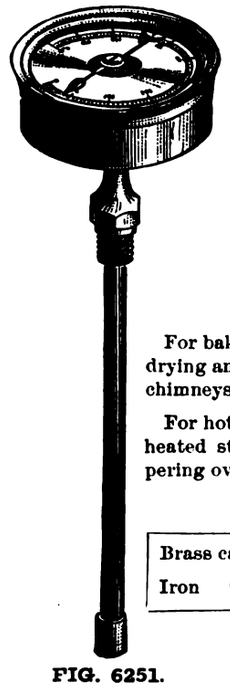


FIG. 6251.

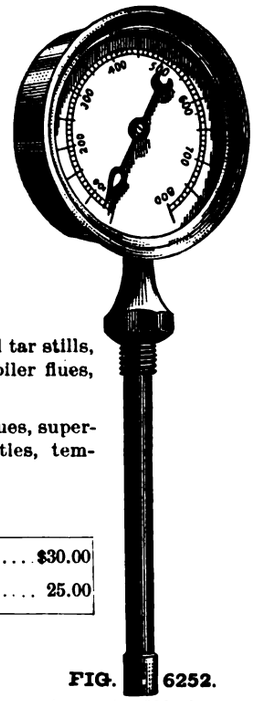


FIG. 6252.

For bakers' ovens, oil and tar stills, drying and Japan ovens, boiler flues, chimneys, etc., etc.

For hot-air pipes, boiler flues, superheated steam, varnish kettles, tempering ovens, etc., etc.

PRICES.

Brass case, 5½-inch dial	$30.00
Iron " 5½ " "	25.00

This pyrometer correctly indicates temperatures to 800 degrees Fahrenheit, by the expansion of its metallic stem.

Each pyrometer is carefully graduated to a standard, and is fully guaranteed. They are in general use for all manufacturing operations where a durable and reliable indicator of heat is required.

The metal of the expansion stem, also the length of the same, is varied, to adapt the pyrometer to all situations. For bakers' and Japan ovens, the pyrometer is screwed into a cast-iron box plate, set in the side or front wall of the oven.

In oil and tar stills the pyrometer may be inserted in end, side, or top of same, with expansion stem wholly or partially in the vapor, if desired—the opening in the still to be tapped with ¾-inch pipe thread.

For blast furnaces a special variety is furnished, with an attachment for preserving the expansion stem from becoming overheated.

In inquiries, or orders, please give all necessary particulars.

Special pyrometers made to order.

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SIGHT-FEED LUBRICATORS.

DETROIT LUBRICATOR.

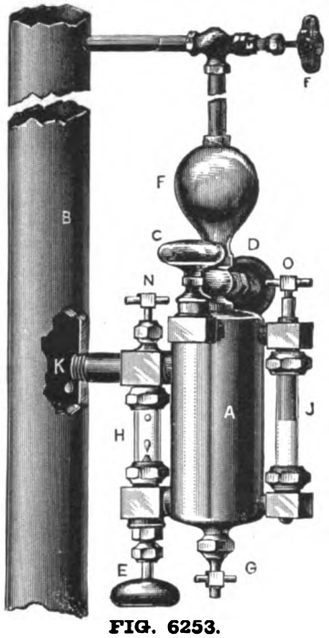


FIG. 6253.

DESCRIPTION.

A—Oil reservoir.
B—Steam pipe.
C—Oil filler.
D—Water feed valve.
E—Valve to regulate flow of oil.
FF—Steam tube and condensing chamber.
G—Drain valve to draw off water to prevent freezing, etc.
H—Sight-feed glass.
J—Glass indicator.
K—Oil discharge pipe.
N—Valve to correct pulsation or unsteadiness in feed.
O—Vent.

Note.—⅓ pints have no gauge glass.

PRICES.

Size.	Plain brass.	Nickel-plated.	Suitable for engine with diameter of cylinder as follows:
One-third pint.....	$17.00	$20.00	Up to 8 inches.
Half-pint.....	22.00	25.00	8 to 10 inches.
Pint.....	30.00	35.00	10 to 18 inches.
Quart.....	45.00	50.00	18 to 30 inches.
Half-gallon.....	60.00	65.00	30 and over.
Gallon.....	75.00	80.00	.....

SPRAY FEED LUBRICATOR.

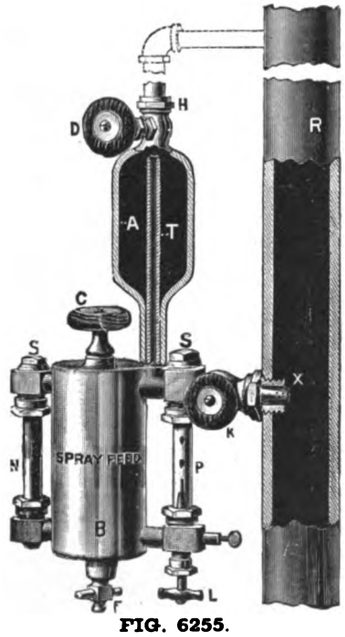


FIG. 6255.

DESCRIPTION.

A—Condensing chamber.
B—Oil reservoir.
C—Filling plug.
D—Upper steam valve.
F—Drain valve.
K—Lower steam valve.
L—Valve for regulating flow of oil.
N—Indicator glass.
P—Sight-feed glass.
R—Steam pipe.
SS—Plugs for cleansing and replacing glass.
T—Circulating tube.
X—Spray nozzle.

IMPROVED SENIOR LUBRICATOR.

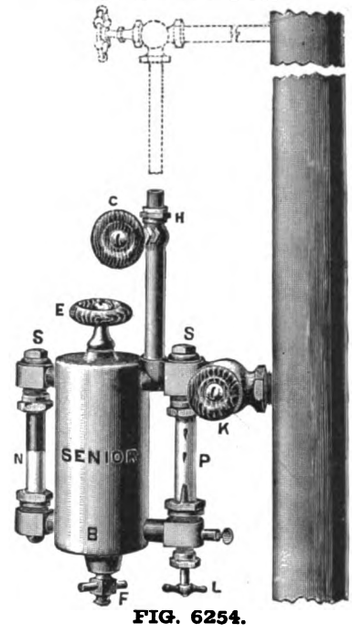


FIG. 6254.

DESCRIPTION.

B—Oil reservoir.
C—Condenser valve.
E—Filling plug.
F—Drain valve.
H—Union to connect condenser pipe and valve.
K—Discharge valve.
L—Valve for regulating flow of oil.
N—Indicator glass.
P—Sight-feed glass.
Vent to drain or blow out sight-feed glass P.

DIRECTIONS FOR CONNECTING AND OPERATING.

Drill and tap steam pipe above the throttle valve to receive oil discharge shank, and higher up for ¼ inch pipe thread for condenser pipe. See price list for length of condenser pipes. Best results are obtained from long condenser pipes.

To operate, close valves C, L and K.

Drain the lubricator by opening valve F. Close valve F and fill full with oil at E.

After filling, open valve K slowly, and when sight-feed glass P has filled with water, open valve C and wait a few moments for condensation; then regulate the flow of oil with valve L.

Indicator glass N shows the quantity of oil in the oil reservoir.

If indicator glass N, or sight-feed glass P, break, they can be replaced by unscrewing plugs S, and slipping glasses through from the top. This feature in construction of the lubricator also facilitates cleansing the glasses.

The bottom sight-feed glass fitting is provided with a drain valve for blowing out or draining sight-feed glass.

PRICES.

Size.....	⅓ pt.	½ pt.	⅔ pt.	1 pt.	1½ pt.	1 qt.	½ gal.	1 gal.
Suitable for engine cylinders.	Up to 6 in.	6 to 10 in.	10 to 14 in.	14 to 18 in.	18 to 24 in.	24 to 30 in.	From 30 up.	
Shanks threaded, pipe thread.	⅜	⅜	½	½	½	½	½	½
Finished brass, each.....	$15.00	$17.00	$20.00	$22.00	$25.00	$28.00	$38.00	$60.00
Nickel-plated, each.....	17.00	19.00	22.50	25.00	28.50	32.00	43.00	65.00
Length of condenser pipes necessary, inch.	18	24	30	36	42	48	60	72

Lubricators without indicator glass, N, 25 cents each less, net.

Lubricators are sent without condenser pipes and angle valve, unless ordered otherwise. Extra for brass condenser pipes and angle valve on ⅓, ½ and ⅔ pints, 50 cents; 1 pint, 1½ pint and 1 quart, 75 cents; ½ gallon and 1 gallon, $1.00 each, net.

DESCRIPTION, FIG. 6255.

The "spray feed" system of feeding oil consists in forcing the oil—after it has passed in drops up through the glass tube—into the steam pipe in the form of a "spray," thus atomizing and completely mixing it with the steam before it reaches the parts to be lubricated. With this lubricator feed only two-thirds the number of drops as are required with ordinary cups.

DIRECTIONS.

Tap the steam pipe for the oil discharge shank and higher up one-quarter inch pipe thread for condenser pipe.

Connect condenser A with steam pipe by condenser pipes, elbow and union H. To fill and operate, close valves L, K and D, drain cup at F, and fill with oil. Then open valves K and D, and after sight-feed glass P has filled with water by condensation, regulate oil drops at L.

PRICES.

Size.....	⅓ pt.	½ pt.	⅔ pt.	Pt.	1½ pt.	1 qt.	½ gal.	Gal.
Suitable for engine cylinders.....	Up to 6 in.	6 to 10 in.	10 to 14 in.	14 to 18 in.	18 to 24 in.	24 to 30 in.	From 30 up.	
Shanks threaded.....pipe thread	⅜	⅜	½	½	½	½	½	½
Finished brass.....each	$15.00	$17.00	$20.00	$22.00	$25.00	$28.00	$38.00	$60.00
Nickel-plated..... "	17.00	19.00	22.50	25.00	28.50	32.00	43.00	65.00
Length of condenser pipes necessary.....inches	18	24	30	36	42	48	60	72

Lubricators without indicator glass N, 25 cents less each, net.

Lubricators are sent without condenser pipes and angle valve, unless otherwise ordered. Extra for these on ⅓, ½, ⅔ pint, 50 cents; 1, 1½ pint, 1 quart, 75 cents; ½, 1 gallon, $1.00 each, net.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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JOKER SIGHT-FEED LUBRICATORS.

Attach this lubricator to steam pipe above the throttle, using ⅛ inch iron pipe and angle valve on ⅛ pint, and ¼ inch on larger sizes, for connecting union F to steam pipe. To obtain best results length of vertical pipe between union F and valve H should not be less than one foot, but greater length is better.

To fill and operate.—Close valves D, E and H, drain cup at C and fill full with oil. First open valve E slowly, allowing sight-feed glass B to fill with water. Then open valve H and wait a few moments for condensation, then regulate oil drops by valve D.

This lubricator is provided with a vent-screw for blowing out and draining sight-feed glass when necessary.

To prevent freezing, valve D and C should be left open.

The Joker, on account of being cast in one piece, will work in exposed positions in coldest weather.

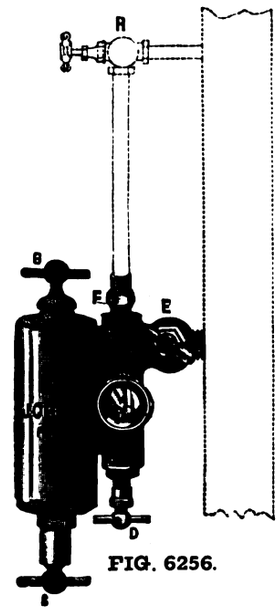


FIG. 6256.

PRICES.

Size	Pint	⅛	¼	⅜	½
Shank	Pipe thread	¼	¼	⅜	⅜
Price	Each	$3.50	$4.00	$5.00	$6.00

The Joker is also furnished, without extra charge, for attachment to steam chest or steam pipe, between throttle and steam chest. In ordering these, specify "for attachment to steam chest."

STAR DOUBLE CONNECTION LUBRICATOR.

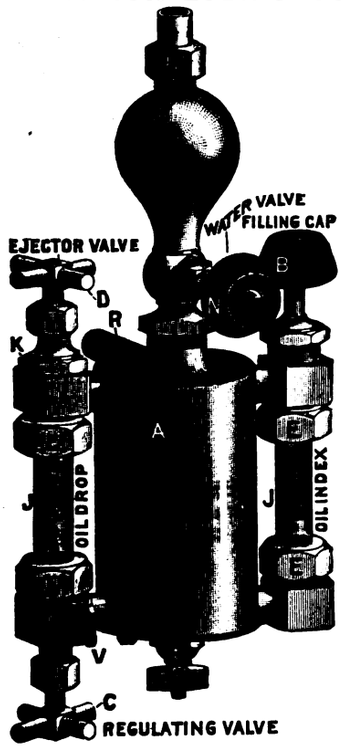


FIG. 6257.

PRICES, FIG. 6257.

Capacity	⅓ pint.	½ pint.	1 pint.	1 quart.	½ gallon.
Size of attaching shank, pipe thread.	⅜ inch.	½ inch.	½ inch.	½ inch.	¾ inch.
Finished	$5.60	$7.00	$8.75	$11.25	$16.25
Nickel-plated	6.25	7.50	9.50	12.50	17.50
Suitable for engine cylinders	up to 8 in.	8 to 10 in.	10 to 18 in.	18 to 30 in.	30 and over.

SEIBERT'S SINGLE SIGHT-FEED LUBRICATORS.

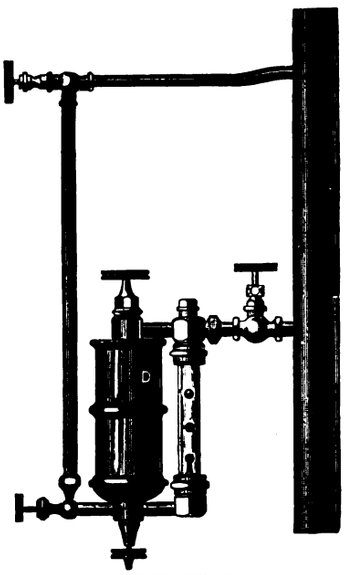
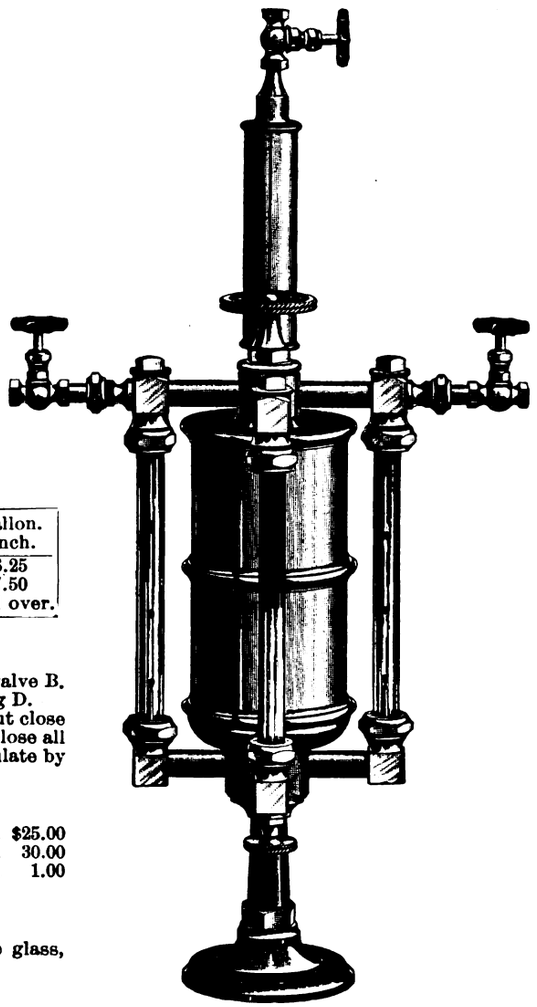


FIG. 6258.

REPRESENTS HANGING CUPS.

PRICES BELOW.

SEIBERT'S DOUBLE SIGHT-FEED LUBRICATOR.


FIG. 6258 1-2.

PRICES.

	Brass.	Nickel-plated.
No. 4, 1 quart	$65.00	$70.00
" 5, ½ gallon	85.00	92.00
" 6, 1 "	115.00	125.00

COUSE LUBRICATOR, PLAIN AND AUTOMATIC.

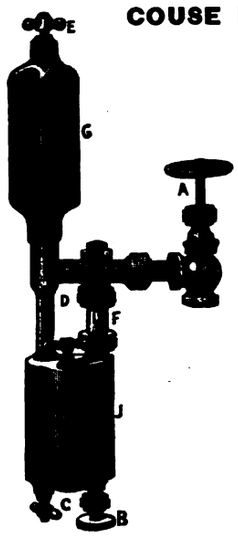


FIG. 6259.

1. Close steam valve A.
2. Close regulating valve B.
3. Open drain cock C.
4. Remove filler plug D.
5. Open direct feed plug E to give vent; after water has run out close drain cock C, then fill oil reservoir J solid full with oil, then close all and turn on steam by valve A; wait a few minutes, then regulate by part of a turn the drops by valve B.

PRICES.

Pints, finished brass	$25.00
Quarts, " "	30.00
Nickel-plated, extra net	1.00

DESCRIPTION, FIG. 6258.

Nos. 1 and 2 are hanging cups, without gauge glass.

" 3 " 4 are made either hanging or with stand and gauge glass, similar to Fig. 6258½.

All sizes larger made with stands.

PRICES, FIG. 6258.

	Brass finished, with sight-feed.	Nickel-plated, with sight-feed.
No. 1, ⅓ pint, for 10 horse-power engine	$20.00	$22.00
" 2, ½ " " 25 " "	25.00	27.50
" 3, 1 " " 150 " "	35.00	38.00
" 4, 1 quart, " 300 " "	50.00	55.00
" 5, ½ gal., " 500 " "	70.00	76.00
" 6, 1 " " 500 " "	or more.. 90.00	98.00

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UP DROP.

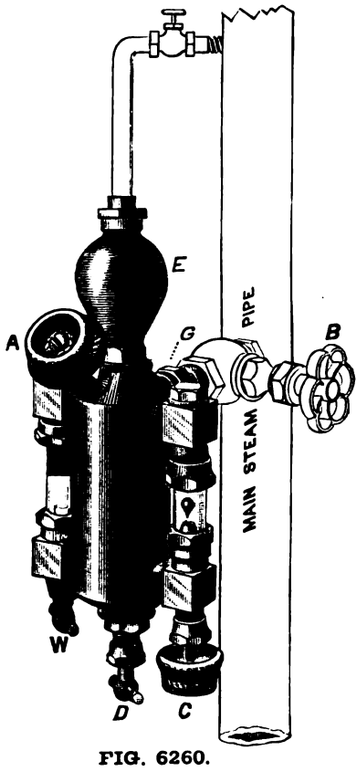


FIG. 6260.

SIGHT-FEED LUBRICATORS.

DIRECTIONS FOR APPLICATION.

1. Connect the lubricator to main steam pipe by the union coupling G, at the back of the cup, which is chased for ½ or ¾ inch pipe, according to size, placing a common globe valve, B, sideways, with short nipple on the pipe side, between pipe and lubricator, the handle to project horizontally, as illustrated. It is important to have the globe-valve attached sideways, so as to keep a clear passage in the valve for the oil to pass through. 2. Connect top of condenser to main steam pipe by ¼ in. pipe, placing a common ¼ in. globe valve at the bend, as illustrated. 3. The connection between coupling G and main steam pipe must be above the throttle, so that pressure will remain on the cup when throttle is closed.

DIRECTIONS FOR USE.

Fill the cup with clean strained oil through filling plug A, then open valves B and D; wait until sight-feed glass has filled with water of condensation, then start and regulate the feed by valve C.

To stop.—Close valve C.

When the cup is empty, close valves C and D and draw off water by waste cock W; then fill and start as before, always opening valve D first.

NOTES.

1. In case the sight-feed glass breaks, close valves B, C and D, and remove the broken glass by unscrewing the plug at the top of bracket and slipping the glass through. In the same way the indicating glass can be removed in case of breakage.

2. Once in two weeks, at least, blow out the cup with steam, opening all valves wide, with the exception of the filling plug, which must remain closed. This will clean all passages, and prevent clogging and stoppage, especially where sticky, black oil is used.

Keep valve D always open, except when draining the cup, as per directions.

PRICES.

Size	⅛ pint.	½ pint.	¾ pint.	1 pint.	1½ pint.	1 quart.
Prices, nickel-plated	$16.00	$20.00	$24.00	$30.00	$36.00	$44.00

VOLUNTEER UP DROP, DOUBLE CONNECTION.

DIRECTIONS FOR APPLICATION.

1. Connect the lubricator to main steam pipe at B, placing a common globe valve between the lubricator and steam pipe, so as to be able to turn steam off should glass break at any time; also a globe valve at bend of top pipe to connect to condenser. 2. The connection between lubricator and main steam pipe at B must be above the throttle, so that pressure will remain on the cup when throttle is closed.

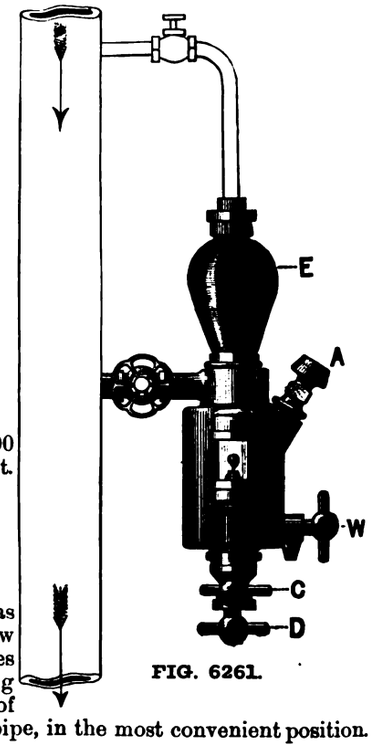


FIG. 6261.

DIRECTIONS FOR USE.

Fill the cup with clean strained oil through filling plug A, then open valves B and D; wait until sight-feed glass has filled with water of condensation, then start and regulate the feed by valve C.

To stop.—Close valve C.

When the cup is empty, close valves C and D and draw off water by waste cock W; then fill and start as before, always opening valve D first.

NOTES.

1. In case the sight-feed glass breaks, close valves B, C and D, and remove the broken glass by unscrewing the plug at the top of it and slipping the glass through.

2. Keep valve D always open, except when draining the cup, as per directions.

3. Once in two weeks, at least, blow out the cup with steam, opening all valves wide, with the exception of the filling plug, which must remain closed. This will clean all passages and prevent clogging and stoppage, especially where sticky, black oil is used.

PRICES.

Numbers	1	2	3
Prices, rough brass finish	$10.00	$12.00	$15.00
Capacity (approx.)	½ pint.	½ pint.	¾ pint.

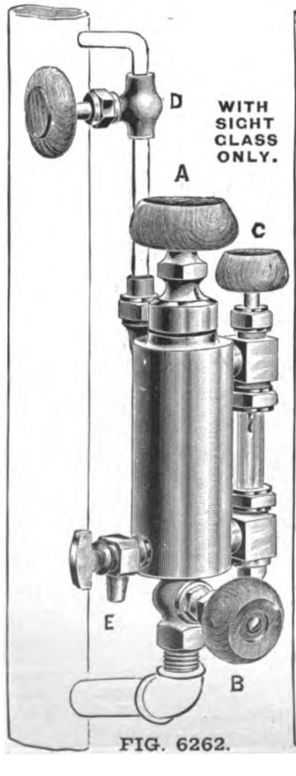


FIG. 6262.

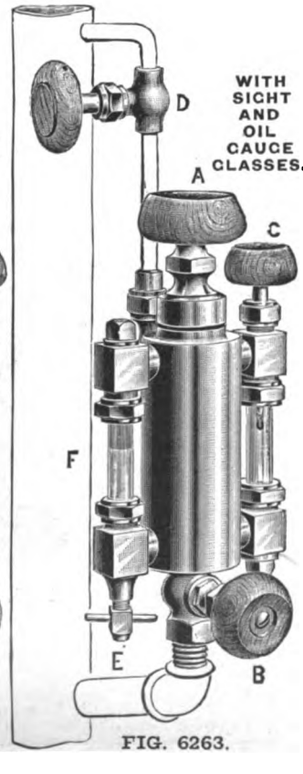


FIG. 6263.

HANDY SIGHT-FEED LUBRICATORS.

DIRECTIONS FOR APPLICATION.

1. Attach the cup to main steam pipe, as close as possible, by a short nipple and elbow at the bottom, taking care the angle does not sag. 2. Connect the valve accompanying the lubricator to the little elbow on top of cup, and to the main steam pipe by ⅛ in. pipe, in the most convenient position.

DIRECTIONS FOR USE.

Fill the cup through filling plug A with clean strained oil.

To start.—Open bottom steam valve B, ½ turn, and top steam valve D wide, then, after waiting a few minutes, open valve C, when the drop will fall down in sight-feed glass.

Regulate the feed valve C, according to size of engine, but not to exceed 50 drops per minute.

To stop.—Close valves C and D.

When the cup is empty, close all valves and draw off condensed water and impurities by waste cock E; then fill and start as before.

PRICES, NICKEL-PLATED.

Size No.	1	2	3	4	5	6	7
Approximate capacity in pints	¼	⅓	½	¾	1	1½	2
Prices, with sight glass only	$8	$10	..	..	..	..	..
Prices, with sight and oil gauge glass	..	..	$14	$16	$18	$24	$30

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SIGHT-FEED LUBRICATORS.

How to attach.—Connect this double connection lubricator to steam pipe by shank R, using a short nipple, and coupling H to about three feet of ¼ inch iron pipe, with a ¼ inch angle valve at top end of same.

Directions for use.—1. Close all valves of lubricator, and fill chamber through filling hole B with clean oil, and replace cap.

2. Open angle valve in condenser pipe, and valve D, and wait until sight glass fills full of water.

3. Then regulate oil drops by valve C at bottom of sight chamber to required rate of feed.

To replace sight glass, if broken, remove cage K and insert glass, leaving a little end play to allow for expansion. To refill, draw off water through cock F and proceed as before.

Clean sight glass J by blowing steam through vent V. Clean out lubricator once or twice a month by opening all valves and blowing steam through same.

Caution.—In freezing weather, when lubricator is not in use, open all valves and drain thoroughly.

PRICES.

Capacity	¼ pint.	⅓ pint.	½ pint.	1 pint.
Size of attaching shank, pipe thread	⅜ inch.	⅜ inch.	½ inch.	½ inch.
Finished	$3.00	$3.75	$5.00	$7.00
Plated	3.50	4.25	5.75	8.25

CRESCENT UP FEED.

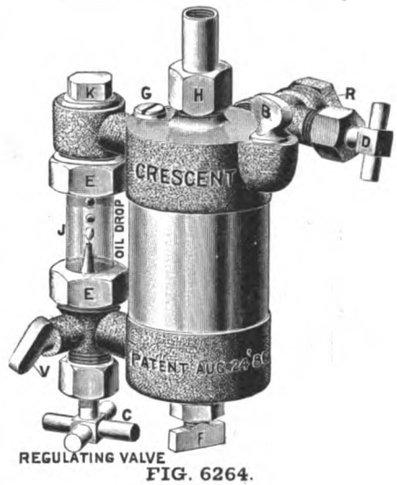


FIG. 6264.

PRICES, FIG. 6265.

	Brass finished.	Nickel-plated.
⅓ pint	$17.00	$20.00
½ pint	22.00	25.00
1 pint	30.00	35.00
1½ pint	37.00	42.00
1 quart	45.00	50.00
½ gallon	60.50	65.00

MICHIGAN "CYCLONE" CUP.

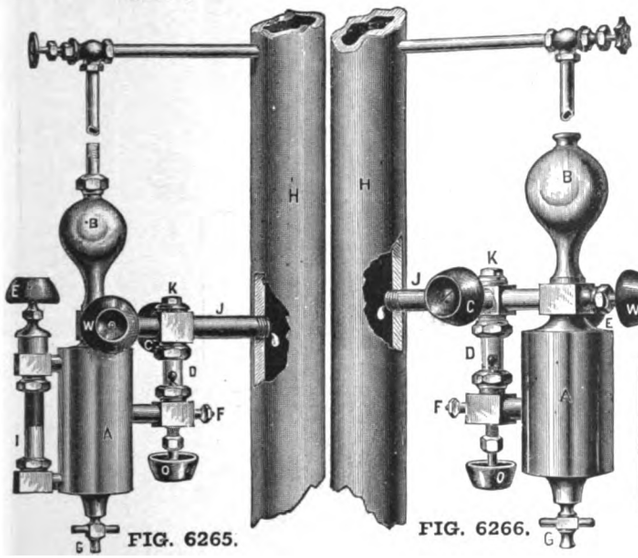


FIG. 6265.

"JUNIOR" CUP.

FIG. 6266.

PRICES, FIG. 6266.

	Brass finished.	Nickel-plated.
¼ pint	$13.00	$16.00
⅓ pint	15.00	18.00
½ pint	18.00	21.00
1 pint	22.00	25.00
1 quart	30.00	33.00

VICTORY.

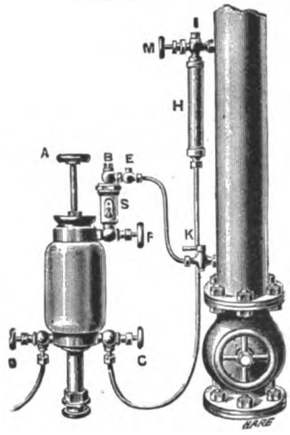


FIG. 6267.

PRICES, FIG. 6267.

	Single sight.	Double sight.	Triple sight.	Nickel-plating.
½ pint, brass	$25.00	$27.00	.....	$1.25
1 pint "	35.00	37.00	$40.00	1.50
1 quart "	50.00	55.00	60.00	2.00
½ gallon "	70.00	75.00	80.00	2.50
1 gallon "	90.00	95.00	100.00	3.00

Detailed instructions with each cup.

ENGINEER'S FAVORITE.

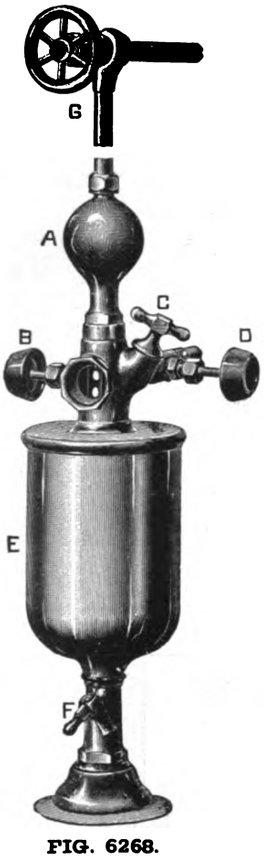


FIG. 6268.

DESCRIPTION.

A—Condenser.
B—Water or regulating valve.
C—Filling plug.
D—Oil discharge valve.
E—Oil reservoir.
F—Drain cock.
G—Steam pipe and valve.

PRICES, FIG. 6268.

½ pint,	brass finish,	$22.00
1 pint,	"	28.00
1 quart,	"	40.00
½ gallon,	"	55.00
1 gallon,	"	70.00
½ pint	nickel-plate,	24.00
1 pint,	"	33.00
1 quart,	"	46.00
½ gallon,	"	63.00
1 gallon,	"	75.00

ACME LUBRICATORS.

CLASS "A."

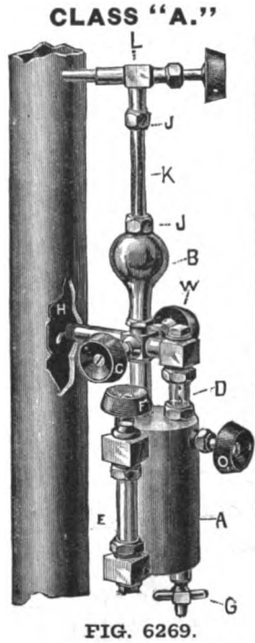


FIG. 6269.

CLASS "B."

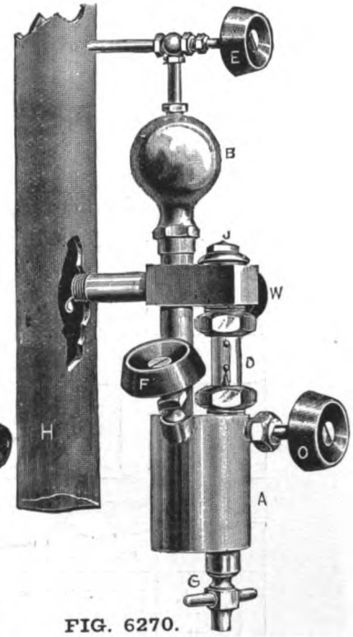


FIG. 6270.

CLASS "C."

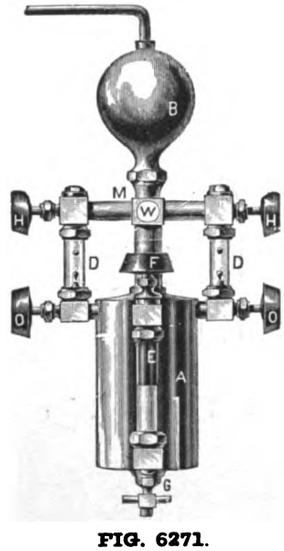


FIG. 6271.

PRICES.

CLASS "A."			CLASS "B."			CLASS "C."		
	Brass.	Nickel.		Brass.	Nickel.		Brass.	Nickel.
½ pint	$22.00	$25.00	⅓ pint	$15.00	$18.00	½ gallon	$75.00	$85.00
1 pint	30.00	35.00	½ pint	18.00	21.00	1 gallon	85.00	95.00
1 quart	45.00	50.00	1 pint	22.00	25.00			
½ gallon	60.00	65.00	1 quart	35.00	40.00			
1 gallon	75.00	80.00						

Connections for all classes, 50 cents extra. Class "B" rough, 25 cents less.

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SICHT-FEED LUBRICATORS.

BARCLAY'S.

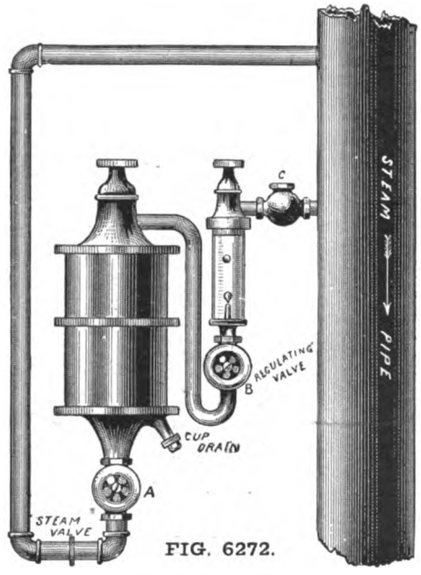


FIG. 6272.

PRICES, FIG. 6272.

SINGLE CUP.

No.	Size.	Brass finished.	Nickel-plated.
1	One-half pint	$15.00	$17.00
2	Three-fourths pint	20.00	22.00
3	One pint.....	27.00	30.00
4	One quart.....	35.00	39.00
5	One-half gallon...	45.00	50.00
6	One gallon	60.00	66.00
7	Two gallons.....	89.00	.....

DOUBLE CUP FOR TWO SEPARATE ENGINES.

No.	Size.	Brass finished.	Nickel-plated.
1	One-half pint.....	$27.00	$31.00
2	Three-fourths pint	31.00	34.00
3	One pint.....	33.00	38.00
4	One quart	42.00	48.00
5	One-half gallon....	58.00	63.00
6	One gallon.....	75.00	80.00

Gauge glass, to show oil, $1.75 extra.

EAGLE, CLASS B.

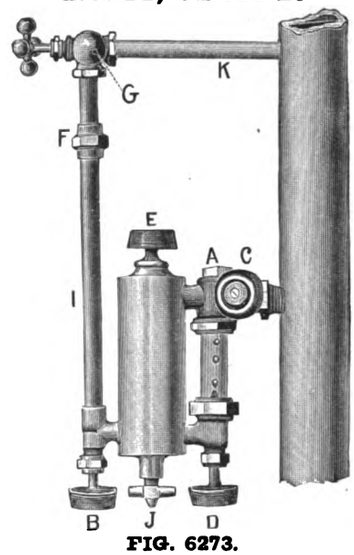


FIG. 6273.

PRICES, FIG. 6273.

BEST STEAM METAL, POLISHED BRASS.

¼	pint,	$8.00 each.
⅓	"	10.00 "
½	"	12.00 "
1	"	16.00 "

CHAMPION.

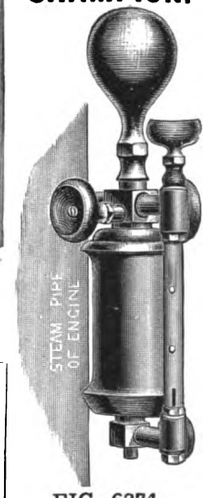


FIG. 6274.

PRICES, FIG. 6274.

Nickel-plated.		Suitable for discharging oil per minute.	Prices.
Number.	Capacity.		
2	½ pint.	1 to 2 drops.	$25.00
3	1 "	1 to 5 "	35.00
5	1 quart.	1 to 15 "	50.00

JUNIOR SINGLE CONNECTION.

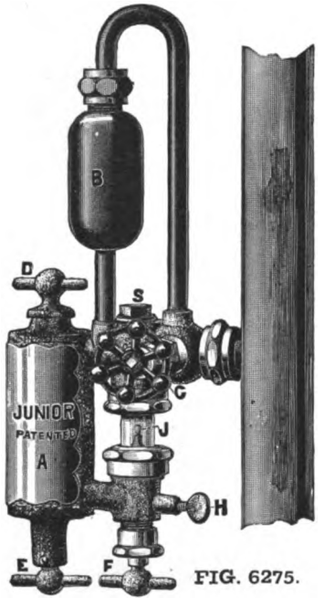


FIG. 6275.

PRICES, FIG. 6275.

Size .....pint.	¼	⅓	½	1
Shank.....pipe thread.	⅜	⅜	½	½
Brass, label finish, bronzed trimmings .....each.	$7.00	$8.00	10.00	14.00
Nickel-plated..... "	8.50	10.00	12.00	16.00

CROSBY SINGLE CONNECTION.

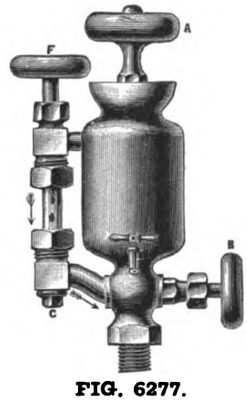


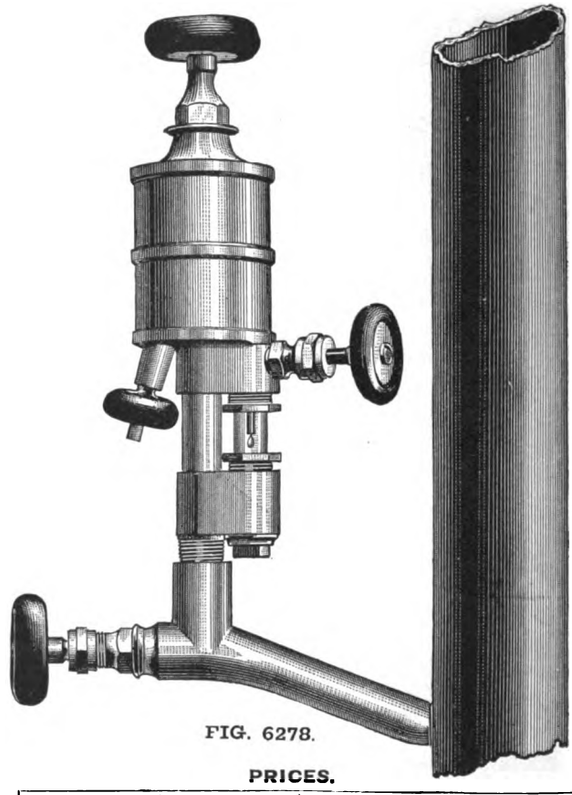
FIG. 6277.

Especially adapted for pumps and small engines.

PRICES, FIG. 6277.

Size.	Brass.	Nickel-plated.
⅓ pint.	$8.00	$8.50
½ "	10.00	10.75
1 "	15.00	16.00
1 quart.	25.00	26.50

ELLIS CYLINDER OIL CUP.


FIG. 6278.

PRICES.

Size.	Nickel-plated.	Brass.	Size of glasses used.
¼ pint.	$9.00	$6.00	⅝ x 1 7/16
½ "	10.50	7.50	⅝ x 2 1/8
⅔ "	13.50	10.00	⅝ x 2 1/8
1 "	18.00	12.00	⅝ x 2 5/16
1 quart.	24.00	16.00	⅝ x 2 3/4
2 "	36.00	22.00	⅝ x 2 3/4
1 gallon.	48.00	30.00	⅝ x 2 3/4

Fittings will be one-half inch standard, unless otherwise ordered.

DETROIT.

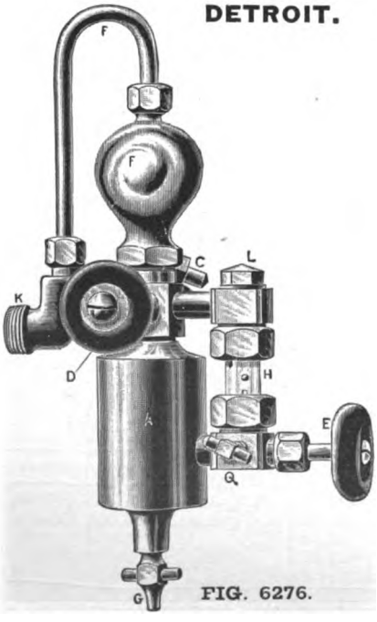


FIG. 6276.

PRICES, FIG. 6276.

Size.	For cylinder.	Brass finish.	Nickel-plated.
¼ pint.	Up to 5 in.	$15.00	$18.00
⅓ "	5 to 8 in.	17.00	20.00
½ "	8 to 12 in.	20.00	23.00
1 "	12 to 20 in.	28.00	32.00
1 quart.	20 in. & over	42.00	47.00

PARTS, FIG. 6276.

A—Oil reservoir. C—Filling plug. D—Regulating valve. E—Water feed valve. F—Condensing chamber. G—Drain valve. H—Sight-feed glass. K—Steam connection. L—Plug to insert glass.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SWIFT'S. SIGHT-FEED LUBRICATORS. CRESCENT UP-FEED.

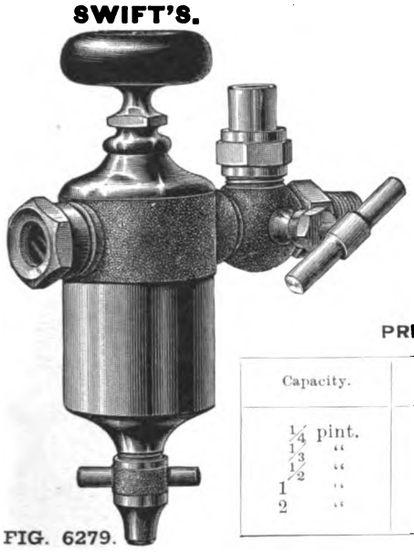


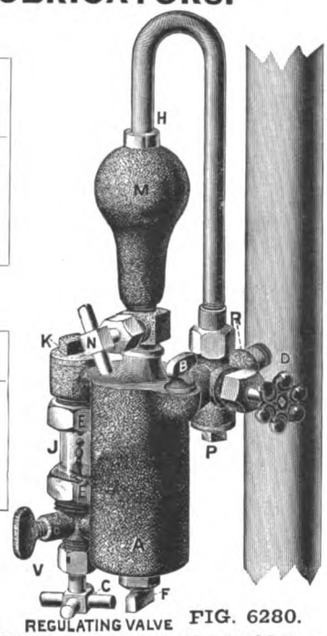
FIG. 6279.

CAPACITY, FIG. 6279.

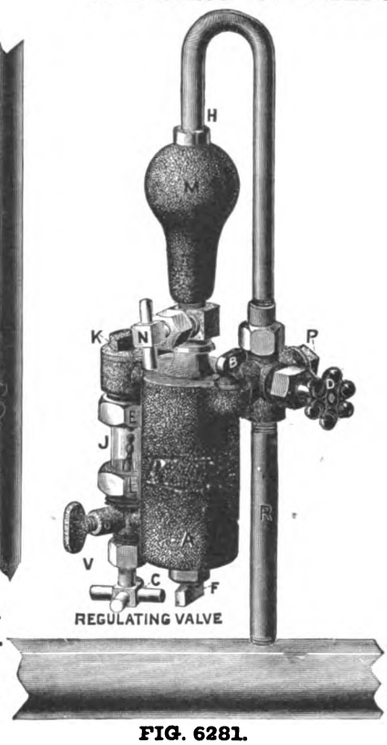
Pints.	For engine cylinder.	Amount of oil generally used per minute.
¼	Up to 5 in.	1 to 3 drops.
⅓	5 " 8 "	2 " 4 "
½	8 " 12 "	4 " 6 "
1	12 " 20 "	5 " 8 "
2	20 " 30 "	7 " 10 "

PRICES, FIG. 6279.

Capacity.	Brass finished.	Nickel-plated.
¼ pint.	$10.00	$12.00
⅓ "	12.00	14.00
½ "	16.00	20.00
1 "	22.00	26.00
2 "	34.00	40.00



REGULATING VALVE FIG. 6280. SHOWS SIDE CONNECTION.



REGULATING VALVE

FIG. 6281. SHOWS BOTTOM CONNECTION.

AIR BRAKE LUBRICATOR.

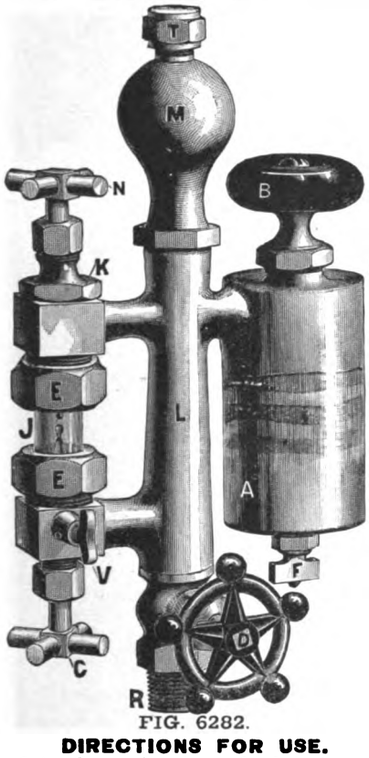


FIG. 6282.

PRICES, FIGS. 6280 AND 6281.

Capacity	⅛ pint.	¼ pint.	⅓ pint.	½ pint.	1 pint.
Size attaching shank, pipe thread	⅜ inch.	⅜ inch.	⅜ inch.	½ inch.	½ inch.
Bronzed	$3.75	$4.00	$4.25	$5.25	$7.50
Finished	4.25	4.65	5.00	6.25	8.25
Plated	4.75	5.25	5.50	7.00	9.00

DIRECTIONS FOR USE.

1st. Close all valves of lubricator, remove filling cap B and fill up with good strained oil, then replace filling cap.

2d. Open sight chamber stop valve N wide.

3d. Open base shut-off valve D and wait a few minutes until the sight glass fills with water.

4th. Regulate oil drops by valve C at bottom of sight chamber, say 3 to 5 drops per minute.

5th. Now close base valve D and upper sight chamber valve N nearly shut, say within a half turn of their seats.

6th. To clean sight chamber, blow steam through small valve V. When cup needs refilling, draw off water through valve F and proceed as before.

To replace sight glass if broken, unscrew cage K and insert glass as far as it will go. Any good Scotch glass ¾ by 2¼ will do to replace with.

After rate of oil discharge is once set the flow can be instantly stopped or started by closing or opening valve N, without disturbing the drop valve C.

To stop, close all valves of lubricator.

Clean out all parts of lubricator once or twice a month by blowing steam through same. **PRICES, EACH, $6.25.**

STAR DUPLEX CONDENSER DOUBLE UP-FEED LOCOMOTIVE LUBRICATORS.

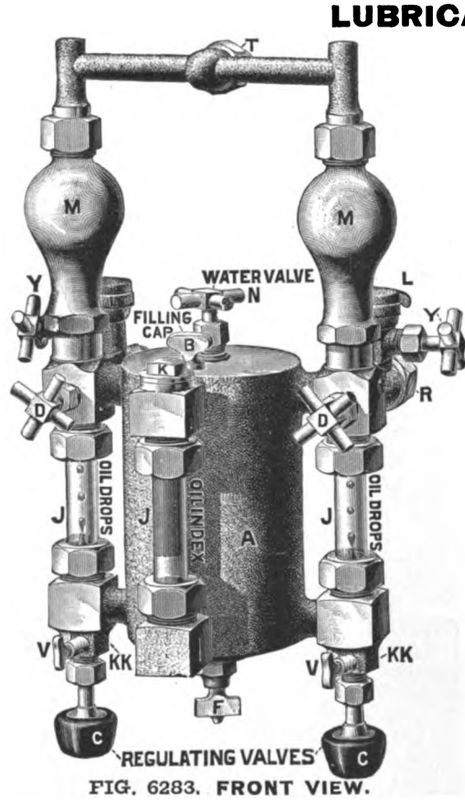


FIG. 6283. FRONT VIEW.

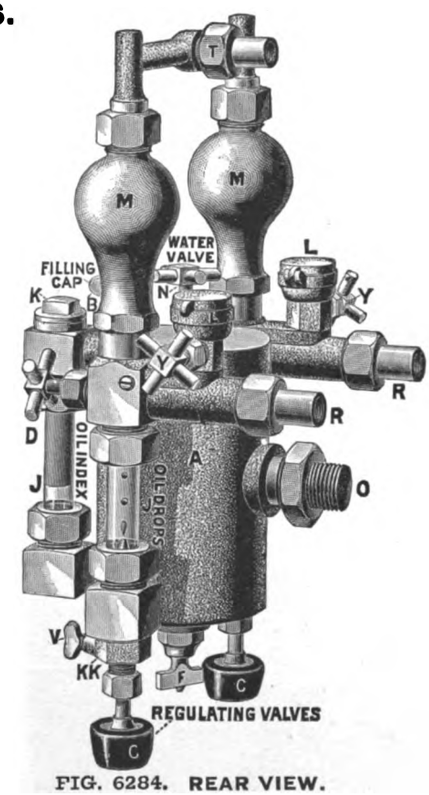


FIG. 6284. REAR VIEW.

A—Oil chamber.
B—Filling cap.
CC—Oil drop regulating valves.
DD—Ejector valves.
F—Drain valve for oil chamber.
G—Air vent for filling.
JJJ—Sight-feed and index glasses.
KK—Removable cages for replacing glasses.
LL—Auxiliary oil cups.
MM—Condensing chambers.
N—Water valve.
O—Bracket stud and lock nut.
RR—Discharge couplings to cylinders.
T—Connecting coupling to boiler.
VV—Valves for cleaning out sight glasses.
YY—Valves for auxiliary oil cups.

Connection couplings RR and T are ¼ inch pipe thread.

PRICES.

Capacity	1 pint.	1 quart.
For light locomotives	$20.00	$25.00
For heavy locomotives	....	28.00

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DYNAMO TRIPLE SIGHT-FEED AND OTHER LUBRICATORS.

WITH SIGHT CHAMBERS ON SIDE ARMS.

FOR LARGE JOURNALS ON ENGINE OR DYNAMO.

PRICES, FIG. 6285.

Capacity	1 quart.	½ gallon.	1 gallon.
Size of center shank, pipe thread...inches,	¾	¾	¾
Finished...each,	$26.00	$36.00	$50.00
Nickel-plated...each,	30.00	42.00	58.00

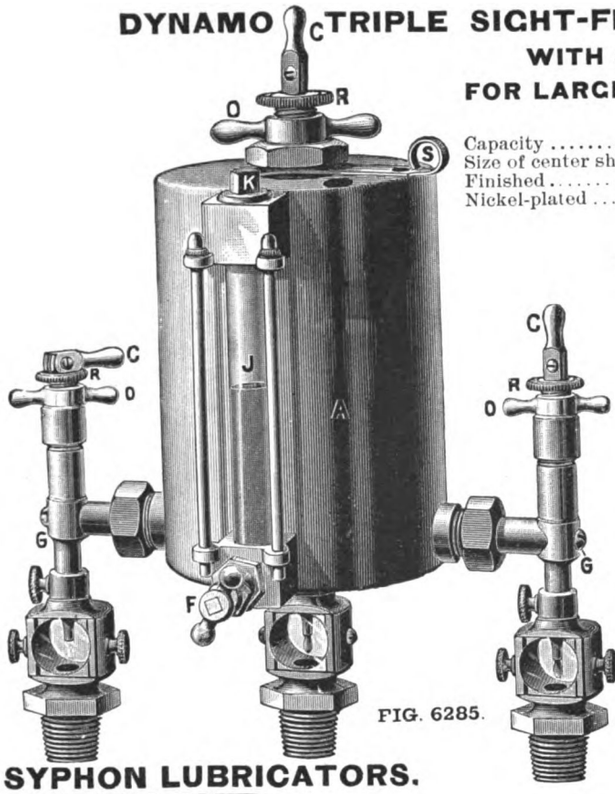


FIG. 6285.

SELF-ACTING.

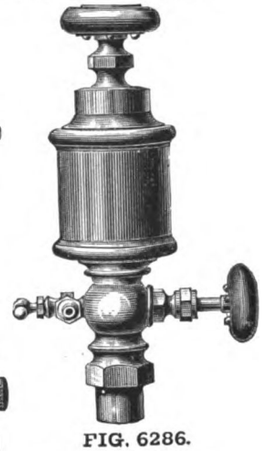


FIG. 6286.

PRICES, FIG. 6286.

Size, inches.	Capacity, pints.	Plain, each.	With cross handle, heavy.
1	⅛	$3.00	....
1½	⅛	4.50	....
2	⅓	6.00	....
2½	⅓	8.00	....
3	¾	10.00	14.00
3½	1	13.00	18.00
4	2	16.00	21.00

AUTOMATIC NEEDLE VALVE.

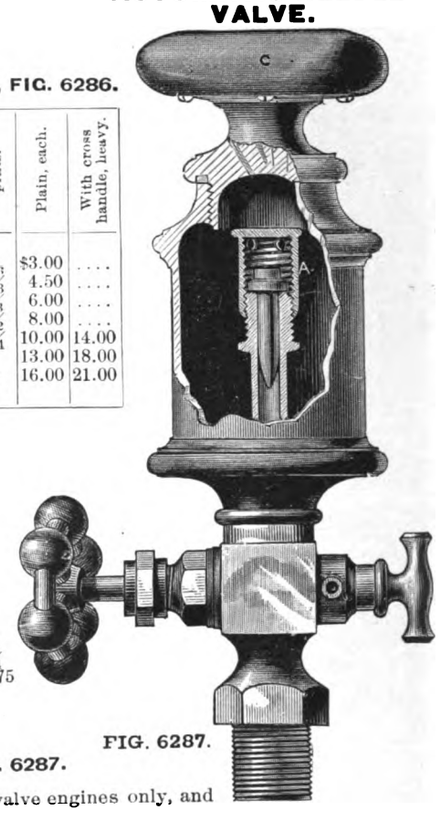


FIG. 6287.

PRICES, FIG. 6287.

This lubricator works automatically. It is for slide valve engines only, and must be placed on the steam chest, not on steam pipe.

The lubricator stops feeding when the engine stops running.

Diameter...inches,	1¾	2	2½	3
Capacity	..	½ pint.	¾ pint.	1 pint.
Pipe thread...each,	⅜	½	½	¾
Plain top...each,	$4.70	$6.20	$7.70	$9.00
Cross top, with glass gauge...each,	..	..	11.30	14.50

A card with full directions for using the oil feeder is attached to every cup.

SYPHON LUBRICATORS.

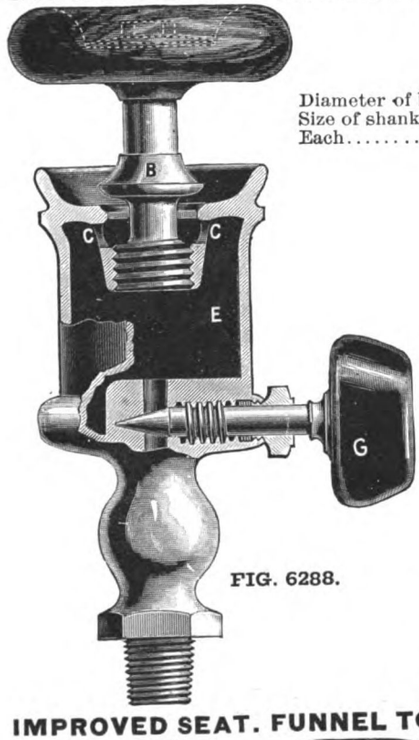


FIG. 6288.

PRICES, FIG. 6288.

Diameter of body...inches,	1¼	1½	1¾	2	2¼	2½	3	3½	4
Size of shank, pipe thread	⅜	⅜	⅜	½	½	¾	¾	¾	¾
Each	$2.45	2.65	2.90	3.30	3.75	4.25	5.35	7.50	10.75

IMPROVED SEAT LUBRICATORS.

WOOD OR BRASS HANDLED.

PRICES, FIG. 6289.

Number	1	2	3	4	5	6
Size, in inches	1	1½	2	2½	3	3½
Price, per dozen	$18.00	$24.00	$33.00	$45.00	$54.00	$66.00
Capacity, in pints	⅛	⅛	¼	½	¾	1

IMPROVED SEAT. FUNNEL TOP. COMMON LUBRICATOR.

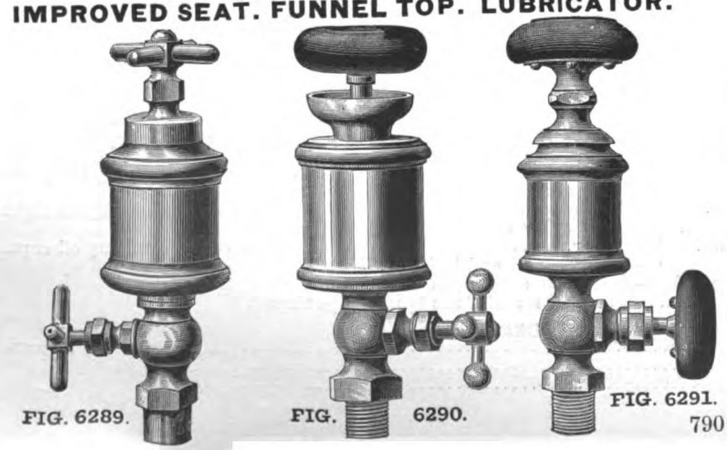


FIG. 6289. FIG. 6290. FIG. 6291.

FUNNEL-SHAPED TOP LUBRICATORS.

NO WASTE OF OIL IN FILLING.

PRICES, FIG. 6290.

Number	1	2	3	4	5	6	7
Size, in inches	1¼	1½	1¾	2	2¼	2½	3
Price, per dozen	$15.00	$21.00	$24.00	$30.00	$36.00	$42.00	$54.00
Capacity, in pints	⅛	⅛	⅛	¼	⅓	½	⅞

COMMON LUBRICATORS.

WOOD HANDLED.

PRICES, FIG. 6291.

Number	1	2	3	4	5	6
Size, in inches	¾	1	1½	1¾	2	2¼
Price, per dozen	$12.00	$15.00	$18.00	$24.00	$30.00	$39.00
Capacity, in pints	⅛	⅛	⅛	⅛	⅓	½

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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COMMON LUBRICATORS.

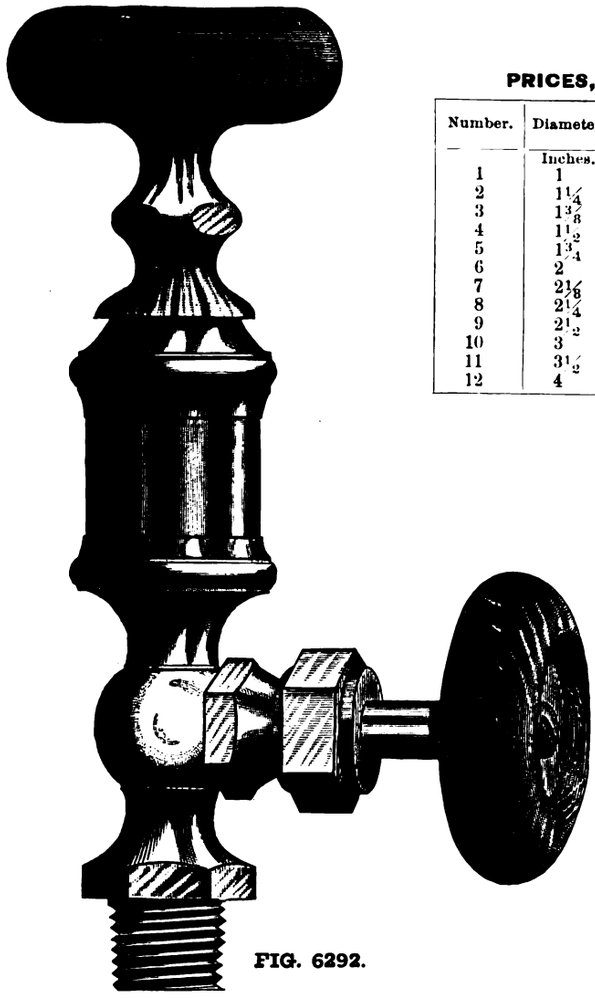


FIG. 6292.

PRICES, FIG. 6292.

Number.	Diameter.	Threaded iron pipe.	Prices.
	Inches.	Size.	Each.
1	1	3/8	$2.00
2	1 1/4	3/8	2.20
3	1 3/8	3/8	2.30
4	1 1/2	1/2	2.40
5	1 3/4	1/2	2.60
6	2	1/2	2.90
7	2 1/8	3/4	3.10
8	2 1/4	3/4	3.25
9	2 1/2	3/4	3.75
10	3	3/4	4.75
11	3 1/2	1	7.00
12	4	1	10.00

PRICES, FIG. 6293.

Size.	Each.
1 1/2	$4.00
2	5.50
2 1/2	8.00
3	12.00
4	18.00

BROUGHTON'S LUBRICATORS.

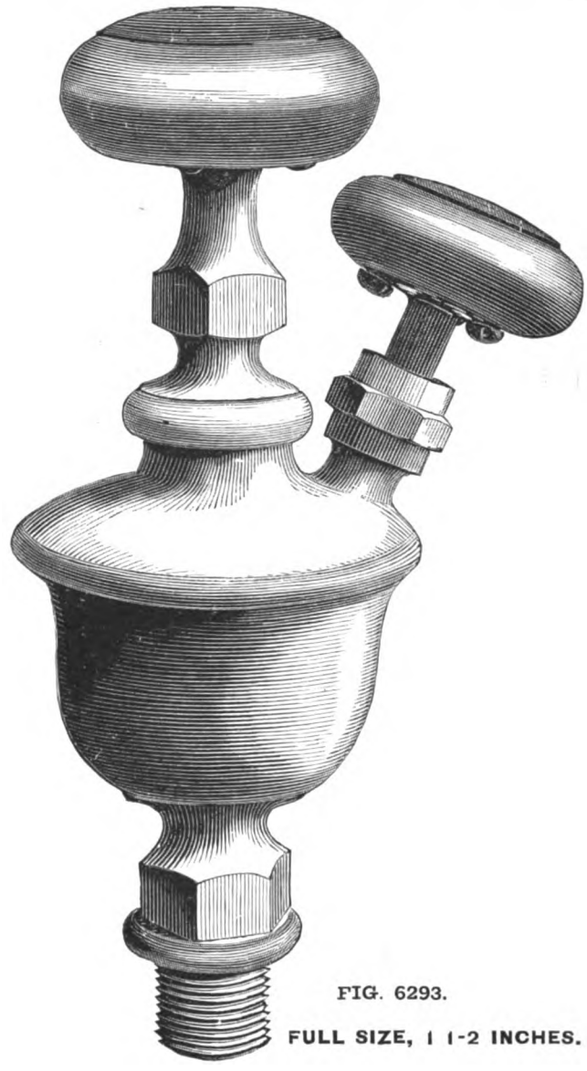


FIG. 6293.

FULL SIZE, 1 1-2 INCHES.

GLASS BODY OIL PUMPS.

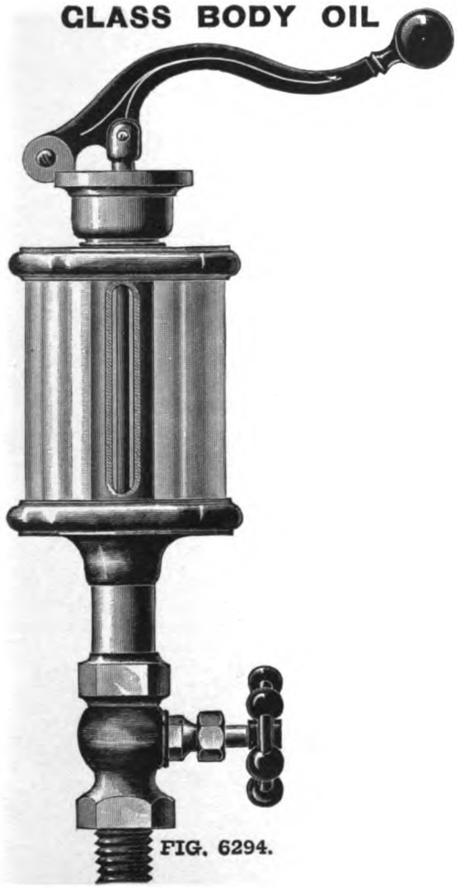


FIG. 6294.

The glass body oil pump is easily filled and operated, and is intended to be used in connection with sight-feed lubricators on stationary engines. No large engine, especially an electric light engine, should be without a cup of this kind as an auxiliary to the sight-feed lubricator.

PRICES, FIG. 6294.

No.	Outside diam. of glass.	Shank.	Capacity.	Brass.	Nickel-plated.	Extra glasses. Net.
	Inches.	Pipe thread.	Pint.	Each.	Each.	Each.
1	1 3/4	3/8	1/3	$7.50	$8.00	$0.20
2	3	1/2	1	10.00	11.00	.60

AUTOMATIC CYLINDER OIL PUMPS.

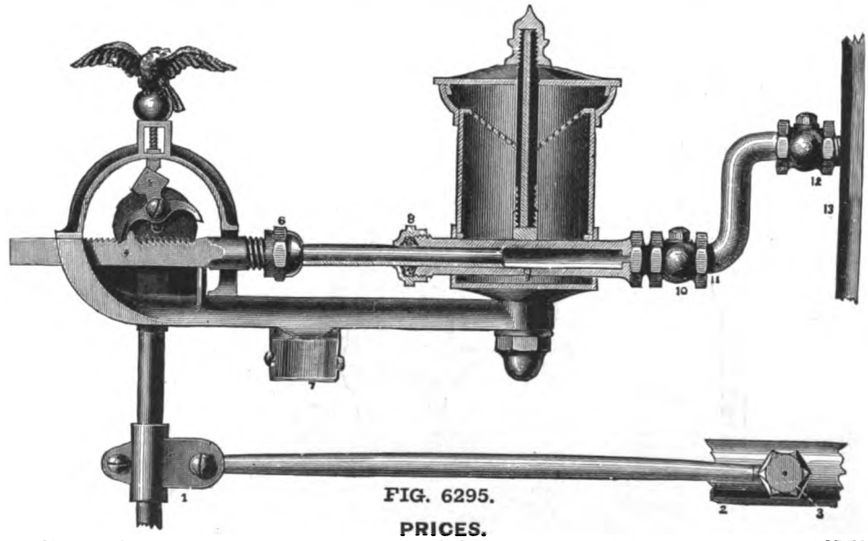


FIG. 6295.

PRICES.

No. 1. Glass cup, iron frame, nickel-plated, holds over one pint..... $25.00
No. 2. Glass cup, iron frame, nickel-plated, holds over one quart 30.00
Sight-feed..... 5.00

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FELTHEUSEN'S HAND CYLINDER OIL PUMPS.

Nos. 3, 04, 4 and 5 to go on side of cylinder or steam pipe. Nos. 03 and 6 to go on top of cylinder or steam pipe. Nos. 04, 4 and 5 have extension, with thread and nut on bottom of bowl, to which support brace can be fastened from either right or left hand side if desired. Fifty cents extra will be charged when special male and female valves are sent with pumps.

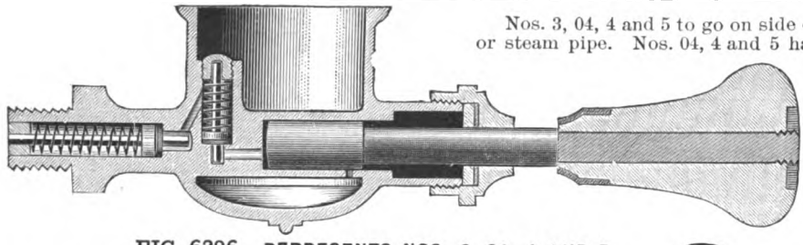
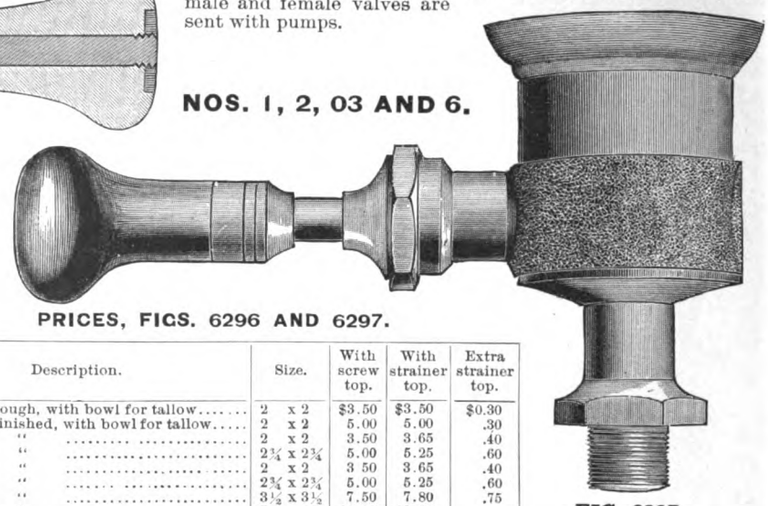


FIG. 6296. REPRESENTS NOS. 3, 04, 4 AND 5.

NOS. 1, 2, 03 AND 6.



PRICES, FIGS. 6296 AND 6297.

Description.	Size.	With screw top.	With strainer top.	Extra strainer top.
No. 1. Rough, with bowl for tallow	2 x 2	$3.50	$3.50	$0.30
" 2. Finished, with bowl for tallow	2 x 2	5.00	5.00	.30
" 03. "	2 x 2	3.50	3.65	.40
" 6. "	2¾ x 2¾	5.00	5.25	.60
" 3. "	2 x 2	3.50	3.65	.40
" 04. "	2¾ x 2¾	5.00	5.25	.60
" 4. "	3½ x 3½	7.50	7.80	.75
" 5. "	7 x 4½	12.00	12.00	
Loco pump, gauge glass and two-outlet cock	7 x 4½	20.00	20.00	

FIG. 6297.

MICHIGAN OIL PUMPS.

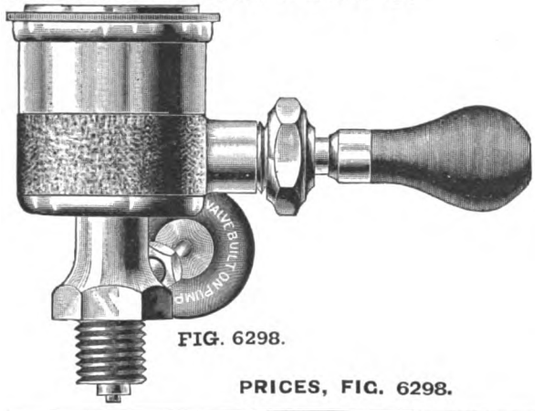


FIG. 6298.

PRICES, FIG. 6298.

No.	Capacity.	Size of bowl.	Price, with screw top, brass finish.	Price, with strainer top, brass finish.
503	¼ pint.	2¼ x 2¼	$3.50	$3.65
504	½ "	2¾ x 2¾	5.00	5.25
505	1 "	3½ x 3½	7.50	7.80
PRICES, FIG. 6299.				
500	¼ pint.	2¼ x 2¼	$3.50	$3.65
501	½ "	2¾ x 2¾	5.00	5.25
502	1 "	3½ x 3½	7.50	7.80

For nickel-plated add 50c. net to above prices.

MICHIGAN HAND CYLINDER OIL PUMPS.

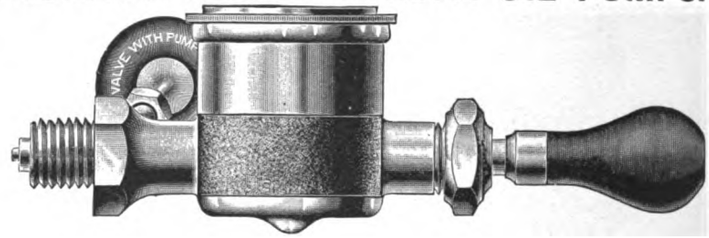


FIG. 6299.

SPINDLE STEP PUMP.

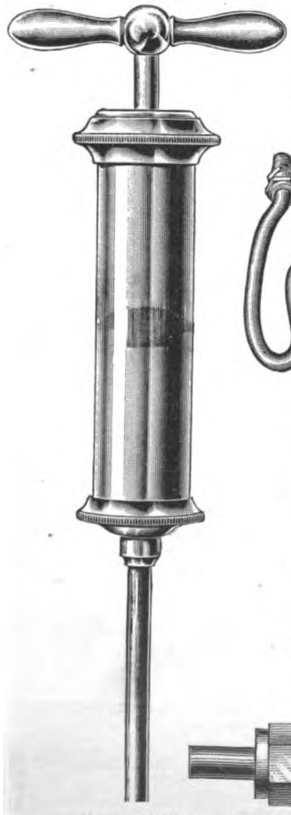
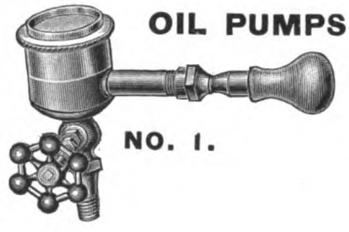


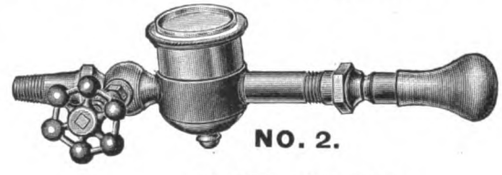
FIG. 6300.

PRICE, $8.00.

OIL PUMPS FOR STEAM CYLINDERS.



NO. 1.



NO. 2.

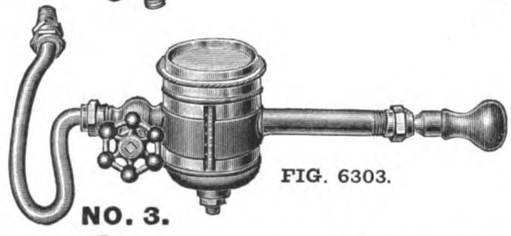


FIG. 6303.

NO. 3.

PRICES, FIG. 6303.

No. 1 pump, for portable and small engines	$6.50
No. 2 pump, for portable and small engines	6.50
No. 3 pump, size 3, capacity ½ pint oil	12.00
No. 3 pump, size 4, capacity 1 pint oil	15.00
No. 3 pump, size 5, capacity 1 quart oil	24.00

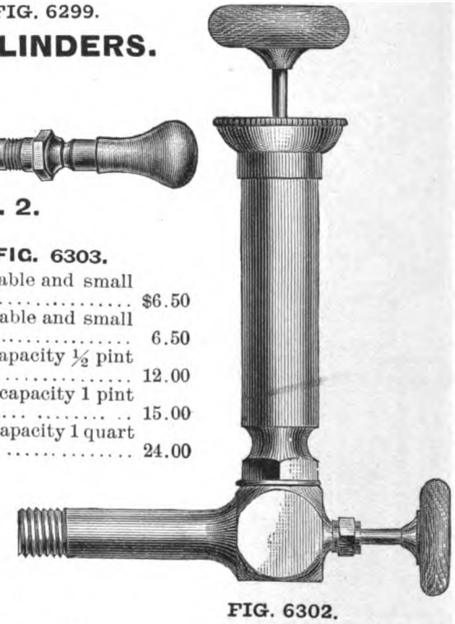


FIG. 6302.

PRICE, EACH, $10.00.

BRASS OIL PUMPS.



FIG. 6301.

PRICES.

No. 4..... $14.00 each.
" 5..... 16.00 "

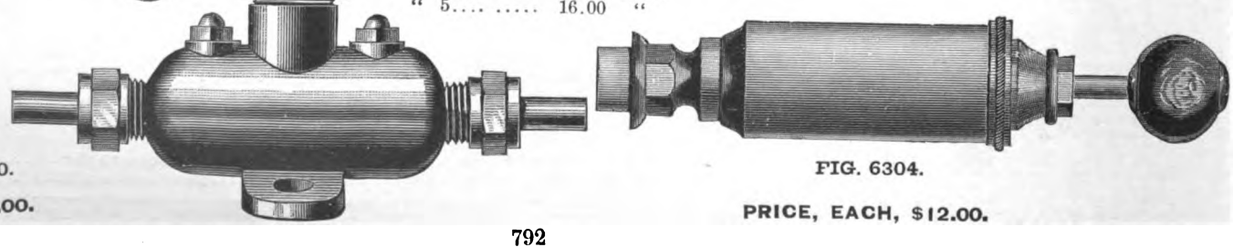


FIG. 6304.

PRICE, EACH, $12.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ALL BRASS OIL CUPS.

PLAIN, FULL SIZE. NO. 00.

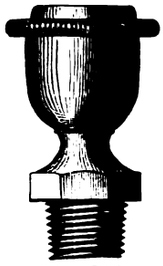


FIG. 6305.

PLAIN, FULL SIZE. NO. 1.

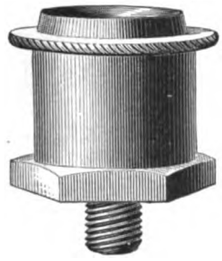


FIG. 6306.

OCTAGON, NO. 37. T HANDLE.



FIG. 6307. FULL SIZE.

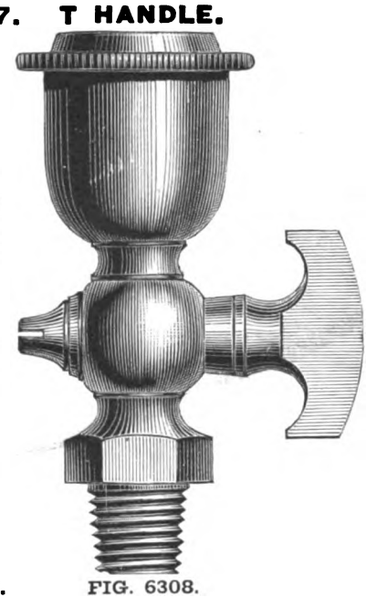


FIG. 6308.

LEVER HANDLE.

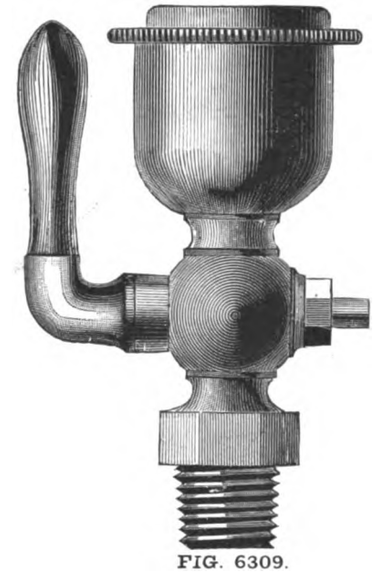


FIG. 6309.

PRICES, FIG. 6305.

No.	00	0	1	2	3	4	5	6	7	8	9
Diameter.....in.,	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/4	2 3/4
Threaded iron pipe...size,	1/8	1/8	1/8	1/4	1/4	3/8	3/8	1/2	1/2	1/2	3/4
Prices.....each,	$0.25	$0.30	$0.35	$0.40	$0.50	$0.60	$0.90	$1.25	$1.75	$2.25	$3.50

PRICES, FIG. 6306.

No.	0	1	2	3	4	5	6
Diameter.....in.,	3/4	7/8	1 1/8	1 1/4	1 1/2	1 3/4	2
Threaded iron pipe.....size,	1/8	1/8	1/4	1/4	3/8	3/8	1/2
Prices.....each,	$0.35	$0.40	$0.60	$0.75	$1.00	$1.50	$2.00

PRICES, FIG. 6307.

No.	37	38	39	40	41	42	43	44
Diameter.....	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/2
Diameter blank shank...	1/2	1/2	1/2	5/8	3/4	7/8	7/8	1 1/8
Cuts pipe to.....	1/4	1/4	1/4	1/4	3/8	1/2	1/2	3/4
Prices.....each,	$1.25	$1.50	$1.75	$2.00	$3.00	$3.50	$5.00	$7.00

PRICES, FIG. 6308.

No.	1	2	3	4	5
Diameter .....in.,	1	1 1/4	1 1/2	2	2 1/4
Threaded iron pipe...size,	1/4	1/4	3/8	1/2	1/2
Prices.....each,	$1.00	$1.50	$2.00	$3.00	$3.75

PRICES, FIG. 6309.

No.	1	2	3	4	5
Diameter .....in.,	1 1/8	1 1/4	1 1/2	2	2 1/4
Threaded iron pipe.....size,	1/4	1/4	3/8	1/2	1/2
Prices.....each,	$1.35	$1.60	$2.20	$3.25	$4.00

BRASS HINGE LID OIL CUPS.

SMALL BASE. FULL SIZE. NO. 1.



FIG. 6310.

LARGE BASE. FULL SIZE. NO. 2.



FIG. 6311.

PRICES.

No.	1	2	3	4	5	6	7
Outside diameter....in.,	7/8	1	1 1/4	1 1/2	1 3/4	1 7/8	2
Pipe thread.....in.,	1/8	1/4	1/4	3/8	3/8	3/8	1/2
Price.....each,	$0.70	$0.85	$1.20	$1.60	$2.10	$2.50	$2.70
With elbow shank, "	.85	1.15	1.60	2.10	2.65	3.05	3.25

NEEDLE OIL CUPS,

FULL SIZE. NO. 1.

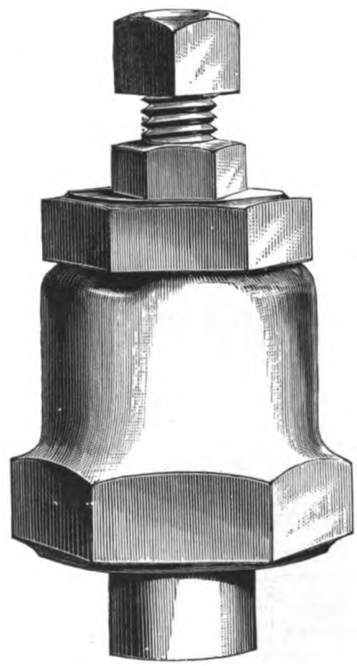


FIG. 6312.

No	1	2	3	4
Prices....	$1.90	$2.20	$2.50	$2.75

DUPLEX OIL FEEDERS, FOR LOCOMOTIVE AND STATIONARY ENGINE GUIDES.



FIG. 6312 1-2.

DESCRIPTION, FIG. 6312 1-2. **PRICE, EACH, $5.00.**

Set the spring catch at zero in the notched disk, loosen the jam nut under the thumb wheel and screw the spindle down to its seat, then firmly secure the spindle in place by screwing the small jam nut down on to the head of the brass cup. Fill the cup through the large hole in the dome; the small hole is for vent, but both should remain open. So adjusted, the oil is held in the glass cup; to cause it to feed, the spring catch is withdrawn from the zero notch, and turned in the direction that the numerals run, until the desired amount of feed is secured. By turning the spring catch back to zero, the outflow of oil is arrested and the wastage of oil stopped. By noting the number of the notch that gives the desired feed, a method is obtained for securing a uniform and economical operation of the cup every time that it is used. The shanks are left blank and are 1¼ in. in diameter, by ¾ in. long. The cup will hold 2¼ oz. and stands 5¾ in. high from the top to the under side of base.

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GREASE CUPS.

CAST BOTTOM.



FIG. 6313.

SHEET BRASS.



FIG. 6314.

SHEET ZINC.



FIG. 6315.

GLASS CAST BOTTOM.



FIG. 6316.

GLASS.



FIG. 6317.

OFFSET GLASS.

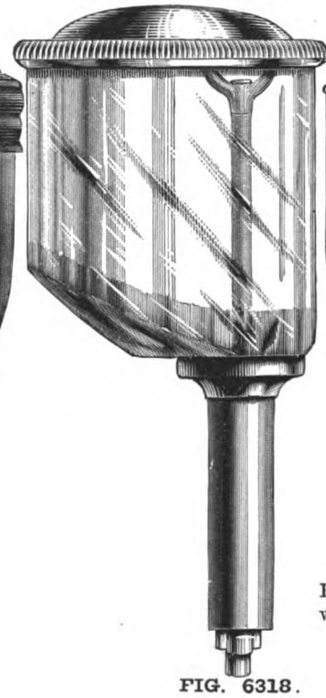


FIG. 6318.

SHEET METAL CUPS.

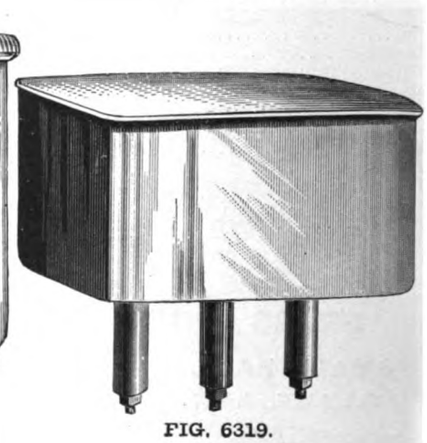


FIG. 6319.

This cup represents a sheet metal cup. For cups of this kind, a sketch is required, with measurements, etc.

PRICES, FIG. 6313.

No.	Style.	Diameter of largest part in inches	Height in inches	Diameter of tube usually put in this cup.	Size of screw pipe tap	Prices, each, plain.	Prices, each, nickel-plated.	Prices, per dozen, plain.	Prices, per dozen, nickel-plated.
1	Cast bottom	2 5/8	3 5/8	3/8, 7/16, 1/2	3/8, 1/2	$1.75	$2.25	$18.00	$24.00
1 1/2	"	3	4 1/8	3/8, 7/16, 1/2	3/8, 1/2	2.25	2.75	24.00	30.00
2	"	3 1/2	4 3/4	7/16, 1/2, 9/16, 5/8	1/2, 3/4	3.00	3.50	32.50	36.00
3	"	4	5 1/4	7/16, 1/2, 9/16, 5/8	1/2, 3/4	3.75	4.50	42.00	48.00

PRICES, FIG. 6314.

1	Brass	2 5/8	2 3/4	3/8, 7/16, 1/2		1.25	1.50	12.00	15.00
1 1/2	"	3	3 1/8	7/16, 1/2, 9/16, 5/8		1.75	2.00	18.00	21.00
2	"	3 1/2	3 7/8	7/16, 1/2, 9/16, 5/8		2.25	2.75	24.00	30.00
3	"	4	4 1/4	1/2, 5/8, 3/4		3.00	3.50	30.00	36.00
4	"	5	5 1/4	3/4, 7/8, 1		3.75	4.25	36.00	42.00

PRICES, FIG. 6315.

No.	Style.	Diameter of largest part in inches	Height in inches	Diameter of tube usually put in this cup.	Size of screw pipe tap.	Prices, each.	Prices, per dozen.
1	Zinc	2 5/8	2 3/4	3/8, 7/16, 1/2		$1.00	$9.00
1 1/2	"	3	3 1/8	7/16, 1/2, 9/16, 5/8		1.25	12.00
2	"	3 1/2	3 7/8	7/16, 1/2, 9/16, 5/8		1.75	18.00
3	"	4	4 1/4	1/2, 5/8, 3/4		2.25	24.00
4	"	5	5 1/4	3/4, 7/8, 1		3.00	30.00

PRICES, FIG. 6316.

1	Glass, with cast bottom	2 3/8	3 3/4	5/16, 3/8	1/4, 3/8	1.75	18.00
1 1/2	"	2 5/8	4 1/4	3/8, 7/16, 1/2	3/8, 1/2	2.25	24.00
2	"	3	4 3/4	1/2, 9/16, 5/8, 11/16	1/2, 3/4	2.75	30.00

PRICES, FIGS. 6317 AND 6318.

1/2	Glass	2	2 1/2	5/16, 3/8, 7/16		.75	7.00
1	"	2 3/8	3	3/8, 7/16, 1/2		1.00	9.00
1 1/2	"	2 3/8	3 3/8	7/16, 1/2, 9/16		1.25	12.00
2	"	3	3 7/8	9/16, 5/8, 3/4		1.50	15.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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STAUFFER'S GREASE CUPS.

PRICES, FIG. 6320.

Lubricator No.	2	3	4	5	6	7	8	9	10
Diameter of cup	7/8 in.	1 1/4 in.	1 1/2 in.	2 in.	2 3/8 in.	2 3/4 in.	3 3/8 in.	4 in.	5 in.
Corresponding diameter of shafting	3/4 in.	1 in.	1 1/2 in	2 in.	2 1/2 in.	3 1/2 in.	4 3/4 in.	6 in.	8 in.
Prices, in brass	$0.45	$0.60	$0.75	$1.00	$1.50	$2.00	$2.50	$3.00	$3.75
Prices, nickel-plated or gold bronze	.....	.....	.85	1.10	.....	.....	.....	.....	.....
Prices, in cast iron	.....	.35	.45	.60	.80	1.00	1.20	1.50	.....



FIG. 6320.

BALLANTINE'S GREASE CUPS.

PRICES, FIG. 6321.

Size of cups.	Pipe thread on stems.	Extra for altering stems.	Brass nickeled.	Brass finished.	Brass rough.
in.	in.				
1	1/4	$0.15	$2.20	$2.10	$1.35
1 1/4	3/8	.20	2.50	2.35	1.55
1 1/2	3/8	.25	2.80	2.60	1.75
1 3/4	1/2	.30	3.20	2.95	1.95
2	1/2	.35	3.70	3.35	2.20
2 1/2	3/4	.40	5.00	4.50	3.00
3	3/4	.45	6.75	6.25	4.00
3 1/2	1	.50	8.50	8.00	5.50
4	1	.55	10.25	9.75	7.00

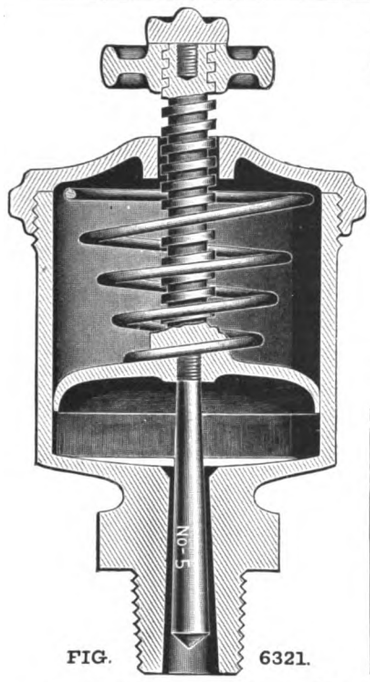


FIG. 6321.

PLAIN GREASE CUP.

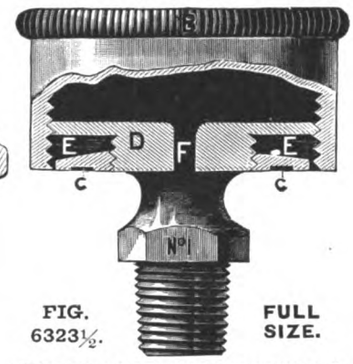


FIG. 6323½. FULL SIZE.

PRICES, FIGS. 6323 & 6323 1-2.

No.	Inside diameter.	Pipe thread.	Automatic cups, finished brass, Fig. 6323.	Automatic cups, nickel-plated, Fig. 6323.	Plain cups, finished brass, Fig. 6323½.
	in.	in.	each.	each.	each.
00	1	1/8	....	....	$0.70
0	1 1/4	1/4	$2.00	$2.25	.90
1	1 1/2	1/4	2.50	2.80	1.15
2	2	3/8	3.20	3.60	1.50
3	2 1/2	1/2	4.30	5.00	2.15
4	3	1/2	6.00	6.75	2.90

COMPRESSION GREASE CUPS.

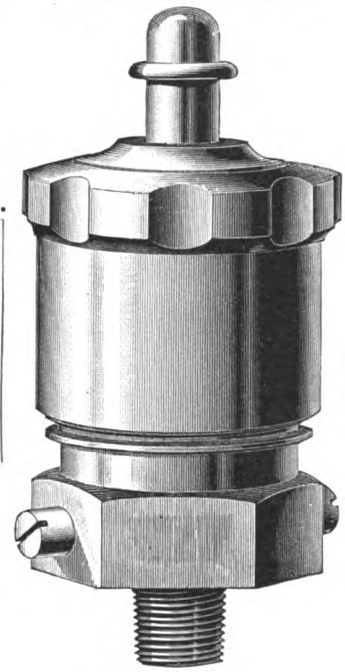


FIG. 6324.

Threaded, male or female.

BUFFALO GREASE CUPS.

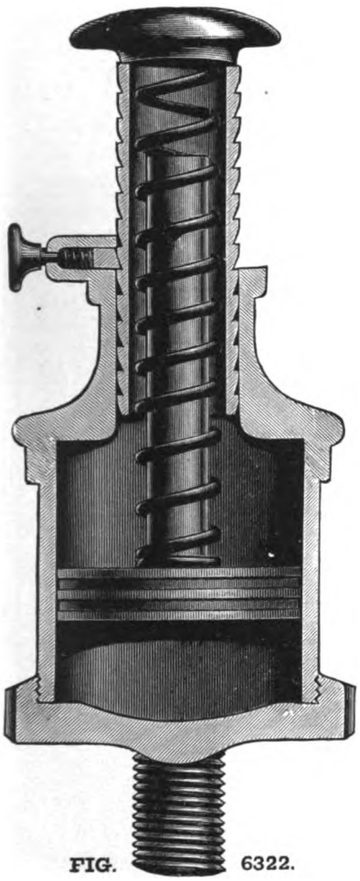


FIG. 6322.

PRICES, BRASS CUPS.

	Brass finish.	Nickeled.
No. 1, holding 1 1/2 oz. each	$2.50	$3.00
No. 2, " 2 3/4 " " "	3.25	3.75
No. 3, " 4 " " "	4.00	4.65
No. 4, " 8 " " "	5.00	5.75

PRICES, IRON CUPS, BRONZED OR JAPANNED.

No. 1, holding 1 1/2 oz. each	$1.50
No. 2, " 2 3/4 " " "	2.00
No. 3, " 4 " " "	2.25
No. 4, " 8 " " "	2.50

In ordering compression cups, please specify what shank thread is wanted, otherwise we send them with plain shanks.

AUTOMATIC GREASE CUPS.



FIG. 6323.

PRICES, FIG. 6324.

Number	00	0	1	2	3
Diameter of cup, in.	1	1 1/4	1 1/2	2	2 1/2
Capacity	1/2 oz.	1 oz.	1 1/2 oz.	3 oz.	7 oz.
Size shank, pipe thread,	1/4	1/4	3/8	3/8	1/2
Finished, per doz.	$21.00	$25.00	$29.00	$33.50	$50.00
Nickel-plated, per doz.	24.00	28.00	32.00	37.00	54.00

PRICES, FIG. 6325.

Iron painted, per doz.	$10.00	$11.25	$12.00	$12.50	$25.00

These cups, when used on counter or main shafts, work at any angle which the position of the box may require, or even upside down.

ALL IRON GREASE CUPS.

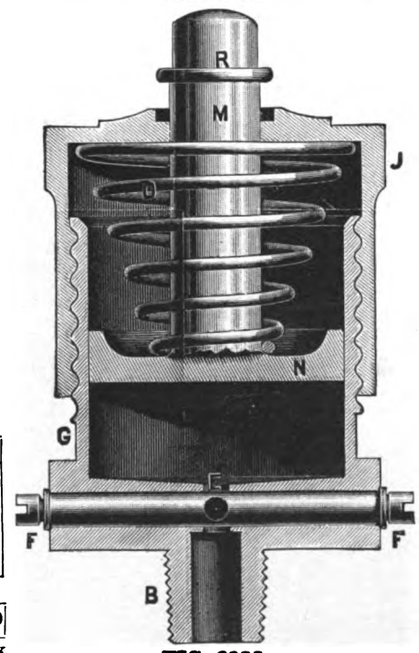


FIG. 6325.

Threaded, male or female.

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STOP AND SIGHT-FEED OILERS.

SKELETON FRAME.



FIG. 6326.

PRICES, FIG. 6326.

No.	Height of cup, complete. Inches.	Width of cup, complete. Inches.	Capacity in ounces.	Size of shank pipe thread. Inches.	Prices per dozen, nickeled.
184	4¾	1¾	1	¼	$18.00
185	5	1⅞	1½	¼	21.00
186	5½	2⅛	2	⅜	24.00
187	5¾	2½	4	⅜	27.00
188	6¾	2⅞	6	⅜	32.00
189	7¼	3⅜	10	½	40.00
190	7¾	3¾	15	½	54.00
191	8½	4¼	24	½	84.00
192	9¼	4⅞	36	½	120.00

PRICES, FIG. 6327.

No.	Height of cup, complete.	Width of cup, complete.	Capacity in ounces.	Size of shank pipe thread. Inches.	Prices per dozen, nickeled.
264	4½	1¾	1	¼	$21.00
265	4¾	2	1½	¼	27.00
266	5½	2⅛	2	⅜	30.00
267	6⅛	2⅝	4	⅜	33.00
268	6¾	3	6	⅜	40.00
269	7⅛	3½	10	½	54.00
270	8	3¾	15	½	72.00
271	8¾	4⅜	24	½	108.00
272	9½	5	36	½	168.00

SHELL CASED.

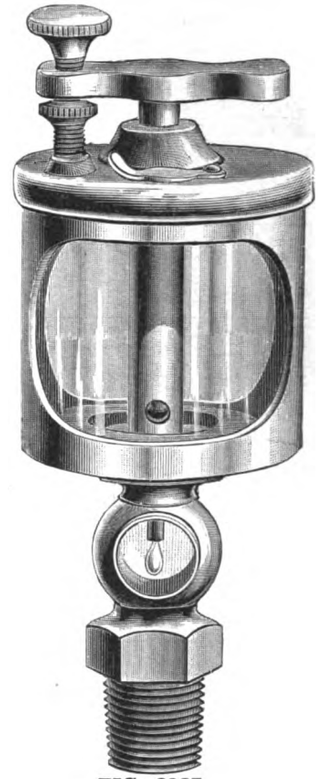


FIG. 6327.

WITH TWO HOLES IN SHANKS.

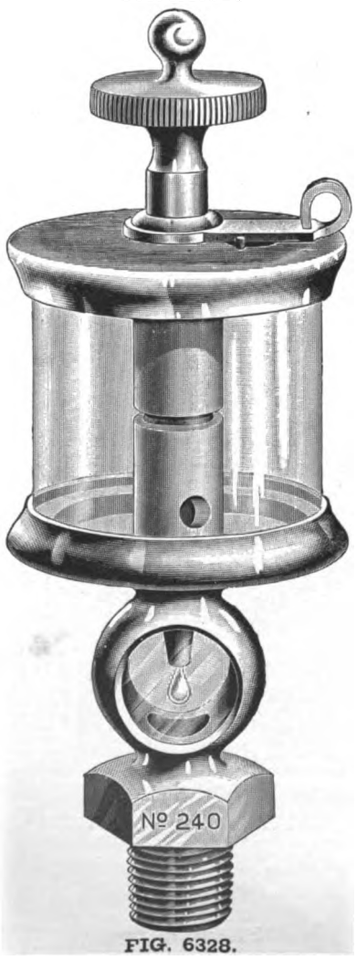


FIG. 6328.

MICHICAN SLIDE TOP SIGHT-FEED AND DYNAMO OILERS.

PRICES, FIG. 6328.

No.	Capacity in ounces.	Diameter of glass shell. Inches.	Size of shank. Inches.	Prices per dozen, brass finish.	Prices per dozen, nickeled.
240	1	1⅝	¼	$24.35	$26.75
241	1½	1¾	⅜	27.95	30.35
242	2¼	2	⅜	32.40	34.80
243	3⅔	2⅜	⅜	37.55	40.55
244	6	2¾	½	53.40	57.00
245	10	3⅛	½	72.35	75.65
246	Pint.	3½	¾	100.80	105.00
247	Quart.	4⅛	¾	148.00	153.00

Oiler has a friction valve stem not influenced by vibration.

All oilers threaded standard gas pipe tap, and will be shipped with shanks threaded as listed, unless otherwise specified in order.

PRICES, FIG. 6329.

No.	Capacity in ounces.	Diameter of glass shell. Inches.	Size of shank. Inches.	Prices per dozen, brass finish.	Prices per dozen, nickeled.
401	1	1⅝	¼	$12.00	$13.20
402	1½	1¾	⅜	14.25	15.45
403	2¼	2	⅜	16.14	17.60
404	3⅔	2⅜	⅜	19.44	20.90
405	6	2¾	....	25.20	26.65
406	10	3⅛	½	34.80	36.75
407	Pint.	3½	¾	44.40	46.35
408	Quart.	4⅛	¾	63.60	66.00

All boilers threaded standard gas pipe tap, and will be shipped with shanks threaded as listed, unless otherwise specified in order.

FLUSHING. B

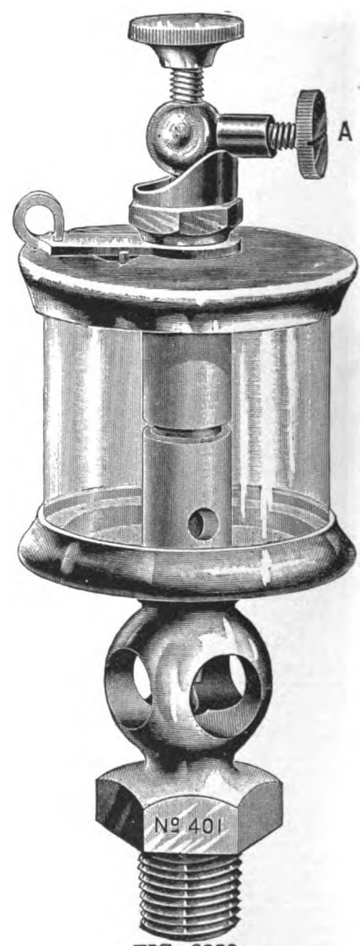


FIG. 6329.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SICHT-FEED OILERS.

PLAIN TAPER SCREW FILLING HOLE.

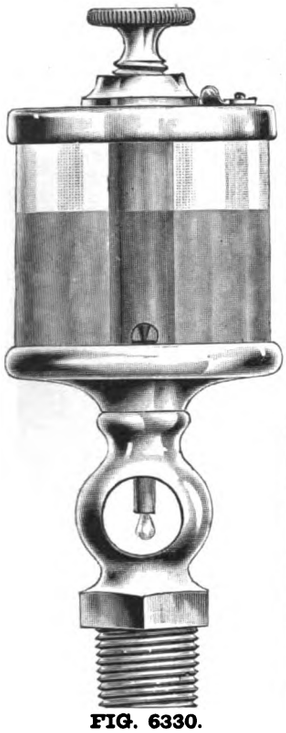


FIG. 6330.

PRICES, FIG. 6330.

No.	Height of cup complete. Inches.	Width of cup, complete. Inches.	Capacity, in ounces.	Size of shank, pipe thread. Inches.	Prices, per doz.
164	4¼	1¾	1	¼	$13.00
165	4⅞	1⅞	1½	¼	15.00
166	5⅜	2⅛	2	⅜	17.00
167	5⅝	2½	4	⅜	20.00
168	6¾	2⅞	6	⅜	24.00
169	7¼	3⅜	10	½	32.00
170	7¾	3¾	15	½	44.00
171	8½	4¼	24	½	60.00
172	9¼	4⅞	36	½	96.00

ADJUSTABLE.



FIG. 6331.

PRICES, FIG. 6331.

No.	Diam. of glass. Inches.	Height of glass. Inches.	Capacity. Ounces.	Pipe thread. Inches.	Prices, each.
181	1⅛	1		⅛	$1.40
182	1¼	1⅛	½	⅛	1.50
183	1½	1⅜	⅝	¼	1.75
184	1¾	1½	1	¼	2.00
185	2	1¾	2	⅜	2.25
186	2¼	2⅛	3	⅜	2.75
187	2½	2⅜	4	⅜	4.00
188	2¾	2½	6	½	5.00

SIGNAL OILERS.

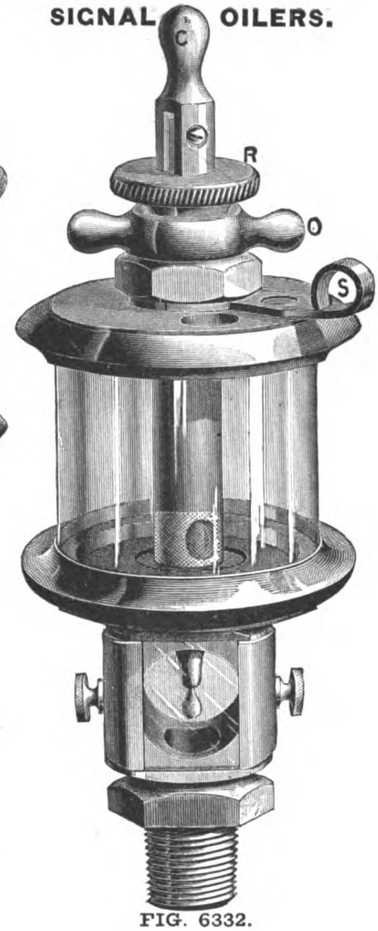


FIG. 6332.

PRICES, FIG. 6332.

When lever C stands perpendicular the cup is feeding; when horizontal, oil stops feeding.

Number	0	1	1½	2	3	4	5	6
Outside diameter of glass....Inches	1¼	1½	1¾	2	2¼	2½	3	3½
Height of glass..... "	1⅛	1⅜	1⅝	1⅞	2⅛	2¼	2¾	4
Capacity.....	½ oz.	⅝ oz.	1 oz.	2 oz.	¼ pt.	⅓ pt.	½ pt.	1 pt.
Size of shank pipe thread....Inches	¼	¼	⅜	⅜	⅜	½	½	½
Finished.....each	$3.00	$3.25	$3.50	$3.75	$4.25	$5.25	$7.25	$9.25
Nickel-plated..... "	3.50	3.75	4.00	4.25	4.75	5.75	8.00	10.25

ROYAL.



FIG. 6334.
FULL SIZE NO. 1 1-2.

RIVAL.

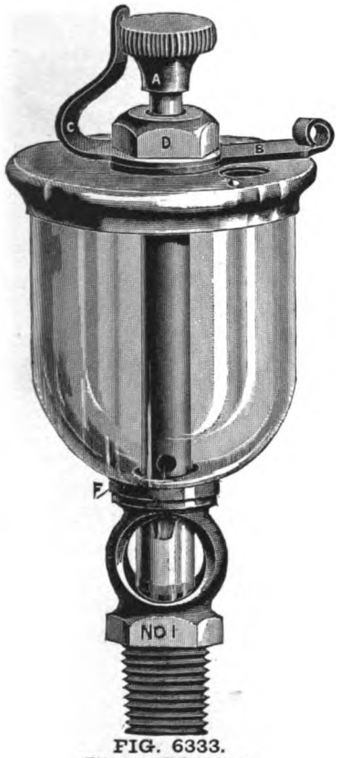


FIG. 6333.
FULL SIZE NO. 1.

SICHT-FEED GLASS OILERS.

These cups are for engine bearings and dynamo use. Simple and practical.

DIRECTIONS TO SET FEED.

Regulate the feed by turning the milled cover, so that when the flattened side of thumb-nut engages the spring the desired feed is obtained. When the desired feed is once established, it can be shut off or put on by turning the milled thumb-nut; i. e., to the right, feed off; to the left, feed on.

To avoid mistakes when ordering glasses and cork washers, specify name and number of cup as stamped on the cup.

PRICES.

No.	Outside diameter of glass. Inches.	Height of glass. Inches.	Capacity. Ounces.	Pipe thread.	Finished brass. Each.	Nickel-plated. Each.	Extra glasses, net. Each.
00	1⅛	1	½	⅛	$1.10	$1.20	$0.06
0	1¼	1⅛	⅝	⅛	1.25	1.40	.08
1	1½	1⅜	1	¼	1.50	1.70	.10
1½	1¾	1⅝	1½	¼	1.75	2.00	.10
2	2	1⅞	2½	⅜	2.10	2.35	.12
3	2¼	2⅛	4	⅜	2.55	2.85	.15
4	2½	2⅜	5	⅜	3.15	3.50	.25
5	3	3	10	½	3.90	4.30	.35
6	3½	4	18	½	4.80	5.30	.65

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SIGHT-FEED OILERS.

CROWNING COVER, FULL SIZE. No. 3.

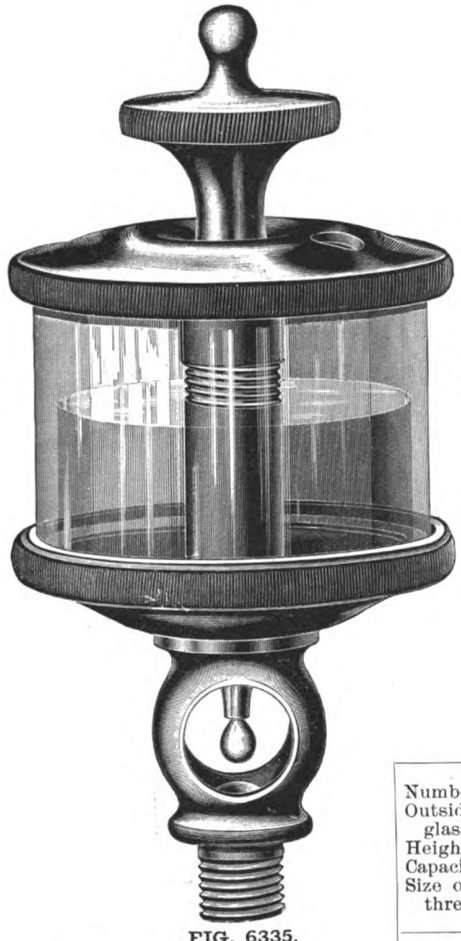


FIG. 6335.

WITH SNAP LEVER.

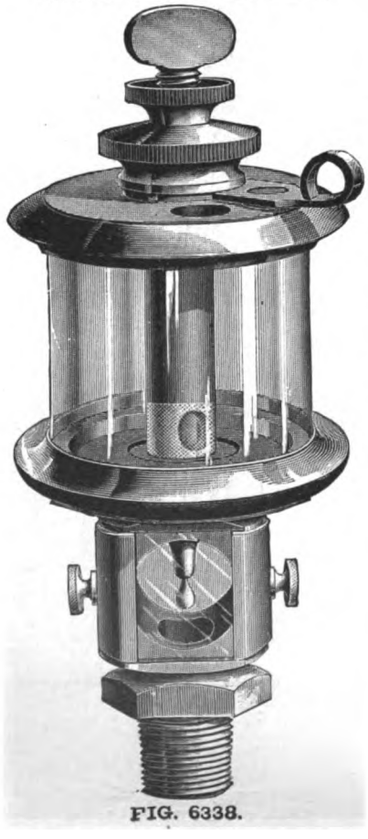


FIG. 6338.

PRICES, FIG. 6335.

	Capacity.	Prices, in brass. Per doz.	Nickeled. Per doz.
No. 1	1 oz.	$18.00	$22.00
" 2	1½ "	20.00	24.00
" 3	2½ "	22.00	26.00
" 4	3½ "	26.00	30.00
" 5	5½ "	33.00	38.00

State, in ordering, size and number of thread.

Fitted with glass protection for drip only when so ordered.

STOP FEED.



FIG. 6336.

PRICES, FIG. 6337.

Sizes.	Capacity.	Diameter of glass.	Size of shank, thread, iron pipe.	Prices, each, brass finished	Prices, each, nickeled.
A	1 oz.	1½ in.	¼ in.	$2.75	$3.00
B	1½ "	1¾ "	⅜ "	3.10	3.40
C	2¼ "	2 "	⅜ "	3.50	3.90
D	3½ "	2¼ "	⅜ "	4.00	4.40
E	4½ "	2½ "	⅜ "	5.00	5.50
F	8 "	3 "	½ "	7.00	7.60
G	1 pt.	3½ "	½ "	8.00	8.75
H	1½ "	3½ "	¾ "	9.00	10.00

Cups are sent regular pipe thread shanks as per above list, unless otherwise specified.

PRICES, FIG. 6336.

Number	0	1	1½	2	3	4	5	6
Outside diameter of glass...in.	1¼	1½	1¾	2	2¼	2½	3	3½
Height of glass..in.	1⅛	1⅜	1⅝	1⅞	2⅛	2¼	2¾	4
Capacity	½ oz.	⅜ oz.	1 oz.	2 oz.	¼ pt.	⅓ pt.	½ pt.	1 pt.
Size of shank, pipe thread...in.	¼	¼	⅜	⅜	⅜	½	½	½
Finished...each	$1.40	$1.50	$1.75	$2.00	$2.25	$2.65	$3.35	$4.50
Nickel-plated.. "	1.65	1.75	2.10	2.35	2.65	3.10	3.85	5.10

To stop the flow of oil it is only necessary to raise the top bar C; give it a quarter turn and drop it into the slot. Reverse the operation to start it again. Regulate drop by milled nut R.

PRICES, FIG. 6338.

Number	0	1	1½	2	3	4	5	6
Outside diameter of glass...in.	1¼	1½	1¾	2	2¼	2½	3	3½
Height of glass..in.	1⅛	1⅜	1⅝	1⅞	2⅛	2¼	2¾	4
Capacity	½ oz	⅜ oz.	1 oz.	2 oz.	¼ pt.	⅓ pt.	½ pt	1 pt.
Size of shank, pipe thread...in.	¼	¼	⅜	⅜	⅜	½	½	½
Plain top, finished..	$1.25	$1.50	$1.75	$2.10	$2.55	$3.15	$3.90	$4.80
Plain top, nickel-plated	1.40	1.70	2.00	2.35	2.85	3.50	4.30	5.30
Index top, finished..	1.50	1.80	2.25	2.75	3.25	4.00	5.00	6.25
Index top, nickel-plated	1.75	2.10	2.60	3.25	3.75	4.75	6.00	7.25

PRICES, FIG. 6339.

Sizes.	Capacity, ounces.	Diameter of glass shell, inches.	Size of shank, inches.	Prices, per dozen, brass finish.	Prices, per dozen, nickeled.
301	1	1⅝	¼	$27.35	$29.75
302	1½	1¾	⅜	32.65	35.05
303	2¼	2	⅜	37.35	40.35
304	3⅔	2⅜	⅜	45.60	48.60
305	6	2¾	½	60.00	63.60
306	10	3⅛	½	84.00	87.60
307	Pint.	3½	¾	108.00	114.00
308	Quart.	4⅛	¾	156.00	162.00

All oilers threaded standard gas-pipe tap, and will be shipped with shanks threaded as listed, unless otherwise specified in order.

QUICK-STOP LEVER.



FIG. 6337.

OPEN AND STOP FEEDS.

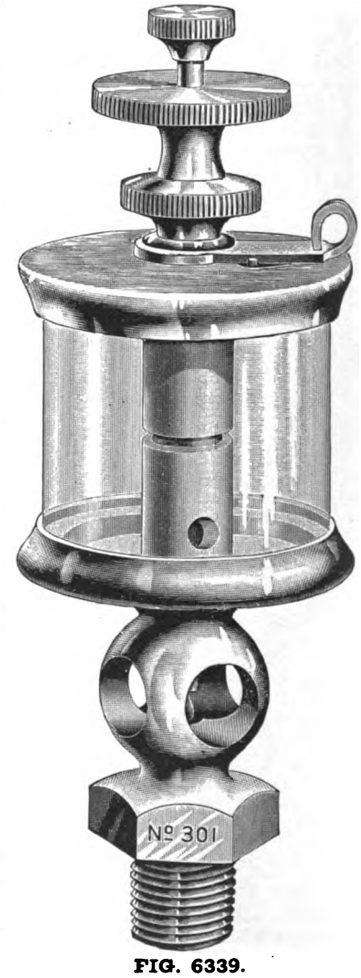


FIG. 6339.
FULL SIZE, NO. 301.

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CROWN, FULL SIZE, NO. 1 1-2.

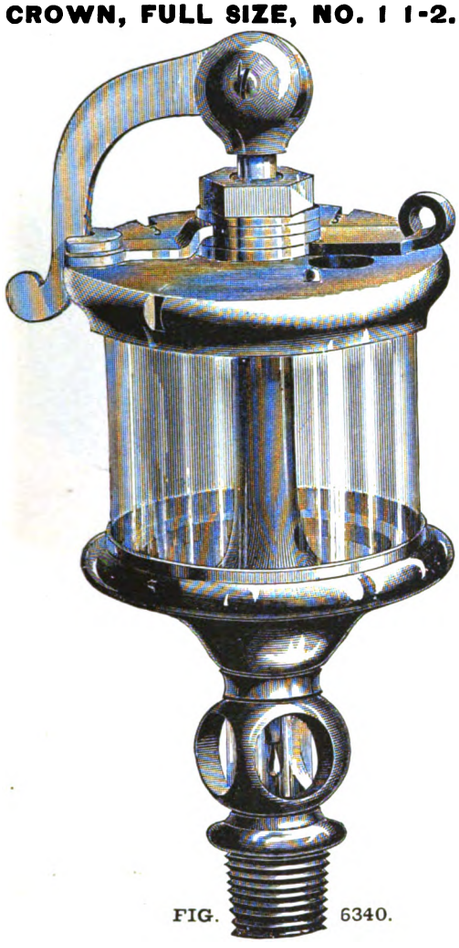


FIG. 6340.

RUBY, FULL SIZE, NO. 1.

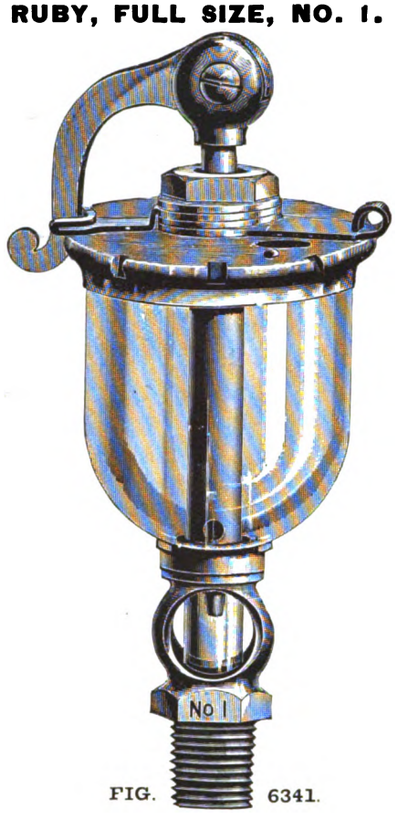


FIG. 6341.

PILLOW BLOCK AND DYNAMO OILERS.



FIG. 6342.

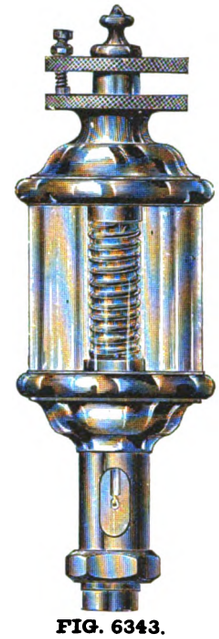


FIG. 6343.

PRICES, FIGS. 6340 AND 6341.

No.	Outside diam. of glass.	Height of glass.	Capacity.	Pipe thread.	Finished brass.	Nickel-plated.	Extra glasses, net.
	In.	In.	Oz.		Each.	Each.	Each.
0	1¼	1⅛	⅝	⅛	$1.25	$1.40	$0.08
1	1½	1⅜	1	¼	1.50	1.70	.10
1½	1¾	1⅝	1½	¼	1.75	2.00	.10
2	2	1⅞	2½	⅜	2.10	2.35	.12
3	2¼	2⅛	4	⅜	2.55	2.85	.15
4	2½	2⅜	5	⅜	3.15	3.50	.25
5	3	3	10	½	3.90	4.30	.35
6	3½	4	18	½	4.80	5.30	.65

PRICES, FIG. 6344.

	Loose covers.		Fixed covers.	
	Brass.	Nickel.	Brass.	Nickel.
No. 0....per doz.	$20.00	$23.00	$23.00	$26.00
No. 1.... "	23.00	26.00	26.00	29.00
No. 2.... "	27.00	30.00	30.00	33.00
No. 3.... "	33.00	36.00	36.00	39.00
No. 3½.. "	39.00	44.00	44.00	49.00
No. 4.... "	45.00	50.00	49.00	54.00
No. 5.... "	60.00	65.00	65.00	70.00
No. 6.... "	75.00	80.00	80.00	85.00

PRICES, FIG. 6345.

With sight-feed.

	Brass.	Nickel.
No. 8. ½ oz.....per doz.	$14.00	$17.00
No. 9. 1 " ..... "	16.00	19.00
No. 10. 1½ " ..... "	19.00	21.00
No. 11. 2½ " ..... "	22.00	25.00
No. 12. 3¾ " ..... "	26.00	29.00
No. 13. 5 " ..... "	29.00	32.00
No. 14. 7 " ..... "	32.00	35.00

PRICES, FIG. 6346.

Outside diam.	Height	Capacity.	Prices, per dozen.	Outside diam.	Height	Capacity.	Prices, per dozen.
In.	In.	Oz.		In.	In.	Oz.	
1¼	2¾	¼	$36.00	2⅜	4¾	2¼	$72.00
1½	3	¾	48.00	2¾	5¼	3¼	84.00
2	3¾	1	60.00	3¼	5¾	4½	96.00
2	4¼	1¼	60.00	4	7	8	120.00

PRICES, FIGS. 6342 AND 6343.

Number.	Outside diameter.	Height.	Capacity.	Prices, per doz.
Fig. 6342. 25	2 inches.	5 inches.	1¼ ounces.	$36.00
" 25½	2⅜ "	5¼ "	2 "	42.00
" 26	2¾ "	5½ "	3 "	46.00
" 26½	3¼ "	6¼ "	5 "	50.00
" 27	3½ "	7½ "	8 "	58.00
Fig. 6343. 28	3¾ "	9½ "	12 "	96.00
" 29	4½ "	11 "	1½ pints.	132.00

AUTOMATIC AND STOP SIGHT-FEED OILERS.



FIG. 6344.



FIG. 6345.

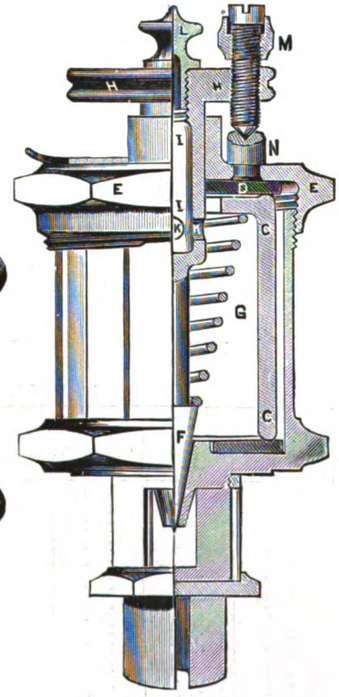


FIG. 6346.

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SLIDE TOP GLASS OILERS AND EXTRA GLASSES.

PIONEER, FULL SIZE.



FIG. 6347.

YANKEE, FULL SIZE.

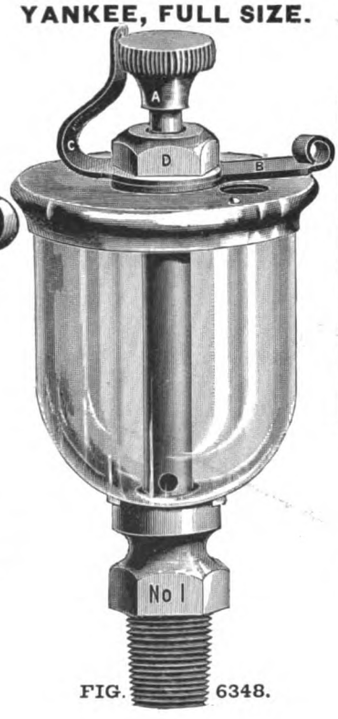


FIG. 6348.

CYLINDRICAL GLASSES.
FULL SIZE, NO. 2.



FIG. 6349.

URN GLASSES.
FULL SIZE, NO. 1 1-2.

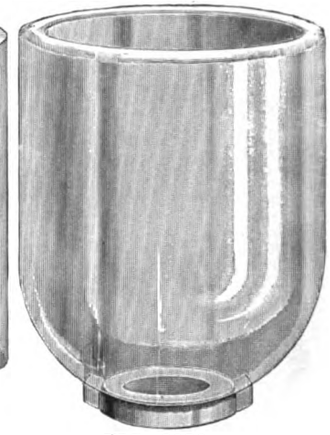


FIG. 6350.

To avoid mistakes when ordering glasses and cork washers, specify name and number of cup as stamped on the cup.

PRICES, FIGS. 6347 AND 6348.

No.	Outside diameter of glass, inches.	Height of glass, inches.	Capacity, ounces.	Pipe thread.	Finished brass, each.	Nickel-plated, each.	Extra glasses, net.
000	1	7/8	1/4	1/8	$0.70	$0.80	$0.05
00	1 1/8	1	1/2	1/8	.75	.85	.06
0	1 1/4	1 1/8	5/8	1/8	.80	.95	.08
1	1 1/2	1 3/8	1	1/4	1.00	1.20	.10
1 1/2	1 3/4	1 5/8	1 1/2	1/4	1.25	1.50	.10
2	2	1 7/8	2 1/2	3/8	1.50	1.75	.12
3	2 1/4	2 1/8	4	3/8	1.90	2.20	.15
4	2 1/2	2 3/8	5	3/8	2.40	2.75	.25
5	3	3	10	1/2	3.10	3.50	.35
6	3 1/2	4	18	1/2	4.00	4.50	.65

PRICES, FIGS. 6349 AND 6350.

No.	Outside diameter of glass, inches.	Height of glass, inches.	Prices, net, each.	Prices, cork washers, net, per dozen
000	1	7/8	$0.05	$0.15
00	1 1/8	1	.06	.18
0	1 1/4	1 1/8	.08	.24
1	1 1/2	1 3/8	.10	.30
1 1/2	1 3/4	1 5/8	.10	.36
2	2	1 7/8	.12	.40
3	2 1/4	2 1/8	.15	.45
4	2 1/2	2 3/8	.25	.50
5	3	3	.35	.60
6	3 1/2	4	.65	.75

SHELL CASE SCREW FEED.

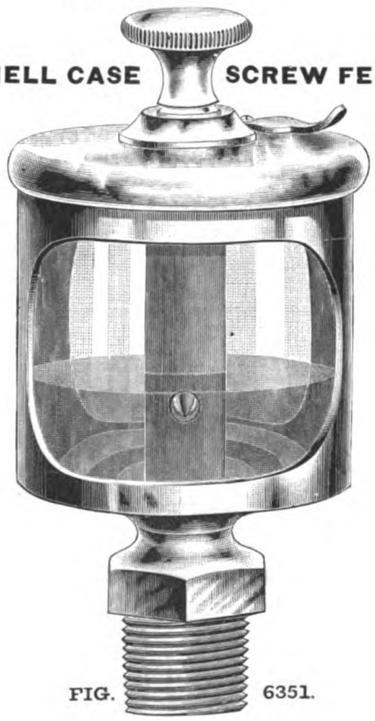


FIG. 6351.

PRICES.

No.	Height of cup, complete, inches.	Width of cup, complete, inches.	Capacity, in ounces.	Size of shank, pipe thread Inches.	Prices, per dozen, nickeled.
221	3 1/4	1 1/4	1/4	1/8	$10.00
222	3 1/2	1 3/8	3/8	1/8	12.00
223	3 5/8	1 1/2	1/2	1/8	13.00
224	4	1 3/4	1	1/4	14.00
225	4 3/8	2	1 1/2	1/4	16.00
226	4 3/4	2 1/8	2	3/8	20.00
227	5 1/4	2 5/8	4	3/8	24.00
228	5 3/4	3	6	3/8	30.00
229	6 1/8	3 1/2	10	1/2	40.00
230	7	3 3/4	15	1/2	54.00
231	7 3/4	4 3/8	24	1/2	84.00
232	8 1/2	5	36	1/2	120.00

SKELETON FRAME, PLAIN TAPER SCREW FEED OILERS.

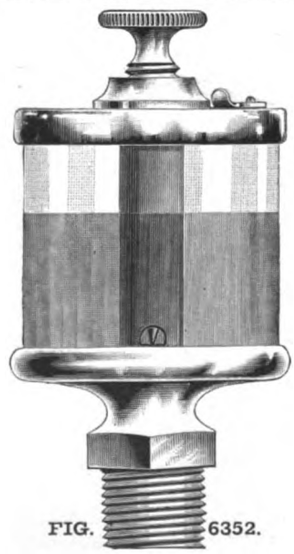


FIG. 6352.

No.	Height of cup, complete, inches.	Width of cup, complete, inches.	Capacity, in ounces.	Size of shank, pipe thread Inches.	Prices, per dozen.
141	2 3/4	1 1/8	1/4	1/8	$8.00
142	3	1 1/4	3/8	1/8	9.00
143	3 1/4	1 3/8	1/2	1/8	10.00
144	3 3/4	1 3/4	1	1/4	11.00
145	4	1 7/8	1 1/2	1/4	12.00
146	4 1/8	2 1/8	2	3/8	14.00
147	4 3/4	2 1/2	4	1/4	17.00
148	5 3/4	2 7/8	6	1/4	21.00
149	6 1/4	3 3/8	10	1/2	27.00
150	6 3/4	3 3/4	15	1/2	36.00
151	7 1/2	4 1/4	24	1/2	54.00
152	8 1/4	4 7/8	36	1/2	84.00

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SLIDE TOP OILERS.

PLAIN NICKELED CUPS.

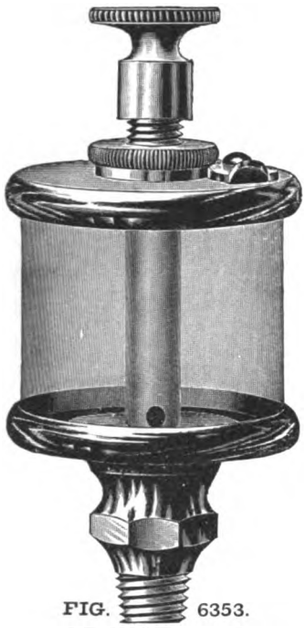


FIG. 6353.

ADJUSTABLE OIL CUPS.

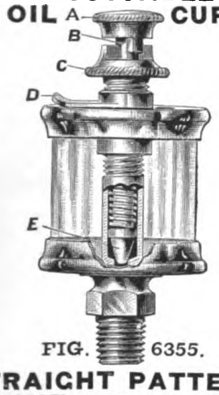


FIG. 6355.

STRAIGHT PATTERN ENGINE OILERS.



FIG. 6356.

These cups are finished in polished brass if desired.

PRICES.

No.	Diameter of glass, in.	Per doz.
0 engine.	1¼	$12.00
1 "	1¼	21.00
2 "	1¾	36.00
3 "	2¼	48.00
4 locomotive.	2	54.00
5 ex. engine.	3	150.00

The No. 0 cup is especially adapted to agricultural machinery and portable engines.

PRICES, FIG. 6353.

No.	Ounces.	Thread, pipe.	Prices, per dozen.
7	¼	⅛	$8.00
8	½	⅛	9.00
9	1	⅛	11.00
10	1¾	¼	13.00
11	2½	¼	15.00

PRICES, FIG. 6354.

No.	Capacity, ounces.	Diameter of glass shell, inches.	Height of glass shell, inches.	Size of shank, inches.	Prices, per dozen, brass finish.	Prices, per dozen, nickeled.
X 1	½	1⅛	1	¼	$9.35	$10.55
X 2	¾	1¼	1⅛	¼	10.10	11.90
X 3	1	1⅝	1⅜	⅜	12.60	15.00
X 4	1½	1¾	1½	⅜	16.45	18.85
X 5	2¼	2	1¾	⅜	19.20	21.60
X 6	3⅔	2⅜	2¼	⅜	24.00	27.00
X 7	6	2¾	2½	½	36.00	39.00
X 8	10	3⅛	2⅞	½	54.00	57.60
X 9	Pint.	3½	4	¾	78.00	84.00
X 10	Quart.	4⅛	5⅛	¾	126.00	132.00

All oilers threaded standard gas pipe tap, and will be shipped with shanks threaded as listed, unless otherwise specified in order.

PRICES, FIG. 6355.

No.	Diam. of glass, inches.	Height of glass, inches.	Capacity, oz.	Pipe thread, inches.	Prices, each.
80	1	⅞	....	⅛	$0.75
81	1⅛	1	....	⅛	.75
82	1¼	1⅛	½	⅛	.85
83	1½	1⅜	¾	¼	1.00
84	1¾	1½	1	¼	1.30
85	2	1¾	2	⅜	1.60
86	2¼	2⅛	3	⅜	2.00
87	2½	2⅜	4	⅜	3.00
88	2¾	2½	6	½	4.00

FULL SIZE, NO. X 4.



FIG. 6354.

SNAP LEVER ENGINE OILERS, WITH FILTERS.

BROUGHTON'S OILERS.



FIG. 6357.

FULL SIZE, NO. 0.

PRICES.

No.	Each.	Extra glasses, each.
0	$1.15	$0.20
1	1.30	.20
2	1.80	.30
3	2.50	.40
4	4.00	.50
5	5.25	.75

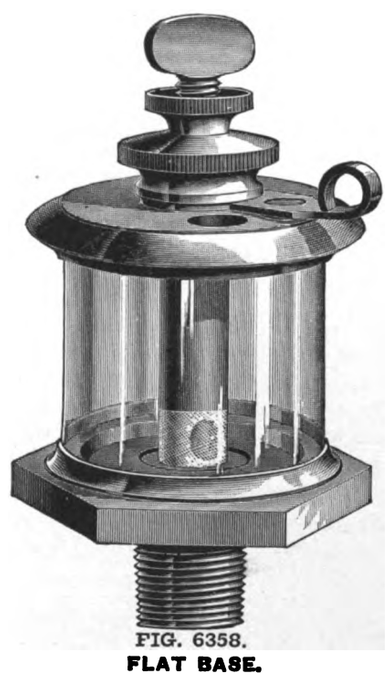


FIG. 6358.

FLAT BASE.



FIG. 6359.

ROUND BASE.

PRICES, FIGS. 6358 AND 6359.

No.	Outside diameter of glass, inches.	Height of glass, inches.	Capacity.	Size of shank, pipe thread.	Finished.	Nickel-plated.
00	1	⅞	.....	⅛	$0.75	$0.85
0	1¼	1⅛	½ oz.	¼	.80	.95
1	1½	1⅜	¾ "	¼	1.00	1.20
1½	1¾	1⅝	1 "	⅜	1.25	1.50
2	2	1⅞	2 "	⅜	1.50	1.75
3	2¼	2⅛	¼ pt.	⅜	1.90	2.20
4	2½	2¼	½ "	½	2.40	2.75
5	3	2¾	⅔ "	½	3.10	3.50
6	3½	4	1 "	½	4.00	4.50

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STOP FEED LOCOMOTIVE AND ENGINE OILERS.

GUIDE CUPS.

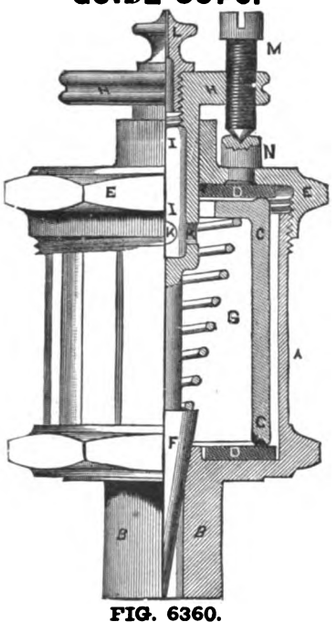


FIG. 6360.

ENGINE OILERS.



FIG. 6362.

ENGINE OILERS.



FIG. 6364.

GENERAL DESCRIPTIVE CUPS, FIGS. 6360 TO 6367.

Figure 6360 is a locomotive guide cup, which is composed of an outer skeleton brass frame A, A, and an inner glass vessel C, C, united with cork washers D, D, so that the oil will be held inside without leaking. To fill the cup, unscrew top piece L, and pour in the oil, which passes down openings I, I, into the cup. The feed of the cup is regulated by set-screw M, which passes through the rim of thumb wheel H, H, and rests on nipple N when the cup is feeding, and with the action of the screw M the cone F can be raised as desired, so as to feed the exact quantity of oil needed by the machinery to which it is attached. When no feed is required it is only necessary to lift the thumb wheel H, H, and turn it slightly to one side, so that the screw M may descend from its seat on nipple, thereby allowing the cone F to close feed opening. When feed is again required, it is only necessary to raise the screw M on the nipple N, as before, when the exact feed will be resumed which was previously had.

PRICES, FIG. 6360.

No.	Outside diameter.	Height.	Capacity.	Prices, per dozen.
½	1⅛ inch.	2½ inch.	¼ ounce.	$24.00
1	1¼ "	2¾ "	⅝ "	36.00
2	1¾ "	3½ "	1 "	48.00
3	2 "	4 "	1¼ "	48.00
4	2⅜ "	4½ "	2¼ "	60.00
4½	3 "	5 "	3¼ "	72.00
5	3½ "	5½ "	4½ "	84.00
6	4½ "	7 "	10 "	96.00

PRICES, FIG. 6361.

No.	Outside diameter.	Height.	Capacity.	Prices, per dozen.
16	1½ inch.	2⅞ inch.	½ ounce.	$30.00
17	2¼ "	3½ "	1¼ "	48.00
17½	2⅝ "	4 "	2½ "	54.00
18	3 "	4½ "	3½ "	60.00
18½	3¼ "	4¾ "	5 "	72.00
19	3½ "	5 "	8 "	84.00

PRICES, FIGS. 6362 AND 6363.

No.	Outside diameter.	Height.	Capacity.	Prices, per dozen.
7 small	1⅞ inch.	3½ inch.	¾ ounce.	$22.00
7	2 "	4¼ "	1¼ "	24.00
7½	2 5/16 "	4⅝ "	2 "	28.00
8	2¾ "	5 "	3 "	32.00
8½	3⅛ "	5½ "	5 "	36.00
9	3½ "	6 "	8 "	40.00

Fig. 6362 represents patent oiler with feed regulator and brass mountings. Lead glass very heavy and clear. This cup is ornamental and reliable for use of any kind of oil, on account of the ease with which the desired feed can be secured even when the engine or machinery to which it is attached is in motion. We guarantee a great saving in oil. Is adapted to stationary or marine engines. When filling cup, lift regulating screw off to allow air in cup to escape through vent hole in nipple. Fig. 6363 has radial slide filling arrangement.

PRICES, FIGS. 6364 AND 6365.

No.	Outside diameter.	Height.	Capacity.	Prices, per dozen.
52	1⅝ inch.	4 inch.	1 ounce.	$24.00
53	1⅞ "	4¼ "	1¼ "	28.00
54	2 3/16 "	4½ "	2¼ "	32.00
54½	2½ "	4¾ "	3¼ "	36.00
55	2⅞ "	5¼ "	4½ "	40.00
55½	3⅜ "	5¾ "	7 "	48.00

These cuts represent a new design and very desirable pressed glass cup, round base, brass mountings, with patent adjustable feed. Suitable for any service except crank pin, when the engine revolves at a greater rate of speed than 65 revolutions per minute. Fig. 6365 has radial filling slide on cap.

ENGINE OILERS.



FIG. 6361.

ENGINE OILERS.



FIG. 6363.

ENGINE OILERS.

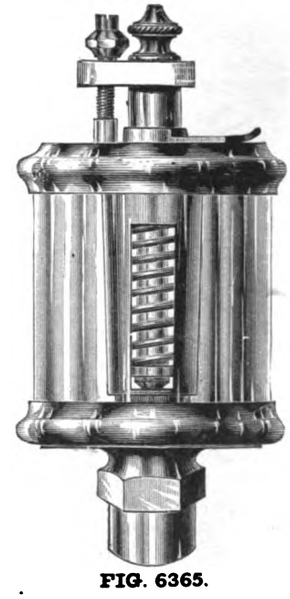


FIG. 6365.

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STOP FEED ENGINE OILERS AND PIN OILERS.

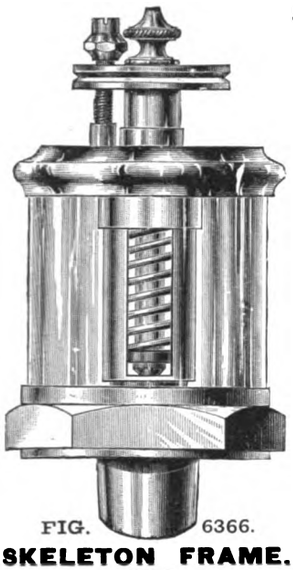


FIG. 6366.

SKELETON FRAME.

PRICES, FIGS. 6366 AND 6367.

No.	Outside diameter.	Height.	Capacity.	Prices, per doz.
56	1 5/8 inch.	3 3/4 inch.	1 ounce.	$24.00
57	1 7/8 "	4 "	1 1/4 "	28.00
58	2 3/8 "	4 1/4 "	2 1/4 "	32.00
59	2 1/2 "	4 1/2 "	3 1/4 "	36.00
60	2 7/8 "	5 "	4 1/2 "	40.00
60 1/2	3 3/8 "	5 1/2 "	7 "	48.00

These cups have a flat hexagon base, with patent adjustable feed. Pressed lead glass, clear and heavy. Brass mountings, ornamental and strong. This cup is suited to all bearings, except rapidly revolving crank pin connections. It is well adapted for locomotive guides and rocker boxes. Fig. 6367 has radial filling slide, best suited for locomotive guides.

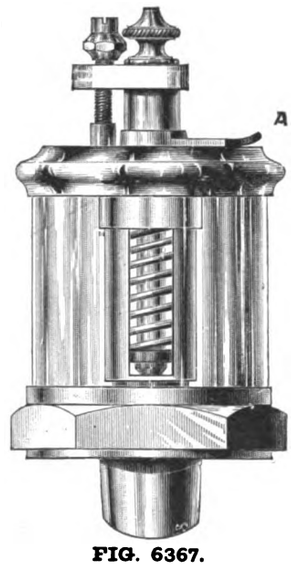


FIG. 6367.

PRICES, FIG. 6369.

No.	Outside diameter.	Height.	Capacity.	Prices, per doz.
0	1 inch.	1 1/2 inch.	1/8 ounce.	$12.00
30	1 1/4 "	2 1/8 "	1/4 "	18.00
31	1 1/2 "	2 3/4 "	5/8 "	24.00
32	1 5/8 "	3 1/4 "	1 1/8 "	32.00
33	1 7/8 "	3 3/4 "	1 5/8 "	36.00
34	2 1/4 "	4 1/8 "	2 1/2 "	48.00
34 1/2	2 3/4 "	4 3/4 "	3 1/2 "	60.00
35	3 1/2 "	5 1/2 "	4 1/2 "	72.00
36	4 1/2 "	7 "	10 "	84.00

LOCOMOTIVE ROD CUPS.

This represents an oil cup especially suited for rotary motion, with extra heavy brass case and a glass vessel therein in which the oil is contained, perfectly air-tight, so that the cup will feed only when the machinery is in motion, being perfectly automatic. The quantity of oil in cup can be seen at all times through openings in the case; is particularly adapted to locomotive connecting rods; will run 5,000 miles to one filling.



FIG. 6368.

PRICES, FIG. 6368.

No.	Height of cup, complete, inches.	Width of cup, complete, inches.	Capacity in ounces.	Size of shank pipe thread, inches.	Prices, per dozen.
101	2 3/4	1 1/8	1/4	1/8	$8.00
102	3	1 1/4	3/8	1/8	9.00
103	3 1/4	1 3/8	1/2	1/8	10.00
104	3 3/4	1 3/4	1	1/4	11.00
105	4	1 7/8	1 1/2	1/4	12.00
106	4 1/8	2 1/8	2	3/8	14.00
107	4 3/4	2 1/2	4	3/8	17.00
108	5 1/4	2 7/8	6	3/8	21.00
109	6 1/4	3 3/8	10	1/2	27.00
110	6 3/4	3 3/4	15	1/2	36.00
111	7 1/2	4 1/4	24	1/2	54.00
112	8 1/4	4 7/8	36	1/2	84.00



FIG. 6369.

SKELETON FRAME.

PRICES, FIG. 6370.

Outside diameter.	Height.	Capacity.	Prices, per dozen.
1 1/2 inch.	3 1/4 inch.	1 1/8 ounce.	$12.00
2 1/8 "	4 1/4 "	3 "	18.00
2 1/2 "	5 1/4 "	5 "	24.00
3 "	6 "	8 "	30.00

For small engines, agricultural machinery, shafting, etc., etc. This cup is durable, ornamental and cheap.



FIG. 6370.

PRICES, FIG. 6371.

Diam., inches.	Height, inches.	Capacity ounces.	Pipe, size shank.	Prices, per dozen.
1 1/2	2 1/2	3/4	1/8	$7.00
2 1/8	3 1/2	2	1/4	10.00
2 1/2	4	4	1/4	13.00

PRICES, FIG. 6372.

1 1/2	2 1/2	3/4	1/8	6.00
2 1/8	3 1/2	2	1/4	9.00
2 1/2	4	4	1/4	12.00

PRICES, FIG. 6373.

1 1/2	2 1/2	3/4	Smooth shank	6.00
2 1/8	3 1/2	2	with wooden conical plug if ordered	9.00
2 1/2	4	4		12.00

These cups will feed by agitation or suction; the glass is exceptionally strong, will scarcely ever break by a fall from line of shafting to floor. Can supply a 2 oz. capacity of either figure with flat side for wall bearings.

SHAFTING PIN OILERS.

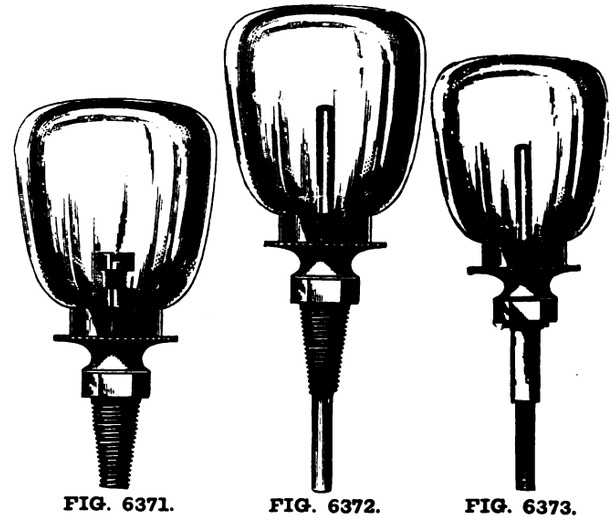


FIG. 6371. FIG. 6372. FIG. 6373.

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SELF-OILERS FOR SHAFTINGS AND ENGINES, WITH WIRE FEED.

WOOD PLUG. WALL BOX. SOLID SHANKS.

NO. 9. NO. 10. NO. 13. NO. 10. NOS. 15 & 22. NOS. 24 & 26. A TO D.

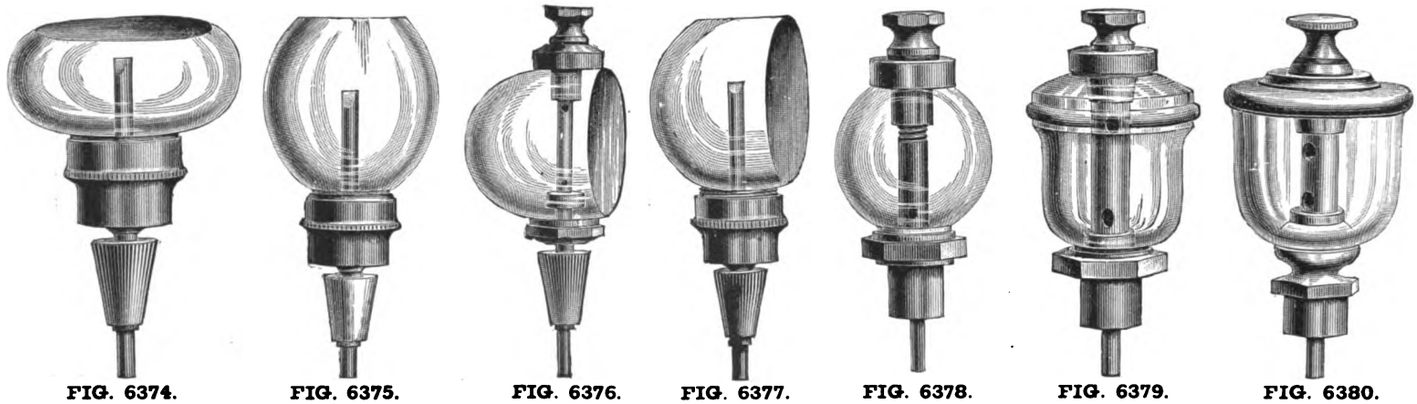


FIG. 6374. FIG. 6375. FIG. 6376. FIG. 6377. FIG. 6378. FIG. 6379. FIG. 6380.

They are composed of a transparent glass cup, mounted in brass, provided with a hollow tube, inside of which is placed a loose-acting solid or hollow wire, which acts as a feeder and regulator. The cup is fixed on the bearing, and the wire rests upon the journal, thereby acting with the shaft in its motions. The wire is also so regulated inside the tube as to feed according to the demand only. There is no flow of oil whatever while the machinery is not in motion; they are as reliable in winter as in summer. Being a perfectly air-tight vessel, the oil will never gum in them.

PRICES, FIGS. 6374 TO 6379.	Capacity.	Diameter.	Height.	Prices, per doz.
No. 000. For cards, looms, lathes or for small journals	¾ oz.	1½ in.	2½ in.	$4.50
" 000. " " " " " " " ⅛ shanks	¾ "	1½ "	2½ "	5.00
" 00. " " " " " " "	¾ "	1½ "	2½ "	4.50
" 0. " card cylinders, strippers and compact connections	1 "	2¼ "	2½ "	4.50
" 0. " " " " " " " ⅛ shanks	1 "	2¼ "	2½ "	5.00
" 3. " " " " " " " to fill from top	¾ "	1½ "	2⅛ "	4.50
" 9. " shaftings, pickers, looms and fans	1½ "	2⅛ "	3¼ "	4.50
" 9. W. B. for compact shaftings or connections	1½ "	1¾ "	3¼ "	4.50
" 10. For shaftings, pickers, looms and fans	3⅛ "	2¼ "	4½ "	4.50
" 10. W. B. for compact shaftings or connections	3 "	2 "	4½ "	4.50
" 11. For shaftings or connections where the cups are required to be screwed in.	1½ "	2⅛ "	3⅛ "	7.00
" 12. " same use as No. 11	3⅛ "	2¼ "	4¼ "	7.00
" 13. To fill from top	1½ "	2½ "	3¼ "	7.50
" 13. W. B. ditto	1½ "	1¾ "	3⅛ "	7.50
" 14. ditto	3⅛ "	2½ "	4 "	7.50
" 15. For engines or connections, ditto, to screw in	3⅛ "	2⅝ "	4 "	10.50
" 16. " small connections, ditto, "	⅜ "	1¾ "	2 "	7.00
" 18. " upright shafts, "	3½ "	2⅝ "	4½ "	18.00
" 22. " small engines or lathes, "	¾ "	1⅝ "	2½ "	9.00
" 23. " fast-running lathes, "	⅜ "	1⅝ "	1⅜ "	9.00
" 24. " engines, "	2¼ "	2¼ "	3⅜ "	10.50
" 25. " heavy bearings or pillow blocks, "	8 "	3 "	6 "	18.00
" 26. " small engines, "	¾ "	1¾ "	2¾ "	9.00

ENGINE CUPS.

SHELL CASED, NOS. 20 TO 100. SKELETON, NOS. 30 TO 150.

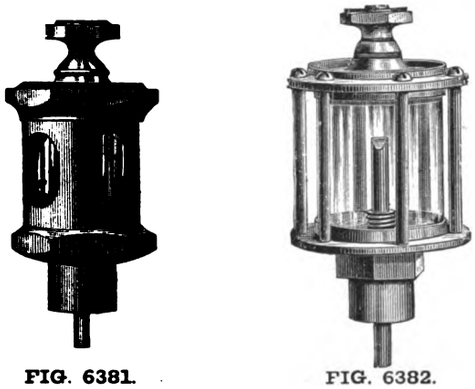


FIG. 6381. FIG. 6382.

PRICES, FIG. 6380.	Capacity.	Diameter.	Height.	Prices, per doz.
A	¾ oz.	1½ in.	2½ in.	$8.00
B, small	¾ "	2 "	3 "	10.00
B	1⅛ "	2¼ "	3½ "	12.00
C	3 "	2⅞ "	4⅛ "	16.00
D	8 "	3⅛ "	5¼ "	20.00

DIRECTIONS FOR USING.

Fill the cup full of oil, then screw the cap down air-tight. Place the tube in the oil hole in an upright position, or upon an angle of 45 degrees. Permit the rod to rest upon the journal, and have a perfectly free action. If you desire the oil to flow faster, reduce the size of the wire with emery paper.

LOOSE PULLEY CUPS, WITH HOLLOW WIRES.

	Capacity.	Diameter.	Height.	Prices, per doz.
No. 22. Same description as above	¾ oz.	1¼ in.	2¼ in.	$10.50
" 23. " " " "	⅛ "	1¼ "	1⅜ "	10.50
" 15. " " " "	3½ "	2½ "	4 "	12.00

PATENT SHAFTING & ENGINE OIL CUPS.

WITH REGULATING SCREWS AND PATENT ADJUSTING KNOB.

SHAFTING OILER. ENGINE OILER.

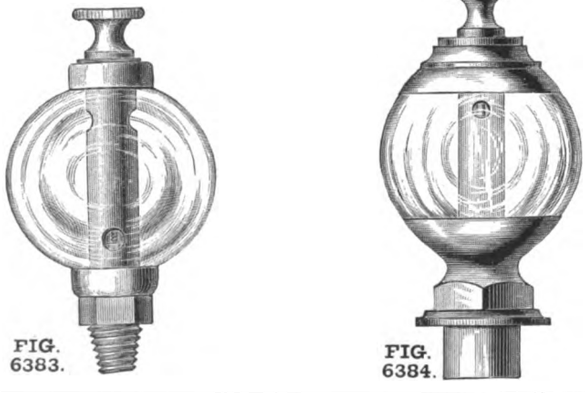


FIG. 6383. FIG. 6384.

PRICES, FIG. 6383.	Capacity.	Diameter.	Height.	Prices, per doz.
No. 4	⅜ oz.	1⅛ in.	2⅛ in.	$7.00
" 5	¾ "	1¼ "	2¼ "	7.50
" 5 W. B.	⅝ "	1⅜ "	2¼ "	7.50
" 6	2 "	2⅜ "	3⅜ "	9.00
" 7	3½ "	2⅝ "	4 "	10.50
" 8	5 "	3 "	4⅞ "	13.50

PRICES, FIG. 6384.	Capacity.	Diameter.	Height.	Prices, per doz
No. 5½	¾ oz.	1¾ in.	3 in.	$8.00
" 5½	1½ "	2 "	3⅛ "	9.00
" 6½	2 "	2⅜ "	4 "	10.50
" 7½	3½ "	2⅞ "	4¼ "	13.50
" 8½	5 "	3 "	5¼ "	18.00

Nickel-plating, extra, from $1.50 to $3.00 per dozen, net, according to size.

ENGINE CUPS—SHELL CASED.

PRICES, FIG. 6381.	Capacity.	Diameter.	Height.	Prices, per doz.
No. 20	⅛ oz.	1 in.	1⅛ in.	$12.00
" 21	⅛ "	1¾ "	2¼ "	18.00
" 28	¼ "	1½ "	2½ "	27.00
" 36	1 "	2 "	3½ "	36.00
" 42	1¼ "	2 "	4 "	36.00
" 60	2⅛ "	2⅜ "	4¼ "	48.00
" 72	4⅛ "	3 "	4½ "	60.00
" 72, iron mounted	4⅛ "	3 "	4½ "	24.00
" 100	1 qt.	5¼ "	10 "	150.00

ENGINE CUPS—SKELETON.

PRICES, FIG. 6382.	Capacity.	Diameter.	Height.	Prices, per doz.
No. 30	¼ oz.	1¾ in.	2½ in.	$18.00
" 46	1 "	2¼ "	3⅛ "	27.00
" 48	1¼ "	2⅜ "	3¾ "	27.00
" 54	1 "	2½ "	3⅛ "	27.00
" 60	1¼ "	2½ "	3¾ "	33.00
" 72	2 "	2¾ "	4½ "	39.00
" 76	4½ "	3¾ "	5¾ "	48.00
" 80	8 "	3¾ "	5½ "	66.00
" 90	14 "	5 "	7¼ "	90.00
" 150	3 pts.	6½ "	8⅛ "	150.00
" 32, iron mounted	8 oz.	4½ "	6 "	21.00

Crank-pin cups for upright engines, to order.

DYNAMO AND ELECTRICAL MACHINERY OILERS.

The above style of cups, fitted with our patent loose-acting wire of brass, are extensively used for dynamos and electrical light machinery with the best results.

The sizes are as follows:

No. 4a—
" 5a—
" 6a— } Capacity and prices same as shafting oilers, Fig. 6383.
" 7a—
" 8a—

Several of our other styles are also suitable, and may be similarly fitted to order without extra charge.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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CODY SHAFT OILERS, BRASS OR WOOD SHANKS, AND CRANK PIN CUPS.

PRICES, FIGS. 6385 TO 6387.

No.	Capacity, ounces.	Diameter, inches.	Height, inches.	Prices, per dozen.
1	1	1¾	2⅝	$6.00
2	1⅝	2	3	6.50
3	2¾	2½	3½	7.00

Shanks are threaded ⅜ inch on point, 16 threads to the inch.

BRASS SHANKS. SECTION. WOOD PLUG AND WIRE.

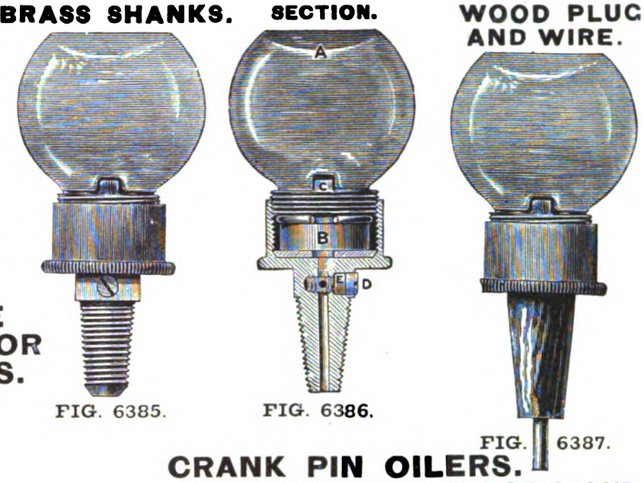


FIG. 6385. FIG. 6386. FIG. 6387.

GLASS CRANK PIN OILER.

Fig. 6388 is made as shown in cut, flat base or with round base and with automatic valve.

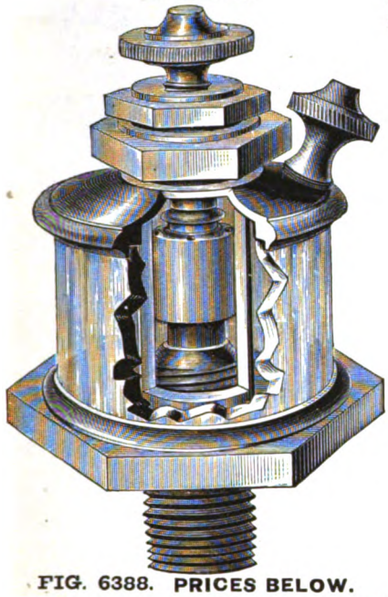


FIG. 6388. PRICES BELOW.

ADJUSTABLE SIGHT-FEED FOR HOR. ENGINES.



FIG. 6389.

CRANK PIN OILERS. AUTOMATIC FOR LIGHT OR HEAVY OILS.

FOR HEAVY ENGINES.



FIG. 6390.

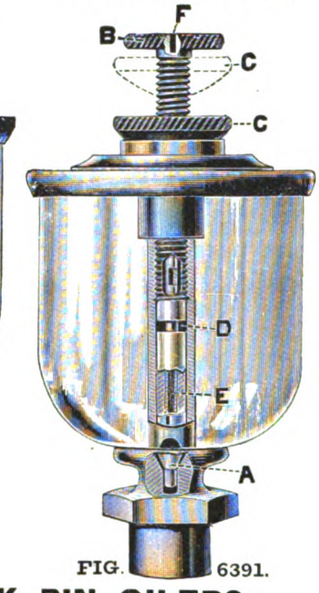


FIG. 6391.

PRICES, FIG. 6389.

Outside diameter.	Height.	Capacity.	Prices, per dozen
2¼ inch.	4½ inch.	1¼ ounce.	$32.00
2⅝ "	5 "	2¼ "	36.00
2¾ "	5½ "	3½ "	40.00
3⅛ "	5¾ "	5½ "	44.00
3½ "	6¼ "	8 "	52.00

PRICES, FIG. 6390.

Outside diameter.	Height.	Capacity.	Prices, per dozen.
1½ inch.	2⅞ inch.	½ ounce.	$12.00
1⅞ "	3⅛ "	⅝ "	15.00
2 "	3½ "	1¼ "	18.00
2⅝ "	4 "	2¼ "	21.00
2¾ "	4½ "	3½ "	24.00
3⅛ "	4¾ "	5 "	27.00
3½ "	5 "	8 "	30.00

PRICES, FIG. 6391.

Outside diameter.	Height.	Capacity.	Prices, per dozen.
1⅞ inch.	3⅛ inch.	¾ ounce.	$22.00
2 "	3½ "	1¼ "	24.00
2½ "	4 "	2¼ "	28.00
2¾ "	4½ "	3½ "	32.00
3⅛ "	5 "	5 "	36.00
3½ "	5¼ "	8 "	40.00

WIRE FEED CRANK PIN OILERS.

NEEDLE VALVE. SCREW FEED.

Full sizes.

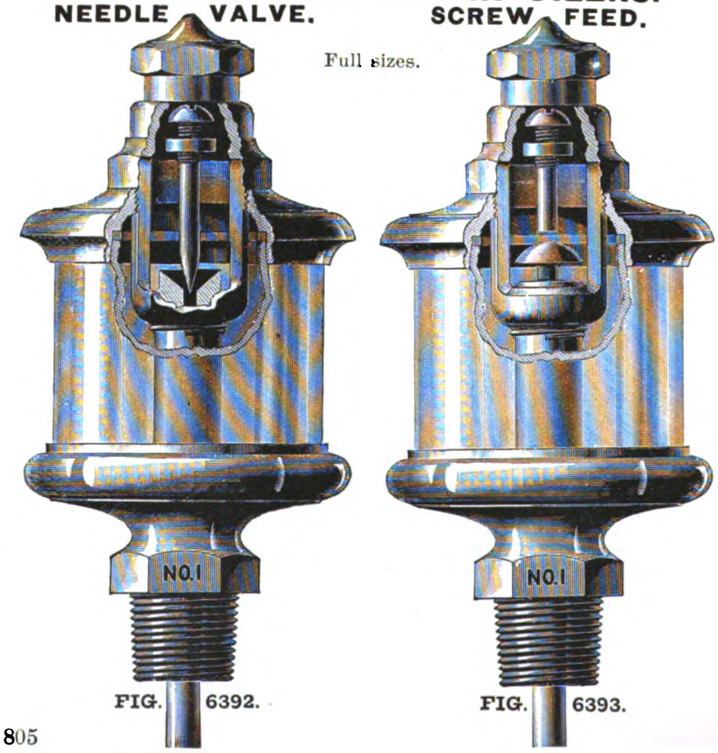


FIG. 6392. FIG. 6393.

PRICES, FIG. 6388.

No.	Outside diameter of glass, inches.	Height of glass, inches.	Capacity.	Size of shank pipe thread, inches.	Finished, each.
0	1¼	1⅛	½ oz.	¼	$1.10
1	1½	1⅜	⅝ "	¼	1.50
1½	1¾	1⅝	1 "	⅜	2.00
2	2	1⅞	2 "	⅜	2.50
3	2¼	2⅛	¼ pt.	⅜	3.00
4	2½	2¼	½ "	½	4.00
5	3	2¾	¾ "	½	6.00
6	3½	4	1 "	½	9.00

PRICES, EITHER FIG. 6392 OR 6393.

No.	Outside diameter of glass, inches.	Height of glass, inches.	Capacity, ounces.	Pipe thread.	Prices, each.
0	1¼	1⅛	⅝	⅛	$1.10
1	1½	1⅜	1	¼	1.50
1½	1¾	1⅝	1½	¼	2.00
2	2	1⅞	2½	⅜	2.50
3	2¼	2⅛	4	⅜	3.00
4	2½	2⅜	5	⅜	4.00

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AUTOMATIC CRANK PIN OILERS.



FIG. 6394.

PRICES, FIG. 6394.

No.	Capacity. Ounces.	Diam. of glass shell. Inches.	Height of glass shell. Inches.	Size of shank. Inches.	Prices, per dozen, brass finish.	Prices, per dozen, nickeled.
1	3/4	1 1/4	1 1/8	1/4	$18.00	$19.20
2	1	1 5/8	1 3/8	1/4	24.00	25.20
2 1/2	1 1/2	1 3/4	1 1/2	3/8	27.00	28.45
3	2 1/4	2	1 3/4	3/8	30.00	31.45
4	3 2/3	2 3/8	2 1/8	3/8	36.00	37.80
5	6	2 3/4	2 1/2	1/2	54.00	57.00
6	10	3 1/8	2 7/8	1/2	72.00	76.20

This cup can be emptied in five minutes, or can be so regulated as to feed for four weeks. On slow-running engines, the oil being continually flowed over convex disk at top of oiler, discharges into the oil tube and runs of its specific gravity to parts to be lubricated. As the speed of engine is increased, the oil is lifted to the top of cup and maintains an accumulated pressure from centrifugal force, which force is increased and diminished in exact proportion to variation of speed of engine, oil ceasing entirely to flow when engine stops.

CRANK PIN WIPER SYSTEM, WITH TELESCOPIC BLADE.



FIG. 6395.

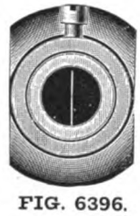


FIG. 6396.

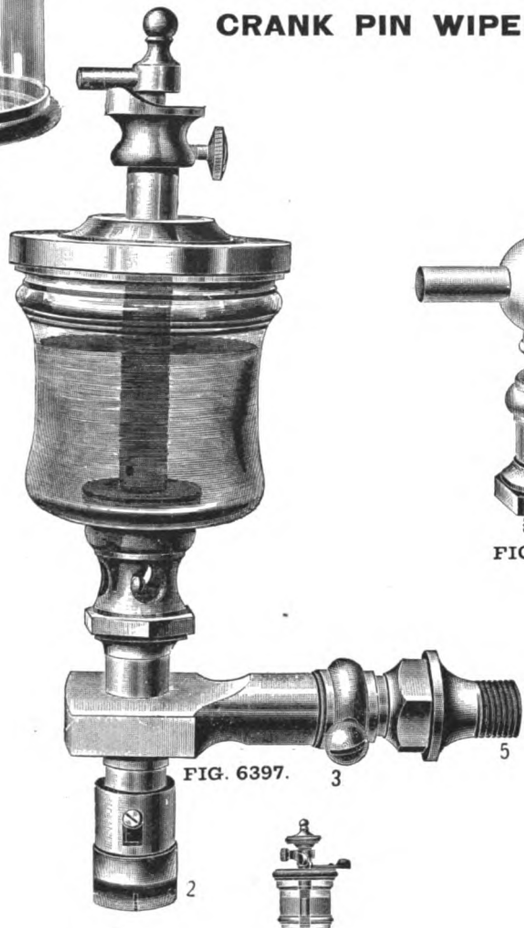


FIG. 6397.

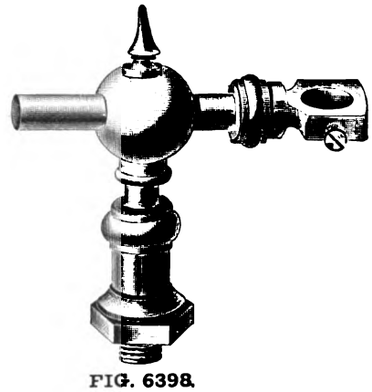


FIG. 6398.

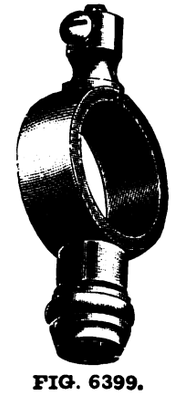


FIG. 6399.

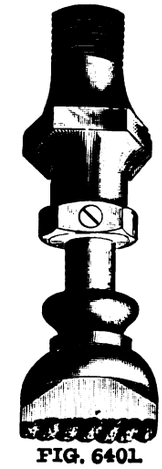


FIG. 6401.

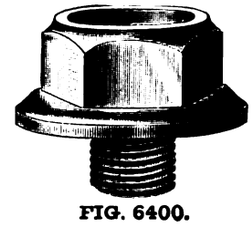


FIG. 6400.



FIG. 6402.

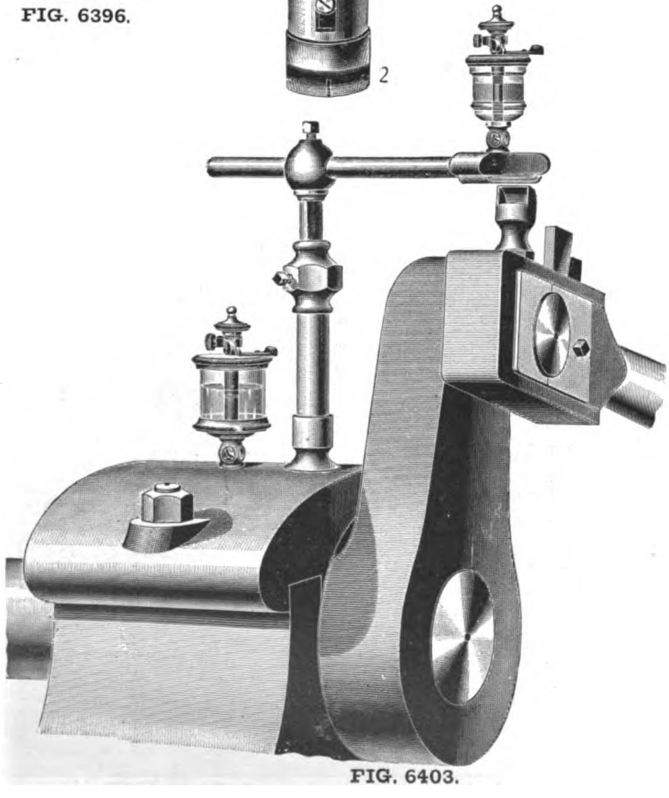


FIG. 6403.

PRICES, FIGS. 6395 TO 6402.

These cuts represent the details of our wiper system, which may be readily applied to any form of engine.

Size, threads, etc., will be made to suit purchasers. Special price given on application.

WILKINSON'S CRANK PIN WIPER.

PRICES, FIG. 6403.

Size	1	2	3	4	5	6
Height from top of pillow-block to top of crank	8 in.	11 in.	15 in.	18 in.	22 in.	26 in.
Distance from face of pillow-block to center of crank connection	8 "	10 "	12 "	14 "	15 "	16 "
Prices, in brass	$15.00	$20.00	$25.00	$30.00	$40.00	$50.00
Prices, nickel-plated	17.00	23.00	28.00	33.00	44.00	55.00

All sizes are made so as to be adjustable from 1 to 3 inches. Fitted with any style of oil cup.

In ordering, please give distance from top of pillow block—or wherever standard will set—to top of crank. Distance from face of pillow block—or from center of hole that is tapped for standard—to center of hole in crank connection. Also height of key, and height of key above the crank. Give size of hole in strap and number of thread.

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HODGES' OILER.
ATTACHED TO PULLEY.

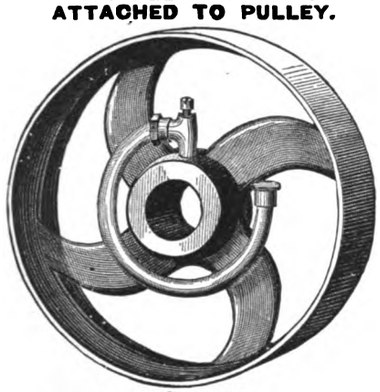


FIG. 6404.



FIG. 6405.

PRICES, FIG. 6405.

Diam. tube.	Inside diam. of oiler.	Prices, each.	Diam. tube.	Inside diam. of oiler.	Prices, each.
½	2½	$1.20	⅝	4½	$1.60
½	3	1.25	⅝	5	1.70
½	3½	1.30	⅝	5½	1.80
½	4	1.40	⅝	6	1.90
⅝	4	1.50	⅝	7	2.00

LOOSE PULLEY OILERS.

DREW OILER.

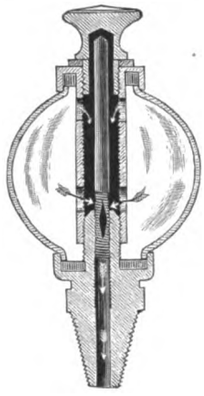


FIG. 6406.

The arrangement of the shell over the feed rod being such that the centrifugal force of the oil in the revolving cup keeps up a constant flow of oil to the bearing.

PRICES.

No. 1 shafting, for loose pulleys, $12.00 per dozen.

ROUND GLASS.

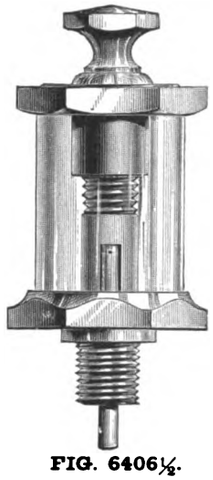


FIG. 6406½.



FIG. 6407.

STANDARD GLASS.



FIG. 6408.

Fig. 6408 is a loose pulley oiler, which will feed while the pulley is in motion, if attached as shown in Fig. 6407, observing relative position of cup and motion of pulley, as shown by dart on rim of pulley; shank may be detached from cup, so as to render it convenient of attachment and avoid contact with arms of pulley; after the shank is properly screwed into hub, then attach cup and fill with oil. All shanks ⅛ inch gas pipe size.

Fig. 6406½, oil cup for small bearings, lathes, etc. Glass body, full size, as shown in cut. Threaded ⅛ iron pipe.

PRICES.

	Outside diam.	Height.	Capacity.	Prices, per doz.
Fig. 6408.	1⅞ inch.	3¼ inch.	1⅛ ounce.	$18.00
Fig. 6406½.	1⅛ "	2 "	⅛ "	12.00

PRICES, FIG. 6411.

Number	0	1	2	3	4
Outside diameter....inches,	1	1¼	1½	1¾	2
Capacity .....ounces,	¼	½	¾	1¼	1¾
Prices .....each,	$0.25	$0.30	$0.40	$0.50	$0.65

Shanks on Nos. 0, 1, 2 are threaded ⅜ inch on point, 16 threads to the inch.
Shanks on Nos. 3, 4 are threaded ¼ inch pipe thread.

LOCOMOTIVE OILER.

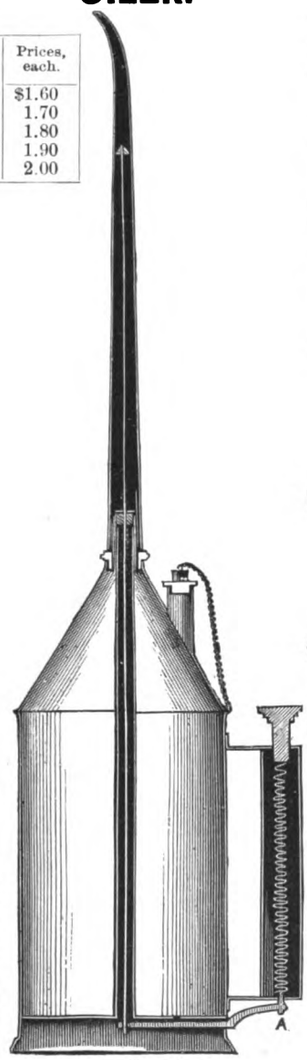


FIG. 6410.

PUMP OILER.



FIG. 6409.

Steel pump, quart, per dozen....$60.00
Brass " " " 66.00

PRICES, FIG. 6410.

1	pint;	brass,	with	valve;	per doz. $36.00
2	"	"	"	"	" 48.00
3	"	"	"	"	" 60.00
1	"	"	no	"	" 24.00
2	"	"	"	"	" 36.00
3	"	"	"	"	" 48.00
1	"	tin,	with	"	" 24.00
2	"	"	"	"	" 33.00
3	"	"	"	"	" 45.00
1	"	"	no	"	" 12.00
2	"	"	"	"	" 21.00
3	"	"	"	"	" 33.00

DROP LUBRICATORS.

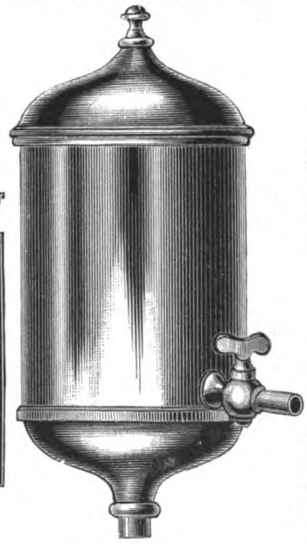


FIG. 6412.

BRASS LOOSE PULLEY OILER.

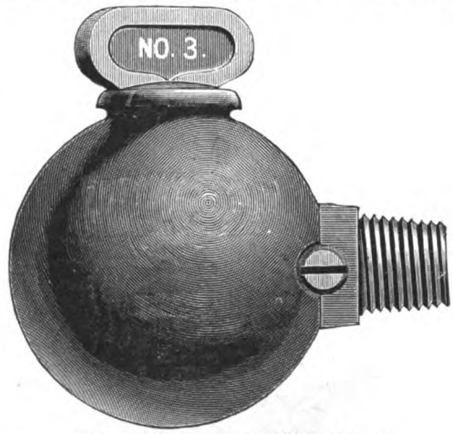


FIG. 6411. FULL SIZE NO. 3.

PRICES, FIG. 6412.

For machines, bolt and screw machines, etc.

1	pint;	brass or copper;	per dozen.....		$18.00
2	"	"	"	.....	21.00
3	"	"	"	.....	24.00
4	"	"	"	.....	30.00
1	"	tin, zinc top and bottom;	per doz.		10.00
2	"	"	"	"	12.00
3	"	"	"	"	15.00
4	"	"	"	"	18.00

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MALLEABLE IRON OILERS.

IMPROVED.

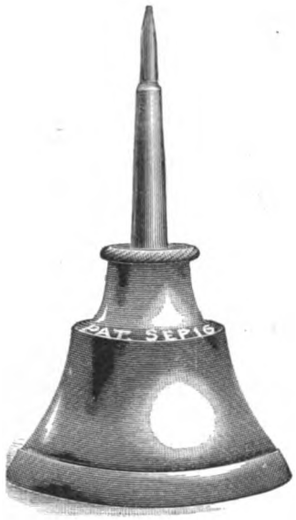


FIG. 6413.

SECTION.

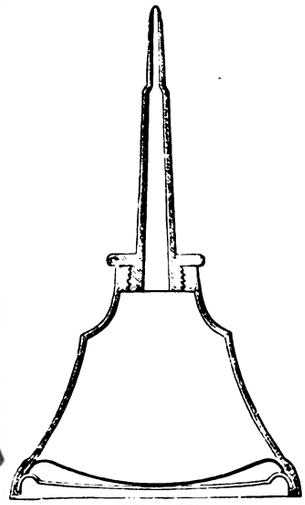


FIG. 6414.

NO. 1.

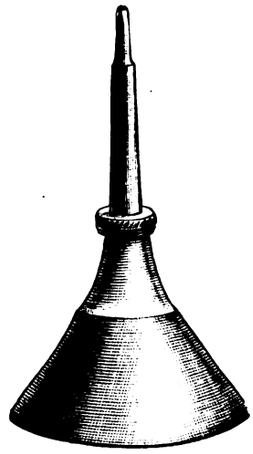


FIG. 6415.

NOS. 2 AND 3.

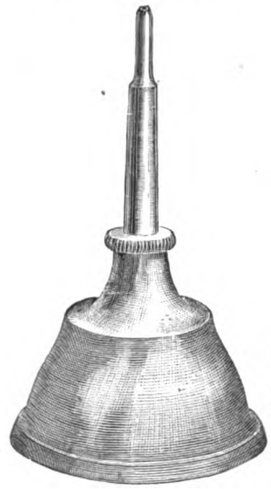


FIG. 6416.

NO. 4, EXTRA LARGE.

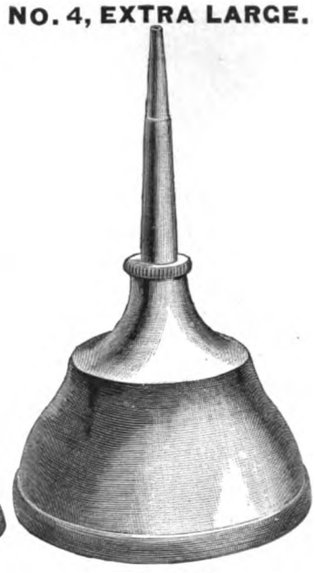


FIG. 6417.

PRICES.

No. 11	$3.60	per dozen.
No. 12	4.00	"
No. 13	4.40	"

PRICES.

No. 1	$3.60	per dozen,	capacity	2⅝ oz.
No. 2	4.00	"	"	3¾ "
No. 3	4.40	"	"	5½ "
No. 4	5.20	"	"	8 "
Extra tubes	1.80	"		

Packed 12 dozen in a case, each size.

O. K. NOS. 20 AND 30.

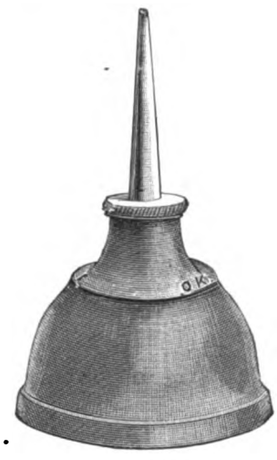


FIG. 6418.

DOME NOS. 22 AND 44.



FIG. 6419.

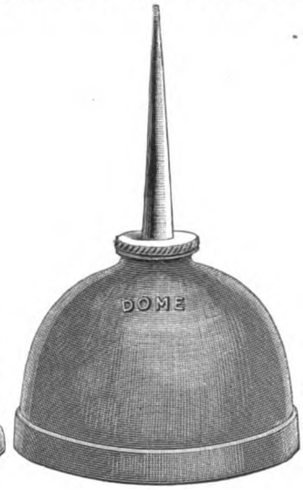


FIG. 6420.

O. K. NO. 10.

O. K. LONG TUBE.

DOME, LONG TUBE.

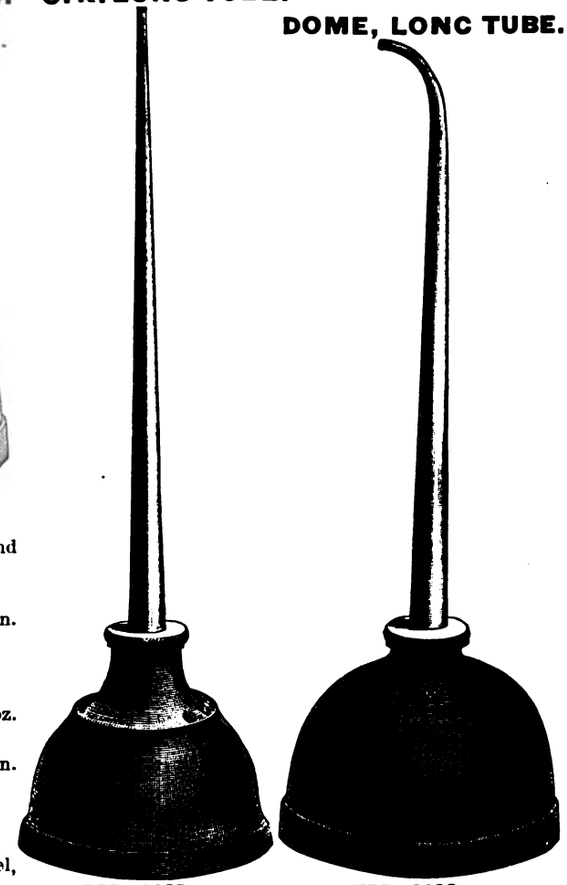


FIG. 6421. FIG. 6422.

STEEL SPRING BOTTOM OILER.

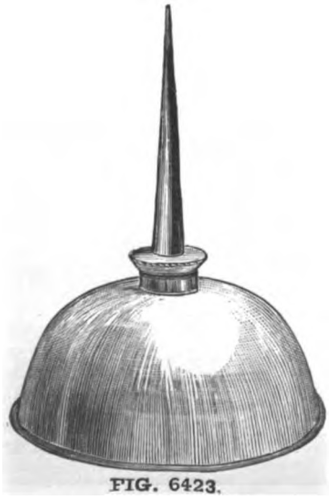


FIG. 6423.

Figs. 6418 to 6422 oilers all have wide mouth and automatic spring bottoms.

PRICES, FIGS. 6418 AND 6419.

No. 10	$5.40	per dozen.
No. 20	6.00	"
No. 30	6.60	"
Extra tubes	1.80	"

Capacity No. 10, 4½ oz. No. 20, 5¼ oz. No. 30, 7½ oz.

PRICES, FIG. 6420.

No. 22	$5.60	per dozen.
No. 44	9.50	"

Capacity of No. 22, 5 oz. No. 44, very large, 12 oz.

PRICES, FIG. 6423.

The body of this oiler is made of the best No. 20 steel, and is stamped and spun from one piece.

The bottom is made of specially prepared spring steel, and is brazed into the body with spelter, and will stand a heat of 1,700 degrees without melting, thus giving a great advantage and superiority over other oilers now in the market, whose bottoms are all put in with soft solder.

The cup is neat and symmetrical in shape, holding half a pint, and will stand almost any abuse.

Price, $7.00 per doz. Extra spouts, $3.00 per doz.

PRICES, FIG. 6421.

	Straight.	Bent.	
No. 10 with 9 inch tubes	$7.00	$7.25	per dozen.
No. 20 " 9 " "	7.50	7.75	"
No. 30 " 9 " "	8.00	8.25	"
Extra 9 " "	3.40	3.75	"

PRICES, FIG. 6422.

	Straight.	Bent.	
No. 22 with 9 inch tubes	$7.25	$7.50	per dozen.
No. 44 " 9 " "	11.00	11.25	"

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STEEL AND BRASS OILERS.

PRICES, FIGS. 6424 AND 6425.

Nos. 12, 13, 120 and 130 have straight spouts or nozzles. Nos. 14, 15, 16, 140, 150 and 160 have bent spouts or nozzles.

No. 12.	Steel oiler;	2¾	inch diameter;	2½	inch nozzle;	per dozen	$4.50
No. 13.	"	3⅜	"	3	"	"	5.50
No. 14.	"	3⅜	"	9	"	"	6.50
No. 15.	"	4¼	"	3	"	"	9.25
No. 16.	"	4¼	"	9	"	"	10.50
No. 120.	Brass oiler;	2¾	"	2½	"	"	6.50
No. 130.	"	3⅜	"	3	"	"	8.00
No. 140.	"	3⅜	"	9	"	"	9.20
No. 150.	"	4¼	"	3	"	"	12.00
No. 160.	"	4¼	"	9	"	"	14.00

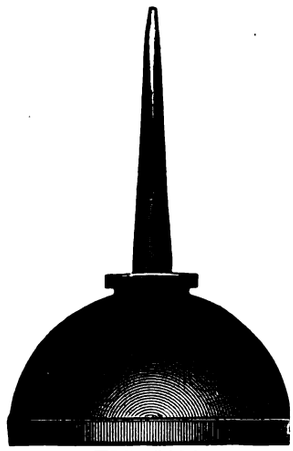


FIG. 6424.

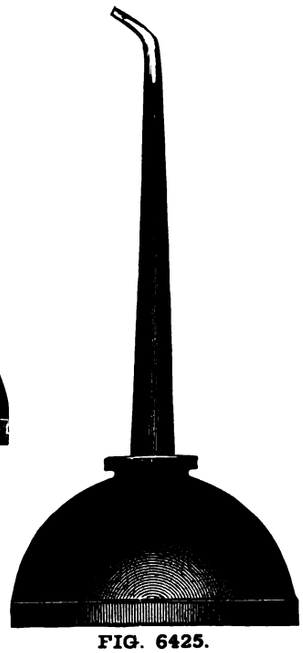


FIG. 6425.

VENTED STEEL AND BRASS OILERS.

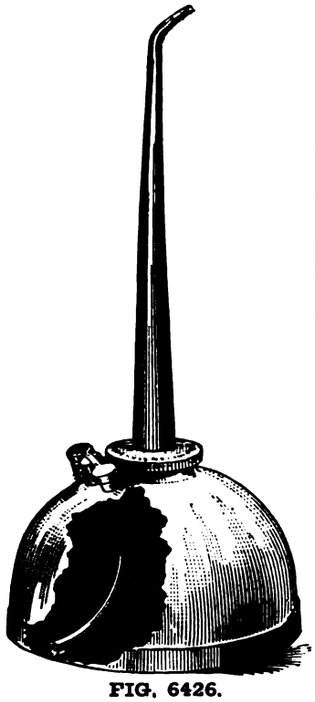


FIG. 6426.

PRICES, FIG. 6426.

By pressing on thumb piece oil will flow freely.

No. 215.	Patent steel oiler;	2¾	inch diameter;	2½	inch nozzle;	per dozen	$5.50
No. 216.	" "	3⅜	"	3	"	"	6.50
No. 217.	" "	3⅜	"	9	"	"	7.50
No. 218.	" "	4½	"	3	"	"	10.25
No. 219.	" "	4¼	"	9	"	"	11.50
No. 220.	Patent brass oiler;	2¾	"	2½	"	"	7.50
No. 221.	" "	3⅜	"	3	"	"	9.00
No. 222.	" "	3⅜	"	9	"	"	10.20
No. 223.	" "	4¼	"	3	"	"	13.00
No. 224.	" "	4¼	"	9	"	"	15.00

BROUGHTON'S EXTRA HEAVY.

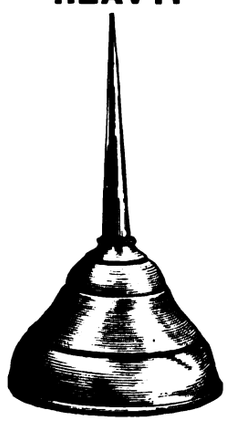


FIG. 6427.

ALL STEEL AND STEEL BRASS BOTTOM OILERS.

PRICES, FIG. 6428.

		All steel.	S. & B. B.
No. 00.	Per gross	$12.00	$15.00
No. 0.	"	15.00	18.00
No. 1.	"	18.00	21.00
No. 1½.	"	21.00	24.00
No. 2.	"	24.00	30.00
No. 3.	"	27.00	36.00
No. 4.	"	33.00	42.00
No. 5.	"	42.00	54.00
No. 6.	"	54.00	66.00

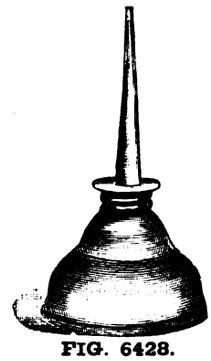


FIG. 6428.

AUTOMATIC OILER.

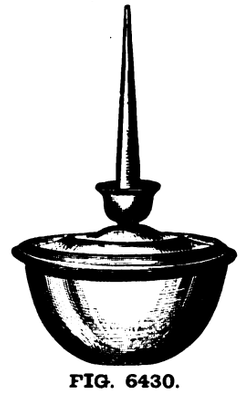


FIG. 6430.

OLMSTEAD'S OILER.

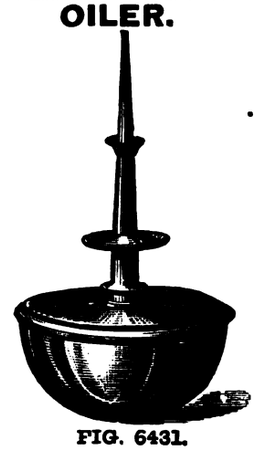


FIG. 6431.

STEEL TIP OILERS.

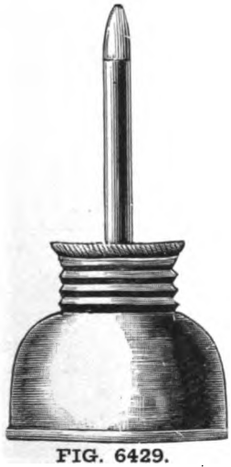


FIG. 6429.

PRICES.

	Tin.	Tin, brass bottom.	Brass.	Tin, br. bot'm steel tip.
No. 1, per doz.	$1.50	$1.75	$3.00	$2.25
No. 2, "	1.60	2.00	3.75	2.75
No. 3, "	2.50	3.00	5.00	3.50

PRICES OF EXTRA SPOUTS.

Tin, 4¼, 40c.; 5½, 45c.; 9, 60c. per dozen.
Brass, 4¼, 60c.; 5½, 75c.; 9, $1.00 per dozen.
Steel tip, $1.00.

PRICES.

ZINC TOP, BRASS BOTTOM.

No. 1.	Per dozen		$2.50
No. 2.	"		3.50
No. 2.	"	with 7 inch spout	3.75
No. 3.	"		4.50
No. 4.	"		6.00
No. 5.	"		7.50

ALL BRASS.

No. 1.	Per dozen		$3.50
No. 2.	"		4.50
No. 2.	"	with 7 inch spout	4.75
No. 3.	"		5.50
No. 4.	"		7.00
No. 5.	"		8.50

PRICES, FIG. 6430.

ZINC.

No. 0.	Stock No. 350;	per dozen			$3.00
No. 1.	"	351	"		3.50
No. 2.	"	352	"		4.00
No. 3.	"	353	"		4.50

BRASS.

No. 0.	Stock No. 354;	per dozen			$5.00
No. 1.	"	355	"		5.50
No. 2.	"	356	"		6.50
No. 3.	"	357	"		7.50

COPPER.

No. 0.	Stock No. 358;	per dozen			$5.25
No. 1.	"	359	"		5.75
No. 2.	"	360	"		6.75
No. 3.	"	361	"		7.75

PRICES.

TIN.

No. 00.		per dozen	$5.50
No. 0.	Long bent spout	"	4.75
No. 0.	For engineers, etc	"	4.50
No. 1.	Machinist's size	"	4.00
No. 2.	" "	"	3.50
No. 3.	Sewing machine size	"	3.00

ZINC.		BRASS.	
No. 00.	Per doz., $7.50	No. 00.	Per doz., $9.00
No. 0.	" 5.00	No. 0.	" 7.50
No. 1.	" 4.25	No. 1.	" 6.50
No. 2.	" 3.50	No. 2.	" 5.50
No. 3.	" 3.00	No. 3.	" 5.00

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CHASE'S MACHINE OILERS.

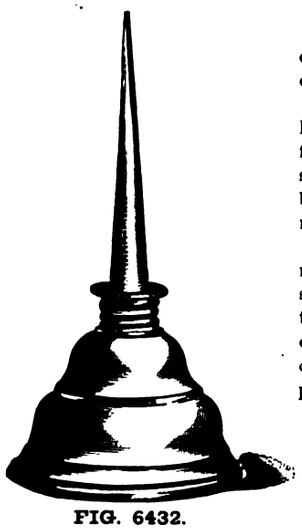


FIG. 6432.

First.—The spun screw has a coarse round thread, which causes it to work easily.

Second.—The opening being larger, it can be more easily filled, and the thread of the screw is less liable to strip or become bruised, in either case making the oiler useless.

Third.—The tube of the oiler running down through and inside of the screw prevents the tube from breaking off, as in other oilers, which depend only on solder to hold them in their place.

EXTRA SPOUTS FOR ABOVE OILERS.

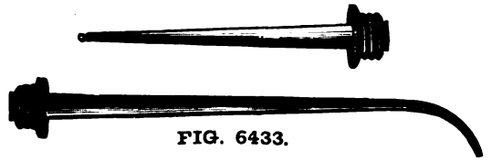


FIG. 6433.

PARACON OILERS.



FIG. 6434.

PRICES, SPOUTS FOR FIG. 6434.

	Per gross.		Per gross.
No. 0	$3.75	No. 3	$4.75
" 1	4.00	" 4	5.00
" 1½	4.25	" 5	5.50
" 2	4.50	" 6	6.00

	Straight.	Bent.
7 inch	$6.75	$7.00
8 "	7.25	7.50
9 "	7.75	8.25
10 "	8.75	9.25

BRASS SPOUTS, FOR BRASS AND COPPER PARACON OILERS.

	Per gross.		Per gross.
No. 0	$4.00	No. 3	$6.25
" 1	4.50	" 4	7.00
" 1½	4.75	" 5	7.75
" 2	5.50	" 6	8.25

	Straight.	Bent.
7 inch	$9.00	$9.25
8 "	10.00	10.25
9 "	11.00	11.50
10 "	12.50	13.00

TIN OILERS. PRICES, FIG. 6435.

	Per dozen.
No. 0, stock No. 303	$1.25
" 1, " " 73	1.50
" 2, " " 74	2.00
" 3, " " 75	2.25
" 4, " " 76	2.75

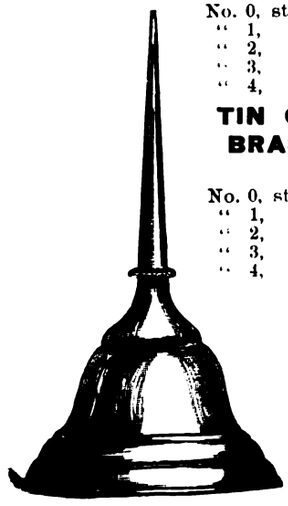


FIG. 6435.

TIN OILERS, WITH BRASS BOTTOMS.

PRICES.

No. 0, stock No. 306	$1.50
" 1, " " 77	1.75
" 2, " " 78	2.50
" 3, " " 79	3.00
" 4, " " 80	3.50



FIG. 6436.

ZINC OILERS, WITH TIN BOTTOMS.

PRICES, FIG. 6432.

	Per dozen.		Per dozen.
No. 00, stock No. 100	$1.00	No. 3, stock No. 105	$2.25
" 0, " " 101	1.25	" 4, " " 106	2.75
" 1, " " 102	1.50	" 5, " " 107	3.50
" 1½, " " 103	1.75	" 6, " " 108	4.50
" 2, " " 104	2.00		

ZINC OILERS, WITH BRASS BOTTOMS.

PRICES.

No. 00, stock No. 110	$1.25	No. 3, stock No. 115	$3.00
" 0, " " 111	1.50	" 4, " " 116	3.50
" 1, " " 112	1.75	" 5, " " 117	4.50
" 1½, " " 113	2.00	" 6, " " 118	5.50
" 2, " " 114	2.50		

BRASS OILERS.

PRICES.

No. 0, stock No. 120	$2.25	No. 3, stock No. 124	$4.00
" 1, " " 121	2.50	" 4, " " 125	4.75
" 1½, " " 122	3.00	" 5, " " 126	6.00
" 2, " " 123	3.50	" 6, " " 127	7.50

COPPER OILERS.

PRICES.

No. 0, stock No. 130	$2.50	No. 3, stock No. 134	$4.25
" 1, " " 131	2.75	" 4, " " 135	5.00
" 1½, " " 132	3.25	" 5, " " 136	6.25
" 2, " " 133	3.75	" 6, " " 137	8.00

EXTRA SPOUTS.

ZINC.

BRASS AND COPPER.

PRICES.

	Per gross.		Per gross.
No. 00	$3.50	No. 3	$4.75
" 0	3.50	" 4	5.00
" 1	4.00	" 5	5.50
" 1½	4.25	" 6	6.00
" 2	4.50		

	Straight.	Bent.
7 inch	$6.50	$7.00
8 "	7.75	8.25
9 "	8.25	8.75
10 "	9.00	9.50

	Per gross.		Per gross.
No. 0	$4.00	No. 3	$6.25
" 1	4.50	" 4	7.25
" 1½	4.75	" 5	8.25
" 2	5.50	" 6	9.25

	Straight.	Bent.
7 inch	$10.25	$10.75
8 "	11.25	11.75
9 "	12.75	13.25
10 "	14.50	15.00

ZINC OILERS, WITH TIN BOTTOMS.

PRICES, FIG. 6434.

	Per dozen.		Per dozen.
No. 0, stock No. 140	$2.00	No. 3, stock No. 144	$3.25
" 1, " " 141	2.25	" 4, " " 145	3.75
" 1½, " " 142	2.50	" 5, " " 146	4.50
" 2, " " 143	3.00	" 6, " " 147	5.50

ZINC OILERS, WITH BRASS BOTTOMS.

PRICES.

No. 0, stock No. 150	$2.25	No. 3, stock No. 154	$4.00
" 1, " " 151	2.50	" 4, " " 155	4.50
" 1½, " " 152	3.00	" 5, " " 156	5.50
" 2, " " 153	3.50	" 6, " " 157	6.50

BRASS OILERS.

PRICES.

No. 0, stock No. 160	$3.00	No. 3, stock No. 164	$5.25
" 1, " " 161	3.50	" 4, " " 165	6.00
" 1½, " " 162	4.00	" 5, " " 166	7.00
" 2, " " 163	4.50	" 6, " " 167	8.50

COPPER OILERS.

PRICES.

No. 0, stock No. 170	$3.25	No. 3, stock No. 174	$5.50
" 1, " " 171	3.75	" 4, " " 175	6.25
" 1½, " " 172	4.25	" 5, " " 176	7.25
" 2, " " 173	4.75	" 6, " " 177	8.75

MOWING MACHINE OILERS.

PRICES, FIG. 6436.

ROUND ZINC.

Stock No. 208 ..... Per gross, $21.00



FIG. 6437.

	Per gross.
In boxes, 3¾ inches diameter, stock No. 206	$20.00
" bulk, 3¾ " " " " 206	18.00
" boxes, 3 " " " " 207	19.50
" bulk, 3 " " " " 207	17.50

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PERFECTION OILERS.

The ball valve is intended to give vent, and to carry all drippings on outside of spout back into can, thus keeping outside perfectly clean. It is easily cleaned out and filled, requires no funnel, and has, what is often a great convenience, a reversible spout, which can be instantly changed to any position desired.

PRICES, FIGS. 6438 AND 6439.

	Tin, straight.	Tin, flaring.	Brass, flaring.	Brass, straight.	Copper, straight.
No. 1, 8 in. spout, per dozen...	$2.90	$3.75	$11.00	$9.25	$10.00
No. 2, 8 " " ...	3.25	4.25	13.75	11.75	12.50
No. 3, 8 " " ...	3.75	4.75	15.75	12.50	13.50

SPECIAL OILERS.

MILL OILER.

No. 2, heavy tin, wired bottoms, straight $5.40
No. 3, " " " 5.75
No. 1, " " flaring 5.25
No. 2, " " " 6.00

	Tin.	Brass.
Extra spouts or fillers, 8 in. long, doz....	$0.85	$1.25
" " 10 " " ...	1.00	1.75
" " 15 " "	1.15	1.90
" " 18 " " ...	1.25	2.25
" " 21 " "	1.50	2.50

The capacity of these oilers is about as follows: No. 1, pt.; No. 2, 1½ pts.; No. 3, 2 pts. Put up ½ doz. in box. All cans on list have 8 in. spouts. If longer are desired, deduct price of 8 in. spout and add cost of spout required.

PRICES, FIG. 6440.

With bent or straight spouts, pints, per dozen..$12 00
" " " quarts, " .. 13.00
" " " half gals., " .. 16.00
" " " extra spouts" .. 6.00



FIG. 6440.

MACHINE OILERS.

FLARING. **STRAIGHT.**

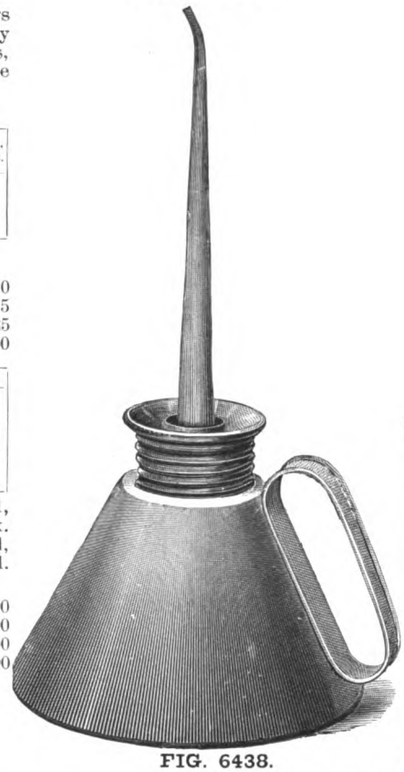


FIG. 6438.

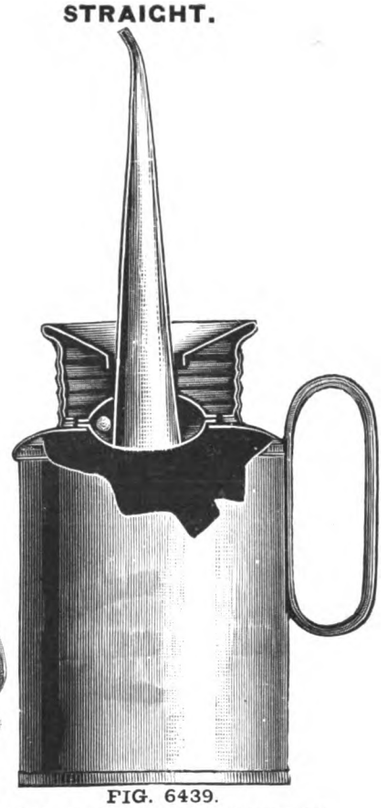


FIG. 6439.

SYPHON. **THOMPSON'S.** **SYPHON.**



FIG. 6441.

Round, with straight or bent spouts.

PRICES,

1 pint, round spring bottom, stock No. 210,

PER GROSS, $21.00.

PRICES, STEEL.

Dimensions same as brass.

NO. 10, PER DOZ., $14.00.

NO. 11, PER DOZ., $18.00.

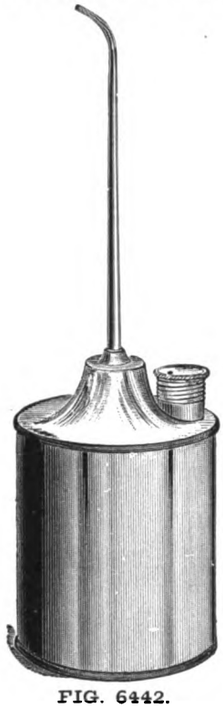


FIG. 6442.

Dripping oiler, no handles,

PRICES,

PER DOZ., $2.25.

With handles and bent spouts,

PRICES,

PER DOZ., $2.75.

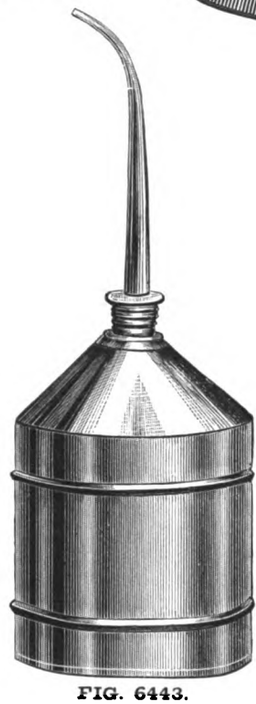


FIG. 6443.

Oval, with straight or bent spouts.

1 pint oval spring bottom,

PRICES,

PER GROSS, $22.00.

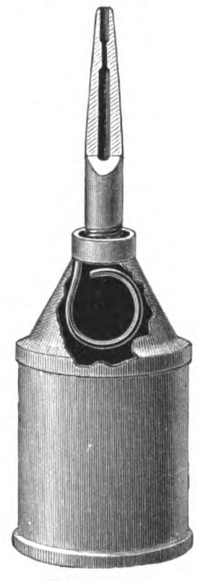


FIG. 6444.

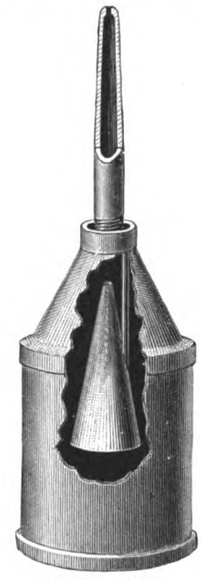


FIG. 6445.

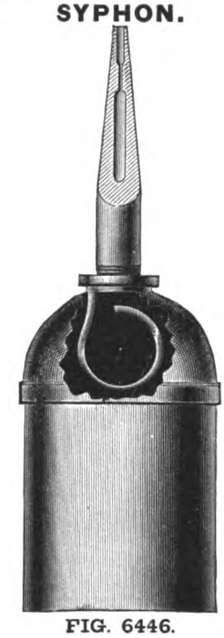


FIG. 6446.

PRICES, FIG. 6445.

3½ in. high, ¼ pint, "small," shape of tube varied to suit, per grs. $33.00
4½ " ½ " "medium," " " " " . 36.00
5½ " 1 " "large," " " " " . 39.00

PRICES, FIG. 6446.

No. 1, 4½ in. high, 2½ in. diam., 3½ in. tube, per gross..... $48.00
No. 2, 5 " 2 11/16 " 4 " " 52.00
No. 3, 5 " 3⅜ " 10 " " 80.00

No. 3 has bent tube.

PRICES, FIG. 6444.

3½ in. high, ¼ pint, "small," per gross..... $33.00
4½ " ½ " "medium," " 36.00
5½ " 1 " "large," " 39.00

Shape of tube varied to suit.

STEEL OR BRASS RAILROAD OILERS.

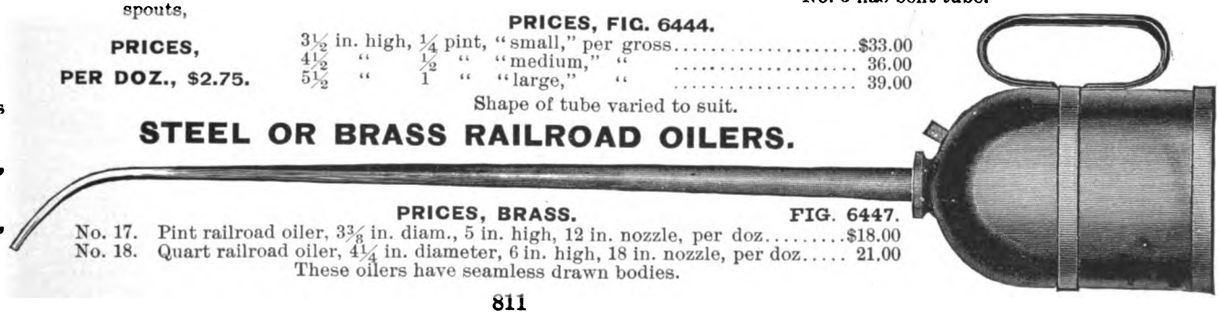


FIG. 6447.

PRICES, BRASS.

No. 17. Pint railroad oiler, 3⅜ in. diam., 5 in. high, 12 in. nozzle, per doz..... $18.00
No. 18. Quart railroad oiler, 4¼ in. diameter, 6 in. high, 18 in. nozzle, per doz..... 21.00

These oilers have seamless drawn bodies.

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HORIZONTAL LOCOMOTIVE OILERS.

PERFECTION.

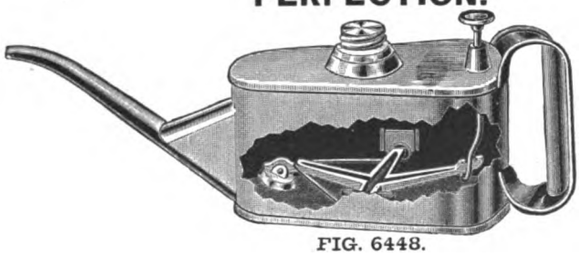


FIG. 6448.

PRICES.

No.	Capacity.	Length spout.	Tin.	Brass.
23	¼ pint.	3½ inches.	$7.00 per doz.	$10.00 per doz.
25	½ "	4½ "	8.00 "	12.00 "
27	1 "	6 "	9.00 "	13.50 "
29	1½ "	7 "	10.00 "	15.00 "
31	1 quart.	8 "	12.00 "	18.00 "

For extra length of spout, 50 cents per dozen, net.

ENGLISH PATTERN.

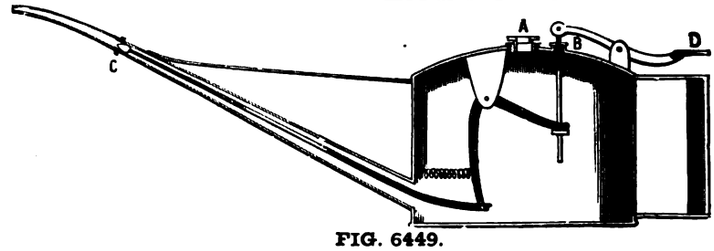


FIG. 6449.

PRICES.

	Per doz.		Per doz.
1 pint, brass, with valve	$36.00	1 pint, brass, no valve	$24.00
2 " " "	48.00	2 " " "	36.00
1 " tin, "	24.00	1 " tin, "	12.00
2 " " "	33.00	2 " " "	21.00

BRASS OR STEEL OIL FILLERS.



FIG. 6450.

PRICES.

		Per doz.
No. 19.	Pint steel fillers, 4½ inch diameter, 3½ inch high, screw top,	$14.00
" 21.	1½ pint steel fillers, 4¾ inch diameter, 4 " " " "	17.00
" 22.	Quart " " 5 " " 5 " " " "	20.00
" 23.	2 quart " " 6 " " 6 " " " "	24.00
" 190.	1½ pint brass " 4¾ " " 4 " " " "	22.00
" 200.	Quart " " 5 " " 5 " " " "	30.00
" 205.	2 " " " 6 " " 6 " " " "	34.00

ZINC OIL FILLER.



FIG. 6451.

PRICES, FIG. 6451.

	Per doz.
1 gill, stock No. 731	$3.00
½ pint, " 732	3.50
1 " " 733	4.00
1½ " " 734	5.00
1 quart, " 735	6.00

BRASS OR COPPER OIL FILLER.



FIG. 6452.

PRICES.

	Per doz.
1 pint, screw top	$12.00
1½ " " "	14.00
2 " " "	16.00
3 " " "	20.00
4 " " "	24.00

With long spouts, extra, $3.00 per dozen.

TALLOW POTS.



FIG. 6453.

PRICES, FIG. 6454.

	Per doz.
No. 212. Quart, 5 in. diam	$21.00
" 213. 2 " 6 " high	25.00

These tallow pots are made of very heavy stock and have a very large spout, and two inch filling opening, with tapered metal plug attached to the handle by a chain.

TALLOW POT.



FIG. 6455.

BRASS OR COPPER OIL FILLER.



FIG. 6454.

PRICES.

	Per dozen.
Pint, brass, stock No. 233	$12.00
1½ pint, " " 234	18.00
Quart, " " 235	21.00
Pint, " with long spout	15.00
Quart, " " "	24.00
Pint, copper, stock No. 230	12.00
1½ pint, " " 231	18.00
Quart, " " 232	21.00
Pint, " with long spout	15.00
Quart, " " "	24.00

PRICES, FIG. 6455.

	Per doz.
2 quart XXXX tin, copper spout	13.00
2 quart XX tin tallow pots, tin spouts	10.00

TALLOW POTS.



FIG. 6456.

PRICES.

	Per doz.
1 quart, brass or copper	$18.00
2 " " "	24.00
3 " " "	30.00
4 " " " with bail	42.00
1 " tin	9.00
2 " "	12.00
3 " "	18.00
4 " " with bail	24.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ENGINEERS' OILER SETS, TRAYS AND DRAINERS.



FIG. 6457.

SIZE, 16 1-2 X 11 1-2, INSIDE.

No. 2. Oval tray, 5 pieces, in brass—3 oilers, 2 cans.

PRICE, EACH, $12.00.

Nickel-plating, extra, $2.00.



FIG. 6459.

SIZE, 14 X 9, INSIDE.

No. 5½. Square tray, 4 pieces, in brass—2 oilers, 1 lamp, 1 can.

PRICE, EACH, $14.00.

Nickel-plating, extra, $1.75.

NO DRAINERS. OVAL FLAT PAN.

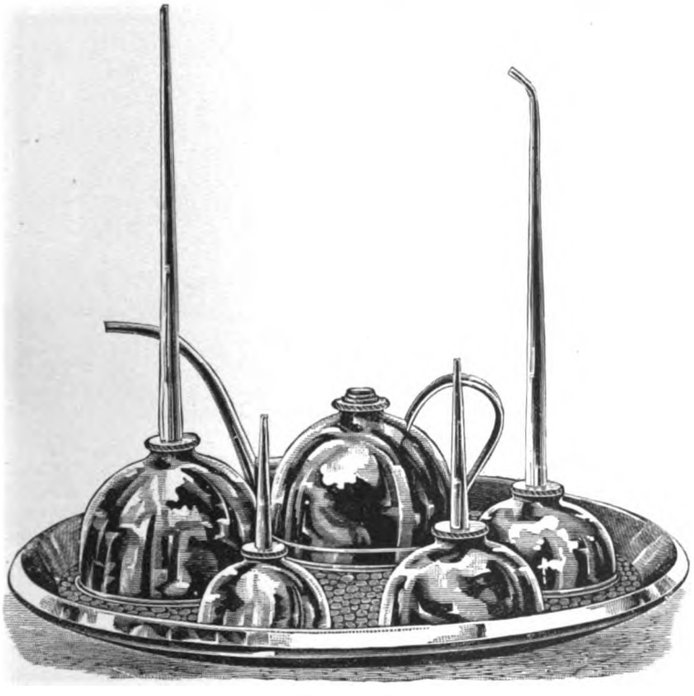


FIG. 6461.

No. 30.	Five pieces, brass, counting tray		$6.00
No. 40.	Six " " " "		9.00
No. 50.	Five " nickel, " "		8.00
No. 60.	Six " " " "		11.00

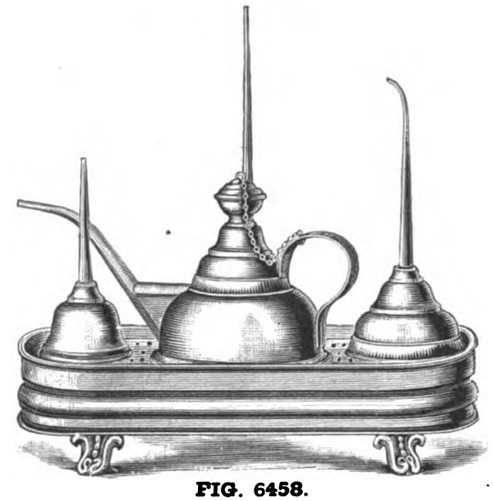


FIG. 6458.

SIZE, 14 1-2 X 8, INSIDE.

No. 3. Oblong tray, 3 pieces, in brass—2 oilers, 1 can.

PRICE, EACH, $8.00.

Nickel-plating, extra, $1.50.



FIG. 6460.

SIZE, 17 1-2 X 11, INSIDE.

No. 6. Square tray, 5 pieces, in brass—3 oilers, 2 cans.

PRICE, EACH, $16.00.

Nickel-plating, extra, $2.00.

NO DRAINERS. OVAL FLAT PAN.



FIG. 6462.

SIZE, 11 X 13 AND 13 X 16, INSIDE.

4 piece set—1 filler and 3 oil cans, in brass			each, $6.00
4 " 1 " 3 "	nickel-plated	"	10.00
5 " 1 " 4 "	brass	"	7.00
5 " 1 " 4 "	nickel-plated	"	12.00

These engineers' sets are made of heavy brass.

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CAN SCREW TOPS.



FIG. 6463.

ZINC.

	Per gross.		Per gross.
½ inch, stock No. 50	$4.00	1¼ inch, stock No. 54	$12.00
¾ " " 51	4.50	1¾ " " 55	16.00
1 " " 52	6.00	2 " " 56	20.00
1¼ " " 53	8.00		

BRASS.

	Per gross.		Per gross.
½ inch, stock No. 57	$4.50	1½ inch, stock No. 61	$13.00
¾ " " 58	5.50	1¾ " " 62	17.00
1 " " 59	7.50	2 " " 63	21.00
1¼ " " 60	10.00		

PARAGON OILER SETS.



PRICES, FIG. 6464.

	Per set.		Per set.
Copper, stock No. 250	small, $7.00	Stock No. 251	large, $8.00
Brass, " 252	" 6.00	" 253	" 7.00
Nickel-plated, " 254	" 10.00	" 255	" 12.00

Small set contains 4 pieces; large set, 5. Trays, 11 x 13½ and 13 x 16.

KEROSENE SCREW TOP CANS.



FIG. 6465.

PRICES, FIG. 6465.

½ gallon, with bail and handle, screw top	each, $2.50
1 " " " " "	" 4.00
2 " " " " "	" 6.00
3 " " " " "	" 9.00
4 " " " " "	" 12.00

SEAMLESS STEEL OIL CANS.



FIG. 6471.

This can is made from two drawn-steel parts, welded in the center, making a seamless bottom. No oil can is perfect unless it produces a ready and constant flow. This is secured by our patent siphon vent, doing away with the necessity of removing the screw cap and the liability of spilling the oil.

PRICES.

	Per doz.
2 quarts	$7.50
4 quarts	9.00

Packed securely one dozen in a crate.

KEROSENE CANS.

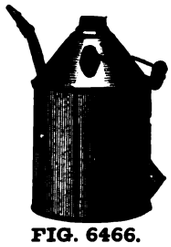


FIG. 6466.

PRICES.

Quarts, 1...$5.00
2... 5.85
4... 7.50
4 ix 10.00

JOURNAL CANS.

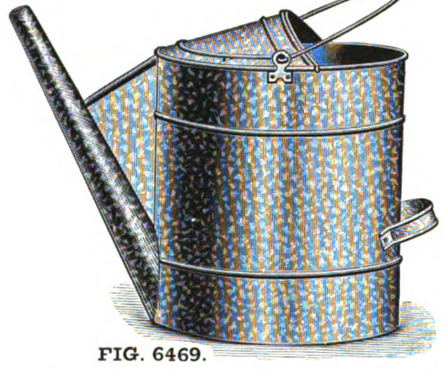


FIG. 6469.

Made of best bloom galvanized iron, well riveted and soldered, with strong handles.

PRICE.

5 gallon journal cans .....per dozen, $13.00

KEROSENE CANS.

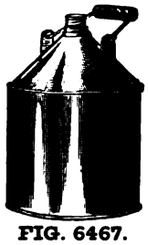


FIG. 6467.

PRICES.

Gallons, 1...$7.50
2....12.50
3....15.00
5....22.90
10....41.75

GAUGE COCK DRIPS.

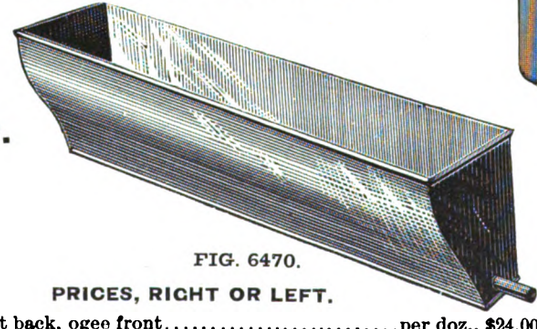


FIG. 6470.

PRICES, RIGHT OR LEFT.

No. 1. Flat back, ogee front.....per doz., $24.00
No. 2. Ogee front and back..... " 36.00
Nickel-plating, extra, each, 75 cents.

GALVANIZED OIL CANS.



FIG. 6468.

PRICES, FIG. 6468.

Gallon.	Diameter.	Height body.	Height cone top.	Each.
1	6¼ in.	7 in.	2½ in.	$2.30
2	8 "	9 "	2¾ "	2.40
3	9 "	10 "	3 "	2.80
5	10¾ "	12 "	3½ "	3.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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WASTE OIL FILTERS AND OIL TANKS.

ECONOMY.

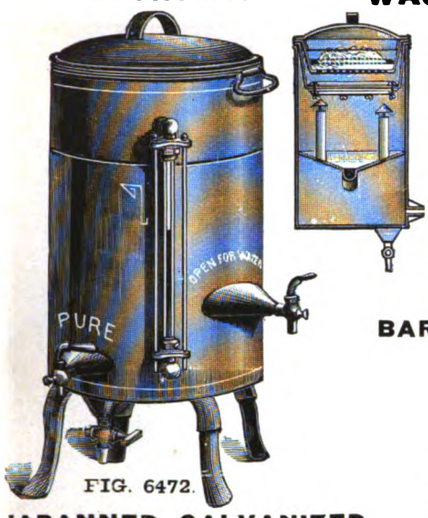


FIG. 6472.

PRICES, FIG. 6476.

No.	Storage capacity.	Filtering capacity.	Prices.
X	3½ gallons.	2 to 2½ gals. per day.	$14.00
0	12 "	5 " 7 " " "	20.00
1	1 barrel.	7 " 10 " " "	30.00
2	1 "	14 " 18 " " "	40.00
3	1½ "	20 " 25 " " "	50.00
4	2 "	25 " 30 " " "	60.00

PRICES, FIG. 6472. IN 2 SIZES.

The smallest, 13 x 22 inches—capacity 12 gallons—will filter from 3 to 5 gallons of oil in 24 hours.....Price, $40.00
The largest, 26 x 30 inches—capacity 1 bbl.—will filter from 10 to 20 gallons in the same time.....Price, $60.00

BARREL OIL PUMP.

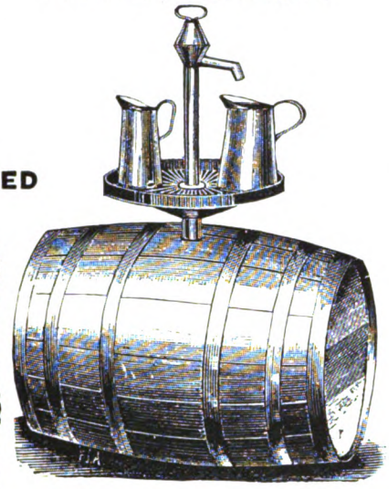


FIG. 6474. PRICE, $2.50.

ROBERTSON'S FILTER.

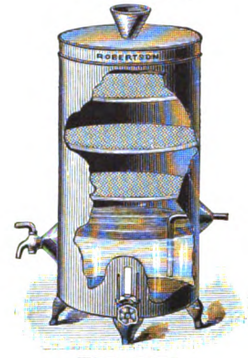


FIG. 6475.
PRICE, $15.00.

TRACY'S.

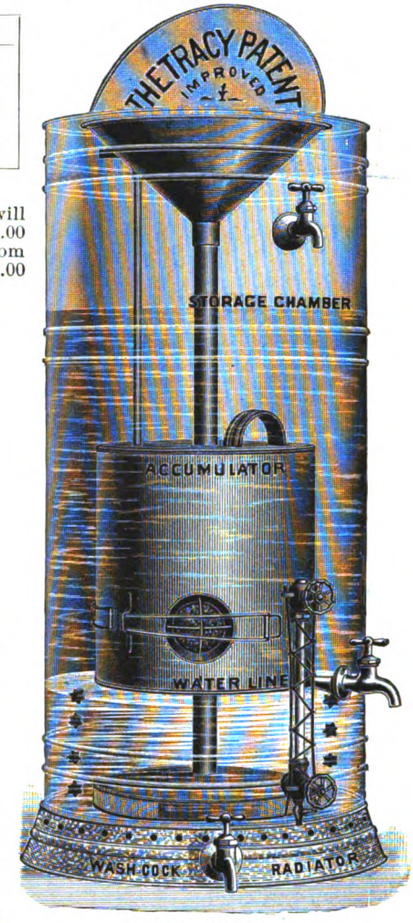


FIG. 6476.

JAPANNED, GALVANIZED OR TIN.

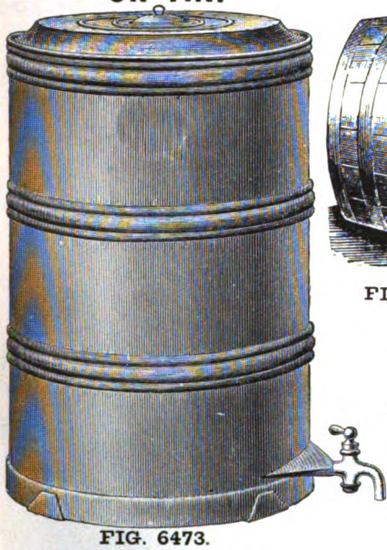


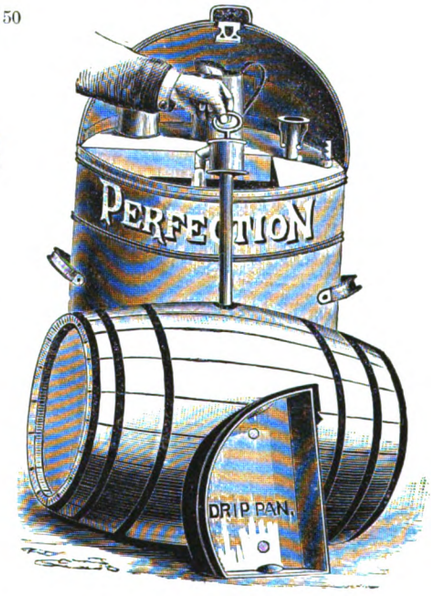
FIG. 6473.

PRICES, FIG. 6473.

IXXXX TIN CYLINDER. NO. 18 CAUCE STEEL BOTTOM, BRASS COCK.

Capacity.	Diameter.	Height.		Tin.	Galv'd.	Japanning extra.
15 gallon,	14	in. x 24 in.	each,	$5.00	$6.25	
20 "	15¼	" x 27 "	"	5.75	7.00	
30 "	18⅛	" x 28 "	"	6.75	8.00	
40 "	18⅛	" x 37 "	"	7.75	9.00	$1.50
50 "	18⅛	" x 45 "	"	8.00	9.25	
60 "	20½	" x 43 "	"	9.25	10.50	
80 "	22½	" x 48 "	"	10.25	11.50	
100 "	22½	" x 60 "	"	12.25	13.50	

PERFECTION.



PRICES, FIG. 6480.

No.				
0,	6	gallons	.....	$5.00
00,	12	"	.....	6.00
000,	25	"	.....	7.50
1,	60	"	.....	10.50
2,	120	"	.....	16.50
3,	150	"	.....	21.00
4,	200	"	.....	24.00
5,	250	"	.....	28.00

W. & B. TANKS.



PRICES, FIG. 6477.

A TANKS.



PRICES, FIG. 6478.

60	gallons	.....	$9.75
120	"	.....	15.50
150	"	.....	20.00
200	"	.....	22.50
250	"	.....	25.00

H TANKS.



PRICES, FIG. 6479.

Tank open and in use.

32	gallons	.....	$6.00
55	"	.....	7.50
60	"	.....	8.50
120	"	.....	15.50

0,	6	gallons	..... $5.00
00,	12	"	..... 6.00
000,	25	"	..... 7.50
1,	60	"	..... 12.00
2,	100	"	..... 18.00
3,	150	"	..... 24.00
4,	200	"	..... 30.00
5,	250	"	..... 33.00

EXTRAS. Set of measures (4) and funnel..... $1.50 Brass padlock and stop-cock for filling oilers.... $1.25

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SAFETY OIL CABINETS.

STORE CABINETS.

60 GALLON.



FIG. 6481.

120 GALLON DOUBLE, 60 GALLONS ON EACH SIDE.

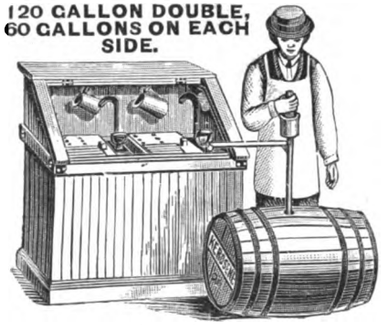


FIG. 6482.

Each store cabinet is supplied with a tin pump for pumping the oil from the barrel into the cabinet, or four feet of rubber tubing for syphoning the oil from the barrel into the cabinet, as preferred; also a full set of measures.

PRICES, FIGS. 6481 AND 6482.

Gallons.	Prices.	No. of compartments.	Capacity.	Size, in inches.
25	$20.00	..	41 inches high.	20 x 22
60	25.00	1	For 1 barrel.	22 x 31
110	35.00	1	" 2 "	26 x 41
120	45.00	2	" 2 "	26 x 49
160	40.00	1	" 3 "	28 x 53
170	50.00	2	" 3 "	28 x 57
180	60.00	3	" 3 "	26 x 71
210	45.00	1	" 4 "	34 x 56
220	55.00	2	" 4 "	34 x 60
260	50.00	1	" 5 "	34 x 69
270	60.00	2	" 5 "	34 x 71
300	90.00	5	" 5 "	36 x 82

FACTORY CABINETS.

60 GALLON.

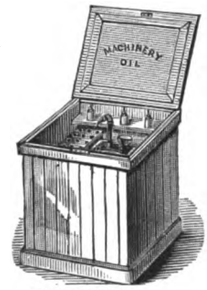


FIG. 6483.

3 BBL. IN 3 PARTS—ONE FOR KEROSENE.



FIG. 6484.

Each factory cabinet is supplied with a tin pump for pumping the oil from the barrel into the cabinet, or four feet of rubber tubing for syphoning the oil from the barrel into the cabinet, as preferred.

PRICES, FIGS. 6483 AND 6484.

Gallons.	Prices.	No. of compartments.	Capacity.	Size in inches.
25	$20.00	1	32 inches high.	22 x 22
60	25.00	1	For 1 barrel.	26 x 28
110	35.00	1	" 2 "	26 x 47
120	45.00	2	" 2 "	26 x 52
160	40.00	1	" 3 "	26 x 66
170	50.00	2	" 3 "	28 x 64
180	60.00	3	" 3 "	26 x 76
210	45.00	1	" 4 "	30 x 73
220	55.00	2	" 4 "	30 x 77
260	50.00	1	" 5 "	30 x 89
270	60.00	2	" 5 "	30 x 94
300	90.00	5	" 5 "	30 x 106

SELF-CLOSING COVER OIL WASTE CANS.



FIG. 6485.

PRICES, FIG. 6485.

11¼ in. diam. x 15 in. high, per doz., $18.00.

Special sizes made to order.

ROUND.			RECTANGULAR.			
Diam.	Height.	Per doz.	Length.	Width.	Depth.	Per doz.
12 in.	x 18 in.,	$24.00	20 in.	x 15 in.	x 20 in.,	$70.00
13 "	x 20 "	28.00	20 "	x 18 "	x 24 "	90.00
14 "	x 22 "	36.00	24 "	x 20 "	x 30 "	132.00
16 "	x 24 "	42.00	26 "	x 22 "	x 30 "	140.00
18 "	x 26 "	56.00	28 "	x 24 "	x 34 "	170.00
20 "	x 30 "	90.00	30 "	x 24 "	x 36 "	190.00
24 "	x 36 "	130.00				

The "iron clad" oil waste cans are made without the use of solder and are galvanized after being put together. They are recommended by the leading insurance companies.

WASTE BASKET OR WALL POCKET.

PRICES, FIG. 6486.

No. 1. Brass, each..... ....$2.00
No. 2. " " 2.75
No. 3. " " 3.00

Nickel-plating, Nos. 1 and 2, each, 50c.; No. 3, each, 75c.

INSIDE MEASUREMENT OF POCKET.

No. 1. 5¾ x 3 in., 5½ deep.
No. 2. 6¾ x 3 " 5½ "
No. 3. 7 x 3½ " 7 "

Special kinds or sizes made to order, and made to fit room spaces.

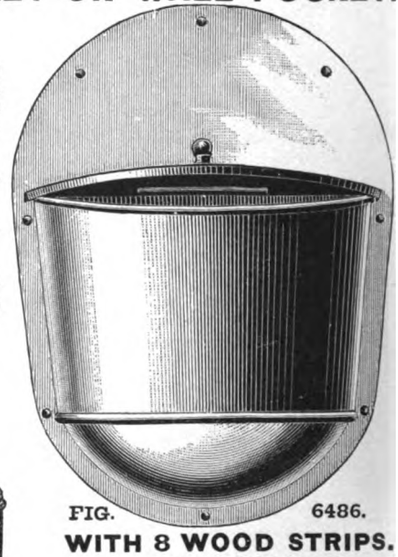


FIG. 6486.

GALVANIZED ASH CANS.

WITH HEAVY BAIL.



FIG. 6487.

PRICES.

No.	Inches.	Each.	With 8 wood straps on side.		
			No.	Inches.	Each.
2½	14 x 19	$5.50			
3	15 x 26	6.50	7	15 x 26	$7.25
4	17 x 26	7.25	8	17 x 26	8.00
5	18 x 26	7.50	9	18 x 26	8.25
6	20 x 26	8.50	10	20 x 26	9.25

ELEVATED R. R. PATTERN.

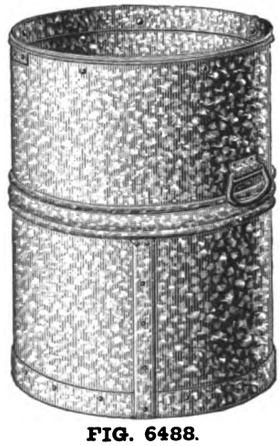


FIG. 6488.

Made of No. 16 gauge steel; weight, 60 lbs.

PRICE.

Size, 18 x 25 in., each.....$15.00

PLAIN.



FIG. 6489.

PRICES.

No.	Inches.	Each.
2½	14 x 19	$4.00
3	15 x 26	4.50
4	17 x 26	5.25
5	18 x 26	5.50
6	20 x 26	6.50

WITH 8 WOOD STRIPS.

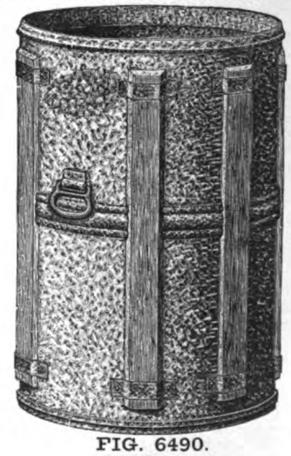


FIG. 6490.

PRICES.

No.	Inches.	Each.	No.	Inches	Each.
7	15 x 26	$5.25	9	18 x 26	$6.25
8	17 x 26	6.00	10	20 x 26	7.25

COVERS FURNISHED. PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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CALVANIZED PAILS.

NO. 1.

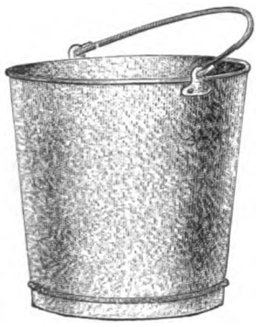


FIG. 6491.

PRICES.

7 quart,	per	dozen..	$4.75
10	"	"	5.50
12	"	"	6.00
14	"	"	6.25
16	"	"	7.50

NO. 2.



FIG. 6492.

PRICES.

10 quart,	per	dozen.....	$5.50
12	"	"	6.00
14	"	"	6.25
16	"	"	7.50
20	"	"	16.00

EXTRA HEAVY.

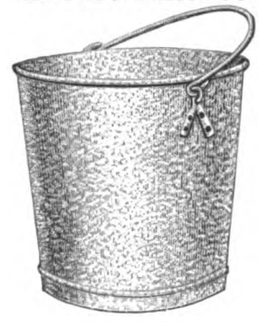


FIG. 6493.

PRICES.

Heavy wrought iron ears. Bottom re-enforced with band iron straps.

14 quart, per dozen..$12.00

FIRE BUCKET.



FIG. 6494.

PRICES.

10 quart,	per	dozen....	$4.50
12	"	"	5.00
14	"	"	5.50

ROUND BOTTOM.



FIG. 6495.

PRICES.

10 quart,	per	dozen.....	$6.75
12	"	"	7.25
14	"	"	7.50

WROUGHT IRON KETTLE EARS.

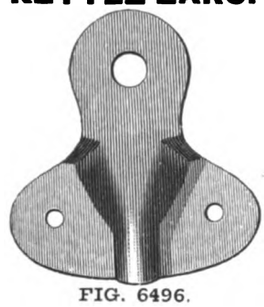


FIG. 6496.

PRICES, FIG 6496.

Nos.	Per gross pairs.
0	$0.50
1	.60
2	.80
3	1.00
4	1.25
5	1.75
6	2.00
7	2.25

MALLEABLE IRON TINNED KETTLE EARS.

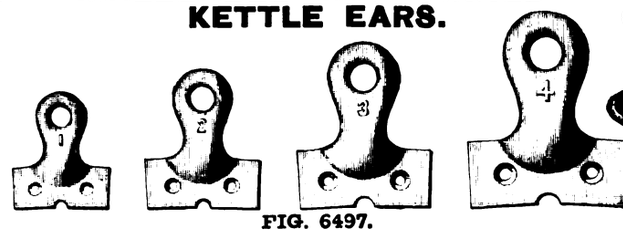


FIG. 6497.

PRICES.

Nos.	1	2	3	4
Weight per gross, lbs.	18	22	42	66
Per lb.	$0.15	.15	.15	.15

Case lots, 100 lbs., cts. per lb., net.

COVERS FOR GALVANIZED PAILS.



FIG. 6498.

PRICES.

10 quart,	per	dozen..	$2.00
12	"	"	2.50
14	"	"	2.50
16	"	"	3.00
20	"	"	4.00

INDURATED WARE.

WATER COOLER.

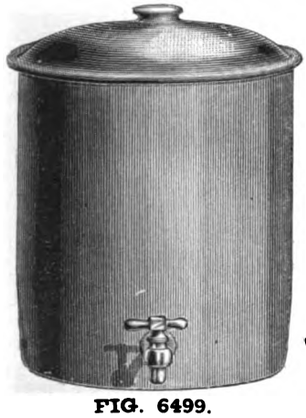


FIG. 6499.

PRICES, FIG. 6499.

3 gallon, 9 in. diameter, 11 in. deep, $32.00 per doz.; $2.70 each.

4 gallon, 10 in. diameter, 12 in. deep, $40.00 per doz.; $3.35 each.

5 gallon, 10½ in. diameter, 13 in. deep, $44.00 per doz.; $3.70 each.

8 gallon, 12 in. diameter, 16 in. deep, $64.00 per doz.; $5.35 each.

12 gallon, 14½ in. diameter, 18¾ in. deep, $96.00 per doz.; $8.00 each.

15 gallon, 14½ in. diameter, 22½ in. deep, $120.00 per doz.; $10.00 each.

PRICES, FIG. 6500.

8½ in. deep, 11 in. diameter, capacity about 12 quarts. Packed ½ doz. in a crate. $5.40 per doz.; 45c. each.

STANDS.



FIG. 6503.

PRICES.

No. 14.	each,	$10.00
No. 15.	"	11.25
No. 16.	"	12.50

WATER COOLER DRAINERS.

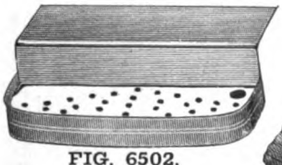


FIG. 6502.

PRICES.

Small, per doz.	$20.00
Large, " "	25.00

PRICES, FIG. 6504.

WATER COOLERS.

Japanned and ornamented, with plated faucets, galvanized inside.

Gallons..	1½	2	3
Each....	$1.75	2.00	2.25
Gallons..	4	6	8
Each....	$2.75	3.75	5.50
Gallons..	10	12	14
Each....	$6.50	10.00	13.00
Gallons....	16		18
Each.....	$15.00		17.50

TIN WATER COOLERS.



FIG. 6504.

STAR PAILS.



FIG. 6500.

FIRE PAILS.



FIG. 6501.

PRICES, FIG. 6501.

11 in. deep over all, 11 in. diam., capacity about 12 qts. Packed 1 doz. in crate, $7.80 per doz.; each, 65c.

Shelves for two pails each, complete with brackets and screws.....each, 60c.

Shelves for three pails each, complete with brackets and screws.....each, 70c.

Shelves for four pails each, complete with brackets and screws.....each, 80c.

PRICES, FIG. 6505.

ENAMELED WATER COOLERS.

No. 22,	2 gal.	each,	$15.00
No. 33,	3 "	"	18.00
No. 44,	4 "	"	21.00
No. 66,	6 "	"	25.00
No. 88,	8 "	"	30.00
No. 1010,	10 gal..	"	36.00

Japanned, extra heavy side handles:

No. 200,	2 gal.	each,	$8.50
No. 300,	3 "	"	9.00
No. 400,	4 "	"	10.50
No. 600,	6 "	"	12.50
No. 800,	8 "	"	13.50
No. 1000,	10 "	"	19.00
No. 1400,	14 "	"	30.00

TIN WATER COOLERS.



FIG. 6505.

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CUSPIDORS.

BRASS SELF-RIGHTING.



PRICES, FIG. 6506.

Gilt finish.....per doz., $12.00
Nickel-plated.. " 15.00

Packed in cases of ½ doz. or 1 doz.

HEAVY TIN.



FIG. 6507.

Colors—blue, maroon, olive and drab; size, 8⅜ x 5⅝.

PRICE.

Per doz.....$12.00

TIN.



FIG. 6508.

Gold bands, colors assorted; size, 8⅜ x 5⅝ inches.

PRICE.

Per doz.....$6.25

SPITTOONS.

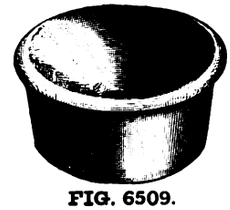


FIG. 6509.

PRICES, FIG. 6509.

No.	Height outside.	Diameter outside.	Per doz.	Each.
0	8 in.	16 in.	$18.00	$1.50
1	5½ "	12 "	9.00	.75
2	5½ "	11½ "	8.40	.70
3	4½ "	9½ "	7.20	.60

Nos. 1, 2 and 3 nested, 4 nests to crate, per nest.....$2.05
No. 0, ⅓ dozen in crate; others, ½ dozen.

SPITTOON TOPS.

The tops of our spittoons being the only part to give out, we list these separately, as follows:

No.	Dozen in crate.	Per dozen.	Each.
0	⅓	$9.60	$0.80
1	1	5.40	.45
2	1	5.40	.45
3	1	4.20	.35

FOUNDRY SPRINKLERS.



FIG. 6510.

Body and spout stamped from one piece. Galvanized after being put together. Bottom strengthened and re-enforced by an additional bottom made of wood.

PRICES.

3 gallon.....per doz., $42.00
4 " " 48.00
5 " " 54.00

GALVANIZED WATER POTS.



FIG. 6511.

Cylinder and spout stamped in one piece.

PRICES.

4 quart.....per doz., $9.00
6 " " 12.00
8 " " 15.00
10 " " 18.00
12 " " 21.00
16 " " 24.00
20 " " 42.00

FIRE SHOVELS.

SHORT HANDLE. LONG HANDLE.



FIG. 6515.

Size, 4¾ x 8 x 16.

FIG. 6516.

Size, 5 x 8 x 23.

PRICES, FIG. 6515.

Galvanized .....per gross, $21.00
Tinned..... " 24.00
Japanned..... " 15.00

PRICES, FIG. 6516.

Galvanized .....per gross, $35.00
Tinned..... " 40.00
Japanned..... " 25.00

JAPANNED AND GALVANIZED COAL HODS.

OPEN TOP.



PRICES, FIG. 6512.

Japanned.

15 inch.....per doz., $8.25
16 " " 8.75
17 " " 9.50
18 " " 10.00

Galvanized.

15 inch.....per doz., $11.50
16 " " 12.50
17 " " 13.50
18 " " 14.50

FUNNEL TOP.



PRICES, FIG. 6513.

Japanned.

15 inch.....per doz., $12.00
16 " " 13.00
17 " " 14.00
18 " " 15.00

Galvanized.

15 inch.....per doz., $15.00
16 " " 16.00
17 " " 18.00
18 " " 20.00

EXTRA HEAVY OPEN TOP.



PRICES, FIG. 6514.

Japanned.

15 inch.....per doz., $8.25
16 " " 8.75
17 " " 9.50
18 " " 10.00

Galvanized.

15 inch.....per doz., $11.50
16 " " 12.50
17 " " 13.50
18 " " 14.50

COTTON, BOX AND HAY HOOKS.

NEW ORLEANS COTTON HOOK.



FIG. 6517.

BOX OR CARTMAN'S HOOK.

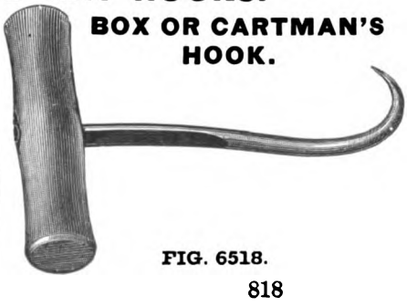


FIG. 6518.

PRICES, FIGS. 6517 AND 6518. Per doz.

No. 1. Black handle, 6 in. blade.....$3.33
" 2. Black handle, 8 in. blade..... 4.00
" 4. Box or cartmen's, varn'd handles, 6 in. blade. 4.20
" 5. Box or cartmen's, varn'd handles, 8 in. blade. 5.00

CAR BOX PACKING HOOKS AND SCREWS.

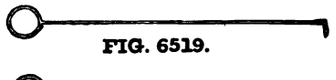


FIG. 6519.

PRICES, EACH, 30 CENTS.

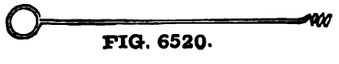


FIG. 6520.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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WASTE, GREASES, ETC.

COTTON WASTE.

All grades, white and colored, for machinery use.

Any amount required.

No. 1.	Prime cop white waste,	@		
No. 1.	Cop machined	"	"	
XXX	"	"	"	
3 XXX	"	"	"	
XX	"	"	"	
X	"	"	"	
E	"	"	"	
A, Extra	"	colored waste,	"	
C	"	"	"	
T	"	"	"	
R	"	"	"	
D	"	"	"	

Packed in pressed bales of about 100 and 500 lbs. each.

WIPING TOWELS.

PRICES.

Silk, per gross.....$12.00
Double cotton, per 1,000 ..... 50.00

ALBANY LUBRICATING COMPOUND.

No. 0 is very soft, being used in extreme cold weather and on exposed journals.

No. 1 is harder than No. 0, and is used on ordinary journals in cold weather, or on very cool or slow-running journals.

No. 2 is harder than No. 1, and is the grade ordinarily used in moderate and warm weather.

No. 3 is adapted to the use of all stationary, marine and tug-boat engines; also, shafting in warm weather, and seldom fails to cool the warmest journals and make lubrication easy.

We also make a grade of extra hardness—No. X—which will lubricate journals with entire satisfaction when no oil or lubricant of any kind would work.

PRICES.

Cans, 5, 10, 25 and 50 lbs., @.....per lb.
Kegs..... about 100 " " ..... "
Half barrels " 200 " " ..... "
Barrels.... " 375 " " ..... "

COTTON MOPS.



FIG. 6529.

PRICES.

No. 1. American..... .....@... .....
No. 2. Beauty..... "..... .....
No. 3. Challenge ..... "..... .....

Put up in all regular sizes, viz.:
5, 6, 7, 8, 9, 10, 12, 15 and 18 lbs. per doz.
Special sizes to order.
Packed in bales of one gross each.
Mop handles, complete.....$18.00 per gross.

GRAPHITE GREASE FOR GEARS.

This grease is of good body, and we recommend it for its great durability and smoothness. Its marvelous lubricating power is due to the Ticonderoga graphite, which is the best solid lubricant known.

10 lb.	packages		15	cents per lb.
25	"		14	" "
50	"		13	" "
100	"		12	" "
400	"	(1 bbl.)...	10	" "

WATER-PROOF GREASE.

For out-of-door friction surfaces, for gears exposed to water, for wire ropes running in mines or quarries exposed to dampness or water, and for the knockers and bangers of Gould screens used by paper-makers, we have substantially the same graphite grease prepared with a water-proof ingredient, which we guarantee that an exposure to even a running stream of water will not wash off. It will stick tighter the more the water touches it.

PRICES.

10 lbs.....$1.50
25 " 3.50
50 " 6.50
100 " 12.00
400 " .....per lb., .10



FIG. 6537.

DENISON'S COOLING AND LUBRICATING COMPOUND.

It will immediately cool a hot journal while car is in motion.
Put up in packages to suit.

PRICE, PER LB.....

LUBROLOCO.

For cooling and lubricating car wheels.

PRICE, PER LB., 10 CENTS.

DREHER'S R. R. CAR COMPOUND.

PRICE, PER GAL., 75 CENTS.

HELMET SOLID OIL.

	1 lb.	3 lbs.	5 lbs.	10 lbs.
In tin cans.....	50c.	$1.50	$2.25	$4.25

In pail, 28 lbs .....40 cents per lb.
In tub, 60 lbs.....39 " "

GRAPHITE PIPE JOINT GREASE.

Invaluable for the joints of radiators, for steam and hot-water apparatus, for gas pipes in streets or buildings, for bolts or screws, and for the various uses of gas fitters, steam fitters, plumbers and machinists.

PRICES.

No. 693.	1 lb.	package	20	cents per lb.
No. 694.	5	"	18	" "
No. 695.	10	"	15	" "
No. 696.	25	"	14	" "
No. 697.	50	"	13½	" "
No. 698.	100	"	13	" "

EVERLASTING AXLE GREASE.

Scrape the grease into a paste. It will scrape into a paste in ten seconds. Do not put on too much at one time. The first week apply it often and sparingly, till the graphite forms a black coating on the axle. This black coating is made by the little flakes of graphite and possesses surprising endurance.

Trade Nos.	PRICES.	Each.
600.	1 lb. box	$0.15
601.	2 " "	.25
603.	10 " pail	1.20
624.	25 " keg	2.75
625.	50 " "	5.00
626.	100 " "	9.00
627.	Bbls. about 350 lbs	8½ cents per lb.

FRAZER'S AXLE GREASE.

PRICES.

Small wood boxes, 1½ lbs. each, 3, 4 and 6 doz. in case, per gross.....
5 lb. wood boxes, with bails, 1 doz. in case .. .. per doz.....
10 lb. wood boxes, " 1 " " ..... " .....
Small tins, 1½ lbs. each, with bails, 2 and 3 doz. in case.. " .....
Medium tins, 3 lbs. each, with bails, 2 doz. in case..... " .....
Large tins, 5 lbs. each, with bails, 1 doz. in case..... " .....

BULK.

Wood pails, 15, 25 and 32 lbs.....per lb.....
Tubs, 36 and 71 lbs..... " .....
Kegs, 112 lbs..... " .....
Half barrels, 225 to 250 lbs..... " .....
Barrels, 400 to 475 lbs..... " .....

DIAMOND X.

Small wood boxes, 1½ lbs. each, 3, 4 and 6 doz. in case..per gross.....
Small tins, with bails, 2 and 3 doz. in case..... " .....

GRAPHITE CAR BOX GREASE.

Prevents hot boxes.

It is an unequaled lubricant for freight cars, passenger cars, ore cars, coal and coke cars, and specially valuable for hot boxes.

PRICES.

Single barrels, about 400 lbs .....10 cents per lb.
Ten barrel lots..... 8 " "
Fifty " " ..... 6 " "

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AMERICAN GRAPHITE PERFECT LUBRICATOR.

Trade Nos.		PRICES.	
630	¼	lb. paper cans	$0.10 each.
631	½	" " "	.15 "
632	1	" " "	.20 "
635	5	" " "	.80 "
633	5	" tin cans, screw top	.85 "
634	10	" " " " "	1.60 "
644	25	" boxes	.14 per lb.
645	50	" "	.13 "
646	100	" kegs	.12 "
647	350	" bbls	.10 "

It is recommended dry for steam and air cylinders, mixed with grease for heavy bearings, and mixed with oil for light bearings. On being applied to a bearing it readily coats the surfaces with a shiny, unctuous veneer. These surfaces then slide on each other with very little friction. On being applied to heated bearings the graphite soon fills up any inequalities of the bearing surfaces due to cutting, abrasion, etc., making them smooth and even, after which the bearing soon cools down.

It is equally useful for wood or metal surfaces; in short, in all cases where friction exists. If the bearings are loose enough for the introduction of this thin flake graphite, it will prevent heated bearings, cool those already heated, and reduce friction better than anything else in existence.

SCOUREE METAL POLISHING PASTE.

PRICES.

No. 1, 2 oz. boxes, in gross lots,							$6.00	5 lb. pails, in 30 lb. lots....@	$0.22
"	"	"	"	"	½	"	3.30	" " 5 to 30 " " .... "	.25
"	"	"	"	"	¼	"	1.80	2½ lb. boxes, in 100 lb. lots "	.20
"	3, ¾	lb.	"	"	gross	"	21.60	" " " 60 " " "	.21
"	"	"	"	"	½	"	11.25	" " " 30 " " "	.22
"	"	"	"	"	¼	"	6.00	1 lb. " " 100 " " "	.20
5 lb. pails, in 100 lb. lots....@							.20	" " " 60 " " "	.21
"	"	"	60	"	"	.... "	.21	" " " 30 " " "	.22

PRESTOLINE METAL POLISH.

PRICES.

PRESTOLINE (Liquid.)

	Per dozen.
Sample size	No. 0, $1.25
½ pints	" 1, 3.00
Quarts	" 2, 9.00
½ gallons	" 3, 15.00
Gallons	" 4, 28.80

PRESTOLINE PASTE.

	Per dozen.
Family size (2 oz.)	$1.20
½ lb. boxes	3.60
1 " "	6.00
2½ " "	12.00
5 " pails	22.20
10 " "	42.00

CHERRY HEAT WELDING COMPOUND.



FIG. 6544.

A flux for welding iron to iron, steel to steel, or malleable iron to steel.

PRICES, FIG. 6544.

1 lb. tins, 50 or 100 lbs. in box, 25c., 17½c.
5 lb. or 10 lb. boxes, 100 or 200 lbs. in box, 20c., 16c.
25 lb. boxes (4 or 8 in case), 15½c.
Assorted cases, 4 10s, 8 5s, 20 1s, or 16 5s, 20 1s, 16⅜c.
50 lb. boxes, in bulk, 15c.; 100 lb., 14½c.; half bbls., 14c., bbls. 13c. per lb.

CHALLENGE DRILLING SOAP.

Prices in bbls. ..... per lb. $
" " ½ bbls. ..... "

CORRUGATED COPPER GASKETS.

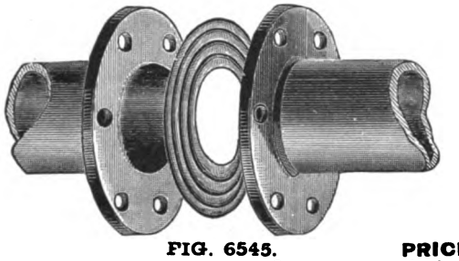


FIG. 6545.

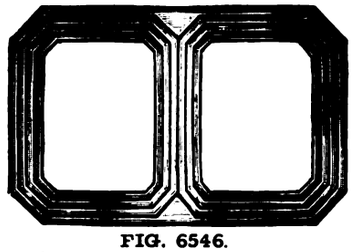


FIG. 6546.

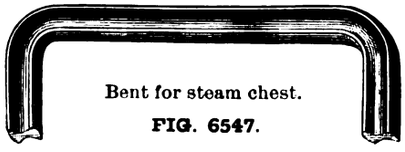
PRICES.

2c. per square inch of actual surface.

DESCRIPTION, FIGS. 6545 AND 6546.

This metallic gasket may be used in place of rubber or other destructible materials in general use for packing. It consists of thin sheet copper, stamped with concentric corrugations. Three to six corrugations are all that are necessary, so that the space within the bolt holes determines the width of the gasket. In cases where the flanges are thin, and for this reason liable to bend when the bolts are tightened, it is advisable to extend the copper gasket to the full width of flange. This will, of course, require the cutting of bolt holes in the gasket. Connections made with these gaskets will not blow out after continued use, for each corrugation makes the entire circle of the flange, and so long as the contact is kept complete by compression, the joint cannot leak. This gasket never blows out like rubber. It may be put in place while steam is leaking through valve. Answers well on pipes in which steam is alternately on and off, for it is not impaired by the repeated expansion and contraction.

SAUNDERS' CORRUGATED COPPER WIRE PACKING.



Bent for steam chest.

FIG. 6547.

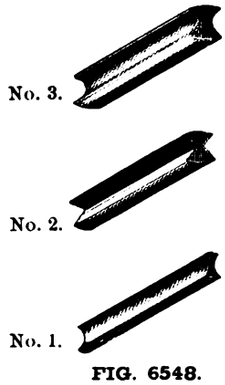


FIG. 6548.

Shows the corrugated wire packing, as sold in bundles.

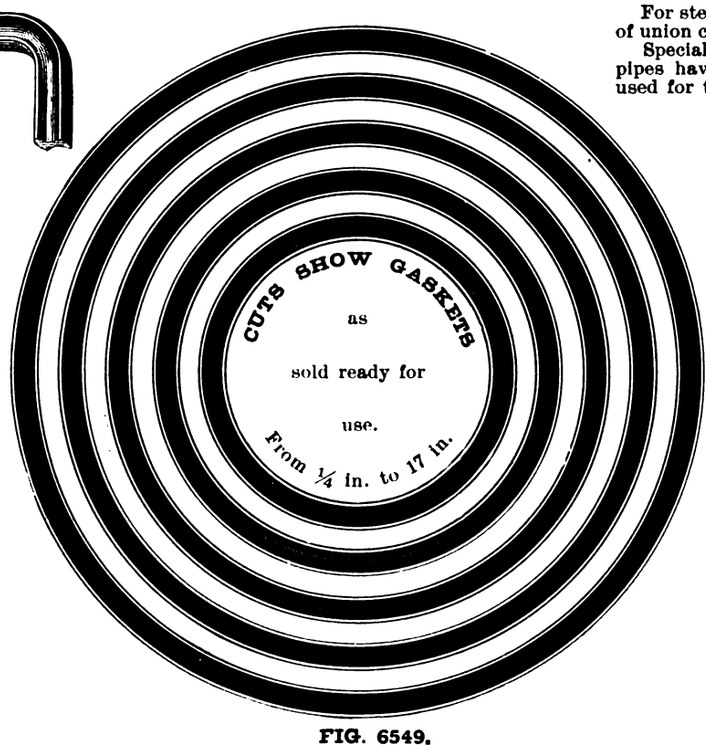


FIG. 6549.

For steam, gas, air or water joints, and all kinds of union coupling.

Special notice.—Should the joints leak when pipes have cooled, after this packing has been used for the first time, tighten them until leaking stops, and they will remain perfectly tight in future. The sizes given on price list are inside diameters.

CORRUGATED WIRE PACKING, IN BUNDLES

Of about 25 lbs. each, or less.

PRICES, FIG. 6548.

No.	Per lb.
1, 2, 3	$1.00

No. 1 is the smallest, and No. 3 the largest.

PRICES, FIG. 6550.

Inside diameter.	For union.	Prices per hundred
9/16	¼	$1.62½
11/16	⅜	1.62½
13/16	½	1.87½
1⅛	¾	2.00
1¼	1	2.35
1⅝	1¼	3.07½
1⅞	1½	3.70
2 5/16	2	4.50

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ECLIPSE SECTIONAL RAINBOW GASKETS.

The Eclipse gasket is red in color and composed of the celebrated Rainbow packing compound. It will not harden under any degree of heat, or blow out under the highest pressure, and can be taken out and repeatedly replaced. Joints can be made in from 3 to 5 minutes.

Sizes, 3/8, 1/2 and 5/8 inch.

PRICE, PER LB., $1.50.

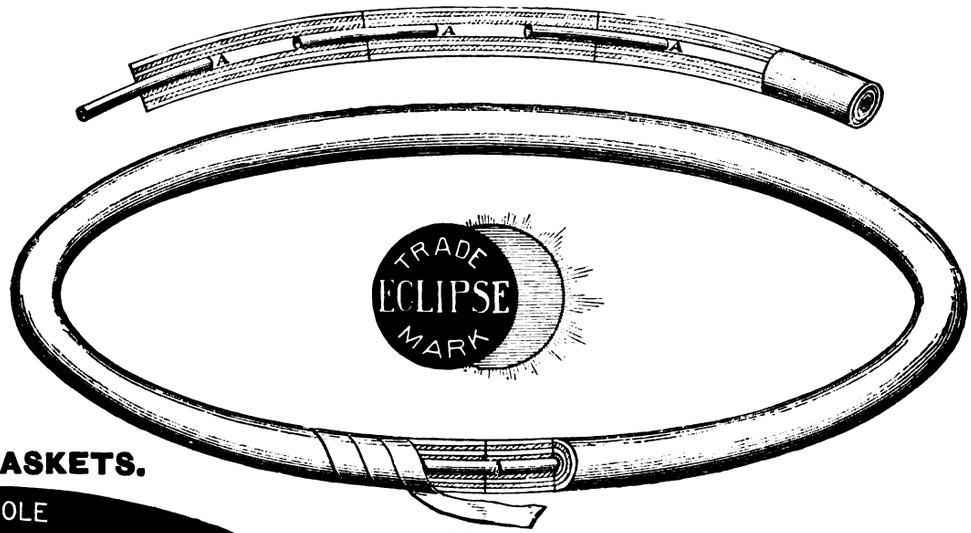


FIG. 6550.

JENKINS' GASKETS.

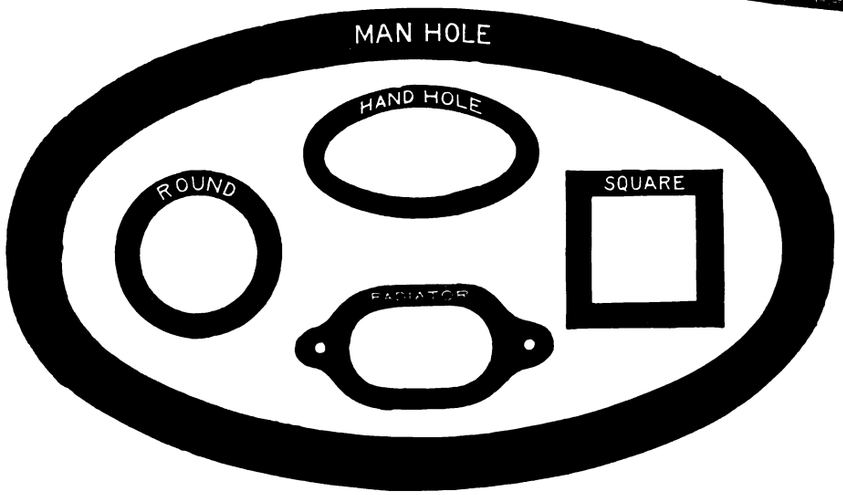


FIG. 6551.

PRICE, $1.00 PER LB.

ASBESTOS GASKETS.



FIG. 6552.

All sizes not exceeding 42 inches outside diameter, from 1/32 to 1/2 of an inch thick, cut to order from our asbestos mill-board—weight less than one-half as much as India-rubber.

Regular shapes, round or square, per lb..... $0.75

Rings and washers, 3 inches or less in diameter, per lb..... $1.50

Asbestos impermeable gaskets, regular shapes, per lb..... $0.75

Asbestos impermeable rings and washers, per lb., 1.50

Send pattern or drawing with orders for irregular shapes.

FIBROUS GASKETS.



FIG. 6555.

REGULAR SIZES AND SHAPES.
PRICES.

1/8 inch or less in thickness, per lb..... $0.90
3/16 " or more " " ..... .80

CANFIELD PURE RUBBER MOULDED GASKETS.

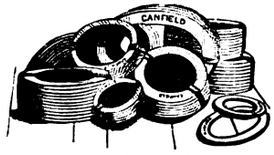


FIG. 6553.

PRICES, HANDHOLE SIZES.

2 x 3, 2 1/4 x 3 1/4, 2 1/2 x 3 3/4, 2 5/8 x 3 3/4, 2 5/8 x 3 7/8, 2 1/2 x 3 1/2.....each, $0.16

2 1/2 x 4, 2 5/8 x 4 7/8, 3 x 4, 3 x 4 1/2, 3 1/4 x 4 1/4, 3 1/4 x 4 1/2, 3 1/8 x 4 7/16, 3 1/2 x 4, 3 1/4 x 4 3/4, 3 1/8 x 4 3/8, 3 3/8 x 4 3/4, 3 1/2 x 4 3/4.....each, .18

2 7/8 x 5 3/8, 3 x 5, 3 1/2 x 5, 3 1/4 x 5 3/4, 3 1/2 x 5 1/2, 3 1/4 x 5 1/4, 3 5/8 x 5 1/2, 3 3/4 x 5 1/2.....each, .20

3 3/4 x 5 3/4, 4 x 5, 4 x 5 1/2, 4 1/2 x 5 3/4, 4 x 5 3/4, 3 3/4 x 6, 4 x 6.....each, .25

5 x 6, 4 1/2 x 6 3/4, 5 x 7, 4 3/4 x 7, 4 1/4 x 6 3/4, 4 3/4 x 7 3/4, 4 1/2 x 6.....each, .30

5 1/2 x 8, 6 1/4 x 8 1/4, 5 3/4 x 9, 5 5/8 x 8, 7 x 9 3/4. " .50

7 1/2 x 12 3/4..... " .60

PRICES, MANHOLE SIZES, CLOTH BACK.

9 1/4 x 13 7/8, 9 x 13 5/8, 9 3/4 x 14 1/8, 9 1/8 x 15, 9 3/4 x 15 1/2, 10 x 14, 10 x 13 7/8.....each, $1.00

10 1/2 x 14 1/2, 10 1/2 x 14 1/8, 10 1/2 x 14 5/8, 10 3/8 x 15 3/4, 10 7/8 x 14, 10 1/2 x 15, 11 x 15.....each, 1.10

12 x 16, 11 7/8 x 15 3/8, 10 7/8 x 16, 12 x 15, 11 x 15 1/2.....each, 1.25

WIRE INSERTION PACKING.

PRICES.

1/8 inch, one ply..... per lb., $0.60
3/16 " " ..... " .55
1/8 " two ply..... " .55

Two insertions are used when made thicker than one-eighth, and the list price is 55 cts. per lb.

The width and length are the same as cloth insertion packing.

STEAM PACKING.

CLOTH INSERTION, CLOTH ON ONE OR BOTH SIDES.

There is one ply of cloth to every one-sixteenth inch thickness.

Each cloth, whether an insertion or on outside, to count as one ply.

Thickness	Prices, per pound.			
	1 ply.	2 ply.	3 ply.	4 ply.
1/64 inch	$0.70	.....	.....	.....
1/32 "	.65	.....	.....	.....
1/16 "	.60	$0.63	$0.66	.....
3/32 "	.....	.58	.61	.....
1/8 "	.....	.55	.58	$0.61
3/16 "	.....	.....	.55	.58
1/4 "	.....	.....	.....	.55

Three cents per pound additional will be charged for each extra ply of cloth.

All cloth insertion packing is one yard wide and not more than forty yards in length.

PURE SHEET RUBBER OR VALVE GUM.

Of superior quality and all thickness, per lb.....$1.40

It is made in sheets about forty-one inches wide and twenty feet long.

PURE RUBBER VALVES, GASKETS, WASHERS, RINGS, ETC.

REGULAR SHAPES AND SIZES.

Per pound..... $1.50

All orders for valves should state whether intended for use in cold or in hot water.

CLOTH INSERTION GASKETS OR RINGS.

REGULAR SHAPES AND SIZES.
PRICES.

1/8 inch or less in thickness, per lb $1.25
3/16 " or more " " 1.00

In all sizes above 3/16 inch there is one ply of cloth to every 1/16 inch thickness. Each cloth, whether insertion or on outside, to count as one ply.

Five cents per pound additional will be charged for each extra ply of cloth.

"USUDURIAN" PACKING.



FIG. 6559.

SELF-VULCANIZING.
PRICES.

In the sheet, per lb.....$0.80
For gaskets, rings, etc., per lb..... .95

Kept on hand in sheets 1/64, 1/32, 1/16, 3/32, 1/8, 3/16, and 1/4-inch thick.

Scraps of "Usudurian" packing can be returned, for which credit will be given.

DIRECTIONS.

Screw tight when cold.

If joint leaks when steam is let on, screw up till leak stops, but no more than is necessary to stop leak.

Cut bolt-holes a little less than the diameter of bolts. As this packing is not vulcanized, it wil be soft as soon as heat is applied, but soon becomes hard. In order to break joints, apply to one side of the packing a paste made of black-lead and water. Chalk or paper will also answer the same purpose.

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SHEET PACKINGS, CONTINUED, AND PISTON PACKINGS.

ASBESTOS MILL-BOARD.

Our mill-board is composed wholly of pure asbestos. It is strictly fire and acid proof, and is valuable for packing joints in contact with fire, oils, etc. It is also used for fire screens, partitions, linings under stoves, grates, etc. In sheets 40 x 40 and 42 x 44 inches, from $\frac{1}{32}$ to $\frac{1}{2}$ inch thick, weighing from 1½ to 28 lbs.; per lb., 16 cts.

Approximate weight per sheet 40 x 40 in.:—

$\frac{1}{32}$	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$ inch, thickness.
1¾	3½	5½	8	10½	14	21	28 lbs.

Special quality, made from demagnetized long fiber. Especially adapted for electrical work, etc.; per lb., price, 25 cts.

ASBESTOS IMPERMEABLE SHEET PACKING.

This is made from our extra quality mill-board, and is acid and steam proof. It forms an economical and durable flat packing for flange joints, steam pumps, cylinder-heads, manhole plates of steam boilers, oil stills, etc. It is very elastic and can be removed and replaced without injury.

In sheets 40 x 40 inches, from $\frac{1}{16}$ to $\frac{1}{2}$ in. thick; weight from 12 ozs. to 4½ lbs. per square foot; per lb., price, 25 cts.

WICCAPEE PLUMBAGO PACKING.

This packing is not vulcanized.

PRICE, per lb., **80c.**

It softens immediately when heat is applied.

It must always be put in place with surfaces cold, and the heat on them gradually raised.

If leakage of steam occurs, tighten joints no more than is necessary to stop it.

Unused scraps of this packing may be returned at half price charged for same.

SOFT SHEET METAL PACKINGS.

PRICE, per lb., **25c.**

Jenkins' packings, $\frac{1}{32}$ inch thick, weighs about 3 lbs. to the square yard; $\frac{1}{16}$ inch, 6 lbs.; $\frac{3}{32}$ inch, 9 lbs. Other thicknesses in proportion.

PRICE, per lb., **80c.**

SELF-ADJUSTING METALLIC PACKINGS.

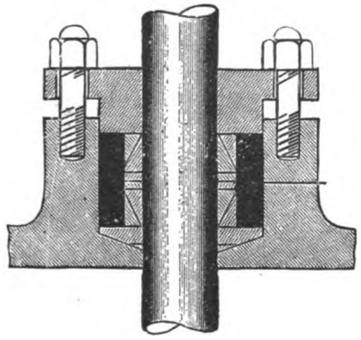


FIG. 6566.

When ordering, give exact size of rod, depth of box and diameter of box.

PRICE,
$5.00 per inch diameter of rod, or fraction of an inch.

DUVAL METALLIC PACKINGS.



FIG. 6567.

State, in ordering:
1st. The purpose for which the packing is to be used.
2d. Diameter of the rod or plunger.
3d. Diameter of the stuffing-box.
4th. Depth of the stuffing-box.
5th. Condition of the rod or plunger—*i. e.*, smooth or scored.

Sizes, ¼, ⅜, ½, ⅝, ¾, ⅞, 1 and 1¼

PRICE, **$3.00.** **$2.50.** per lb.
" over 1¼, per lb.....**2.00.**

It is made of fine white brass wire of special composition, arranged to give the maximum degree of toughness and strength, at the same time being of such hardness that should any wear occur it will take place in the packing and not on the rods.

CORRUGATED RUBBER MATTING.

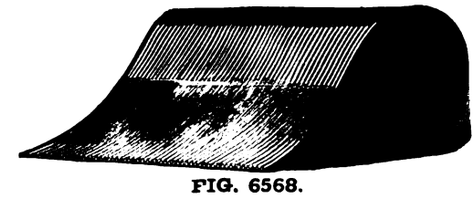


FIG. 6568.

Made in rolls one yard wide and about forty yards long, and cut to order in any size or shape desired.

PRICES.

$\frac{3}{32}$ inch	per square foot		$0.33
$\frac{1}{8}$ "	"		.40
$\frac{3}{16}$ "	"		.56
¼ "	"		.73

MARTIN'S METALLIC STEAM PACKINGS.

LINED WITH BRASS GAUZE.

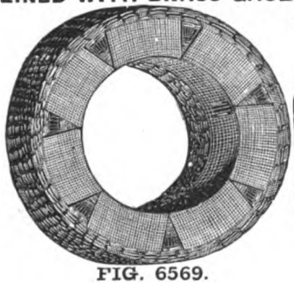


FIG. 6569.

LINED WITH BABBITT METAL.

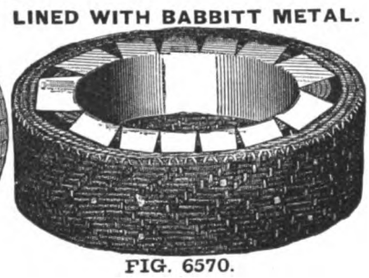


FIG. 6570.

PRICES, either style, per lb., **$1.00.**

FIBROUS METALLIC PACKINGS.



FIG. 6571.

Only one size required.

The smallest valve stem or largest piston rod packed from same can.

PRICE, per lb., **$1.00.**

HARD RED OR GRAY FIBER.

In sheets about 42 x 66 in., 8 x 42 in. or 12 x 42 in.

PRICES.

Under $\frac{1}{16}$ in. thick	60c. per lb.
From $\frac{1}{16}$ in. to ½ in. thick	50c. "
Over ½ in. to ⅞ in. "	60c. "
Over ⅞ in. to 1¼ in. "	65c. "

Parties ordering a full sheet, about 20 square feet, of hard fiber, can have it cut into strips, about 42 or 66 inches long, of any desired width, not less than 4 inches, without extra cost.

DESCRIPTION, FIG. 6571.

Put up in 1, 3, 5, 10 and 25 lb. cans.

This packing is composed of four different metals, which, with long experience, has proven the best material for the purpose, made in one sheet and cut up in very thin strips, three feet long by one-eighth inch wide. It has been pronounced by experts the best yet produced. By a long series of experiments, the combination of metals and the form of the packing were obtained, producing the wonderful results which have made this packing so desirable.

DESCRIPTION, FIG. 6575.

It consists of a granulated metallic substance inclosed in a cotton tube, and is packed in layers, alternating with a soft metal ring. When applied, the granulated coils are firmly packed in place, hammered down solid and even all around the rod, thus perfectly adjusting themselves to both rod and box and at the same time forming a firm steadiment to the rod.

FLEXIBLE SHEET FIBER.

PRICES.

In sheets from $\frac{1}{16}$ to ½ in. thick, 40c. per lb.
" under $\frac{1}{16}$ and over ½ in. thick, 45c. per lb.

SQUARE STICKS OF HARD FIBER.

PRICES.

¼ to ½ in. square, random lengths, 60c. per lb.
Over ½ to ⅞ in. " " 70c. "
" ⅞ to 1¼ in. " " special rates.

COMMON SENSE METALLIC PACKINGS.



FIG. 6575.

PRICE, per lb.—½ and over, **$1.25.**

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PISTON ROD AND VALVE PACKINGS.

TUCKS' PACKING.

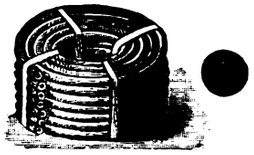


FIG. 6576.

PRICE.

Made of cotton fabric and rubber core; from one-quarter of an inch to one and a half inches diameter, and in lengths of twelve feet.....per lb., 85c.

VULCANIZED ASBESTOS PISTON-ROD PACKING.



FIG. 6578.

This is a flexible rope packing composed of strong, twisted strands of pure asbestos, combined with India rubber and vulcanized. It is an improvement upon our pure asbestos packings, and is superior to all others for piston rods, valve stems, pump valves, etc., where high pressure steam, hot water, oils, acids, ammonia, etc., are used, and for locomotives and marine engines.

The advantages possessed by this packing are that, in consequence of its wonderful strength and durability, it can be used wherever metallic packings have been heretofore necessary. It is self-lubricating to a greater extent than any other material, and will not shrink or blow out.

Round, all sizes, from $\frac{1}{8}$ in. to 2 in. diam.; square, from $\frac{3}{16}$ in. to $\frac{5}{8}$ in.; on reels from 10 to 50 lbs., $\frac{1}{8}$ in., also in $\frac{1}{4}$ and $\frac{1}{2}$ lb. balls, per lb..... $1.25

Do. in $\frac{1}{4}$, $\frac{1}{2}$, and 1 lb. balls, $\frac{1}{8}$ in. diam., per lb..... 1.50

The approximate number of feet to the pound, for the different sizes, are as follows:

$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2 inches diam.
128	50	25	16	9	8	$6\frac{1}{2}$	4	3	$2\frac{1}{4}$	$1\frac{2}{3}$	1 feet.

ASBESTOS STEAM PACKINGS.



FIG. 6582.

On reels containing 15, 25 and 50 lbs. each. Regular sizes from $\frac{1}{4}$ to 2 inches in diameter, per lb..... 60c.

We also manufacture in the above sizes:
Asbestos braided packing.
Asbestos lubricated "
Asbestos and hemp lubricated packing..... } per lb., 60c.

CARLOCK'S SPIRAL PACKING.



FIG. 6583.

Each box contains 12 feet, and we only furnish full boxes. It is made in sizes from $\frac{1}{8}$ inch to 2 inches, and each piece is coiled in a box made especially for it.

PRICE, PER LB., $1.20.

CARLOCK'S ELASTIC RING.



FIG. 6584.

PRICE, $1.20 PER LB.

Each order in elastic or sectional ring, especially prepared for each measurement at our factory.

In ordering, give information as below:

Piston rod.....
Stuffing box.....
Depth box.....No. lbs.....No. rings....
Valve rod.....
Stuffing box.....
Depth box.....No. lbs....No. rings....
Cut-off rod.....
Stuffing box.....
Depth box.....No. lbs....No. rings....
Pump rod.....
Stuffing box.....
Depth box.....No. lbs.....No. rings....

SELDEN PACKING.

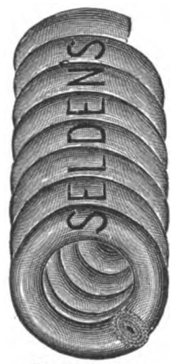


FIG. 6577.

EUREKA PACKING.

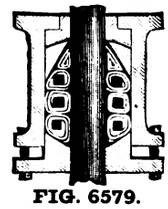


FIG. 6579.

Shows action of gum core in stuffing box.

PRICE, 75c. LB.

SQUARE PISTON PACKING.

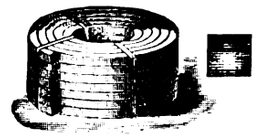


FIG. 6585.

Made of cotton fabric; from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches square, and in lengths of 20 feet, per lb., 85c.

Square hydraulic packing, in lengths of 20 feet, per lb., 85c.

SQUARE RUBBER BACK.



FIG. 6586.

Square piston packing, rubber back, is made in lengths of 20 feet, per lb., $1.00.

PEERLESS PISTON ROD AND VALVE PACKING.

Each box of $\frac{1}{4}$ in. contains 96 ft. weighing 3 lbs. net.
" " $\frac{3}{8}$ " " 54 " " $3\frac{1}{2}$ "
" " $\frac{1}{2}$ " " 36 " " 4 "
" " $\frac{5}{8}$ " " 36 " " 7 "
" " $\frac{3}{4}$ " " 18 " " $4\frac{1}{4}$ "
" " $\frac{7}{8}$ " " 12 " " 4 "
" " 1 " " 12 " " $5\frac{1}{4}$ "
Larger sizes packed in bales.

PRICE, PER LB., $0.80.

PRICES, FIG. 6577.

With rubber core, from $\frac{1}{4}$ inch up ... $0.60 per lb.
With canvas core, from $\frac{1}{4}$ " " .... .50 per lb.
With square core, from $\frac{5}{8}$ " " .... 1.00 per lb.
All sizes varying by sixteenths, from $\frac{1}{4}$ inch to $1\frac{1}{4}$ inch, carried in stock; larger sizes made to order.

SELF-LUBRICATING PLUMBAGO PACKING.

ROUND. SQUARE.



FIG. 6580.



FIG. 6581.

PRICES.

$\frac{1}{16}$, $\frac{1}{8}$ and $\frac{3}{16}$ sizes, per lb.....$2.00
$\frac{1}{4}$ inch and larger, " 1.00

SQUARE FLAX PACKING.



FIG. 6587.

PRICE, 85c. PER LB.

SQUARE PUMP PACKING.



FIG. 6588.

We make to order for steam pumps a square packing, using fine duck and white rubber.

Made in 12 feet lengths.

PRICE, 85c. PER LB.

PATENT PACKINGS.

EMPIRE PACKING

Is made round, oval or flat, and of the following sizes: $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 in., $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2 inches and upward, to any size or diameter required. Put up on reels averaging 25, 50 and 100 lbs. each, also in boxes of 5 and 10 lbs. each.

ALL SIZES, 50c. PER LB.

	Per lb.
Sponge packing	$0.30
Game Cock packing	1.00
United States Navy	.60
Globe packing, $\frac{1}{2}$ inch and under	.65
Globe packing, over $\frac{1}{2}$	.55
Climax packing	.15
Eagle packing, $\frac{3}{8}$ and over	.15
Soapstone round braided packing	.20
All sizes, in 50 or 100 lb. coils	
Flocker's lubricating hemp packing	.15

	Per lb.
Lion round jute core packing	$0.20
All sizes, in 50 or 100 lb. coils	
Cotton packing	.30
Cotton wick packing	.30

"PHOENIX" STEAM PACKING.

	Per spool.	Per lb.
Valve packing, $\frac{1}{8}$ in.	$0.50	$2.00
" " $\frac{1}{8}$ "	.40	2.00
" " $\frac{3}{16}$ "	.40	1.25
Hemp core, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$ in.		.60
" " $\frac{3}{4}$ to $1\frac{3}{8}$ in.		.50
" " $1\frac{1}{2}$ to 2 in.		.75
" " over 2 in.		1.00
Gum core, $\frac{1}{4}$ in. up		.80
" " " " white, extra		.60
" " " " " " in bulk		.42
" " " " " flat		.60
Italian A, A hemp packing		.25

	Per lb.
Italian A hemp packing	$0.20
" B " "	.18
Russia A " "	.17
" B " "	.15
Jute packing	.12

ASBESTOS WICK PACKING.

This article is composed of the purest and finest asbestos fiber, spun into strands, which can be separated and made into the form of a soft, strong, "lamp-wick," which can be wound or packed in any desired shape around small steam and other valve stems, pumps, etc.; and, being strictly acid and fire-proof, is valuable for use in chemical works, etc.

In $\frac{1}{4}$, $\frac{1}{2}$ and 1 lb. balls and on 5 and 10 lb. spools, per lb..... $0.60
Asbestos lubricated wick packing, per lb.. .60

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CYLINDER PISTON PACKINGS AND SPRINGS.

ST. JOHN'S CYLINDER PACKING.

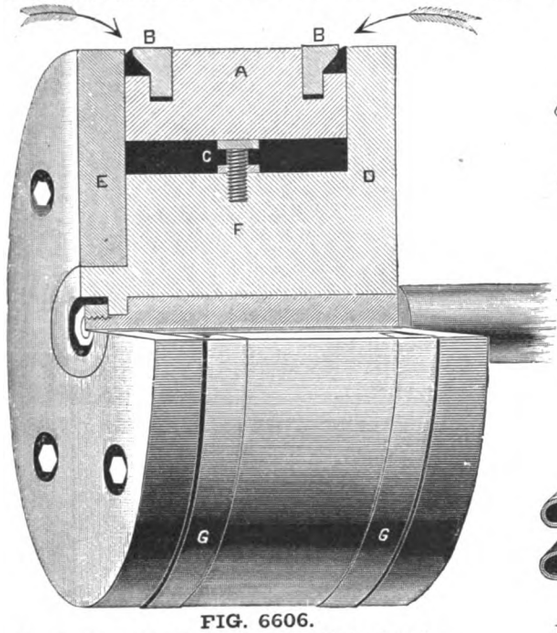


FIG. 6606.

A—Section of bull ring.
BB—Section of packing rings.
C—Centering bolts.
D—Piston head.
E—Follower.
F—Spider.
GG—Rings as in cylinder.

The arrows show the course of the steam entering chamber.

PRICE, $6.00 PER DIAMETRIC INCH.

HAIGHT'S CYLINDER SPRINGS.

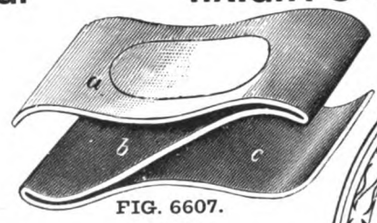


FIG. 6607.

PRICES.

75c. per inch of diameter of cylinder, when the packing space is 4 inches or less.

If over 4 inches in depth, add 25c. per inch and for every fraction of an inch.

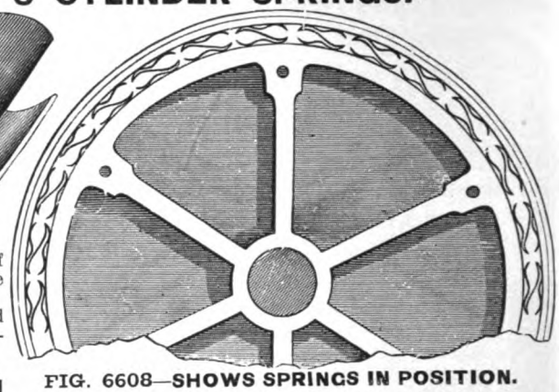


FIG. 6608—SHOWS SPRINGS IN POSITION.

JONES' PISTON SPRINGS.

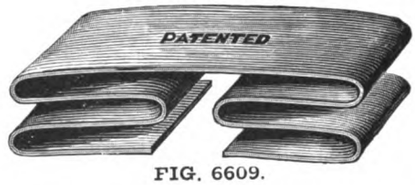


FIG. 6609.

In ordering springs, send always the following dimensions:—Diameter of cylinder, thickness of packing rings, depth and width of packing space.

Depth of packing space—

5 in. and under, $1.25 per in. dia. of cyl.
Over 5 in..... 1.50 " " "

LASHER'S PISTON SPRINGS.

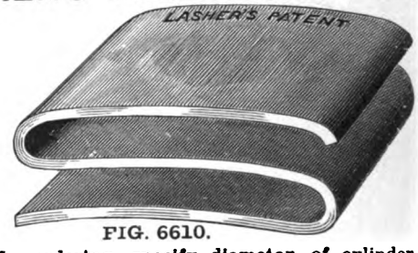


FIG. 6610.

In ordering, specify diameter of cylinder, thickness of packing rings, depth and width of packing space.

Depth of packing space—

5 in. and under....$1.25 per in. dia. of cyl.
Over 5 in..... 1.50 " " "

TRIPP'S METALLIC PACKING FOR PISTONS, PISTON RODS, PISTON VALVES AND VALVE RODS.

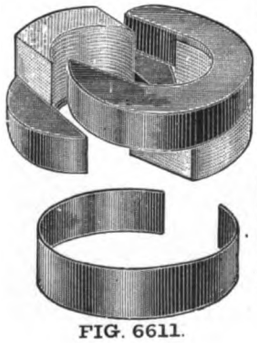


FIG. 6611.

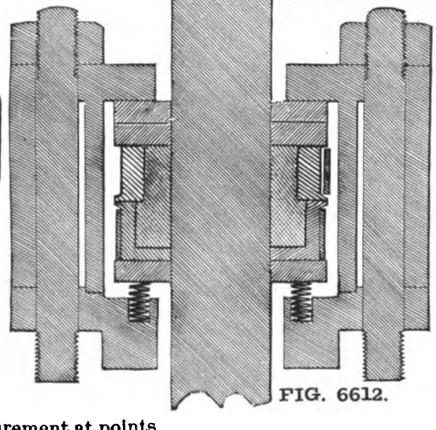


FIG. 6612.

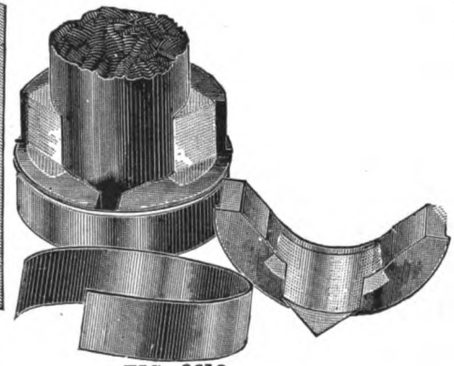


FIG. 6613.

Fig. 6611 is a perspective view of a packing ring, composed of two or four pieces. It is very simple and durable, and is preferable for very small rods, or for hydraulic pumps, when pumping against high pressure, for the ring is one-half balanced, and consequently very much less pressure upon the rod, producing much less friction. This packing is shown in position on the rod, with front and back ring and springs, in Fig. 6612.

Fig. 6613 is an elevation of a packing ring, composed of four pieces, on a rod, with one spring off and one piece removed, showing its construction; the light color showing babbitt metal, the dark color brass composition. A sectional view of this ring in position on the rod is shown, with front and back ring and springs, in Fig. 6612.

In ordering, fill in measurement at points indicated.

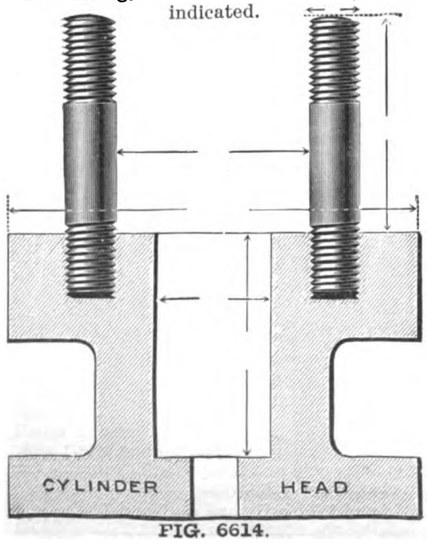


FIG. 6614.

PRICE, $15.00 PER INCH DIAMETER OF ROD.

Diameter of face of stuffing box,.....
Diameter of inside of stuffing box,.....
Depth of stuffing box,.....
Clearance between face of stuffing box and cross-head,.....
No.....and size of stud bolts,.....
Distance between centers of bolts,.....
Location of stud bolts,.....
Length of stud bolts,.....
Horizontal engine,.....
Marine do. .....
Upright do. .....



Send wire gauge exact diameter of rod.

To renew packing when case is good, give—

Thickness of packing,.....
Thickness of washers,.....
Measure lengthwise of rod,.....

CONDENSER FERRULES FOR PACKING SURFACE CONDENSERS.

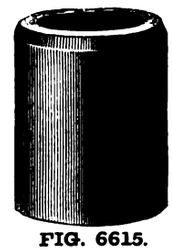


FIG. 6615.

These ferrules are made of hard vulcanized fiber, and are rolled accurately true, both internally and externally, so as to fit snugly on the tubes and into the recesses in the tube sheets or heads. As they will expand when wet fully 30 per cent. in thickness of shell, they are certain to make a tight fit without driving or upsetting. Being entirely uninjured by hot or cold water, whether salt or fresh, and unaffected by grease of any sort, or alkaline solutions, they will last as long as the condenser and never leak.

PRICES ON APPLICATION.

Paper ferrules, all sizes .....3 cents each.
Wood ferrules, prices according to size.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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SCREW WRENCHES.

COE'S KNIFE HANDLE.

Size wrench,	4	6	8	10	12	15	18	21 inch.
Will open,	½	⅞	1¼	1¾	2⅛	2⅝	3	4⅛ "
Cases contain,	6	6	6	6	6	3	2	1 doz.

PRICES, FIG. 6616.

BLACK. Size.	Per doz.	BRIGHT. Size.	Per doz.
6 inch	$9.00	4 inch	$10.00
8 "	10.00	6 "	10.00
10 "	12.00	8 "	11.00
12 "	14.00	10 "	14.00
15 "	24.00	12 "	16.00
18 "	30.00	15 "	26.00
21 "	36.00	18 "	32.00
		21 "	38.00

By sectional view we illustrate our new knife handle, showing malleable iron frame and shank of bar keyed into position.



FIG. 6616.

SECTION OF FIG. 6616.

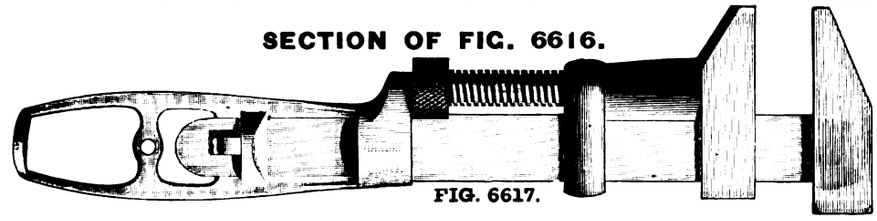


FIG. 6617.

AGRICULTURAL WRENCHES.

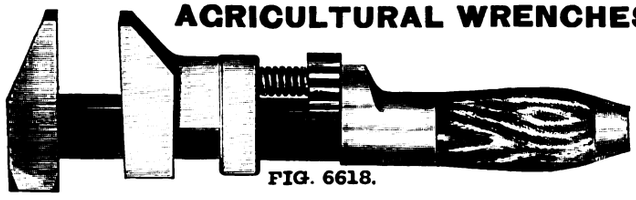


FIG. 6618.

PRICES.

BRIGHT.

Inches	6	8	10
Per dozen	$10.00	$11.00	$14.00
Inches	12	15	
Per dozen	$16.00	$26.00	

BLACK.

Inches	6	8	10
Per dozen	$9.00	$10.00	$12.00
Inches	12	15	
Per dozen	$14.00	$24.00	

15 inch and under packed in cases 6 dozen each.

ENGINEERS' AND STANDARD WRENCHES.

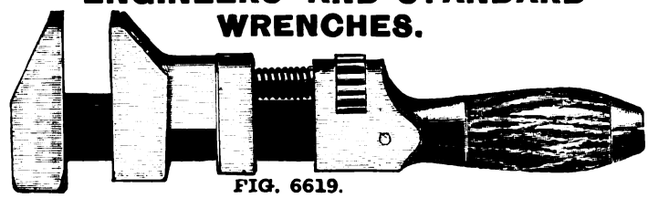


FIG. 6619.

PRICES, ENGINEERS'.

Extra heavy. Thoroughly case-hardened.

BRIGHT.

Inches	6	8	10	12
Per dozen	$10.00	$11.00	$14.00	$16.00
Inches	15	18	21	
Per dozen	$26.00	$32.00	$38.00	

BLACK.

Inches	6	8	10	12
Per dozen	$9.00	$10.00	$12.00	$14.00
Inches	15	18	21	
Per dozen	$24.00	$30.00	$36.00	

15 inch and under packed in cases 6 dozen each.

PRICES, STANDARDS.

Same pattern as engineers'. Not case-hardened.

BRIGHT.

Inches	6	8	10
Per dozen	$10.00	$11.00	$14.00
Inches	12	15	18
Per dozen	$16.00	$26.00	$32.00

BLACK.

Inches	6	8	10
Per dozen	$9.00	$10.00	$12.00
Inches	12	15	18
Per dozen	$14.00	$24.00	$30.00

15 inch and under packed in cases 6 dozen each.

AGRICULTURAL WRENCHES.

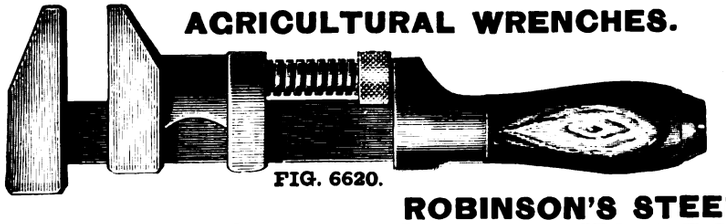


FIG. 6620.

PRICES, FIG. 6620, BLACK.

Inches	6	8	10	12	15
Per dozen	$9.00	$10.00	$12.00	$14.00	$24.00

PRICES, FIG. 6620, BRIGHT.

Inches	6	8	10	12	15
Per dozen	$10.00	$12.00	$14.00	$16.00	$26.00

Cases of 6 dozen each.

ROBINSON'S STEEL BAR WRENCHES.

PRICES, FIG. 6621, BLACK.

Inches	6	8	10
Per dozen	$9.00	$10.00	$12.00
Inches	12	15	18
Per dozen	$14.00	$24.00	$30.00

PRICES, FIG. 6621, BRIGHT.

Inches	6	8	10
Per dozen	$10.00	$12.00	$14.00
Inches	12	15	18
Per dozen	$16.00	$26.00	$32.00

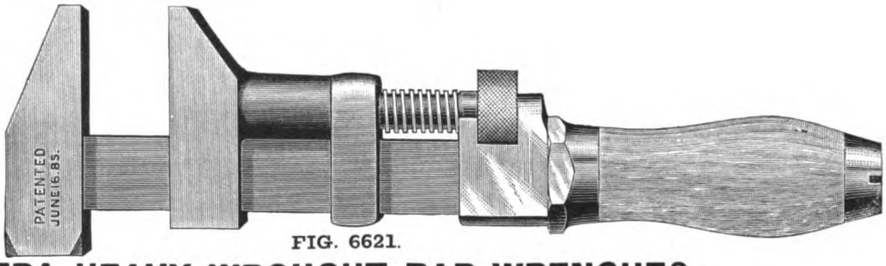


FIG. 6621.

MACHINISTS' EXTRA HEAVY WROUGHT BAR WRENCHES.

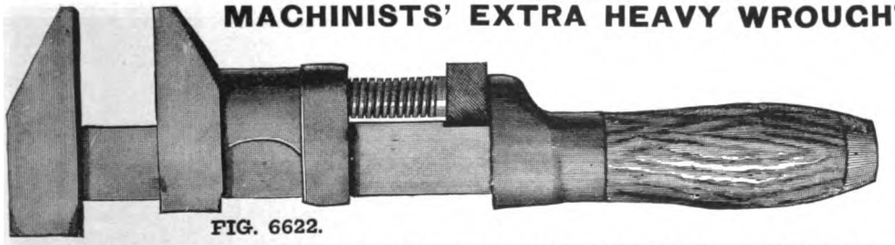


FIG. 6622.

PRICES, FIG. 6622, BLACK.

Inches	6	8	10
Per dozen	$9.00	$10.00	$12.00
Inches	12	15	18
Per dozen	$14.00	$24.00	$30.00

PRICES, FIG. 6622, BRIGHT.

Inches	6	8	10
Per dozen	$10.00	$12.00	$14.00
Inches	12	15	18
Per dozen	$16.00	$26.00	$32.00

EXTRA HEAVY SCREW WRENCHES, WITH WROUGHT IRON BAR.

PRICES, FIG. 6623, BRIGHT.

12 inch	$26.00 per doz.	18 inch	$38.00 per doz.
15 "	32.00 "	21 "	42.00 "

These wrenches are one-half heavier than the regular screw wrenches, being proportionately enlarged in all their parts, making them very strong and inflexible, and are made from the best of material, and in a superior workman-like manner.



FIG. 6623.

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SCREW WRENCHES.

BRIGGS' LONG NUT OR SLEEVE.



FIG. 6624.

PRICES, BRIGHT.

8 inch, $13.75 per doz. 12 inch, $20.00 per doz. 18 inch, $40.00 per doz.
10 " 17.50 " 15 " 32.50 "

MERRICK'S SHORT NUT.

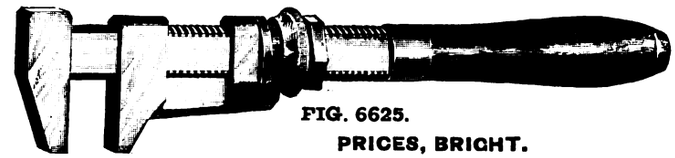


FIG. 6625.

PRICES, BRIGHT.

8 inch, $11.00 per doz. 12 inch, $16.00 per doz. 18 inch, $32.00 per doz.
10 " 14.00 " 15 " 26.00 "

IMPROVED ACME STEEL WRENCHES.



FIG. 6626.

CASES CONTAIN AS FOLLOWS:

5 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	21 in.
6 doz.	6 doz.	6 doz.	6 doz.	6 doz.	3 doz.	2 doz.	1 doz.

PRICES, FIG. 6626.

BRIGHT STANDARD WRENCH.

Per dozen.

6 inch	$9.00	15 inch	$24.00
8 "	10.00	18 "	30.00
10 "	12.00	21 "	36.00
12 "	14.00		

RAILROAD WRENCH.

Per dozen.

12 inch	$14.00	18 inch	$30.00
15 "	24.00	21 "	36.00

ALL NICKELED WRENCH.

Per dozen.

5 inch bicycle	$9.60	12 inch	$18.00
6 "	10.80	15 "	28.80
8 "	12.60	18 "	36.00
10 "	15.00	21 "	57.00

POCKET AND BICYCLE WRENCH.

5 inch.

Bright standard	$8.00
All nickeled	9.60

LIGHTNING WRENCH.

Fig. 6627 shows the way to hold and open the wrench; also the dotted line shows the position of forefinger when extended to pull the jaws together or to the nut. They are made of forge steel, polished.

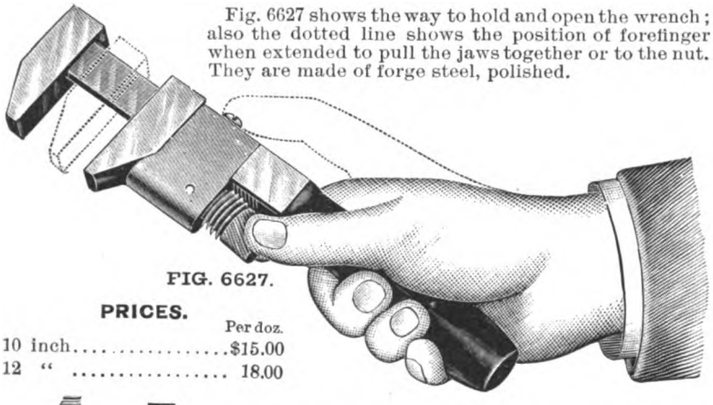


FIG. 6627.

PRICES.

	Per doz.
10 inch	$15.00
12 "	18.00

LIGHTNING WRENCH.



FIG. 6627.

HAYDEN'S POCKET WRENCHES.

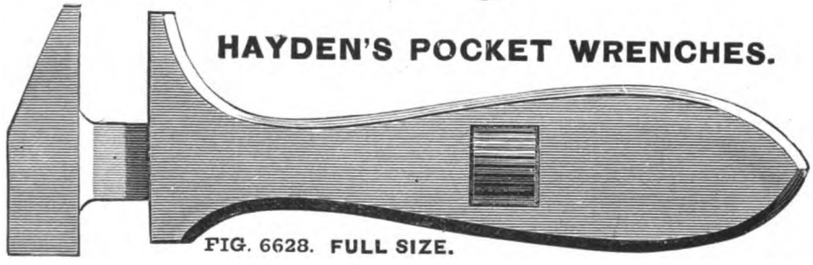


FIG. 6628. FULL SIZE.

PRICES, MALLEABLE IRON.

		Per doz.
No. 1.	4 inches, plain	$3.75
" 2.	4 inches, polished, with brass knurl	6.25
" 3.	4 inches, nickel-plated, with nickeled brass knurl	9.00

BAXTER'S DIAGONAL.

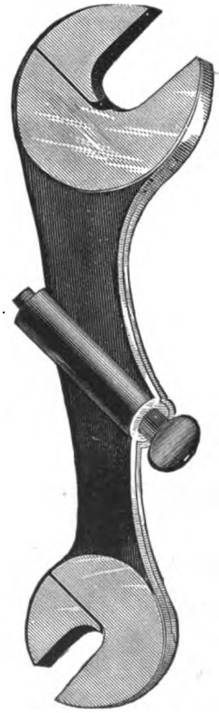


FIG. 6630.

BAXTER'S S WRENCHES.

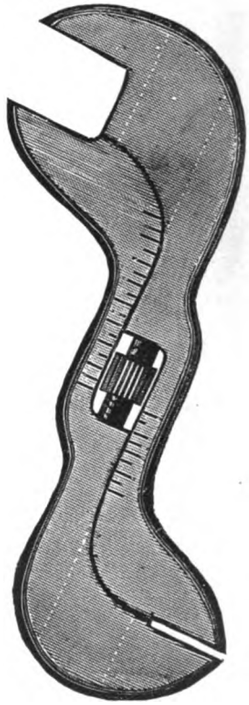


FIG. 6631.

PRICES, EITHER STYLE.

4 inch	per doz., $6.00	10 inch	per doz., $18.00
6 "	" 9.00	12 "	" 24.00
8 "	" 12.00		

ADJUSTABLE 4 INCH POCKET WRENCHES.

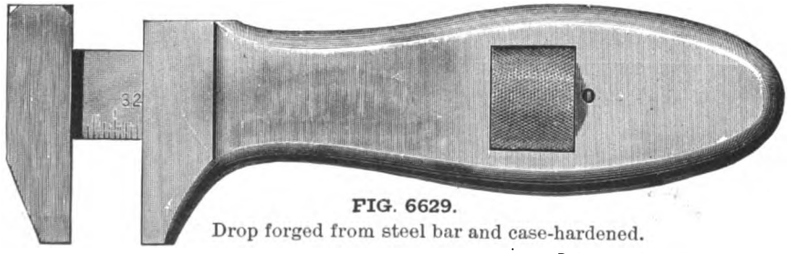


FIG. 6629.

Drop forged from steel bar and case-hardened.

	Opens.	Weight.	Price, per doz. Black.	Price, per doz. Nickeled.
4 inch wrench	1 inch	6½ oz.	$9.00	$10.00

WESTCOTT ADJUSTABLE WRENCHES.



FIG. 6632.

PRICES, FIG. 6632.

	Per doz.
8 in. plain, opening from 0 to 1 in.	$9.00
10 " " " " 0 to 1⅜ "	12.00
14 " " " " 0 to 2 "	21.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ENGINEERS' WRENCHES, DROP-FORGED FROM BAR STEEL.

DOUBLE HEAD.

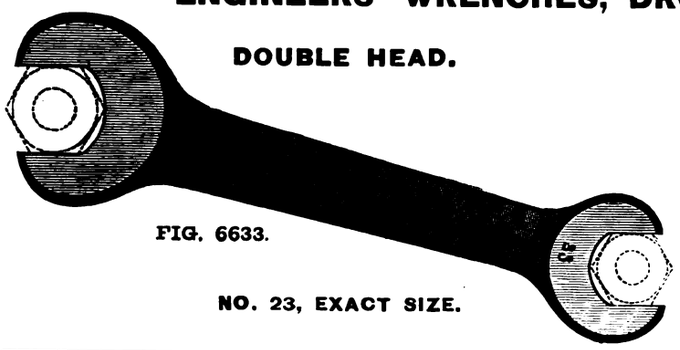


FIG. 6633.

NO. 23, EXACT SIZE.

No.	Size bolts, U.S. standard nuts.	Openings unfinished.	Openings finished.	Extreme length.	Thickness heads.	Prices, unfinished.	Prices, finished.
21	1/8 & 3/16	1/4 & 11/32	5/16 & 13/32	3 1/4	13/64 & 7/32	$0.12	$0.24
22	1/8 & 1/4	1/4 & 7/16	5/16 & 1/2	4	13/64 & 1/4	.14	.28
23	3/16 & 1/4	5/16 & 13/32	3/8 & 1/2	4	7/32 & 1/4	.15	.30
24	3/16 & 5/16	5/16 & 1/2	3/8 & 1/2	4 7/8	7/32 & 9/32	.17	.34
25	1/4 & 5/16	13/32 & 1/2	1/2 & 19/32	4 7/8	1/4 & 9/32	.18	.36
26	1/4 & 3/8	13/32 & 19/32	1/2 & 11/16	5 7/8	1/4 & 5/16	.20	.40
27	5/16 & 3/8	1/2 & 19/32	19/32 & 11/16	5 7/8	9/32 & 5/16	.21	.42
28	5/16 & 7/16	1/2 & 11/16	19/32 & 25/32	6 7/8	9/32 & 11/32	.23	.46
29	3/8 & 7/16	19/32 & 11/16	11/16 & 25/32	6 7/8	5/16 & 11/32	.25	.50
30	3/8 & 1/2	11/16 & 25/32	11/16 & 7/8	7 3/4	5/16 & 25/64	.28	.56
31	7/16 & 1/2	11/16 & 25/32	25/32 & 7/8	7 3/4	11/32 & 25/64	.30	.60
32	7/16 & 9/16	11/16 & 7/8	25/32 & 29/32	8 3/4	11/32 & 7/16	.34	.68
33	1/2 & 9/16	25/32 & 7/8	25/32 & 29/32	8 3/4	25/64 & 7/16	.36	.72
34	1/2 & 5/8	25/32 & 29/32	7/8 & 1 1/16	9 3/4	25/64 & 31/64	.41	.82
35	9/16 & 5/8	25/32 & 29/32	29/32 & 1 1/16	9 3/4	7/16 & 31/64	.43	.86
36	9/16 & 3/4	7/8 & 1 1/32	29/32 & 1 1/4	11 3/8	3/8 & 9/16	.50	1.00
37	5/8 & 3/4	29/32 & 1 5/32	1 1/16 & 1 1/4	11 5/8	31/64 & 9/16	.53	1.06
38	5/8 & 7/8	29/32 & 1 5/32	1 1/16 & 1 7/16	13 1/2	31/64 & 35/64	.62	1.24
39	3/4 & 7/8	1 5/32 & 1 1/4	1 1/4 & 1 7/16	13 1/2	9/16 & 35/64	.65	1.30
40	3/4 & 1	1 5/32 & 1 7/16	1 1/4 & 1 5/8	15 1/2	9/16 & 3/4	.78	1.56
41	7/8 & 1	1 5/32 & 1 7/16	1 7/16 & 1 5/8	15 1/2	21/32 & 3/4	.82	1.64
42	7/8 & 1 1/8	1 5/32 & 1 7/16	1 7/16 & 1 13/16	17 3/8	21/32 & 53/64	1.00	2.00
43	1 & 1 1/8	1 7/32 & 1 29/64	1 5/8 & 1 13/16	17 3/8	3/4 & 53/64	1.08	2.16
44	1 & 1 1/4	1 7/32 & 1 29/64	1 5/8 & 2	19 3/8	3/4 & 29/32	1.27	2.54
45	1 1/8 & 1 1/4	1 7/32 & 1 29/64	1 13/16 & 2	19 3/8	53/64 & 29/32	1.35	2.70
46	1 1/8 & 1 3/8	1 7/32 & 2 3/32	1 13/16 & 2 3/16	21 1/4	53/64 & 61/64	1.65	3.30
47	1 1/4 & 1 3/8	1 7/32 & 2 3/32	2 & 2 3/16	21 1/4	29/32 & 61/64	1.75	3.50
48	1 1/4 & 1 1/2	1 7/32 & 2 3/32	2 & 2 3/8	23 1/4	29/32 & 1 1/16	2.10	4.20
49	1 3/8 & 1 1/2	2 3/32 & 2 9/32	2 3/16 & 2 3/8	23 1/4	61/64 & 1 1/16	2.25	4.50
50	1 3/8 & 1 5/8	2 3/32 & 2 15/32	2 3/16 & 2 9/16	25 1/8	61/64 & 1 1/8	2.65	5.30
51	1 1/2 & 1 5/8	2 9/32 & 2 15/32	2 3/8 & 2 9/16	25 1/8	1 1/16 & 1 1/8	2.85	5.70
52	1 1/2 & 1 3/4	2 9/32 & 2 21/32	2 3/8 & 2 3/4	27 1/8	1 1/16 & 1 3/32	3.30	6.60
53	1 5/8 & 1 3/4	2 15/32 & 2 21/32	2 9/16 & 2 3/4	27 1/8	1 1/8 & 1 3/32	3.55	7.10
54	1 5/8 & 2	2 15/32 & 3 1/16	2 9/16 & 3 1/8	30 7/8	1 1/8 & 1 3/8	4.15	8.30
55	1 3/4 & 2	2 21/32 & 3 1/16	2 3/4 & 3 1/8	30 7/8	1 7/32 & 1 3/8	4.55	9.10
56	1 3/4 & 2 1/4	2 21/32 & 3 7/16	2 3/4 & 3 1/2	34 5/8	1 7/32 & 1 17/32	5.35	10.70
57	2 & 2 1/4	3 1/16 & 3 7/16	3 1/8 & 3 1/2	34 5/8	1 3/8 & 1 17/32	5.95	11.90

SINGLE HEAD SET-SCREW WRENCHES.

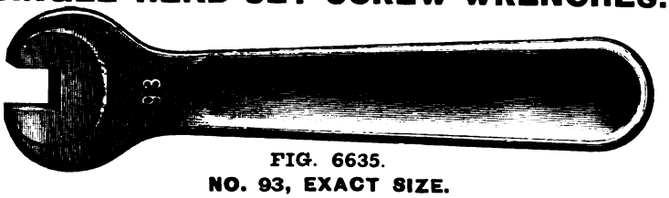


FIG. 6635.

NO. 93, EXACT SIZE.

All these wrenches have concave handles and admit of milling to one or two sizes larger than stated in table.

No.	For set-screw, size.	Extreme length.	Thickness head.	Prices, unfinished.	Prices, finished.
93	1/4	3 5/8	1/4	$0.10	$0.20
94	5/16	4 1/2	5/16	.12	.24
95	3/8	5 3/8	11/32	.15	.30
96	7/16	6 1/4	3/8	.20	.40
97	1/2	7	7/16	.25	.50
98	9/16	7 1/2	1/2	.27	.54
99	5/8	8	9/16	.30	.60
100	3/4	9 1/4	5/8	.35	.70
101	7/8	10 1/2	11/16	.42	.84
102	1	11 1/2	3/4	.50	1.00

DESCRIPTION, FIG. 6636.

Each opening forms an angle of twenty-two and a half (22 1/2) degrees with the handle, which admits of turning any square head bolt or screw completely around where the swing of the handle is limited to forty-five degrees.

Unfinished wrenches are furnished in nine sizes, only as per odd numbers, but eighteen sizes finished wrenches are made (see list), as each forging is milled to two finished combinations.

All these wrenches have concave handles and admit of milling to one or two sizes larger than stated in table.

SINGLE HEAD.



FIG. 6634.

NO. 1, EXACT SIZE.

These wrenches are particularly adapted for machine tools, locomotives, pumps, steam or gas engines and general shop use. The opening forms an angle of fifteen degrees with the handle, which admits of turning a hexagon nut completely around where the swing of the handle is limited to thirty degrees. The finished wrenches are polished, case-hardened and milled to fit U. S. standard nuts, but can be milled to other sizes when required.

Prices will be given for straight, spanner, box, socket, chuck and other wrenches of any size or shape, upon receipt of samples or models.

No.	Size bolt, U. S. standard nut.	Opening unfinished.	Opening finished.	Extreme length.	Thickness head.	Prices, unfinished.	Prices, finished.
0	3/16	5/16	13/32	2 7/8	7/32	$0.09	$0.18
1	1/4	11/32	1/2	3 3/4	1/4	.10	.20
2	5/16	1/2	19/32	4 3/4	9/32	.12	.24
3	3/8	9/32	11/16	5 5/8	5/16	.14	.28
4	7/16	11/32	25/32	6 1/2	11/32	.17	.34
5	1/2	29/64	7/8	7 1/2	25/64	.20	.40
6	9/16	9/32	29/32	8 3/4	7/16	.25	.50
7	5/8	7/8	1 1/16	9 1/4	31/64	.32	.64
8	3/4	1 5/32	1 1/4	11 1/8	9/16	.40	.80
9	7/8	1 11/32	1 7/16	13	21/32	.50	1.00
10	1	1 13/32	1 5/8	14 7/8	3/4	.65	1.30
11	1 1/8	1 23/32	1 13/16	16 5/8	53/64	.85	1.70
12	1 1/4	1 29/32	2	18 1/2	29/32	1.10	2.20
13	1 3/8	2 3/32	2 3/16	20 1/4	61/64	1.40	2.80
14	1 1/2	2 9/32	2 3/8	22 1/4	1 1/64	1.75	3.50
15	1 5/8	2 13/32	2 9/16	24	1 1/16	2.10	4.20
16	1 3/4	2 5/32	2 3/4	25 3/8	1 7/64	2.50	5.00
17	2	3 1/16	3 1/8	29 1/2	1 3/32	3.50	7.00
18	2 1/4	3 7/16	3 1/2	33	1 1/64	4.75	9.50
19	2 1/2	3 13/16	3 7/8	37	1 5/32	.....	.....
20	3	4 9/16	4 5/8	44	1 7/8	.....	.....

DOUBLE HEAD SET-SCREW WRENCHES.

DROP-FORGED FROM BAR STEEL.



FIG. 6636.

NO. 67, EXACT SIZE.

No. unfinished.	No. finished.	For set screws, size.	Extreme length.	Thickness heads.	Prices, unfinished.	Prices, finished.
65	65	3/16 & 1/4	3 3/8	3/16 & 1/4	$0.13	$0.26
	66	3/16 & 5/16	3 3/8	.....	.....	.26
67	67	1/4 & 5/16	4	1/4 & 5/16	.15	.30
	68	1/4 & 3/8	4	.....	.....	.30
69	69	1/4 & 3/8	5	5/16 & 11/32	.18	.36
	70	5/16 & 7/16	5	.....	.....	.36
71	71	3/8 & 7/16	5 7/8	11/32 & 3/8	.22	.44
	72	3/8 & 1/2	5 7/8	.....	.....	.44
73	73	7/16 & 1/2	6 5/8	3/8 & 7/16	.27	.54
	74	7/16 & 9/16	6 5/8	.....	.....	.54
75	75	1/2 & 9/16	7 1/2	7/16 & 1/2	.33	.66
	76	1/2 & 5/8	7 1/2	.....	.....	.66
77	77	9/16 & 5/8	8 3/8	1/2 & 9/16	.40	.80
	78	9/16 & 3/4	8 3/8	.....	.....	.80
79	79	5/8 & 3/4	10	9/16 & 5/8	.48	.96
	80	5/8 & 7/8	10	.....	.....	.96
81	81	3/4 & 7/8	11 3/8	5/8 & 11/16	.58	1.16
	82	3/4 & 1	11 3/8	.....	.....	1.16

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WRENCHES DROPPED FROM STEEL BAR.

HEXACON. SQUARE.

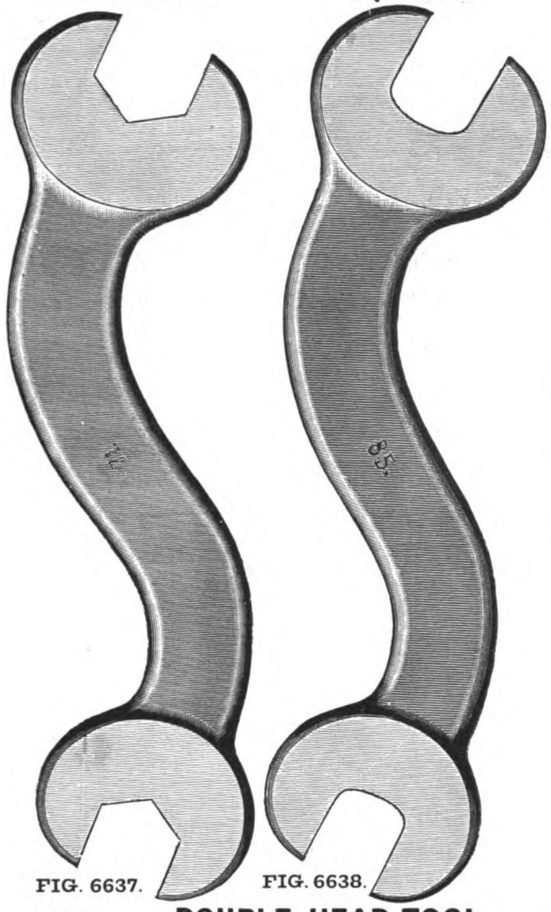


FIG. 6637. FIG. 6638.

No.	Length. Inches.	Thickness of head. Inches.	Finished, Fig. 6637. Size of opening.	Finished, Fig. 6637. Prices.	Unfinished, Fig. 6637. Size of opening.	Unfinished, Fig. 6637. Prices.
70	4	1/4	3/8 and 7/16	$0.20	5/16 and 3/8	$0.10
71	5	5/16	1/2 and 9/16	.30	7/16 and 1/2	.15
72	6	3/8	3/4 and 13/16	.40	9/16 and 5/8	.20
73	7	7/16	7/8 and 1	.50	11/16 and 3/4	.25
74	8	1/2	1 and 1 1/8	.60	13/16 and 7/8	.30
75	9	9/16	1 3/16 and 1 1/4	.70	15/16 and 1	.35

We also finish these wrenches to following sizes for standard nuts:

No. 71 ..... 1/2 and 19/32 ..... Prices, $0.30
No. 72 ..... 11/16 and 25/32 ..... " .40
No. 73 ..... 7/8 and 31/32 ..... " .50
No. 74 ..... 31/32 and 1 1/16 ..... " .60
No. 75 ..... 1 1/16 and 1 1/4 ..... " .70

No.	Length. Inches.	Thickness of head. Inches.	Size of opening.	Fig. 6638. Prices, finished.
84	4	1/4	5/16 and 3/8	$0.20
85 (Cut full size.)	5	5/16	7/16 and 1/2	.30
86	6	3/8	9/16 and 5/8	.40
87	7	7/16	11/16 and 3/4	.50
88	8	1/2	13/16 and 7/8	.60
89	9	9/16	15/16 and 1	.70

DOUBLE HEAD TOOL POST WRENCHES.

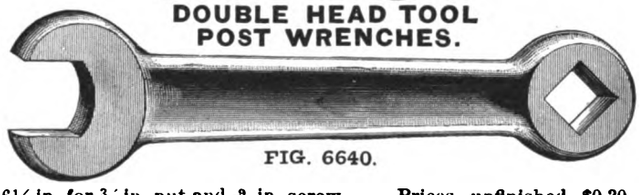


FIG. 6640.

6 1/2	in. for	3/8	in. nut and	9/16	in. screw	Prices, unfinished,	$0.30
7	in. "	1/2	in. " "	5/8	in. "	" "	.35
7 1/2	in. "	5/8	in. " "	5/8	in. "	" "	.40
8	in. "	5/8	in. " "	3/4	in. "	" "	.45
9	in. "	3/4	in. " "	3/4	in. "	" "	.55

DOUBLE HEAD BOX HEXACON.

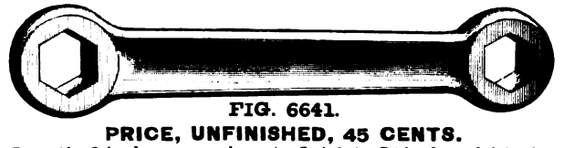


FIG. 6641.

PRICE, UNFINISHED, 45 CENTS.

Length, 9 inches; openings to finish to 7/8 inch and 1 inch.

DROP-FORGED STEEL TRACK WRENCHES. SINGLE HEAD.



FIG. 6642.

DOUBLE HEADED.



FIG. 6643.

WROUGHT IRON KEY WRENCHES.



FIG. 6644.

Length of jaw,	2 1/2	3	3 1/2	4	4 1/2	5
Prices.....	$3.00	$4.00	$5.00	$6.00	$8.00	$10.00

SINGLE HEAD BOX WRENCH.

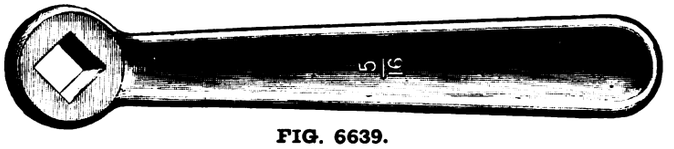


FIG. 6639.

FULL SIZE, NO. 109.

No.	For set-screw. Size. Inches.	Extreme length. Inches.	Thickness head. Inches.	Prices. Unfinished only.
108	1/4	3 3/4	9/32	$0.10
109	5/16	3 3/4	5/16	.11
110	3/8	4 1/4	3/8	.13
111	7/16	4 7/8	7/16	.16
112	1/2	5 1/2	15/32	.19
113	9/16	6 1/4	1/2	.22
114	5/8	7	9/16	.26
115	3/4	8	5/8	.30
116	7/8	9	11/16	.36
117	1	10	3/4	.44

CHUCK WRENCHES.



FIG. 6645.

PRICES, FIG. 6645.

6 inch forgings, 7/16 ..... $0.25
9 " " 1/2 ..... .35
6 " finished 7/16 ..... .40
" " 15/32 ..... .50

PRICES, FIGS. 6642 AND 6643.

	Outside diameter of nuts.	Openings.	Extreme length.	Thickness heads.	Prices, each.
Single head....	1 1/4	1 5/16	23	3/4	$0.60
" "	1 3/8	1 7/16	23	3/4	.60
" "	1 1/2	1 9/16	23	3/4	.60
Double "	1 1/4 and 1 3/8	1 5/16 and 1 7/16	24	3/4	.90
" "	1 1/4 and 1 1/2	1 5/16 and 1 9/16	24	3/4	.90
" "	1 3/8 and 1 1/2	1 7/16 and 1 9/16	24	3/4	.90

PRICES, FIG. 6646.

No. 1 circle, 2 inches..... each, $0.30 } Forgings
No. 2 " 2 1/2 " ..... " .30 } only.
No. 3 " 3 " ..... " .30
No. 4 " 4 " ..... " .35

SPANNER WRENCHES.

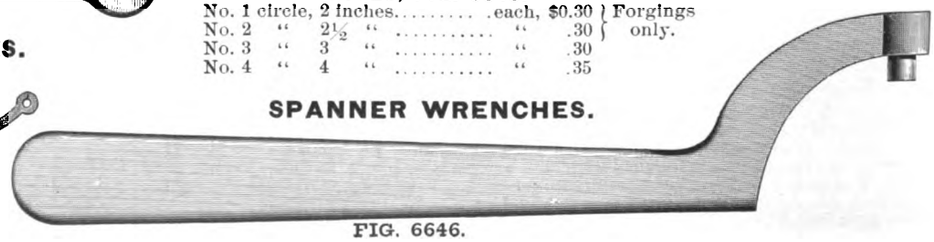


FIG. 6646.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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RATCHET WRENCHES.

PATTERN OF 1886.



FIG. 6647.

It can be changed into a ratchet drill by removing the cap and replacing the gear by a drill socket. A nut or bolt is turned either way without taking off the wrench.

This wrench, like the ratchet drill, can be changed to a right or left hand motion at pleasure.

PRICES.

No. 1,	10-inch lever.	Any one gear on the list below.....	$3.00
No. 2,	12 " "	" " " "	4.00
No. 3,	15 " "	" " " "	5.00
*No. 3½,	18 " "	" " " "	6.00
No. 4,	18 " "	" " " "	7.00

* This handle takes a No. 3 gear.

WRENCH GEARS.

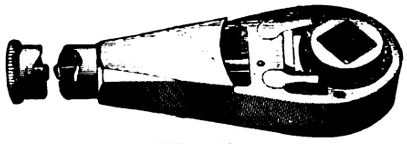


FIG. 6649.

PRICES.

No. 1,	⅜, ½, ⅝ in. square nut,	⅝, ¾ in. hex.,	each, $0.50
No. 2,	½, ⅝, ¾ " " "	¾, ⅞, 1 " " "	.60
No. 3,	¾, ⅞, 1, 1⅛ " " "	1, 1⅛, 1¼ " " "	.75
No. 4,	1⅛, 1¼, 1⅜, 1½ " " "	1¼, 1½, 1¾ " " "	1.00

In ordering wrenches, please state what gears are desired, as a No. 1 wrench may contain either a gear for ⅜, ½, ⅝ square nut, or for ⅔ or ¾ hexagon.

In the following gears the hole is large, leaving too little stock on the corners for severe strains. No. 1, ⅝; No. 2, ¾; No. 3, 1⅛; No. 4, 1½, square.

LEVER RATCHET.

PRICE, FIG. 6651.

Per doz., $33.00.



FIG. 6651.

COMBINATION RATCHET DRILL.



FIG. 6652.

Each drill has about twenty teeth, all engaging at the same time, rendering slipping or stripping of the teeth impossible. The price is lower than any other first-class drill. It is made entirely of steel, case-hardened.

PRICES.

	No. 1.	No. 2.	No. 3.
Length of handle.....	10 inch.	12 inch.	16 inch.
Length of body.....	3 "	4 "	5 "
Length of extra sleeve.....	3⅝ "	4⅜ "	5⅝ "
Price of ratchet.....	$7.00	$10.00	$12.00
Price of sleeve.....	2.00	2.50	3.00

Drills for ratchets, 6 inches long.

⅜	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½
$0.40	$0.40	$0.40	$0.45	$0.45	$0.45	$0.50	$0.55	$0.60	$0.65

BRIDGE-BUILDERS' WRENCHES.

MADE TO ORDER.

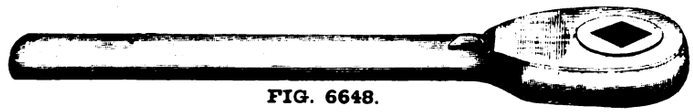


FIG. 6648.

PRICES.

No. 1, 3 ft. lever,	1⅛, 1¼ in. sq. nut.	1½, 1¾ hex. nut,		$8.00
No. 2, 3 "	1½, 1¾, 2 " "	2, 2¼, 2½ " "		14.00
No. 3, 3¼ "	2, 2¼, 2½ " "	2¾, 3, 3¼ " "		16.00
No. 4, 3½ "	2½, 2¾, 3, 3¼ " "	3½, 3¾, 4 " "		18.00
No. 5, 3½ "	3¼, 3½, 3¾ " "	4¼, 4½ " "		20.00

The above prices cover only one gear for each wrench.

EXTRA GEARS.

No. 1, $1.00; No. 2, $2.00; No. 3, $3.00; No. 4, $3.50; No. 5, $4.00.

STEEL SOCKET BRIDGE WRENCHES.

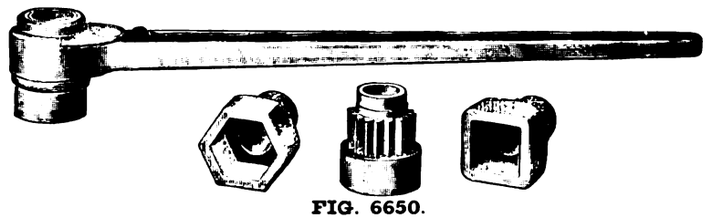


FIG. 6650.

They will turn nuts on or off without removing the wrench, and soon make good their cost by saving labor.

PRICES.

No. 1. Length of handle, 2 feet. Clear hole through the socket for 1⅛ inch bolt. Weight, about ten pounds.
Price, with a single socket.....$8.00
Price of each additional socket..... 1.50
This handle will take sockets for—
1⅜, 1½, 1⅝, 1¾, 2 inch square nuts.
1½, 1⅝, 1¾, 2 inch hexagon nuts.

No. 2. Length of handle, 3 feet. Hole for bolt, 1¾ inches. Weight, 23 pounds.
Price, with a single socket.....$14.00
Price of each additional socket..... 2.50
This size will take sockets for—
2¼, 2½, 2¾, 3 inch square nuts.
2¼, 2½, 2¾, 3, 3¼ inch hexagon nuts.

No. 3. Length of handle, 3 feet. Hole through the socket, 2½ inches. Weight, about 50 pounds.
Price, with a single socket.....$20.00
Price, each additional socket..... 4.50
This size will take sockets for—
3, 3¼, 3½, 3¾, 4, 4¼, 4½ inch square nuts.
3, 3¼, 3½, 3¾, 4, 4¼, 4½ inch hexagon nuts.

Please order by size of nut, small diameter, rather than by size of bolt. Odd sizes made to order.

SQUARE OR HEXAGON LAG SCREW WRENCHES.



FIG. 6653.

Designed for turning coach screws, nuts or bolts, either way, without taking off the wrench.

These wrenches are changeable for various sizes, by means of the different sockets.

So long as the screw runs easily, it can be turned by the wooden handle more conveniently and faster than by the fingers, and independently of the ratchet motion. When this can be no longer done with ease, the twelve-inch handle is brought into use to turn the screw home.

For overhead work and work in close places, this tool is invaluable.

We are now prepared to fill orders promptly for sockets to take any of the following sizes of nuts:—

½, ⅝, ¾, ⅞, 1, 1⅛, 1¼ .....square.
¾, ⅞, 1, 1⅛, 1¼, 1⅜.....hexagon.

These are sizes of nut or bolt head, not of bolt.

PRICES.

Wrench, with a single socket.....$2.00
Each additional socket..... .40

Sockets made to order to fit special nuts or bolts, and to reach into difficult places.

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RENSHAW'S RATCHET DRILLS.

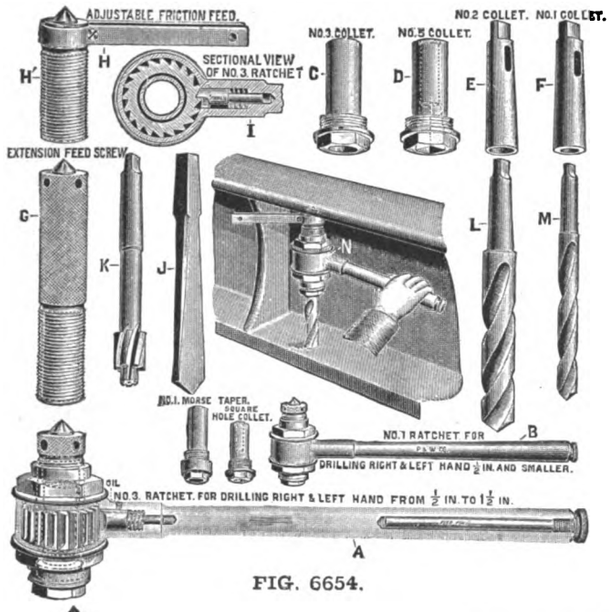


FIG. 6654.

The handle is drop-forged of tough wrought iron. The spindle of steel has substantial ratchet teeth cut in its periphery, engaging with a pawl lodged in the handle, which covers both pawl and ratchet, and protects them from dirt. The feed screw is of steel, and hollow, giving the drill a large capacity in small compass. By transferring the collet and feed screw, as arranged for right-hand drilling, to opposite ends of the spindle, the ratchet may be used for left-hand drilling.

No. 1 has one collet for drills, with shank $\frac{11}{16}$ inch square at shoulder, and one collet for drills, fitting No. 1 Morse's standard taper socket.

WEIGHT, 16 OUNCES. PRICE, $12.00.

Deduct for either collet, if not wanted, $1.60. Weight, 1 ounce each.

No. 3 has one collet, No. 5, for drills, with shank $\frac{11}{16}$ square at shoulder, of $\frac{1}{2}$ to $1\frac{1}{2}$ inches diameter, which are the extreme sizes that this ratchet is adapted to carry, and collets Nos. 1, 2 and 3, for Morse's standard taper shanks. Nos. 3 and 5 collets are held in the spindle by screw-thread. Nos. 1 and 2 collets are tapered externally to fit No. 3 socket. Deductions will be made for collets, when not wanted, as follows: No. 1, weight 8 ounces, and No. 2, weight 6 ounces, $1.10 each; Nos. 3 and 5, weight 8 ounces each, $1.75 each.

WEIGHT, 8 POUNDS 14 OUNCES. PRICE, with four collets, **$16.00.**

The No. 3 ratchet, for the use of boiler-makers, for whose use it is especially adapted, is provided with an extended feed-screw, having a knurled shank $3\frac{1}{2}$ inches long, by which the ratchet may be held by hand in starting the drill, and fed by hand also. When this extended screw is substituted for the regular one, the price is not changed; if it is taken as an extra attachment, it is furnished at $3.50.

An adjustable friction feed attachment can be furnished for $4.00.

	No. 1.	No. 3.
Length of handles over all	$9\frac{1}{2}$ in.	18 in.
Length from top of spindle to bottom of feed collet	3 "	5 "
Length of feed	$1\frac{1}{2}$ "	$2\frac{3}{4}$ "

DOUBLE-ACTING RATCHET DRILLS.

PRICES.

No. 1. $10\frac{3}{4}$ inch handle, with one socket taking Morse taper shank drills, from $\frac{1}{4}$ inch to $\frac{29}{32}$ inch, inclusive, and one socket taking flat drills	$14.00
No. 1. Without the two sockets, as above	11.00
No. 2. $13\frac{3}{4}$ inch handle, with one socket taking Morse taper shank drills, from $\frac{5}{8}$ to $1\frac{1}{4}$ inch, inclusive, and one socket for flat drills	17.00
No. 2. Without the two sockets, as above	14.00
Socket No. 1, for taper shank drills, from $\frac{1}{4}$ to $\frac{13}{32}$, inclusive	1.50
" " 2, " " " " $\frac{5}{8}$ to $\frac{29}{32}$, "	2.00
" " 3, for flat drill, for No. 1 ratchet	1.75
" " 4, " " " 2 "	1.75

Socket No. 1 is fitted with taper shank to slide into No. 2 socket, and purchasers procuring the No. 2 ratchet, with the three sockets, can use the whole list of drills. The sockets used in these drills can be used for lathe work, being of correct taper for the Morse taper shank drills.

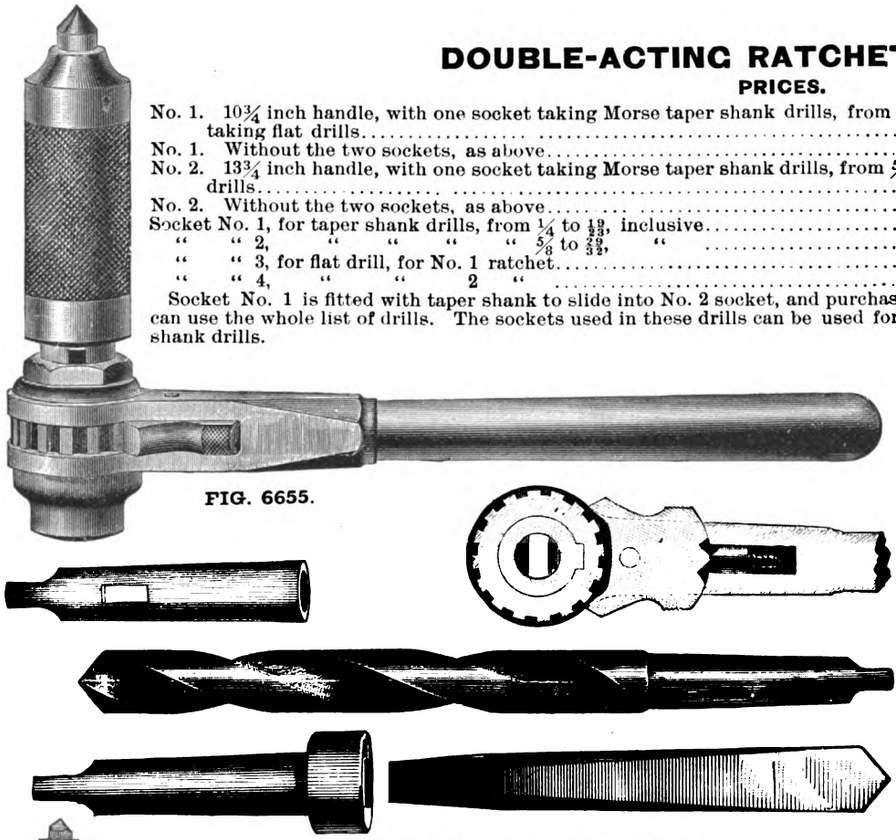


FIG. 6655.

DESCRIPTION, FIG. 6655.

They are drop-forged of the best bar iron and steel for the purpose, and are made to use Morse taper shank twist drill, also provided with socket with square hole for square shank drill. This drill can be changed from right to left hand drilling by simply moving the pawl to the right or left. The sockets furnished with the drill can be utilized in any drilling spindle that may be fitted to receive them.

PACKER BOILER MAKERS' RATCHETS.



FIG. 6657.

PRICES.

No. 1. Boiler, 10 inch handle	$9.00
No. 2. " 12 " "	10.50

These are also called short stock ratchets.

PACKER SLEEVE RATCHETS.

PRICES, FIG. 6656.

No. 1.	Sleeve,	10 inch handle	$10.50	No. 4. Sleeve, 18 inch handle	$19.00
No. 2.	"	12 "	13.50	No. 5. " 24 "	23.00
No. 3.	"	16 "	16.00		

These tools have been made by us for a number of years, and are well known as the leading ratchet drills in the market.

They are manufactured of the best material and in a thorough manner; the screw is protected with a round sleeve, keeping dirt and grit from cutting the thread.

These ratchets are made with steel screws, pawls and hardened points. Every tool is warranted.

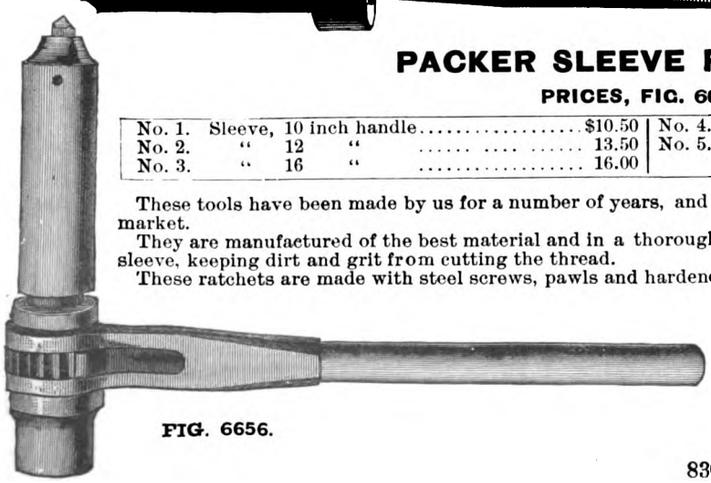


FIG. 6656.

MANNING, MAXWELL & MOORE, 11 AND 13 LIBERTY STREET, NEW YORK.

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PACKER RATCHETS, WITH MORSE TAPER SHANK HOLES.

PRICES.

No. 2A. 12-inch handle, taking No. 1 Morse taper socket or Morse taper shank drills, from $\frac{5}{8}$ to $\frac{29}{32}$, inclusive..... $16.00

No. 3A. 16-inch handle, taking No. 2 Morse taper socket or Morse taper shank drills, from $\frac{13}{16}$ to $1\frac{1}{4}$, inclusive..... 20.00

No. 4A. 18-inch handle, taking No. 3 Morse taper socket or Morse taper shank drills, from $1\frac{9}{32}$ to 2 inches, inclusive..... 25.00

Socket No. 1, for taper shank drills, from $\frac{1}{4}$ to $\frac{29}{32}$, inclusive..... 1.50

Socket No. 2, for taper shank drills, from $\frac{5}{8}$ to $\frac{29}{32}$, inclusive..... 2.00

Socket No. 3, for taper shank drills, from $\frac{13}{16}$ to $1\frac{1}{4}$, inclusive..... 2.50

No. 3. Flat drill socket for No. 2A Packer ratchet, and fitting No. 2 taper socket..... 1.75

No. 4. Flat drill socket for No. 3A Packer ratchet, and fitting No. 3 taper socket..... 1.75

No. 2A. Packer ratchet with No. 1 taper socket will take taper shank drills from $\frac{1}{4}$ to $\frac{29}{32}$, inclusive.

No. 3A. Packer ratchet with No. 1 and No. 2 taper sockets will take taper shank drills from $\frac{1}{4}$ to $1\frac{1}{4}$, inclusive.

No. 4A. Packer ratchet with Nos. 1, 2 and 3 taper sockets will take taper shank drills from $\frac{1}{4}$ to 2 inches, inclusive.

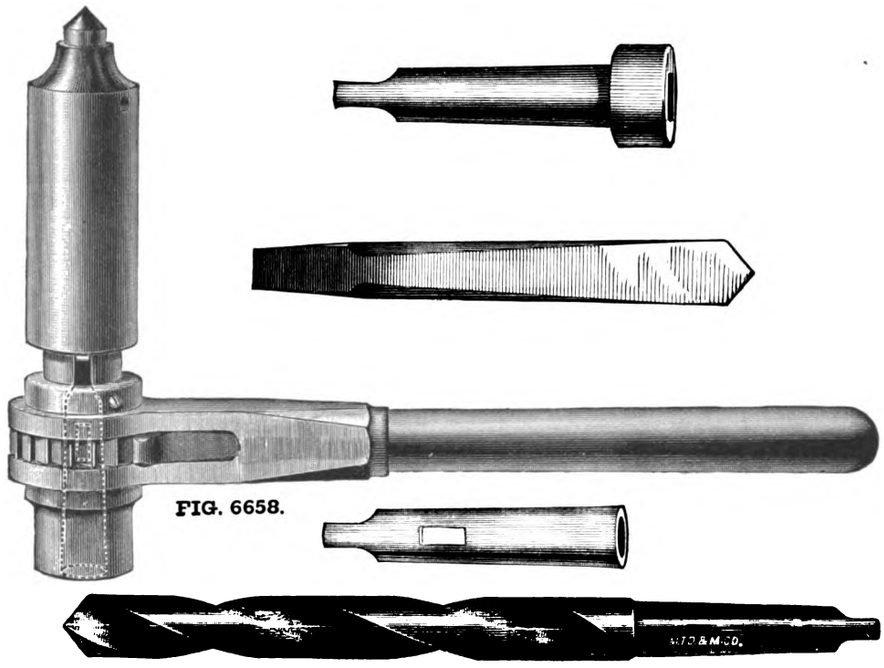


FIG. 6658.

COMBINED DOUBLE-ACTING RATCHET DRILLS.

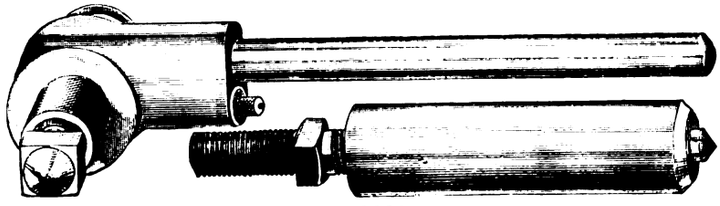
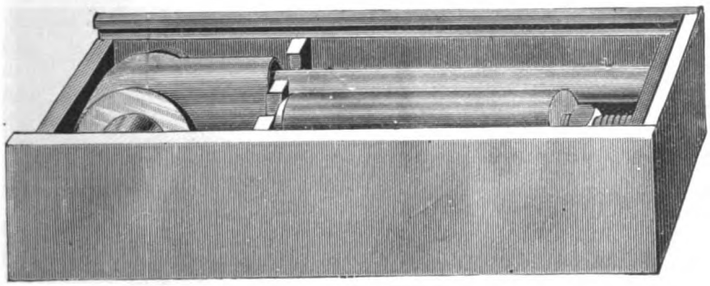


FIG. 6660.

SHOWS BOX FIG. 6660 IS PACKED IN.



PRICES, FIG. 6660.

No. 00,	8 inches.	Weighs, boxed,	2½	lbs., each		$8.00
" 01, 10	"	" "	7½	" "		10.00
" 02, 12	"	" "	12	" "		12.00
" 03, 16	"	" "	15½	" "		15.00
" 04, 18	"	" "	18	" "		18.00
" 05, 24	"	" "	22	" "		22.00

LOWELL RATCHET DRILLS.

CAN BE CHANGED FROM RIGHT TO LEFT AT PLEASURE.

PRICES.

No. A,	10-inch handle	$7.00
" B,	12 "	9.00
" C,	15 "	11.00
" D,	18 "	14.00



FIG. 6661.

RATCHET DRILL STOCKS.

STEEL, ALL POLISHED.



FIG. 6659.

PRICES.

No. 1,	lever,	12 inches,	each	$9.00
" 2,	"	15 "	"	10.50
" 3,	"	20 "	"	12.00

DESCRIPTION, FIG. 6660.

It is two ratchets in one—boiler and common. With this it can be used as a boiler ratchet, where the space is very small. By changing screw it can be used as common ratchet, and have a longer run of feeding screw than has been heretofore obtained with same length of drill stock.

It is reversible, which is convenient in light drilling to turn on and not move drill, also in getting out broken bolts and studs as well as when used as a wrench. The ratchet and socket are of one solid piece of forged steel, with no possible change to move or split.

The screws are large, so that no hard usage can spring them. The screws are also long for length of drill stock.

These ratchets are all neatly polished, with head nickel-plated, and are fitted with Morse's square taper.

SLEEVE BOILER AND RATCHET DRILLS.

This drill may be converted into a wrench by removing the cap and changing the drill socket for a wrench gear of corresponding number, while the price is much below that of other similar tools.

SEE LIST OF GEARS, FIG. 6650.



FIG. 6662.

PRICES.

No. 1,	10-inch handle		$6.00
" 2,	12 "		8.00
" 3,	15 "		10.00
" 4,	18 "		12.00

BOILER RATCHETS.

No. 1,	10-inch handle		$6.00
" 2,	12 "		8.00
" 3,	15 "		10.00

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WESTON'S RATCHET DRILLS.

STYLE "A," FOR GENERAL PURPOSES.

Made with double pawl and ratchet, which gives a stronger bearing than the ratchet teeth of other makers. Made with sleeve covering to feed screw of style "A," protecting it from dirt and grit. Machine-cut, square thread screws.

PRICES.

Length of lever....	12	14	16	18	20	22 inches.
Prices, each	$7.60	$8.00	$8.75	$10.00	$10.50	$12.00



FIG. 6663.

STYLE "B." THE BOILER RATCHET FOR CONFINED PLACES.



FIG. 6664.

PRICES, $8.00.

Length of lever, 14 inches; space required, 3½ inches; will feed ⅝ inch.

STYLE "C," FOR LOCOMOTIVE WORK.

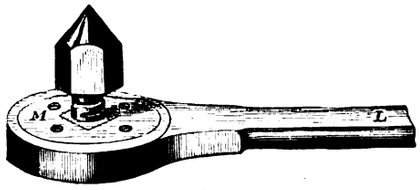


FIG. 6665.

PRICE, $12.00.

Length of lever, 14 inches; space required, 2¾ inches; will feed ⅝ inch.

STYLE "D," SWIVEL HANDLE.

PRICE, $10.00.

Lever 12 inches long.

PRICE, FIG. 6667.

Price, $19.00.

Length of lever, 12 inches; will drill within ½ inch of the inner angle.



FIG. 6666.

STYLE "F," FOR ANGLE IRON.

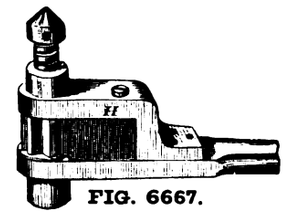


FIG. 6667.

PATENT RATCHETS.

			PRICES.	Polished.	Nickeled.
No. 4.	10 inch	lever.....	each,	$5.75	$7.50
" 5.	12 "	"	"	6.00	8.00
" 6.	15 "	"	"	7.00	9.50
" 6½.	17 "	"	"	7.50	....
" 7.	20 "	"	"	8.00	12.00

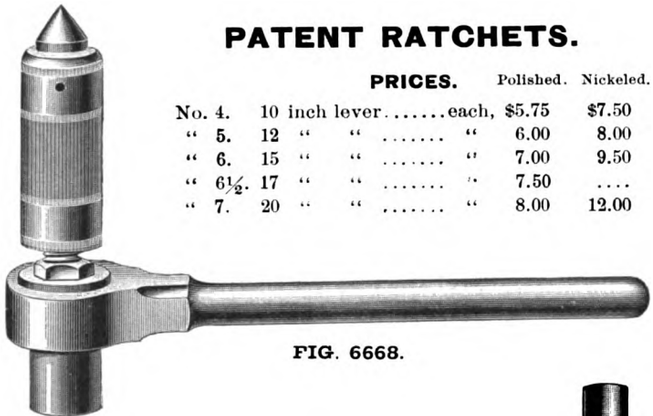


FIG. 6668.

FRICTION DRILLS.

Will work successfully in places so contracted that a ratchet is entirely useless.

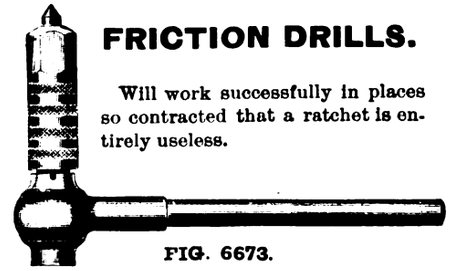


FIG. 6673.

PRICES, FIG. 6673.

1.	10 inch	handle.....	$10.00
2.	12 "	"	12.00
3.	15 "	"	15.00
5.	20 "	"	23.00

SMITH'S RATCHET DRILLS.



FIG. 6669.

FIG. 6670. SECTION.

The stock and gear-wheel is in one solid piece, and made from cast steel, the teeth in said wheel having ⅞ inch bearing surface for pawl to work on. By removing the cap "A" the stock may be instantly removed, and the entire tool taken apart; or, when a boiler ratchet is required, a short stock "B," Fig. 6672, can be substituted for the long one, and thus the necessity of having two ratchets is avoided.

PRICES.

12 inch lever.....	$10.00
15 " "	12.00
18 " "	14.50

FRICTION BOILER DRILL.

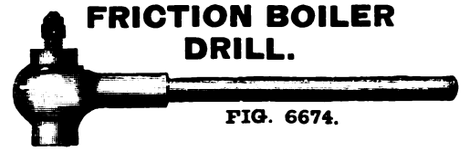


FIG. 6674.

PRICES.

1.	10 inch	handle.....	$9.00
2.	12 "	"	10.50
3.	15 "	"	13.50

FRICTION STOCK "C."

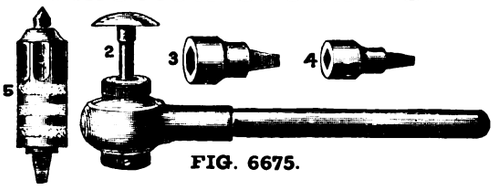


FIG. 6675.

PRICE, FIG. 6675.

Length of handle, 10 inches; includes spindle for wrenches.

Price..... $8.00

FLAT DRILLS FOR RATCHETS.



FIG. 6676.

PRICES.

Sizes....	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	6 ins. long.
Prices...	40	40	40	45	45	45	50	55	60	65	cents each.

SMITH'S BOILER RATCHETS.



FIG. 6671.

PRICES.

No. 1.	12 inch	lever.....	$8.75
" 2.	15 "	"	11.00

INTERCHANGEABLE EXTRA SHORT STOCK.

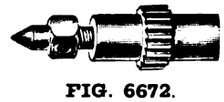


FIG. 6672.

Extra short stocks for boiler work, for either 12 or 15 inch ratchets, Fig. 6669..$5.00

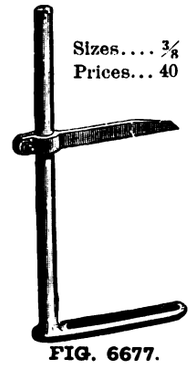


FIG. 6677.

OLD MAN, OR DRILLING POST.

This is a very handy and useful article to use in connection with ratchet drills, and will meet the wants of every machine shop and worker in iron. It is made of wrought iron, the post is turned for the swinging arm, and the foot is planed square, and has a slot in its full length for bolting down.

PRICES.	No. 1.	No. 2.
Height of posts.....	20 in.	26 in.
Radius of arms.....	10 in.	12 in.
Each.....	$8.00	$10.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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BREAST DRILLS.

SECONDARY GRIP.



FIG. 6678.

DESCRIPTION, FIG. 6678.

This drill is made of round wrought iron, ⅝ of an inch in diameter. The handles are rosewood, the head malleable iron, and the chuck jaws of steel. It has a changeable gear, one even and the other speeded three to one. The change from one to the other can be made in one second. The chuck will hold any shape shank, round, square or flat, as seen in the cut. These tools are not sold with the drill stock, but are only put in to show the shape of shank which the chuck will hold.

This drill stock is heavily nickel-plated. It has cut gears. An extra set of steel jaws goes with each drill stock, for holding small round drills.

PRICE, PER DOZ., $36.00.

PARKER'S.

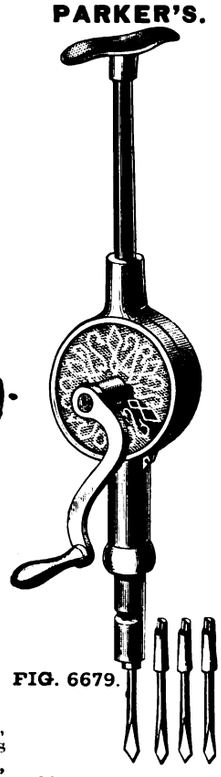


FIG. 6679.

GEARED.

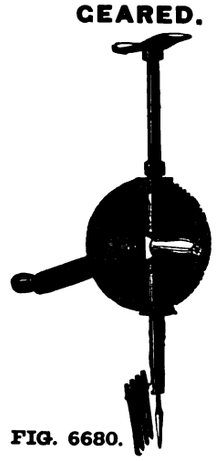


FIG. 6680.

PRICES, FIG. 6679.

Complete, with 4 drills.....each, $4.00
Extra drills.....per set, 1.00

PRICES, FIG. 6680.

No. 1. Double geared stocks, 4 drills, cast steel .....each, $4.50
No. 2. Single geared stocks, 4 drills, cast steel .....each, 3.75
No. 3. Single geared stocks, 4 drills, cast steel .....each, 3.00
Extra drills (4).....per set, 1.50

NICKEL-PLATED, WITH CUT GEARS.

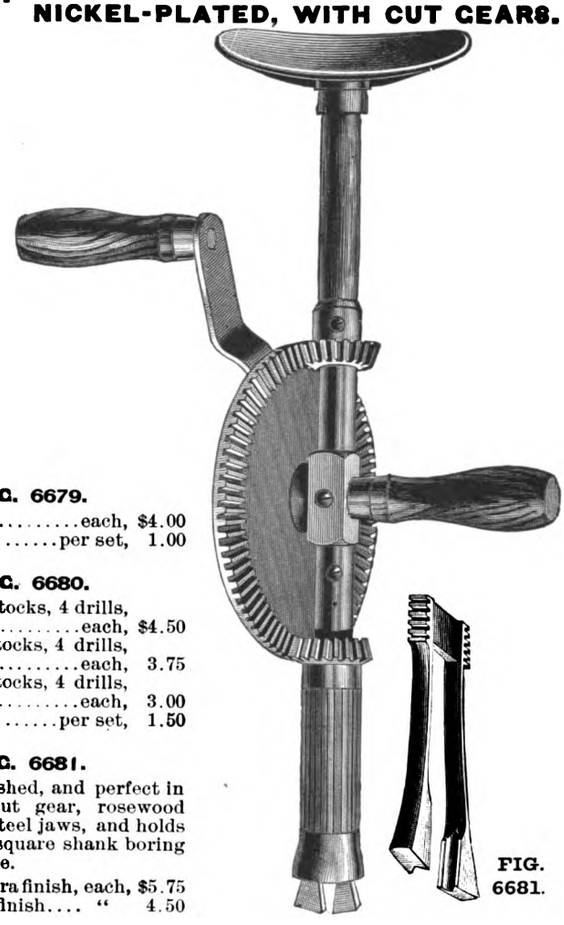


FIG. 6681.

PRICES, FIG. 6681.

This drill is finely finished, and perfect in every part. It has cut gear, rosewood handles and adjustable steel jaws, and holds equally well round and square shank boring instruments of every size.

No. 4. Nickel-plated, extra finish, each, $5.75
No. 5. Enameled, extra finish.... " 4.50

NOS. 1 & 2 HAND DRILLS.



PRICES, FIG. 6682.

No. 1. Single gear, hollow handle, nickel-plated .....per doz., $15.00
No. 1B. Dble. gear, same chuck " 18.00

Six drill points with each of the above drill stocks.

These drill stocks are made of malleable iron, with steel spindles and rosewood head and handle. The jaws are of forged steel, and will hold perfectly any sized drills named below. They are the only drill chucks in use which will hold Morse twist drills from $\frac{1}{32}$ to $\frac{1}{8}$ in.

The No. 3 is same size, style and finish as the No. 1, but with a longer crank and a hollow handle long enough to hold twist drills.

No. 3.....per doz., $18.00
No. 3B. Double gear..... " 21.00

DOUBLE GEARED.



FIG. 6683.

This drill stock is the same as Fig. 6678, but the chuck will only hold round shank drills. Being limited in its range, it holds drills from $\frac{1}{32}$ to $\frac{1}{4}$ in. very firmly and true, and is a most perfect tool, heavily nickel-plated, with rosewood handles. The gears are cut.

PRICE, PER DOZ., $36.00.

SECONDARY GRIP.

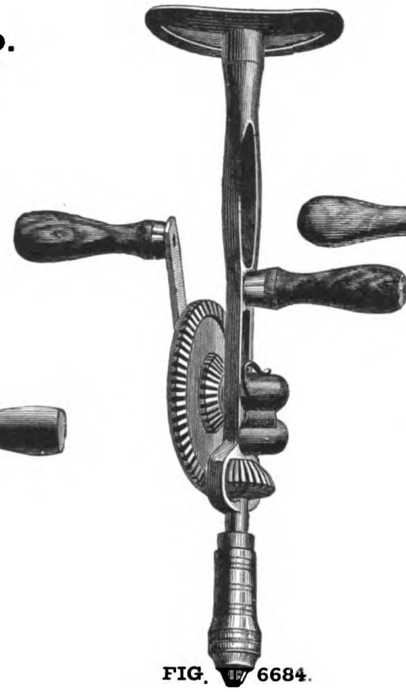


FIG. 6684.

A roller is placed under the large gear wheel, which makes it equal to a double gear. It has a malleable iron stock, japanned, rosewood handles, polished and plated chuck, changeable gears, one even and the other 3 to 1. It has a Barber improved chuck with our recent improvement, which makes it hold perfectly tools of all shapes and sizes.

PRICE, PER DOZ., $30.00.

SECONDARY GRIP.

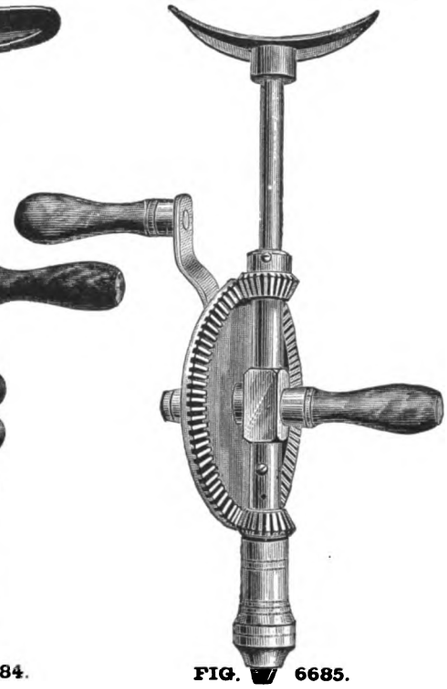


FIG. 6685.

This is the largest sized drill in market, the drive-wheel being 6 inches in diameter, giving a speed of 4½ to 1. It is double-geared and most perfect in every part. It has cut gears, steel stock, rosewood handles, steel jawed chuck, which will hold any size square and round tool shanks. It is heavily nickel-plated.

PRICE, PER DOZ., $48.00.

Drill stocks have extra steel jaws for holding small round drills.

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BREAST, HAND AND BENCH DRILLS.

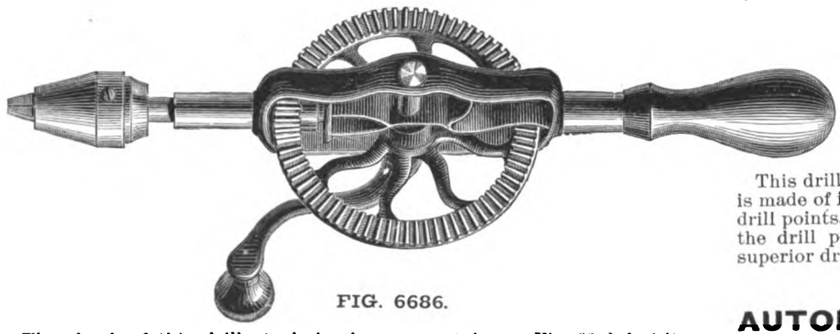


FIG. 6686.

The chuck of this drill stock is the same style as Fig. 6682, but it will hold ¼ inch drills and all smaller sizes. It has cut gears, is heavily nickel-plated, with rosewood head and handle. The head is hollow, and contains six drill points.

PRICE, per doz., **$30.00.**



FIG. 6687.

This drill stock is eight inches in length, and weighs eight ounces. It is made of iron, with rosewood handle, and brass chuck for holding the drill points. This chuck is made on a new plan, and it centers and holds the drill perfectly. With each drill stock we send a box containing six superior drill points, of various sizes.

PRICE of stock and drills, per doz., **$6.00.**

AUTOMATIC BORING TOOLS.

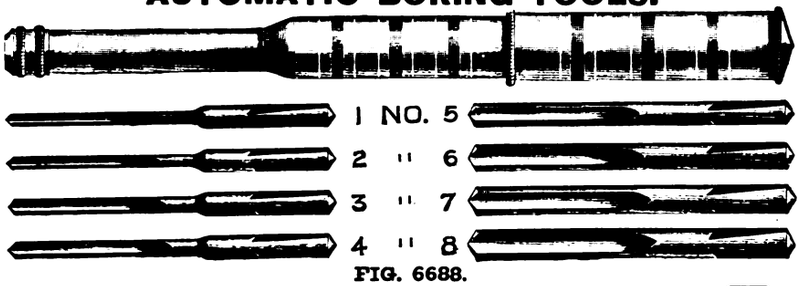


FIG. 6688.

This instrument is designed for boring wood for various purposes, such as for setting brads, finishing nails, screws, etc., eight bits—or drills, size indicated by dots and numerals above—accompanying each tool. It can be used in many places where the bit-brace, gimlet or brad-awl cannot, and is superior to either for the purposes mentioned. Piano-forte and organ builders, as well as cabinet-makers and house carpenters, who have used them, all attest their great value as a tool for doing their work rapidly and perfectly.

PRICE, with drills, per dozen, **$24.00.**

Points, per dozen, 72 cts. Points, per set, 48 cts.

AUTOMATIC DRILL STOCK AND DRILL POINTS.

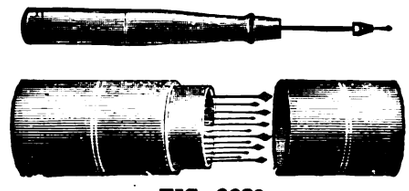


FIG. 6689.

This is a most complete tool for bracket-saw work. The stock is made of rosewood, with steel spindle.

The drill points are easily adjusted by means of a brass thimble, which screws on to the end of the spindle. It is easily worked with one hand, and will drill the most delicate wood without danger of splitting.

PRICE, No. 1, with 12 drill points, assorted, per doz., **$12.00.**

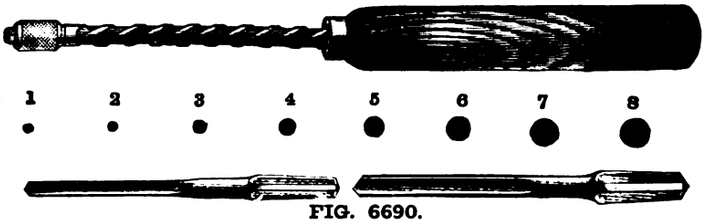


FIG. 6690.

No. 2 is a larger size, and includes a set of 8 drill points the same size as shown above in Fig. 6688 drill, with a suitable chuck to hold them.

PRICE, with 8 drill points, per dozen, **$18.00.**

BENCH DRILL.

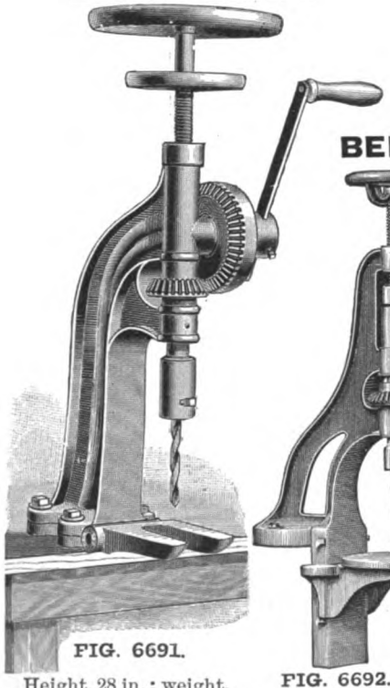


FIG. 6691.

Height, 28 in.; weight, 55 lbs. Drills from ⅛ to ⅞ in. hole, and to center of 9 in. circle. The feed has a run of 3½ in. All shafts and screws are best steel. Chuck is made for ½ in. drill shank.

PRICE, $15.00.

BENCH DRILLS.

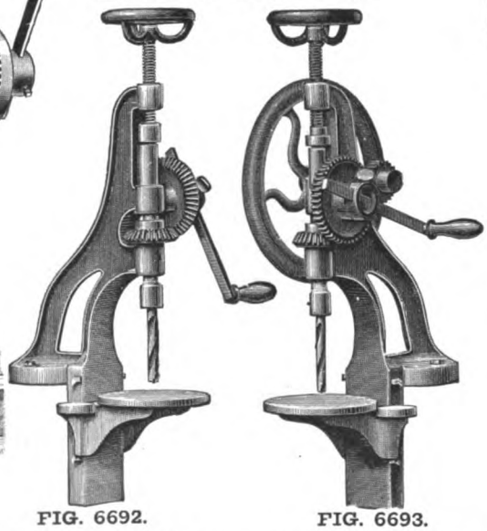


FIG. 6692.

Drills ⅛ to ¾ in. hole.
Length, 33 inches.
Weight, 55 lbs.

PRICE, $12.00.

FIG. 6693.

Drills ⅛ to 1 in. hole.
Length, 33 inches.
Weight, 75 lbs.

PRICE, $15.00.

Drills to center of a 10 inch circle.

Hole in spindle for ½ inch straight shank drills.

BENCH DRILL.

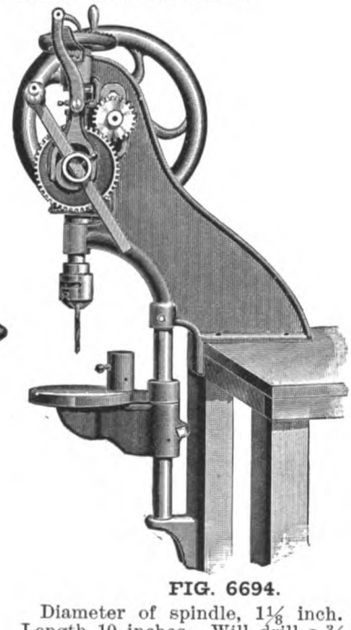


FIG. 6694.

Diameter of spindle, 1⅛ inch. Length, 10 inches. Will drill a ¾ inch hole to the center of a 10 inch circle, 2 inches deep.

Drill socket takes ½ in. round shank.

Diameter of table.....7 inches.
Total length.....38 "
Weight.....90 lbs.

PRICE, $20.00.

BENCH DRILL.

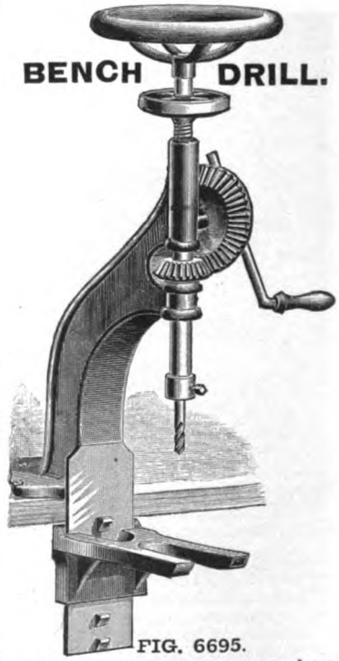


FIG. 6695.

It is 26½ inches high from base of standard to top of balance wheel; weighs 29 lbs.; drills from the smallest to a ½ inch hole square with the bed plate. Run of screw, 3½ inches; drill stock ⅜ inch in diameter; balance wheel weighs 6 lbs.

PRICE, EACH, $10.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BREAST AND UPRIGHT DRILL.

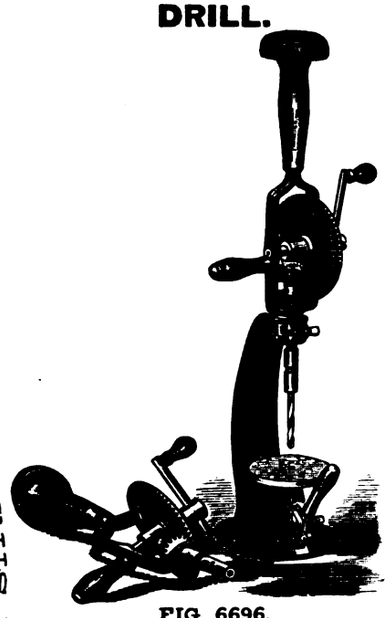


FIG. 6696.

Price, without stand..... .....$4.00
" with " 8.00
Hole in spindle for ¼ in. straight shank drills.

PRICES, FIGS. 6697 AND 6698.

Anvil, vise and drill,	80 pounds	...	$18.00
" and vise,	60	"	.... 10.00
Drill press,	20	"	.... 8.00
Offset vise and drill,	61	"	.... 15.00
" " alone,	41	"	.... 7.00

ANVIL, VISE AND DRILL.

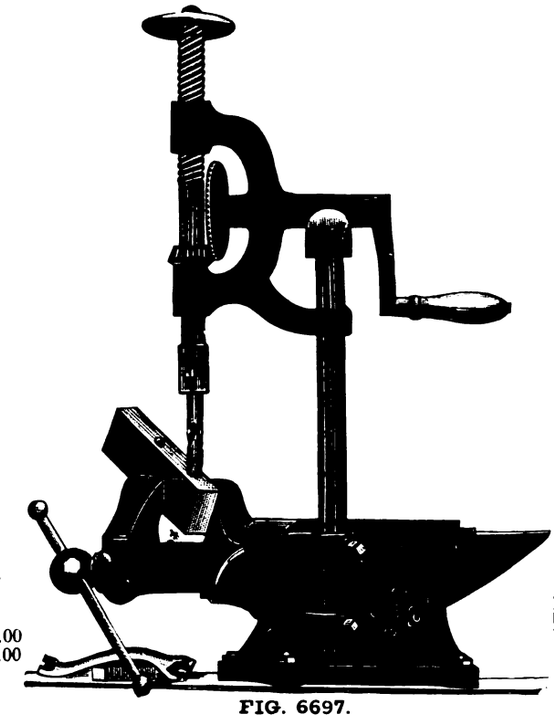


FIG. 6697.

The anvil has a steel face, 4 x 8 in. Vise jaws, 3½ in. wide and steel faced. Steel drill press with adjustable chuck to hold ¼ in. drills and all smaller sizes.

VISE AND DRILL.

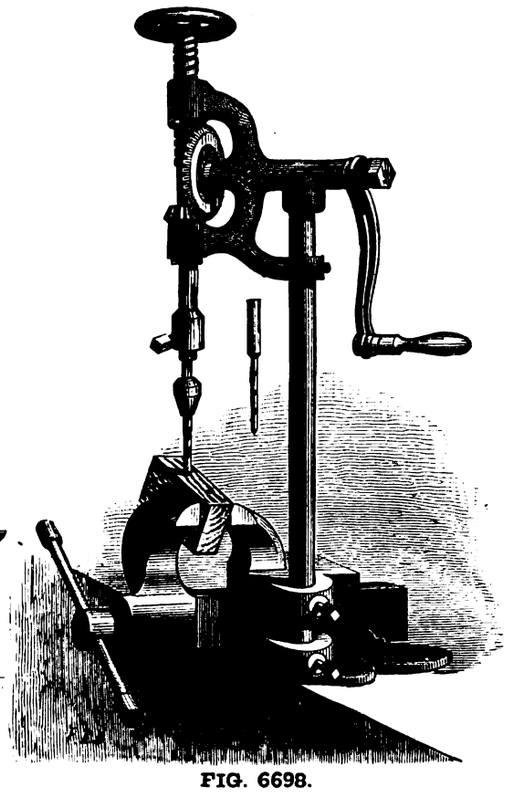


FIG. 6698.

This vise has steel-faced jaws 3½ in. wide, which entirely overhang the screw and the box which covers it.

HORIZONTAL BLACKSMITHS' DRILLS.



FIG. 6699.

No. 1, solid standard, price, $2.40.



FIG. 6700.

No. 2, price, $2.50. No. 3, heavy pattern, price, $2.70.

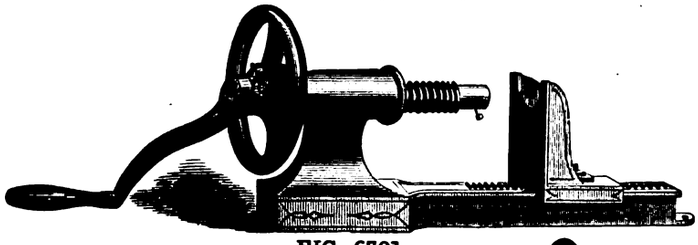


FIG. 6701.

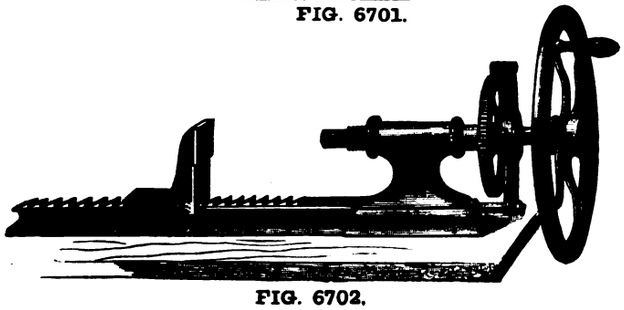


FIG. 6702.

HAND DRILLS.

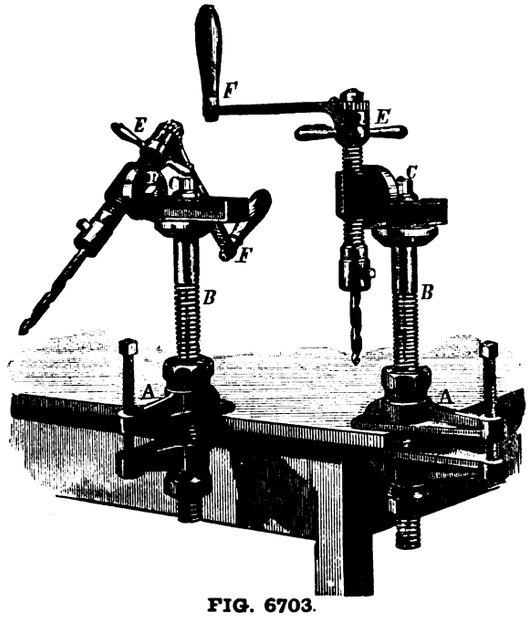


FIG. 6703.

PRICES.

				Straight socket.	Morse taper socket.
No. 1 drills,	¼ to	13/32	inclusive; weight, 11 lbs.;	$20.00	$21.00
" 2 "	1/4 to	33/64	" " 26 "	25.00	27.00
" 3 "	5/8 to	1¼	" " 53 "	35.00	37.50
" 4 "		to 1½	" " 99 "		53.00

PRICES, FIG. 6701.

Length, 26 inches; weight, 33 lbs.; price, with feed, $6.75; without feed, $6.00. Hole in spindle, ½ inch.

PRICES, FIG. 6702.

No. 2. Length, 33 inches; weight, 45 lbs.; price, $10.00; with bal. wheel, $13.00. Hole in spindle, ½ inch.

No. 5. Length, 44 inches; weight, 115 lbs.; price, with balance wheel, $20.00. Hole in spindle, 11/64 inch.

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RATCHET ANGULAR DRILLS.

NO. 1, ANGULAR DRILL.

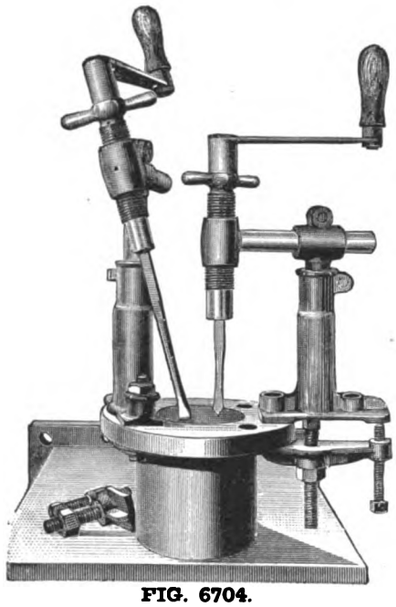


FIG. 6704.

NOS. 2 AND 3, ANGULAR DRILLS.

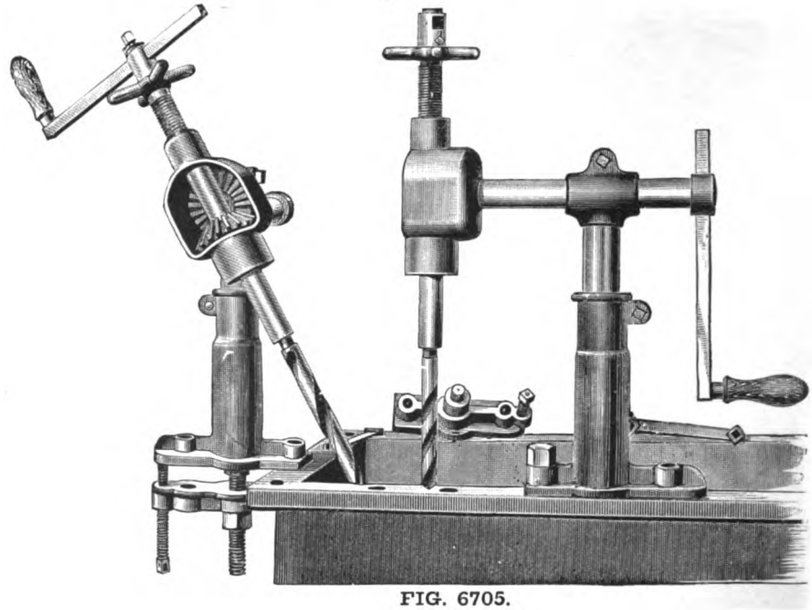


FIG. 6705.

PRICES, FIGS. 6704 AND 6705.

	Prices.	Will drill up to a diameter of	Greatest distance from spindle to center of post.	Vertical adjustment of post.	Spindle traverse.	Socket in spindle.	Weight.	Weight boxed.
No. 1	$16.00	½ inch.	6½ inch.	4 inch.	2½ inch.	Square	11 lbs.	20 lbs.
" 2	32.00	⅞ "	9½ "	5 "	3½ "	No. 2 Morse	33 "	50 "
" 3	50.00	1¼ "	12 "	5 "	4 "	" 3 "	50 "	90 "

UNIVERSAL ANGULAR AND RATCHET DRILLS.

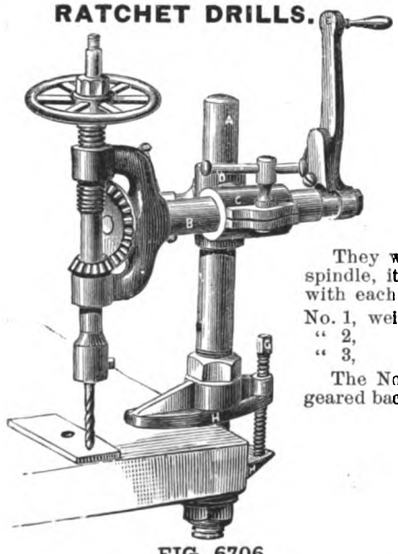


FIG. 6706.

PRICES, FIG. 6706.

They will work at any angle. By placing the crank on the drill spindle, it will work with a ratchet or without. We send a chuck with each machine, which will hold 1/16 to ¼ inch drills.

No. 1,	weight, 26 lbs.,	drills up to ⅝ inch hole	$20.00
" 2,	" 52 "	" " 1 " "	25.00
" 3,	" 106 "	" " 1½ " "	40.00

The No. 2 drill has two sets of gears, making either speeded or geared back machine.

SWIVEL CLAMP DRILL.

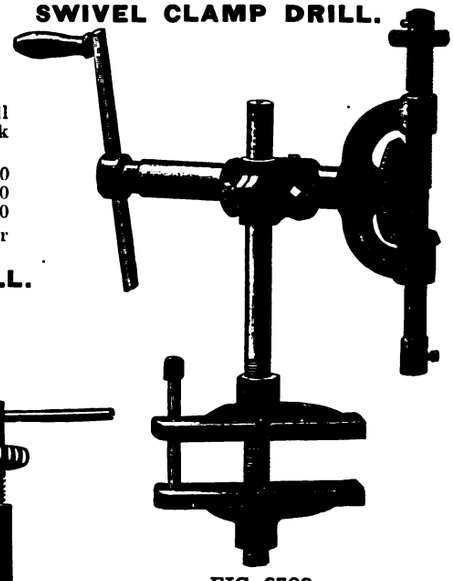


FIG. 6709.

MOFFAT STEAM DRILL.

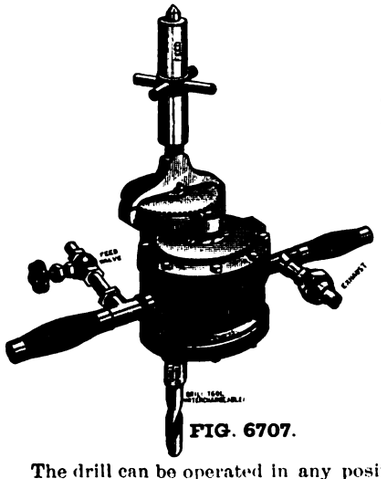


FIG. 6707.

DESCRIPTION, FIG. 6707.

It consists of a small rotary engine, connected by two small steel gears, with a drill spindle, the end of which is a taper socket. The power to run this tool can be steam or compressed air under not less than forty to forty-five pounds pressure.

The tool is fastened to the work to be drilled in the same manner as a ratchet drill. As it weighs but forty pounds, this is easily done. It has a capacity to drill holes in steel, cast or wrought iron from ⅝ to 1½ inches in diameter.

The speed for the different size drills is regulated by the feed valve and feed screw without reducing the power below a satisfactory working point.

The drill can be operated in any position, horizontally or vertically, with equally good results. It is largely used for drilling, reaming and countersinking in bridge work, for drilling all kinds of iron or steel in structural work, vault work, heavy machine work, steam ship-building and repairs, drilling out rivets in boilers, tapping and screwing in stay bolts.

PRICE, $150.00.

SWIVEL CLAMP DRILL.

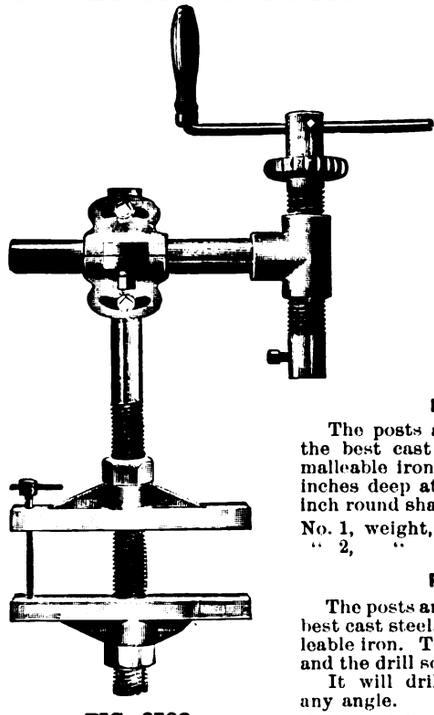


FIG. 6708.

PRICES, FIG. 6708.

The posts are 1¼ inch steel. The clamps are the best cast steel, and the swivel motions of malleable iron. It will drill a ⅜ inch hole 2¼ inches deep at any angle. Drill socket takes ½ inch round shank.

No. 1,	weight, 30 lbs		$15.00
" 2,	" 40 "		20.00

PRICES, FIG. 6709.

The posts are 1¼ inch steel. The clamps are the best cast steel, and the swivel motions are of malleable iron. The spindle is made of machine steel, and the drill socket takes ½ inch round shank.

It will drill a ⅝ inch hole 4 inches deep at any angle.

No. 3,	weight, 40 lbs		$20.00
" 4,	" 50 "		25.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SOLID BOX WROUGHT-IRON LEG VISES.

DESCRIPTION, FIGS. 6710 AND 6711.

The important improvement in our patent concave and convex washers removes all liability of stripping the thread or breaking the screw, which often happens with other vises, and leads to considerable expense in replacing them.

When ordering to replace old boxes and screws, give measurement from A to A, B to B and C to C, as shown in cut.

PRICES, FIG. 6710.

Size No.	Vise No.	Diameter of screw.	Diameter of box.	Prices, each.
1	30- 40	1 inch.	1½ inch.	$3.50
1½	45- 55	1⅛ "	1⅝ "	4.00
2	60- 70	1¼ "	1¾ "	4.00
3	75- 90	1⅜ "	1⅞ "	4.50
4	95–150	1¾ "	2⅜ "	6.50
5	160–200	2 "	2⅝ "	8.00

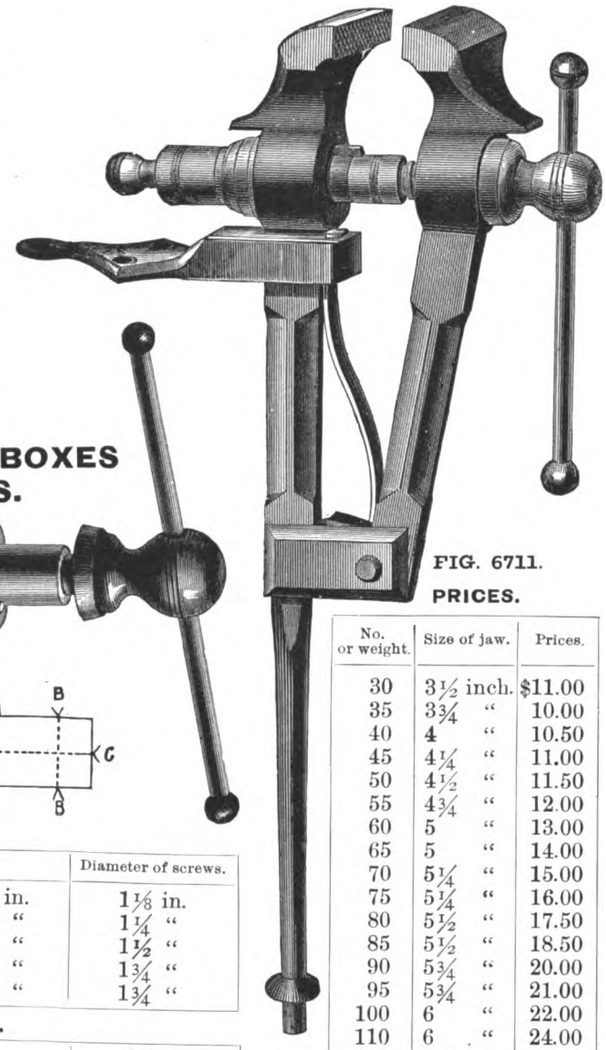


FIG. 6711.

DOUBLE-SCREW PARALLEL-JAW LEG VISES.

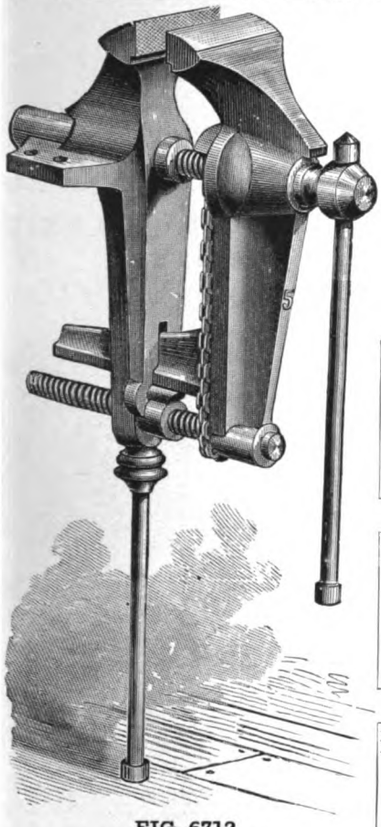


FIG. 6712.

WROUGHT-IRON BOXES AND SCREWS.

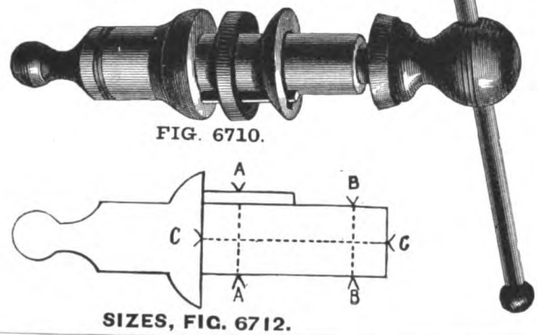


FIG. 6710.

SIZES, FIG. 6712.

No.	Weight, about.	Jaws.	Diameter of screws.
2	65 lbs.	4½ in. x 1 in.	1⅛ in.
3	90 "	5¼ " x 1⅛ "	1¼ "
4	120 "	6¼ " x 1¼ "	1½ "
5	150 "	7 " x 1½ "	1¾ "
6	160 "	8 " x 1½ "	1¾ "

PRICES, FIG. 6712.

No.	Length of lever.	Opens.	Prices.
2	13 in.	5½ in.	$10.50
3	16 "	6½ "	16.00
4	19 "	7½ "	20.50
5	24 "	9 "	27.00
6	26 "	10 "	30.00

PRICES, FIG. 6713.

No. of vise.	Dimensions of jaws.	Weight.	Prices.
2	2 x ⅝ in.	15 lbs.	$3.50
3	3 x ¾ "	30 "	6.00
4	4 x ⅞ "	45 "	8.00
5	5 x 1 "	80 "	12.50
6	6 x 1¼ "	125 "	17.00

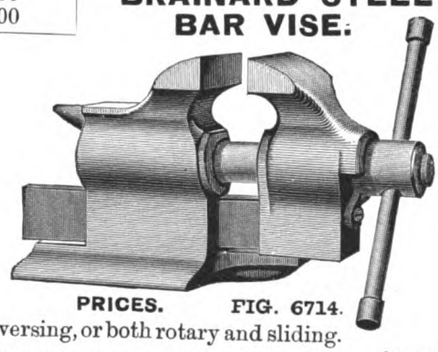
PRICES.

No. or weight.	Size of jaw.	Prices.
30	3½ inch.	$11.00
35	3¾ "	10.00
40	4 "	10.50
45	4¼ "	11.00
50	4½ "	11.50
55	4¾ "	12.00
60	5 "	13.00
65	5 "	14.00
70	5¼ "	15.00
75	5¼ "	16.00
80	5½ "	17.50
85	5½ "	18.50
90	5¾ "	20.00
95	5¾ "	21.00
100	6 "	22.00
110	6 "	24.00
120	6½ "	26.00
130	6½ "	29.00
140	7 "	33.00
150	7 "	36.00
160	7¼ "	41.50
170	7¼ "	44.50
180	7½ "	47.00
200	8 "	56.00

ENGLISH VISES.

Peter Wright's . . . c. per lb.
Others. . . . . c. "

BRAINARD STEEL BAR VISE.



PRICES. FIG. 6714.

This vise is traversing, or both rotary and sliding.

2½ inch.	$6.50
3 "	7.00
3½ "	9.00
4 "	10.00
4½ "	12.50
5 "	17.00
6 "	25.00

SMITH'S HEAVY CHILLED BEAM VISE.

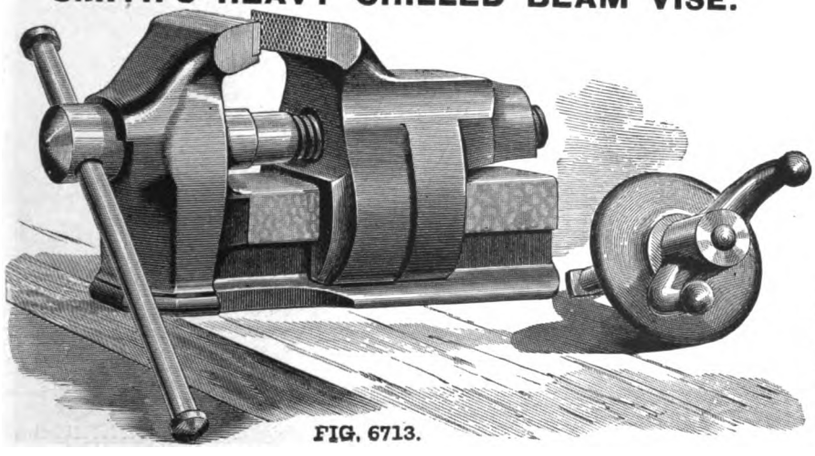


FIG. 6713.

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BENCH VISES.

MACHINISTS' "BULL DOG" VISES.

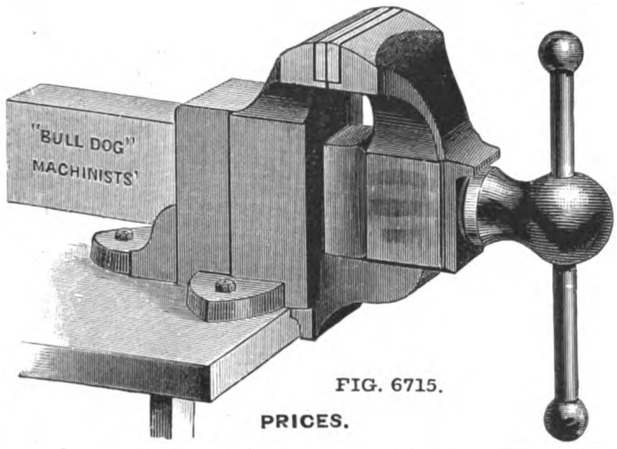


FIG. 6715.

PRICES.

MACHINISTS' SOLID JAW, PARALLEL VISE.

No. 50. Stationary bottom.....Price, $6.00
3¼ inch jaws. Opens 4 inches.

No. 51. Stationary bottom.....Price, 7.00
3⅝ inch jaws. Opens 5 inches.

No. 52. Stationary bottom.....Price, 8.50
4⅛ inch jaws. Opens 5½ inches.

No. 53. Stationary bottom.....Price, 10.00
4⅝ inch jaws. Opens 6¼ inches.

No. 54. Stationary bottom.....Price, 13.00
5 inch jaws. Opens 7 inches.

No. 56. Stationary bottom.....Price, 25.00
6 inch jaws. Opens 9 inches.

No. 58. .....Price, 50.00
8½ inch jaws. Opens 12 inches. Weight, 275 lbs.

For swivel bottom attachment, see Fig. 6718.

RAPID TRANSIT, MACHINISTS' VISES.

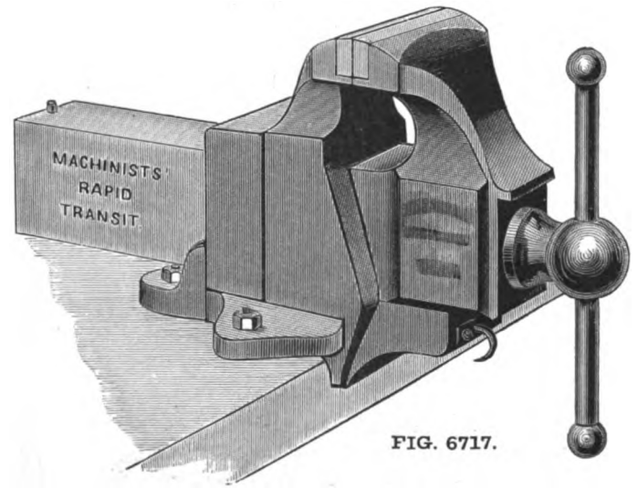


FIG. 6717.

PRICES.

MACHINISTS' NEW RAPID TRANSIT VISE.

No. 70. Stationary bottom.....Price, $6.50
3 inch jaws. Opens 3½ inches.

No. 71. Stationary bottom.....Price, 8.00
3¾ inch jaws. Opens 4½ inches.

No. 72. Stationary bottom.....Price, 11.00
4¼ inch jaws. Opens 5½ inches.

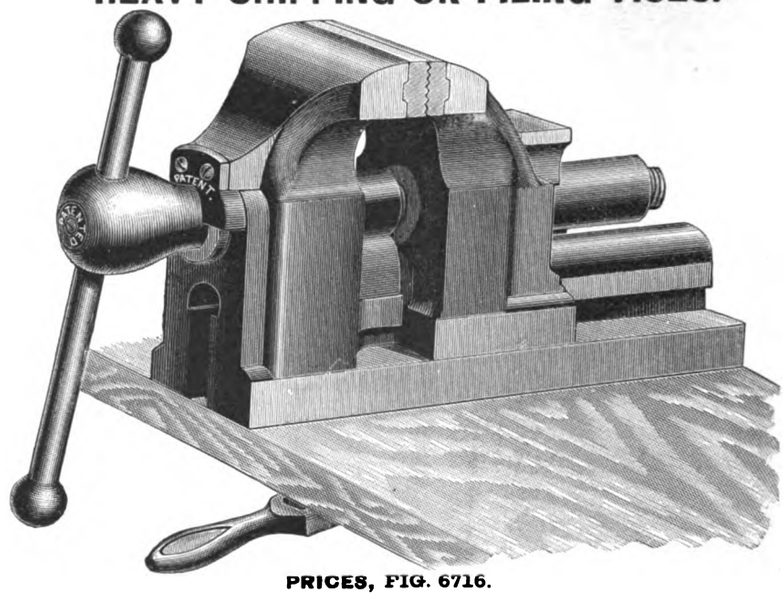
No. 73. Stationary bottom.....Price, 13.50
4¾ inch jaws. Opens 6½ inches.

No. 74. Stationary bottom.....Price, 19.00
5½ inch jaws. Opens 8 inches.

No. 75. Stationary bottom.....Price, 28.00
6½ inch jaws. Opens 9½ inches.

For price swivel bottoms, see Fig. 6718.

HEAVY CHIPPING OR FILING VISES.



PRICES, FIG. 6716.

FIXED OR SWIVELS ON THE BENCH.

No. 65. Length of jaws, 5 inches; weight, 80 lbs.....each, $16.00
No. 66. Length of jaws, 6 inches; weight, 110 lbs.....“ 24.00

SWIVEL ATTACHMENT FOR RAPID TRANSIT AND BULL DOG VISES.

NEW SWIVEL BOTTOM FOR FIGS. 6715 AND 6717.

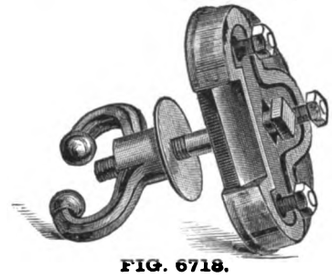


FIG. 6718.

The above represents our new swivel bottom attachment, by use of which all sizes of our stationary bottom Rapid Transit or "Bull Dog" vises may be changed into swivel bottom vises.

The swivel plate attachments, with bolts and nuts complete, are sold separate for the above-named vises only, and can be applied at any time.

In ordering swivel attachment give number of vise for which it is required.

PRICES.
Including bolts and nuts.

For vise Nos. 50 and 70....each,	$1.00	For vise No. 54.....each,	$2.00
“ No. 51..... “	1.25	“ No. 74..... “	2.50
“ Nos. 52 and 71.... “	1.50	“ Nos. 56 and 75.... “	3.25
“ Nos. 72 and 73.... “	1.75	“ No. 58..... “	5.00
“ No. 53..... “	1.75		

HEAVY CHIPPING VISE.

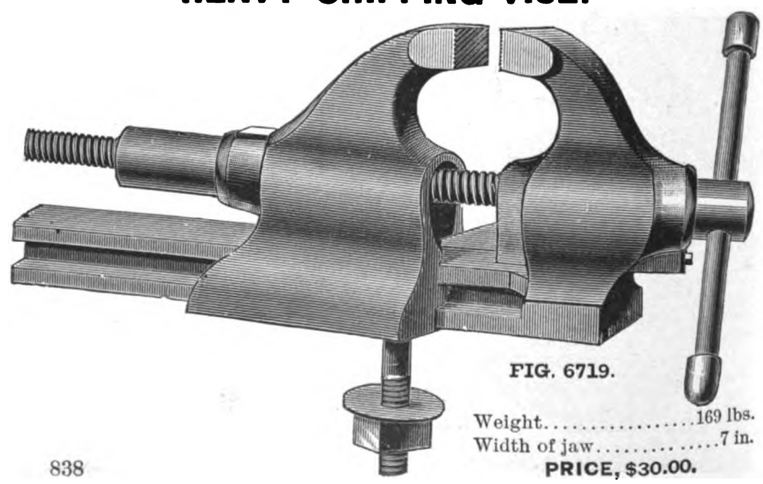


FIG. 6719.

Weight.....169 lbs.
Width of jaw.....7 in.

PRICE, $30.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BENCH VISES.

PRICES, FIG. 6721.

No.				Each.
000.	Round jaws; weight, 23 lbs.;	length of jaws, 3¼ in.		$6.25
1.	" " 31½ lbs.;	" " 3⅝ in.		7.00
2.	" " 41½ lbs.;	" " 4¼ in.		9.00
3.	" " 59½ lbs.;	" " 4¾ in.		11.75
4.	" " 83 lbs.;	" " 5⅜ in.		16.25
5.	" " 120 lbs.;	" " 6⅛ in.		24.00
6.	" " 237 lbs.;	" " 8⅛ in.		50.00

Fig. 6720 represents a detached or broken vise slide, showing the manner of inserting the "patent wrought iron strengthener," referred to below.

PRICES, FIG. 6722.

No.	Width of jaw.	Jaws open.	Weight.	Prices.
31	3½ inches.	5 inches.	26 lbs.	$7.00
32	4 "	6 "	42 "	9.00
33	4½ "	7 "	54 "	10.50
34	5 "	8 "	67 "	15.50
36	5¼ "	8½ "	78 "	17.00
37	6 "	9 "	104 "	24.00
38	6¼ "	9½ "	111 "	27.00

SIMPSON PARALLEL.

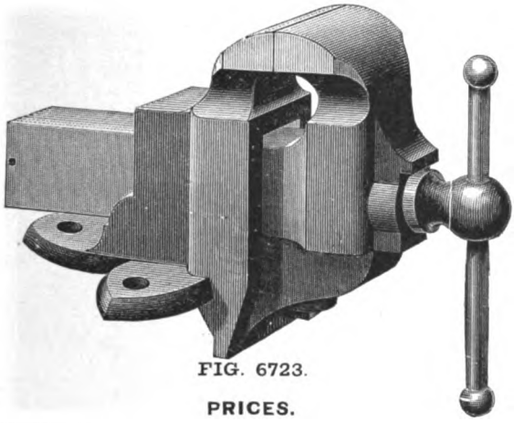


FIG. 6723.

PRICES.

No.	Width of jaws.	Jaws open.	Weight.	Prices.
29	3 inches.	3¼ inches.	15½ lbs.	$4.75
30	3½ "	4 "	26 "	6.50
31	4 "	5 "	37 "	8.00
32	4½ "	5¾ "	49 "	10.00
33	5 "	6½ "	64 "	12.50

PARALLEL BENCH, FIXED.

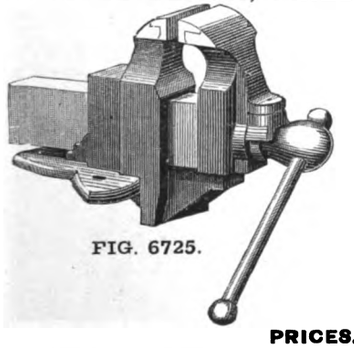


FIG. 6725.

PRICES.

No.	Length of jaw.	Weight.	Prices.
0	3 inch.	25½ lbs.	$5.50
1	3½ "	31½ "	6.50
2	4 "	41 "	8.50
3	4½ "	52½ "	10.75
4	5 "	93 "	16.00
5	6 "	113½ "	23.75
6	7 "	184 "	34.50

STRENGTHENER.

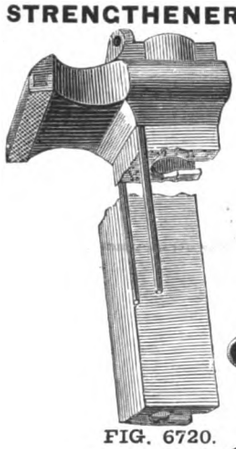


FIG. 6720.

PARKER'S PARALLEL.

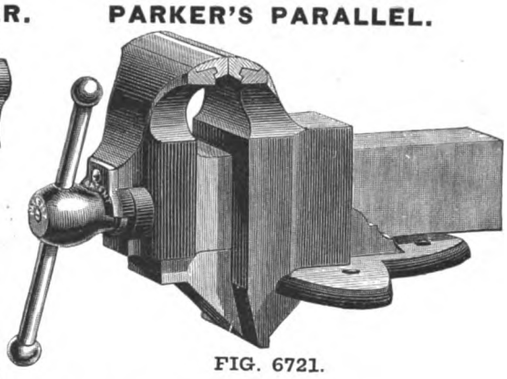


FIG. 6721.

SOLID JAW PARALLEL.

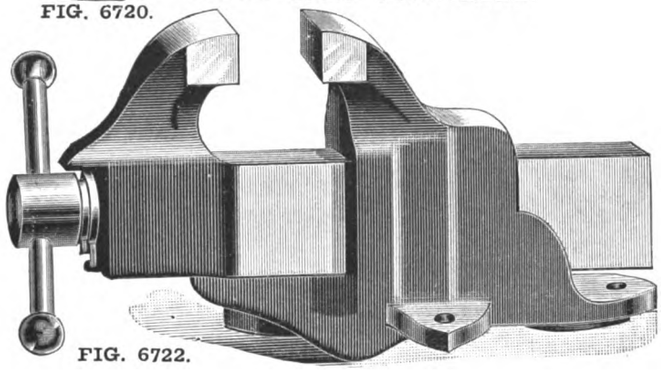


FIG. 6722.

IMPROVED PARALLEL VISES.

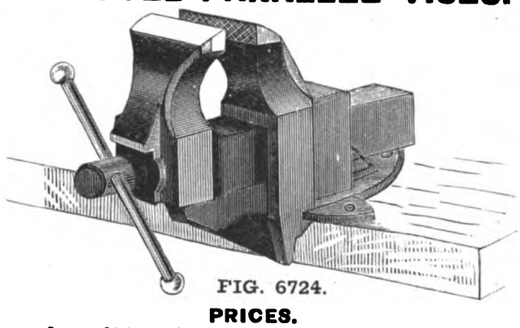


FIG. 6724.

PRICES.

Jaws.....	2	2½	3	3½	4	4½	5	6	inch.
Prices.....	$3.00	$4.00	$5.00	$5.75	$7.50	$9.00	$13.00	$20.00	each.
Weight....	13	18	26	31	41	50	70	110	lbs.

DESCRIPTION, FIG. 6726.

The Parker vises having been imitated in the market, the following numbers will be furnished, which correspond in length of jaws and weight to the imitation vises, but do not have the wrought iron strengthener, or any of our patented improvements. They are equal in strength to any vise in the market, with the exception of our first quality. For the purchaser's protection, these vises are painted green, so they can be easily distinguished from our regular vises, Fig. 6721.

PARKER'S GREEN PAINTED.

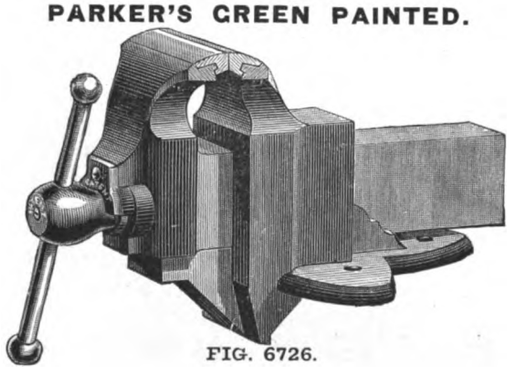


FIG. 6726.

PRICES.

No.	Length of jaws.	Weight.	Prices.
0000	3¼ inches.	23 lbs.	$5.50
100	3⅝ "	31½ "	6.50
200	4¼ "	41½ "	8.50
300	4¾ "	59½ "	10.75
400	5⅜ "	83 "	16.00
500	6⅛ "	120 "	23.75

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PARALLEL BENCH.

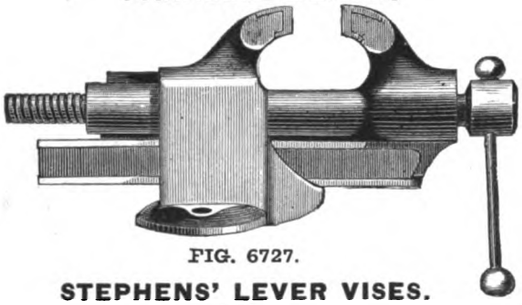


FIG. 6727.

BENCH VISES.

PRICES, FIG. 6727.

No. 20, 2	inch jaw	$4.00
No. 25, 2½	"	5.00
No. 30, 3	"	6.25
No. 35, 3½	"	7.00
No. 40, 4	"	9.00
No. 45, 4½	"	11.75
No. 50, 5	"	16.25
No. 55, 5½	"	20.00

PRICES, FIG. 6728.
ROUGH OR SMOOTH JAWS.

Width of jaw.	Steel faced.	Solid steel.	Opens.	Weight.
No. 3, 2¾ in.	$5.50	$6.25	3 in.	12 lbs.
No. 4, 2¾ " spring	6.00	6.75	3 "	12 "
No. 5, 3½ "	9.00	10.50	5 "	35 "
No. 6, 4½ "	12.50	15.25	6½ "	60 "
No. 7, 5½ " ex. handle	22.00		9 "	110 "
No. 8, 6½ " "	33.00		11 "	160 "

COVERED SCREW.

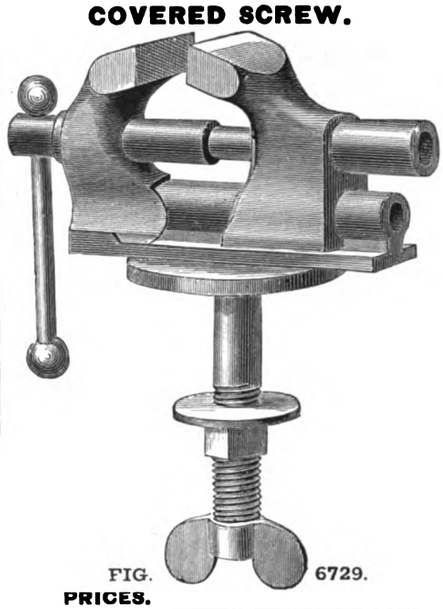


FIG. 6729.

PRICES.

Width of jaw.	Without iron seats.	With iron seats, ex.	Weight.	Width of jaw.	Without iron seats.	With iron seats, ex.	Weight.
1½ in.	$3 00	$0.50	3½ lbs.	4 in.	$10.00	$1.25	56 lbs.
1¾ "	3.50	.50	5 "	4½ "	12.50	1.50	66 "
2 "	4.00	.50	9 "	5 "	17.00	1.75	75 "
2½ "	5.50	.75	22 "	6 "	25.00	2.00	116 "
3 "	7.00	1.00	39 "	7 "	30.00	No seat.	160 "
3½ "	9.00	1.00	47 "				

STEPHENS' LEVER VISES.

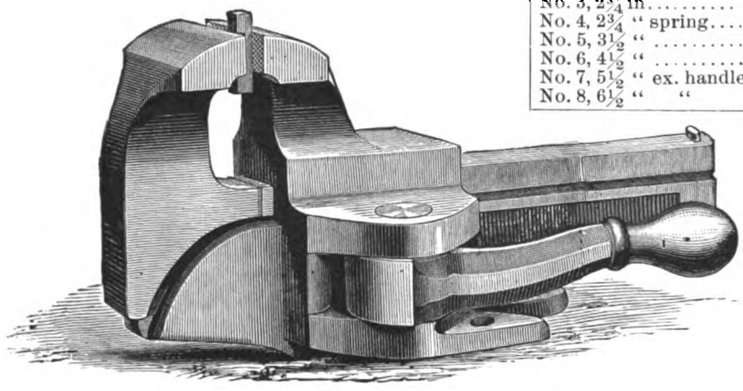


FIG. 6728.

METHOD OF WORKING VISE.

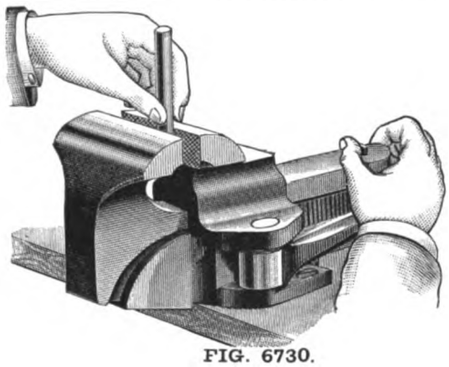


FIG. 6730.

PRICES, FIG. 6731.

2 inch, 50c.; 2¾ inch, 75c.; 3½ inch, $1.00; 4½ inch, $1.25; 5½ inch, $2.00; 6½ inch, $2.50.

DETAILS FOR USE WITH FIG. 6728 AND FIG 6740.

BRASS CAPS.



FIG. 6731.

FINISHING CAPS.

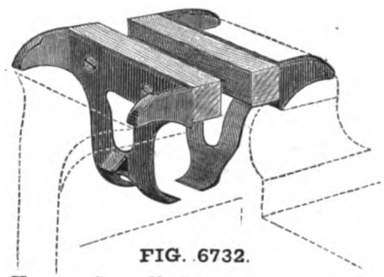


FIG. 6732.

Have soft malleable iron backs and wooden faces.

PRICES, FIG. 6732.

2 inch, 40c.; 2¾ inch, 50c.; 3½ inch, 75c.; 4½ inch, $1.00; 5½ inch, $1.50; 6½ inch, $2.00.

ADJUSTABLE TAPER JAW.

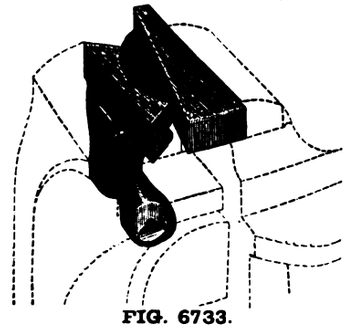


FIG. 6733.

PRICES, FIG. 6733.

2 inch, $1.25; 2¾ inch, $1.75; 3½ inch, $2.75; 4½ inch, $3.75; 5½ inch, $5.00; 6½ inch, $6.75.

ANVIL AND VISE.

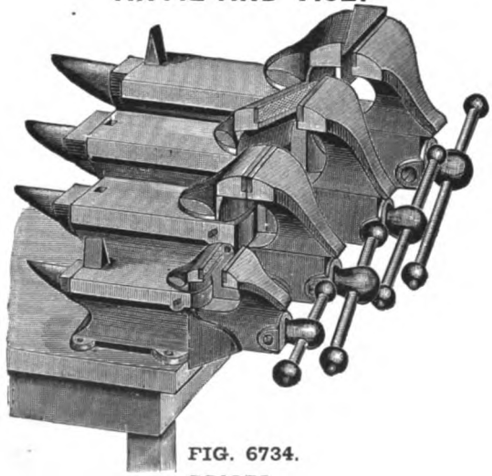


FIG. 6734.

PRICES.

No. 10. Weight, about 9 lbs.; jaws, about 2½ inches wide; opens 3 inches $3.50
No. 20. Weight, about 25 lbs.; jaws, about 3½ inches wide; opens 4 inches 4.50
No. 30. Weight, about 35 lbs.; jaws, about 4 inches wide; opens 5 inches 5.50
No. 40. Weight, about 50 lbs.; jaws, about 4½ inches wide; opens 6 inches 6.50

DESCRIPTION, FIG. 6734.

No. 10. The smallest size is shown, the jaws partially extended It is adapted for use of jewelers, amateurs, boys, or any one who wishes a small, strong and convenient tool. Face of anvil, 4½ x 2 inches.

No. 20 is shown with the jaws closed. This size is especially the householder's favorite, and is useful to make such repairs as are constantly needed about every house. Face of anvil, 6½ x 3 inches.

No. 30 is shown with jaws adjusted to hold a wedge. Face of anvil, 8 x 3½ inches. For general use among mechanics and farmers who wish a strong, durable tool, and not too heavy, this size is especially adapted.

No. 40 is the largest size made. Face of anvil, 8½ x 4 inches. This size is used by mechanics, miners, planters, and others who have need of an extra strong heavy tool.

PARKER'S OVAL SLIDE.

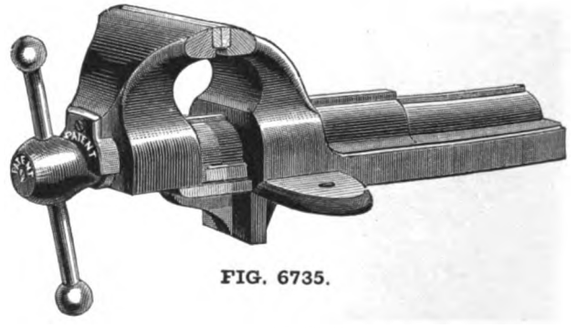


FIG. 6735.

PRICES.

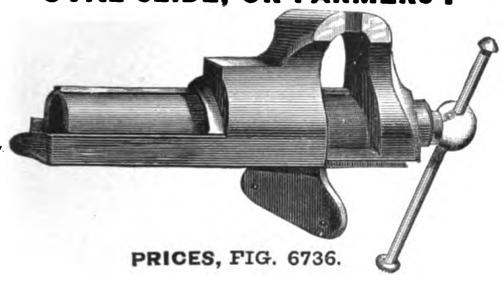
No. 30. Oval slide; weight, 8½ lbs.; jaws, 2⅝ inches long, each $2.50
No. 31. Oval slide; weight, 13 lbs.; jaws, 3 inches long, each 3.00
No. 32. Oval slide; weight, 19 lbs.; jaws, 3¼ inches long, each 4.25
No. 33. Oval slide; weight, 22 lbs.; jaws, 3½ inches long, each 4.75
No. 34. Oval slide; weight, 28 lbs.; jaws, 4 inches long, each 6.50
No. 35. Oval slide; weight, 35 lbs; jaws, 4¾ inches long, each 9.50
No. 36. Oval slide; weight, 62 lbs.; jaws, 5¼ inches long, each 12.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BENCH VISES.

OVAL SLIDE, OR FARMERS'.



PRICES, FIG. 6736.

No.	2-0	0	1	2	3	4
Jaws, inch	2	2½	3	3½	4	4½
Prices, each	$2.50	$2.70	$3.60	$4.65	$6 70	$9.65
Weight, lbs.	8	10	17	26	40	53

PRICES, FIG. 6738.

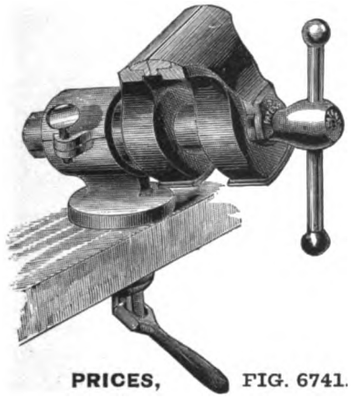
Width jaw.	Opens.	Weight.	Prices.
2 inch.	3 inch.	6 lbs.	$4.50
4½ "	7 "	65 "	12.50
6 "	10 "	145 "	27.00

Specially adapted for drill press work, where chucks cannot be used, and equally good for special or regular bench work.

PRICES, FIG. 6739.

Inch		to	3	3½	4
No. 152.	With anvil	per doz.,	$19.75	$20.25	$20.75
No. 155Y.	" best quality,	"	21.25	21.75	22.25
No. 513.	" for jewelers,	"	36.00	36.00	36.00

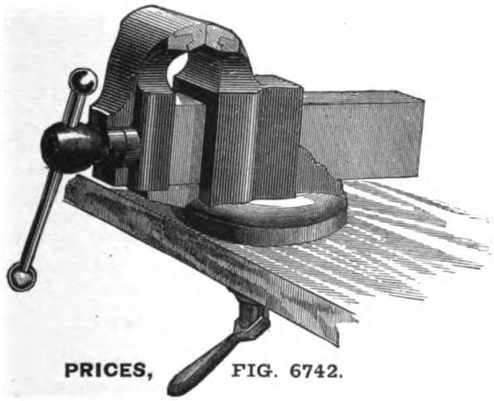
ROUND SLIDE, DOUBLE SWIVEL.



PRICES, FIG. 6741.

No. 10.	Weight, 8 lbs.;	length of jaws,	2¼	inches		each,	$5.25
No. 11.	" 25 "	" " "	3¼	"	.....	"	8.00
No. 12.	" 35 "	" " "	3⅝	"	.....	"	9.75
No. 13.	" 54 "	" " "	4⅛	"	.....	"	12.00
No. 14.	" 75 "	" " "	4¾	"	.....	"	15.25

SWIVEL, WITHOUT PARKER'S IMPROVEMENT, GREEN PAINTED.



PRICES, FIG. 6742.

No. 2000.	Weight, 8½ lbs.;	length of jaws,	2¼	inches		each,	$4.00
No. 2100.	" 23 "	" " "	3⅛	"	....	"	6.25
No. 2200.	" 35 "	" " "	3⅝	"	....	"	8.00
No. 2300.	" 48 "	" " "	4¼	"	....	"	10.00
No. 2400.	" 63½ "	" " "	4¾	"	....	"	13.25

PHOENIX, FIXED AND SWIVEL.

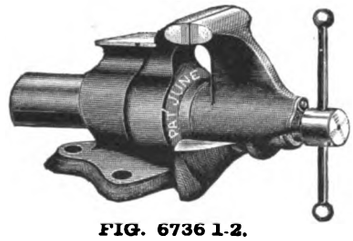


FIG. 6736 1-2.

PRICES, FIG. 6736 1-2.

FIXED.

No. 31. 3½ in. jaws, weighs 33 lbs. Price, each...$7.50
No. 41. 4 in. jaws, weighs 50 lbs. Price, each.....$9.00

SWIVEL.

No. 30. 3½ in. jaws, weighs 40 lbs. Price, each...$8.75
No. 40. 4 in. jaws, weighs 60 lbs. Price, each... .$11.00

BENCH VISES.

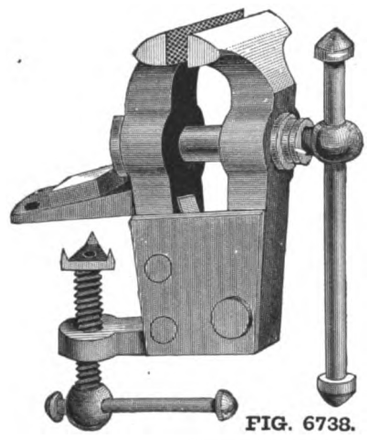


FIG. 6738.

STEPHENS' SWIVEL BASE.

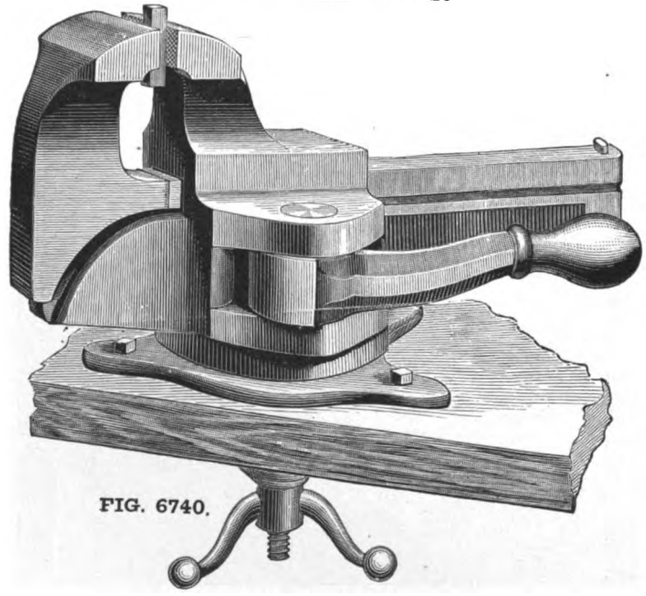


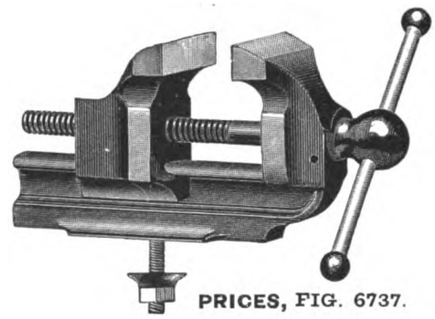
FIG. 6740.

PRICES, EITHER ROUGH OR SMOOTH JAWS.

Width of jaw.	Steel faced.	Solid steel.	Opens.	Weight.
No. 22, 2¾ inch	$6.50	$7.25	3 in.	14 lbs.
" 23, 2¾ " spring	7.00	7.75	3 "	14 "
" 24, 3½ "	10.50	12.00	5 "	42 "
" 25, 4½ "	14.50	.....	6½ "	65 "
" 26, 5½ " ex. handle	26.00	.....	9 "	120 "
" 27, 6½ "	39.00	.....	11 "	175 "

FOR ATTACHMENTS, SEE PAGE 840.

FARMERS' VISES.



PRICES, FIG. 6737.

	Width of jaws.	Jaws open.	Weight.	Prices.
No. 70.	3 inches.	4 inches.	12 lbs.	$2.25
No. 71.	3½ "	5 "	22 "	3.50
No. 72.	4 "	6 "	34 "	5.00

OFF-SET JAW SWIVEL.

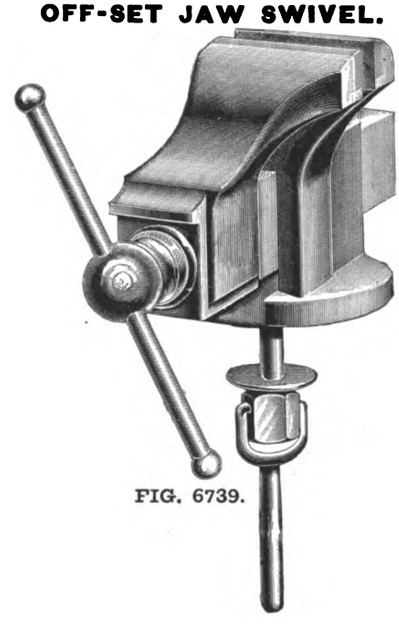


FIG. 6739.

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SWIVEL VISES.

PARKER'S ROUND JAWS.

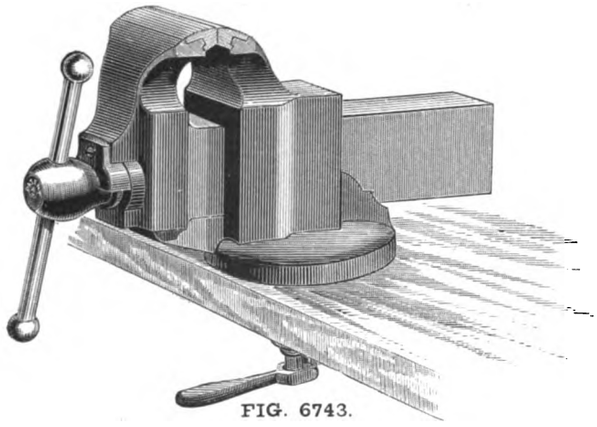


FIG. 6743.

PRICES, FIG. 6743.

No. 23.	Weight, 48	lbs.;	length of jaws, 4¼	inches	.....	each,	$11.00
No. 24.	" 63½	"	" " 4¾	"	.....	"	14.50
No. 25.	" 90	"	" " 5⅜	"	.....	"	20.50
No. 26.	" 131	"	" " 6⅛	"	.....	"	30.00

PRICES, FIG. 6744.

No. 19.	Weight, 8	lbs.;	length of jaws, 2	inches	.....	each,	$4.00
No. 20.	" 8½	"	" " 2¼	"	.....	"	5.00
No. 21.	" 23	"	" " 3⅛	"	.....	"	7.00
No. 22.	" 35	"	" " 3⅝	"	.....	"	8.75

ROUND JAWS, WITH CAST IRON ANVIL.

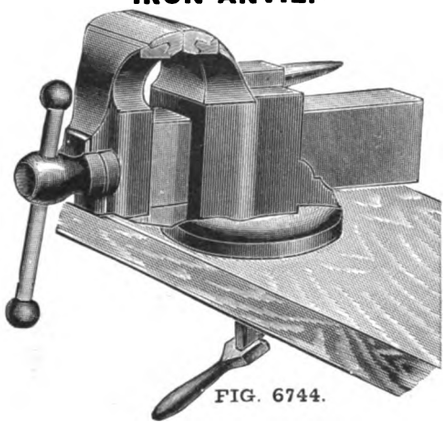


FIG. 6744.

FIXED OR SWIVEL.

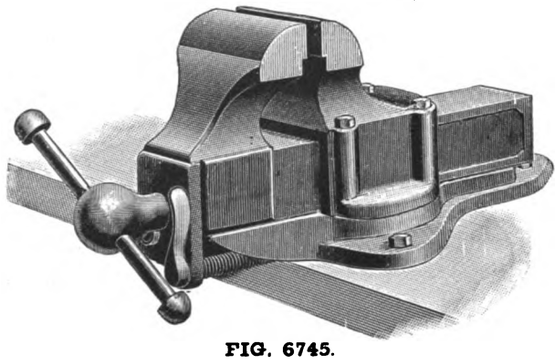


FIG. 6745.

LICHTNING CRIP.

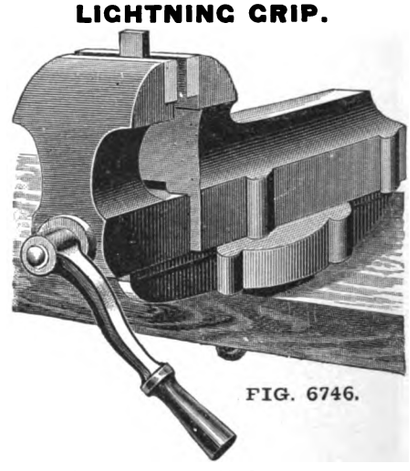


FIG. 6746.

PARALLEL, WITH WROUCHT IRON BAR.

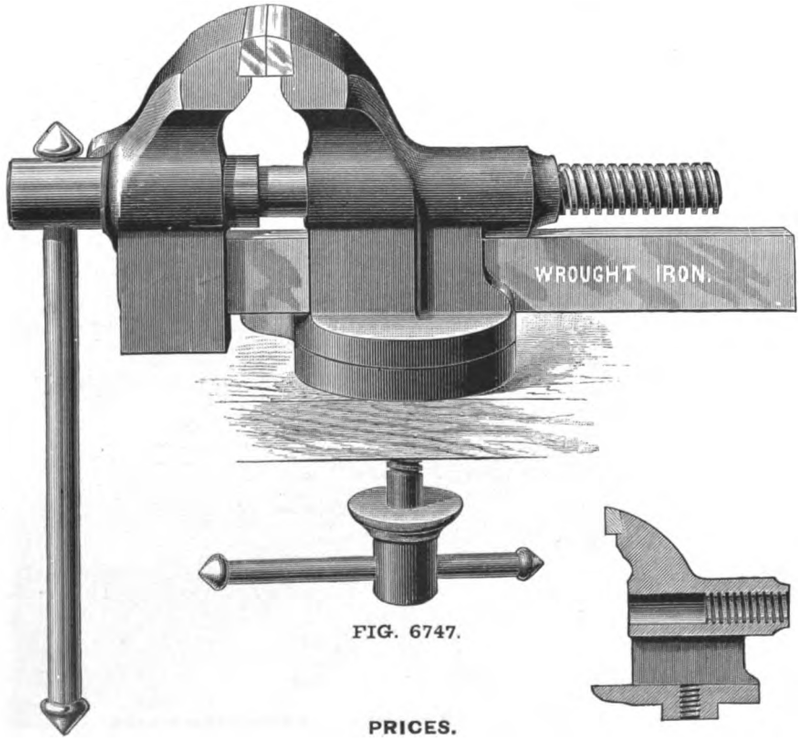


FIG. 6747.

PRICES.

Width of jaw.	Opens.	Weight.	Size of wrought bar.	Diameter of screw.	Prices.
4 in.	8 in.	63 lbs.	2¼ x 1¼	1⅛ in.	$11.00
5 "	9 "	80 "	2¼ x 1¼	1⅜ "	13.00
6½ "	10 "	125 "	2½ x 1½	1⅝ "	17.00
8 "	12 "	165 "	3 x 1½	1⅝ "	22.00

PRICES, FIG. 6745. FIXED.

No. 0.	3½ inch jaws; opens 4½ inches; weight, 32 lbs	$7.75
No. 1.	4 inch jaws; opens 5½ inches; weight, 42 lbs	9.50
No. 2.	4¾ inch jaws; opens 6 inches; weight, 70 lbs	11.50
No. 3.	5½ inch jaws; opens 8 inches; weight, 109 lbs	17.50
No. 4.	6¼ inch jaws; opens 9 inches; weight, 140 lbs	23.00

PRICES, FIG. 6745. SWIVEL.

No. 5.	3½ inch jaws; opens 4 inches; weight, 40 lbs	$8.75
No. 6.	4 inch jaws; opens 5½ inches; weight, 50 lbs	10.50
No. 7.	4¾ inch jaws; opens 6 inches; weight, 78 lbs	12.50
No. 8.	5½ inch jaws; opens 8 inches; weight, 118 lbs	18.50
No. 9.	6¼ inch jaws; opens 9 inches; weight, 150 lbs	25.00

PRICES, FIG. 6746.

The loose jaw can be instantly adjusted and the work firmly fastened with a quarter turn of the handle.

Either fixed or swivel base.

No. 10.	2½ inch jaws;	opens	4	inches	.....	$6.25
No. 11.	3½ "	"	"	5	"	.....	8.50
No. 12.	4½ "	"	"	6	"	.....	11.50
No. 13.	5 "	"	"	6	"	.....	14.00
No. 14.	5½ "	"	"	8	"	.....	17.50
No. 15.	6 "	"	"	9	"	.....	23.00
No. 16.	7 "	"	"	11	"	.....	30.00

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SWIVEL AND ADJUSTABLE JAW VISES.

PARALLEL.

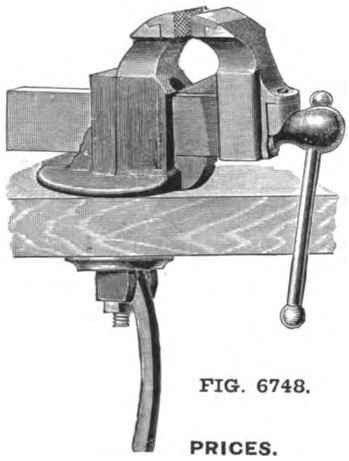


FIG. 6748.

PRICES.

No.	Length of jaw.	Weight.	Prices.
00	2 inches.	7½ lbs.	$4.00
0	3 "	11½ "	6.25
1	3½ "	18½ "	8.00
2	4 "	48 "	10.00
3	4½ "	61 "	13.25
4	5 "	104½ "	18.50
5	6 "	129 "	26.00
6	7 "	194 "	36.00

PARALLEL NEW STYLE.

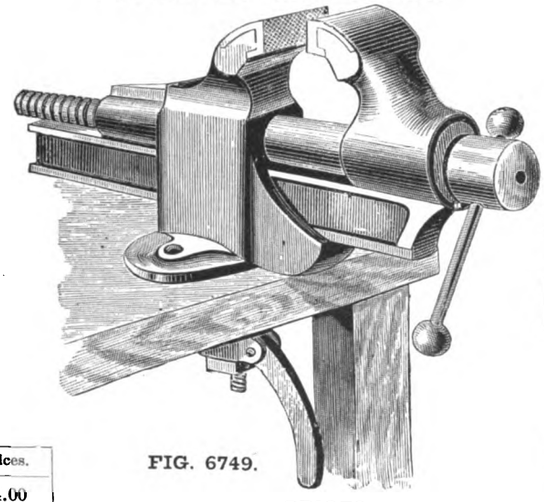
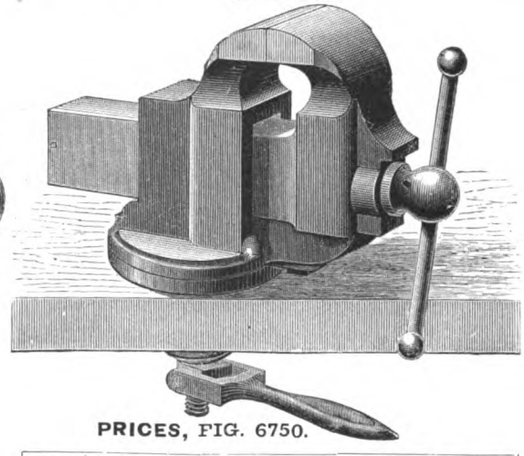


FIG. 6749.

PRICES.

No. 20, 2 inch jaw	$4.50
" 25, 2½ "	5.75
" 30, 3 "	7.00
" 35, 3½ "	8.25
" 40, 4 "	10.75
" 45, 4½ "	14.00
" 50, 5 "	19.25
" 55, 5½ "	23.50

BENCH.



PRICES, FIG. 6750.

No.	Width of jaws.	Jaws open.	Weight.	Prices.
11	2½ inches.	2¾ inches.	9½ lbs.	$4.00
12	3 "	3¼ "	17½ "	5.50
13	3½ "	4 "	28 "	7.50
14	4 "	5 "	44 "	10.00
15	4½ "	5¾ "	59 "	13.00

NEW MODEL SWIVEL.

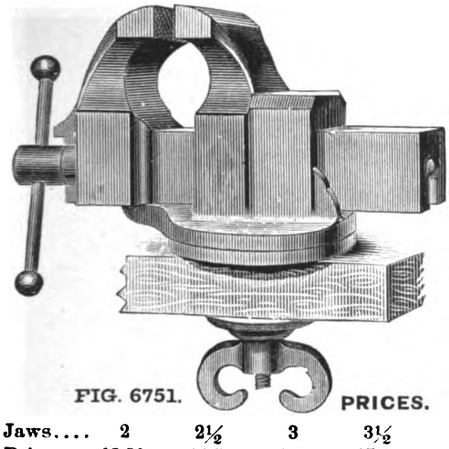


FIG. 6751.

PRICES, EACH, FIG. 6752.

No.	Length of jaws.	Weight.	Prices.
170	3¼ inches.	26 lbs.	$6.50
171	3⅝ "	38 "	7.00
172	4¼ "	57 "	10.50
173	4¾ "	80 "	14.00
174	5⅜ "	90 "	17.00
175	6⅛ "	120 "	24.00

PRICES.

Jaws....	2	2½	3	3½	4	4½	inch.
Prices...	$3.50	$4.50	$5.50	$7.00	$8.50	$10.50	each.
Weight..	14	20	30	35	47	56	lbs.

PARKER, FIXED WITH SWIVEL JAW.

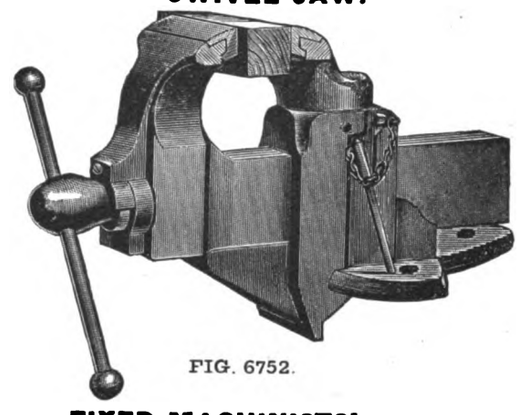


FIG. 6752.

FIXED BASE RAPID SWIVEL JAW.

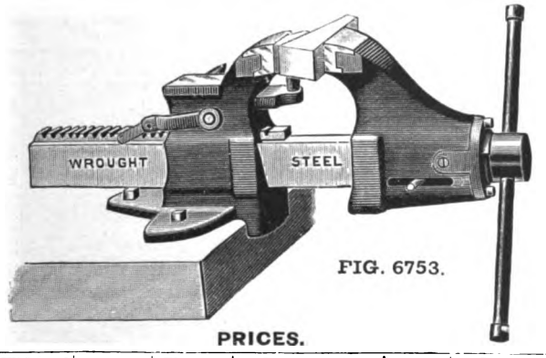


FIG. 6753.

PRICES.

No.	Width of jaw.	Opens.	Weight, lbs.	Prices, each. Fixed base.	No.	Prices, each. Swivel base.
135	3⅝ in.	6½ in.	36	$8.75	130	$10.50
145	4¼ "	8 "	45	11.50	140	13.00
155	5⅜ "	10 "	84	17.00	150	21.00

FIXED MACHINISTS', WITH SELF-ADJUSTING JAW.

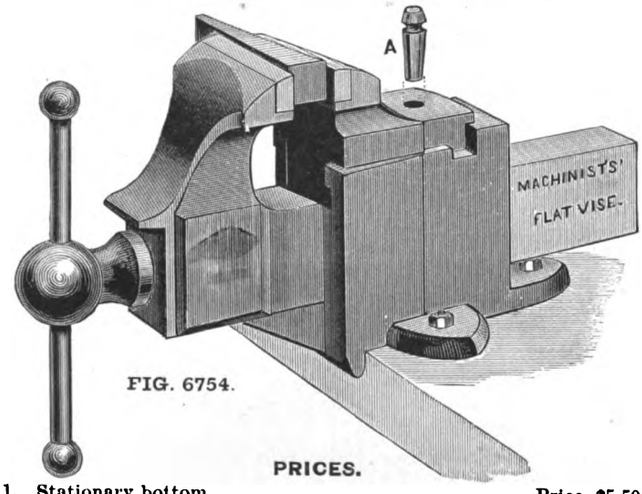


FIG. 6754.

PRICES.

No. 1. Stationary bottom.....Price, $5.50
2⅝ in. jaws. Opens 3½ in. Weight, 13½ lbs.

No. 2. Stationary bottom..... " 7.00
3½ in. jaws. Opens 4¾ in. Weight, 28 lbs.

No. 2½. Stationary bottom..... " 9.00
4 in. jaws. Opens 5¼ in. Weight, 41 lbs.

No. 3. Stationary bottom..... " 10.50
4½ in. jaws. Opens 6 in. Weight, 54 lbs.

No. 4. Stationary bottom..... " 17.00
5¼ in. jaws. Opens 8 in. Weight, 96 lbs.

No. 5. Stationary bottom..... " 24.00
6 in. jaws. Opens 9 in. Weight, 146 lbs.

No. 6. Stationary bottom..... " 30.00
7 in. jaws. Opens 11 in. Weight, 184 lbs.

PRICES, EXTRAS FOR FIXED OR SWIVEL.

Swivel jaws, extra.

Nos. 135 and 130	$1.25
" 145 and 140	1.50
" 155 and 150	1.50

Soft brass jaws, per pair, extra.

Nos. 135 and 130	$1.50
" 145 and 140	1.75
" 155 and 150	2.00

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SWIVEL BASE VISES, WITH SWIVELING JAWS.

MACHINISTS'.

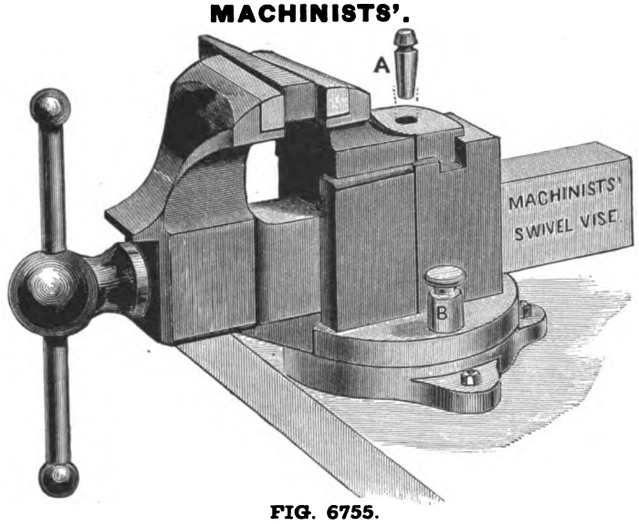
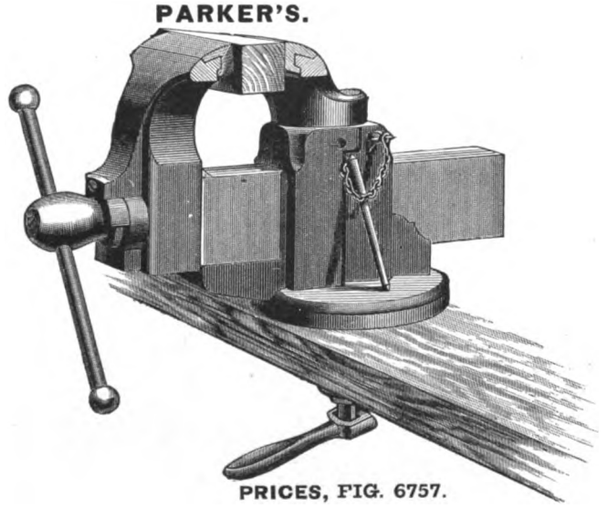


FIG. 6755.

PRICES.

No. 18. Patent swivel bottom; 2⅝ in. jaws; opens 3½ in.; weight, 17 lbs. ..... Price, $6.75
No. 19. Patent swivel bottom; 3½ in. jaws; opens 4¾ in.; weight, 32 lbs. ..... Price, $8.50
No. 19½. Patent swivel bottom; 4 in. jaws; opens 5¼ in.; weight, 46 lbs. ..... Price, $10.50
No. 20. Patent swivel bottom; 4½ in. jaws; opens 6 in.; weight, 65 lbs. ..... Price, $12.50
No. 21. Patent swivel bottom; 5¼ in. jaws; opens 8 in.; weight, 109 lbs. ..... Price, $19.00
No. 22. Patent swivel bottom; 6 in. jaws; opens 9 in.; weight, 168 lbs. ..... Price, $27.00
No. 23. Patent swivel bottom; 7 in. jaws; opens 11 in.; weight, 207 lbs. ..... Price, $35.00

PARKER'S.



PRICES, FIG. 6757.

No. 51. Round jaws; back jaw swivels; weight, 58 lbs.; length of jaw, 4½ in. ..... each, $12.50

PARKER'S.

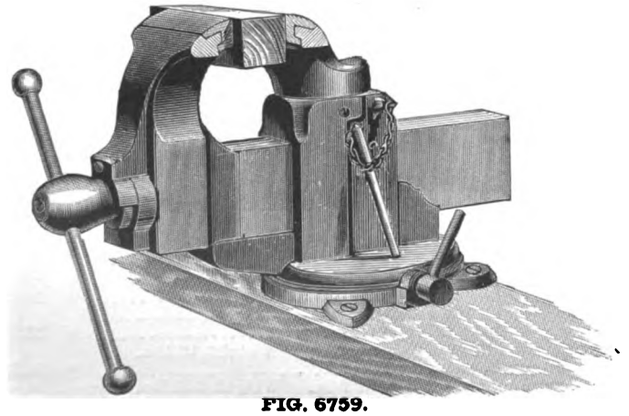


FIG. 6759.

FIXED BASE AND SWIVEL JAW.

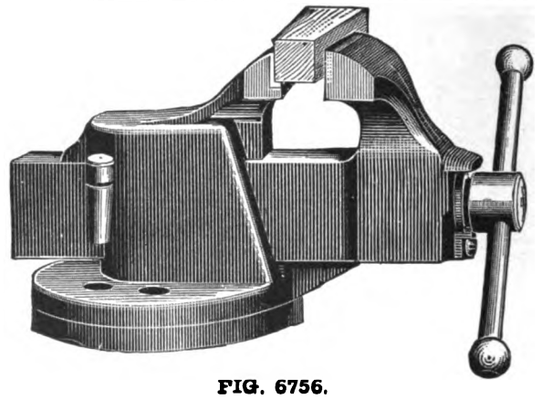


FIG. 6756.

PRICES.

No.	Width of jaw.	Weight.	Jaws open.	Prices.
5	3 in.	20 lbs.	4 in.	$6.25
15	3½ "	35 "	5 "	7 00
25	4 "	52 "	6 "	9.00
35	4½ "	65 "	7 "	10.50
45	5 "	94 "	8 "	15.50
55	5¼ "	97 "	8½ "	17.00
65	6 "	150 "	9 "	24.00
75	6¼ "	160 "	9½ "	27.00

SWIVEL BASE AND JAW.

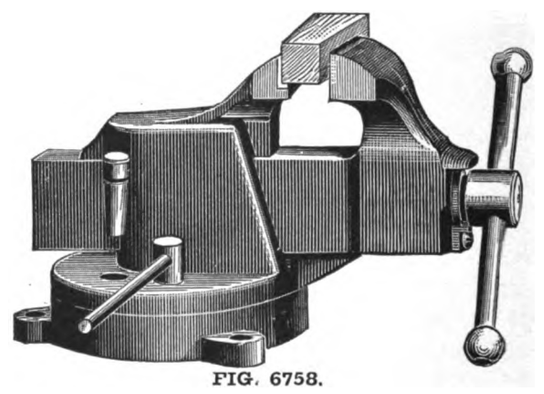


FIG. 6758.

PRICES.

No.	Width of jaw.	Weight.	Jaws open.	Prices.
10	3 in.	24 lbs.	4 in.	$7.75
20	3½ "	40 "	5 "	8.50
30	4 "	60 "	6 "	11.00
40	4½ "	70 "	7 "	12.50
50	5 "	105 "	8 "	17.75
60	5¼ "	110 "	8½ "	19.00
70	6 "	165 "	9 "	27.00
80	6¼ "	175 "	9½ "	30.00

PRICES, FIG. 6759.

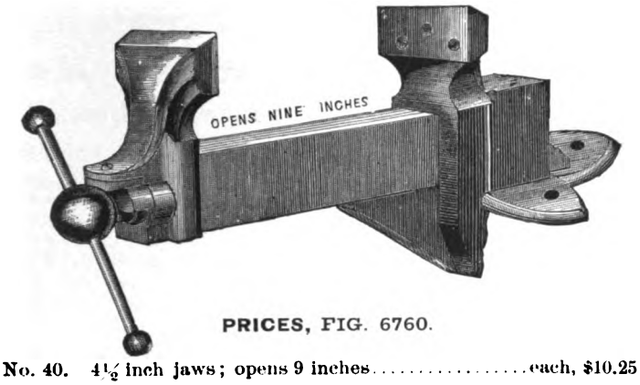
No.	Length of jaw.	Weight.	Jaws open.	Prices.
70	3¼ in.	30 lbs.	.....	$7.00
71	3⅝ "	44 "	.....	8.50
72	4¼ "	66 "	.....	12.50
73	4¾ "	90 "	.....	16.00
74	5⅜ "	102 "	.....	19.00
75	6⅛ "	150 "	.....	27.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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COACH MAKERS' VISES.

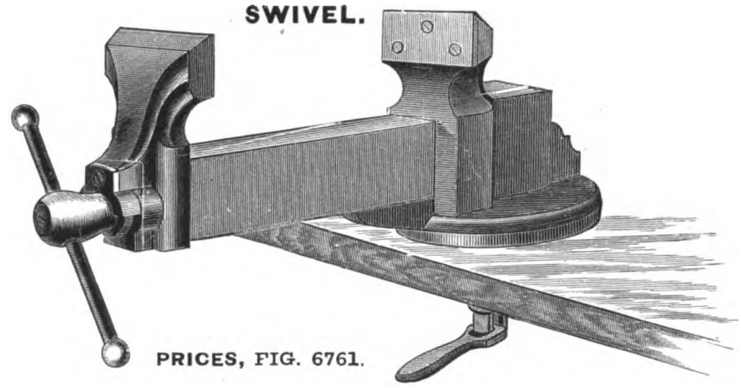
FIXED.



PRICES, FIG. 6760.

No. 40. 4½ inch jaws; opens 9 inches.....each, $10.25

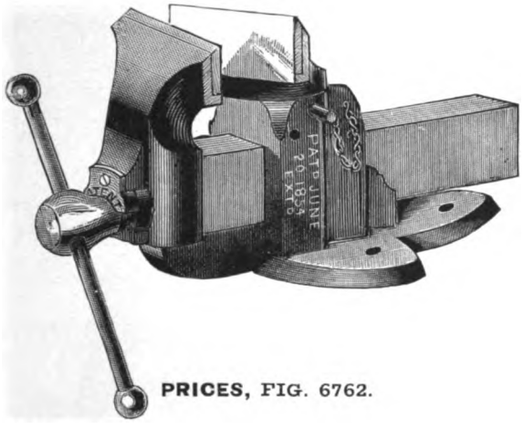
SWIVEL.



PRICES, FIG. 6761.

No. 46. 4 inch jaws; opens 8 inches.....each, $12.50

FIXED, WITH ADJUSTABLE JAWS.

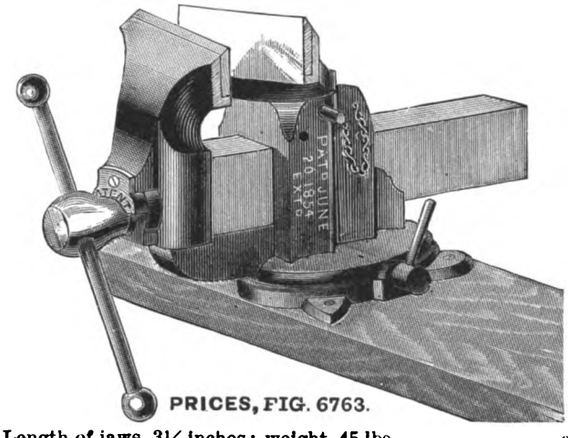


PRICES, FIG. 6762.

No. 176. Length of jaws, 3½ inches; weight, 40 lbs....each, $8.00
Opens 7 inches.

No. 177. Length of jaws, 4½ inches; weight, 60 lbs.....each, 11.00
Opens 9½ inches.

SWIVEL, WITH ADJUSTABLE JAWS.



PRICES, FIG. 6763.

No. 76. Length of jaws, 3½ inches; weight, 45 lbs.....each, $9.50
Opens 7 inches.

No. 77. Length of jaws, 4½ inches; weight, 70 lbs.....each, 13.00
Opens 9½ inches.

FIXED.

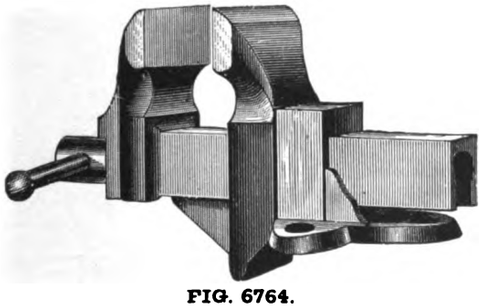


FIG. 6764.

4 inch jaw; opens 9 inches; weight, 45 lbs.....$9.00

FIXED OR SWIVEL.

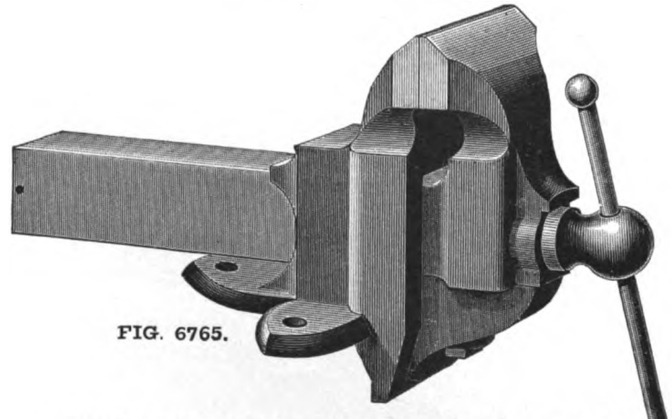


FIG. 6765.

PRICES, FIG. 6765. FIXED BASE AS SHOWN.

	Width of jaws.	Jaws open.	Weight.	Prices.
No. 40.	4 inches.	8½ inches.	41 lbs.	$10.00
" 41.	4½ "	10½ "	49 "	11.50

PRICES, FIG. 6765. SWIVEL.

	Width of jaws.	Jaws open.	Weight.	Prices.
No. 42.	4 inches.	8½ inches.	48 lbs.	$11.50
" 43.	4½ "	10½ "	58 "	13.00

PRICES, FIG. 6766. FIXED, WITH SWIVEL JAW.

	Width of jaws.	Jaws open.	Weight.	Price.
No. 44.	4 inches.	8½ inches.	43 lbs.	$11.50

PRICES, FIG. 6766. SWIVEL BASE AND JAW.

AS SHOWN IN CUT.

	Width of jaws.	Jaws open.	Weight.	Price.
No. 46.	4 inches.	8½ inches.	52 lbs.	$13.00

FIXED OR SWIVEL, WITH SWIVEL JAWS.

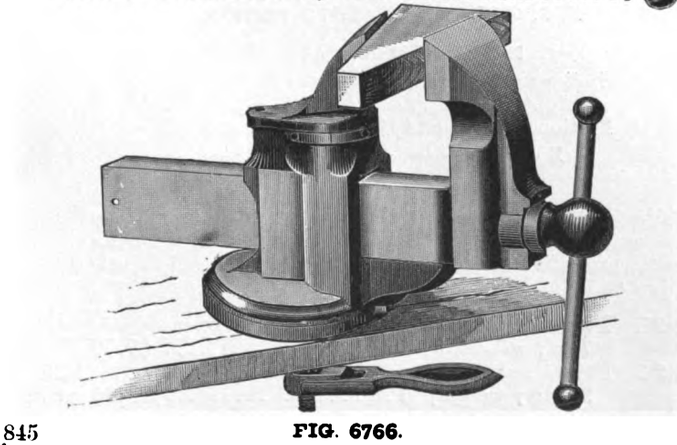


FIG. 6766.

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STEPHENS COACH AND WOOD-WORKERS' VISES.

	Width of jaw.	Price.	Opens.	Weight.
PRICES, FIG. 6767.—No. 34.	4½ inches flat.	$12.50	12 inch.	70 lbs.

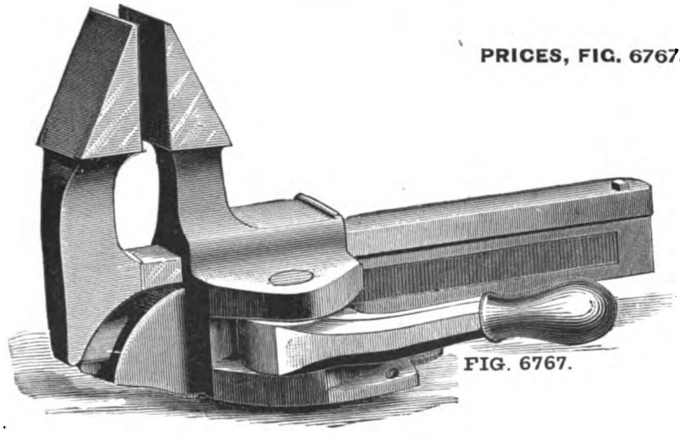


FIG. 6767.

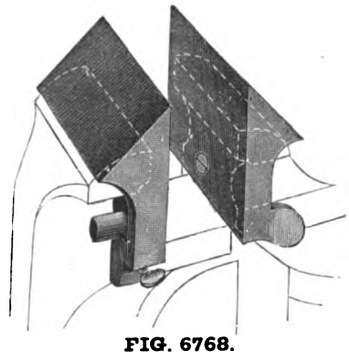


FIG. 6768.

WOOD-WORKERS' JAWS.

PRICES, FIG. 6768.

These are iron, with wood facings; are easily adjusted, and especially adapted to the use of wood-workers generally.

2	inch	$1.25
2¾	"	1.50
3½	"	2.50
4½	"	3.50
5½	"	4.50

BULL DOG.

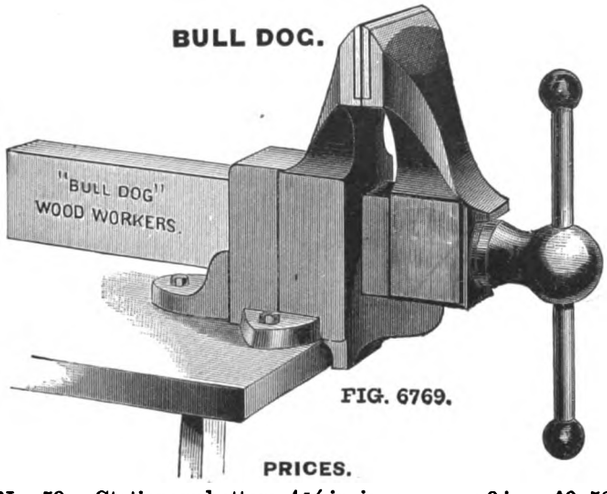


FIG. 6769.

PRICES.

No. 59. Stationary bottom, 4¼ in. jaws; opens 9 in. . . $9.50
Swivel bottom attachment for above 1.50

FIXED OR SWIVEL, WITH ADJUSTABLE JAW.

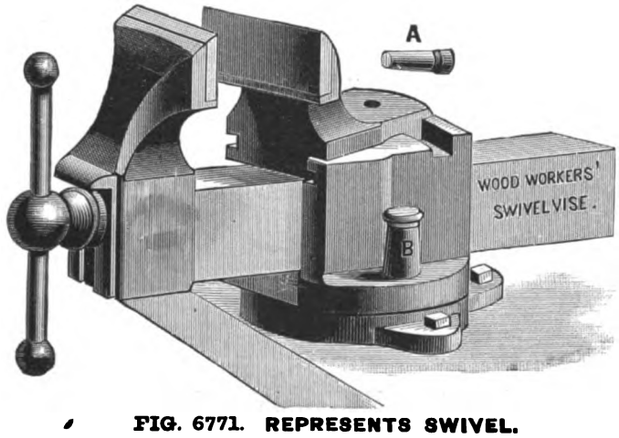


FIG. 6771. REPRESENTS SWIVEL.

PRICES, FIXED BASE.

No. 12. Stationary bottom, 3½ in. jaws; opens 7 in.; weight, 30 lbs. $8.00
No. 10. Stationary bottom, 4½ in. jaws; opens 9½ in.; weight, 59 lbs. 11.00

PRICES, SWIVEL BASE.

Self-adjusting jaw, combined with swivel bottom. The large surfaces of the jaws, which are finished perfectly smooth, protect the work from injury, while the self-adjusting jaw easily and firmly holds articles of any shape.

No. 27. Patent swivel bottom, 3½ in. jaws; opens 7 in.; weight, 34 lbs. $9.50
No. 26. Patent swivel bottom, 4½ in. jaws; opens 9½ in.; weight, 67 lbs. 13.00

COACH-MAKERS' OFFSET JAWS.

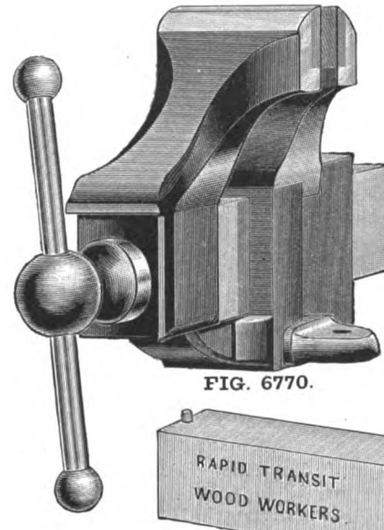


FIG. 6770.

PRICES.

Width jaw.	Opens.	Weight.	Price.
4½ in.	9 in.	60 lbs.	$10.00

The advantage of this vise is: It has the same capacity for holding upright work that a regular 8 inch jaw vise would have.

RAPID TRANSIT COACH-MAKERS'.

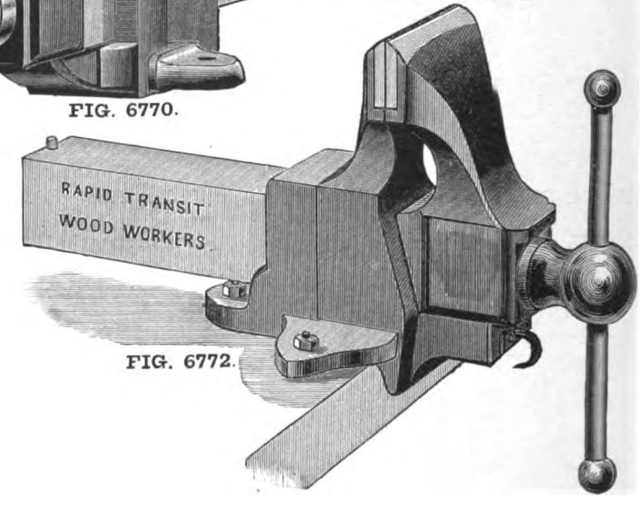


FIG. 6772.

PRICES.

No. 76. Stationary bottom, 4¼ in. jaws; opens 9 in. $11.50
Swivel bottom attachment for above. 1.75

PERFECT COACH-MAKERS' RAPID TRANSIT.

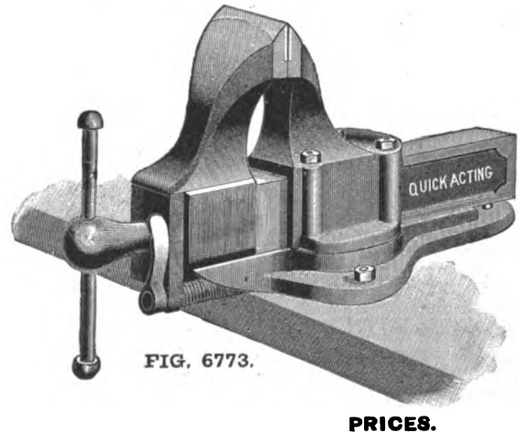


FIG. 6773.

The hand grasps the handle-socket; the fingers, pressing the trigger against it, disengage the nut from the screw. The operator can then slide the loose jaw up to the work and fasten it between the jaws without the hand leaving the handle.

A trial of this vise will convince users of its superiority of convenience and durability.

PRICES.

No. 20. Stationary base, 4¼ in. jaws; opens 8 in.; weight, 55 lbs. $9.50
Swivel attachment for above. . . . . 75 cents extra.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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WOOD WORKERS' AND FILERS' VISES.

6 INCH QUICK ACTION.

Width of jaw, inches.	Weight, lbs.	Opens, inches.	Prices.
6	35	9	$8 00
9	55	12	9.00
14	65	12	10.00

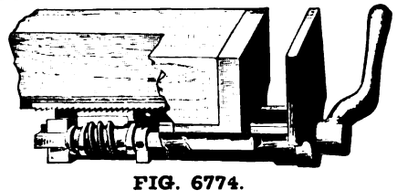


FIG. 6774.

Holding the handle upright, it is pushed with the movable jaw up to the work, when less than a quarter revolution of the handle turns the screw S, and the rack nut N is forced forward to the inclined planes 1, and then upward and engages with the long ratchet rack R, which is attached to the bench-piece; by further turning the handle, the jaws are brought together, firmly gripping the work.

SHOWING AS HEAD OR TAIL ON BENCH.

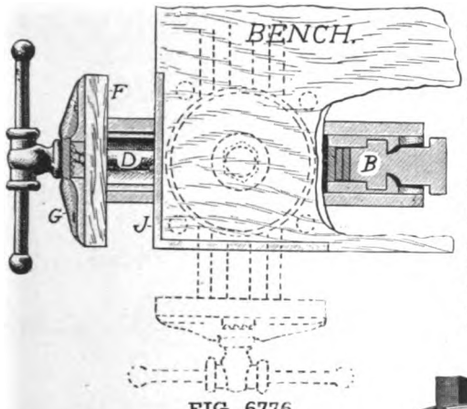


FIG. 6776.

This vise is not only a quick acting vise, adjustable by use of handle solely, but, after the quick adjustment is effected, can be drawn on against the work with a 6 in. way movement.

This vise can be instantly changed from the position as head vise to tail vise, without detaching from bench or loosening screws.

The vise has iron and wood jaws, with steel dog, which can be raised to suit convenience, if desired to clamp against dog instead of jaw, as in use as tail vise.

LIGHTNING GRIP COACH MAKER'S.

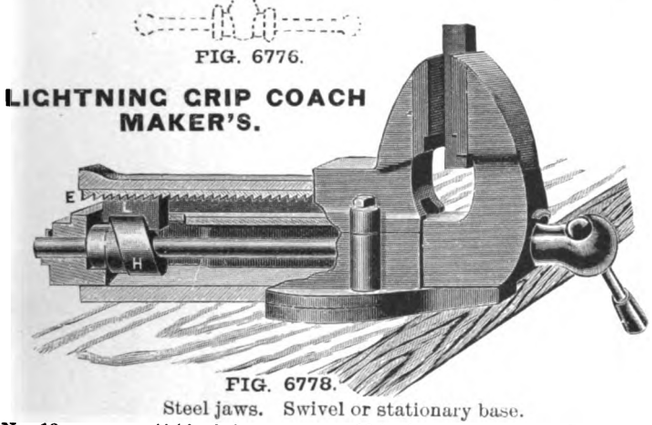


FIG. 6778.

Steel jaws. Swivel or stationary base.

No. 18.... .....4½ inch jaws; opens 10 inches.. ....Price, $10.00

CABINET MAKER'S.

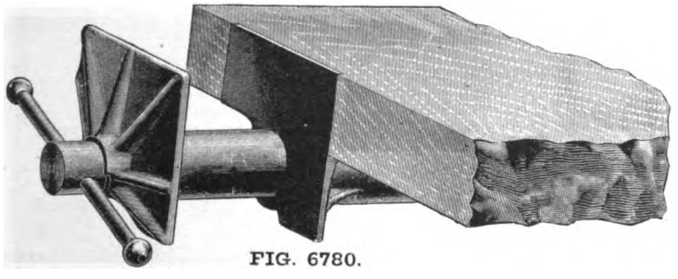


FIG. 6780.

PARKER'S FIXED AND SWIVEL FILER'S VISES.

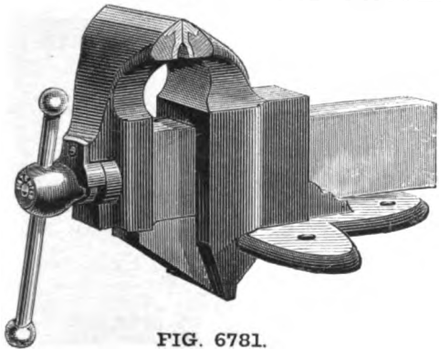


FIG. 6781.

PRICES, FIXED.

No. 42.....each, $7.25

Weight, 33 lbs.; length of jaws, 4 inches.

No. 42½.....each, $6.75

Weight, 30 lbs.; length of jaws, 3¼ inches.

PRICES, SWIVEL.

No. 44.....each, $8.75

Weight, 37 lbs.; length of jaws, 4 inches.

9 INCH QUICK ACTION.

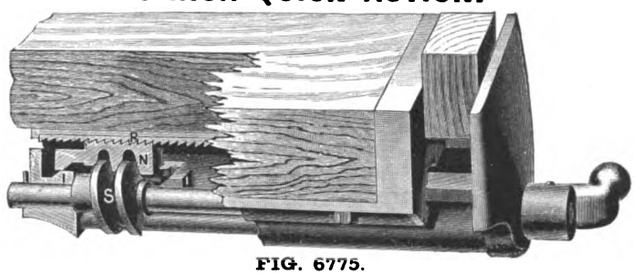


FIG. 6775.

QUICK ACTING SWIVEL BASE.

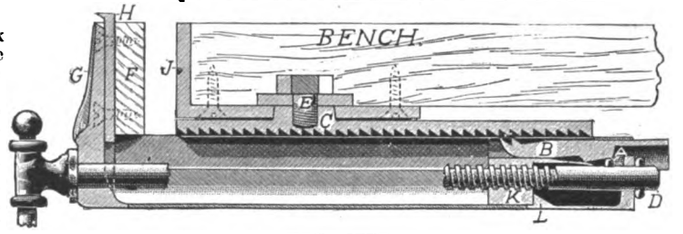


FIG. 6777.

Width jaws,	6 in.	9 in.	14 in.
Prices,	$8.00	$9.00	$10.00

LIGHTNING GRIP WOOD WORKER'S.

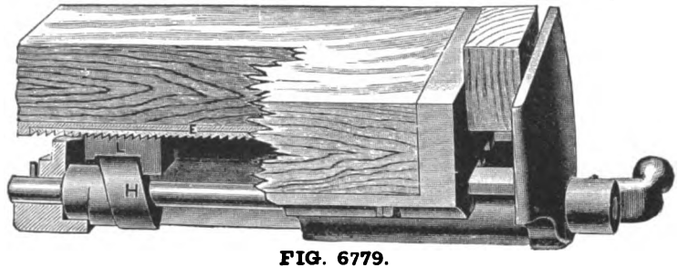


FIG. 6779.

You can fasten in this vise three pieces of wood of 2, 6 and 12 inches wide in ten seconds.

No. 17.....9 inch jaws; opens 12 inches.....Price, $6.00

DESCRIPTION, FIG. 6780.

The jaws of this vise operate parallel, are planed true and smooth, and will hold the work firmly without marring or bruising it.

The screw being entirely enclosed makes it impossible for dirt or chips to interfere with its motion.

As will be seen in the cut, the jaws are flush with the top of bench.

Length of jaws.....9 inches.
Jaws open.....12 "

PRICE, $9.00.

PARKER'S FIXED AND SWIVEL FILER'S VISES, ADJUSTABLE JAWS.

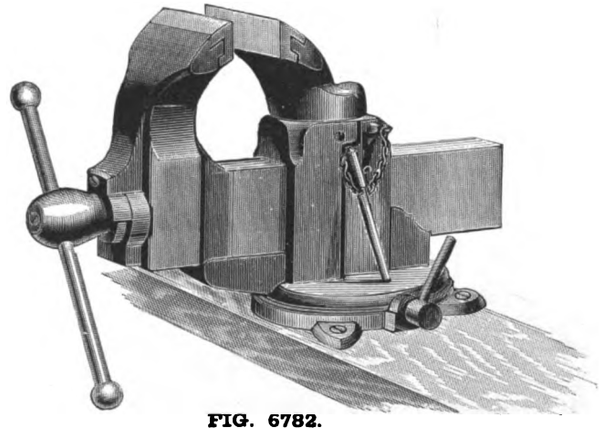


FIG. 6782.

PRICES, FIXED.

No. 178. Length of jaws, 4¼ inches; weight, 40 lbs.....each, $8.00

PRICES, SWIVEL.

No. 78. Length of jaws, 4¼ inches; weight, 45 lbs.....each, 10.00

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FILERS' OR FINISHERS' SAW AND TELEGRAPH VISES.

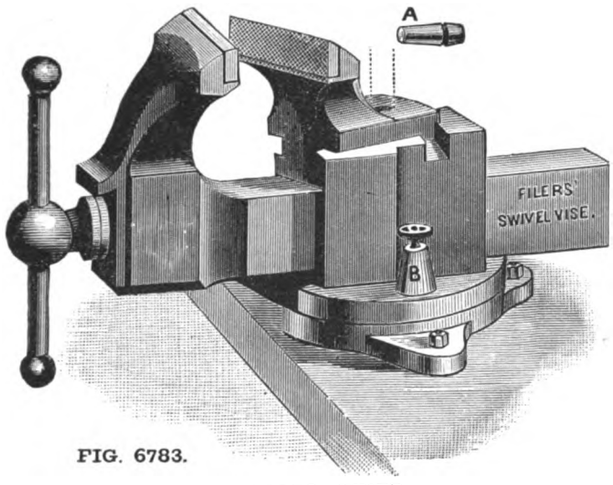


FIG. 6783.

PRICES, FIXED.

No. 42. Stationary bottom.....Price, $8.00
4¼ in. jaws; opens 5¼ in.; weight, 42 lbs.

PRICES, SWIVEL.

No. 47. Patent swivel bottom.....Price, $10.00
4¼ in. jaw; opens 5¼ in.; weight, 47 lbs.

LINEMAN'S HAND VISE.

6 IN. LONG OVER ALL.



FIG. 6786.

STUBS' HAND VISES.

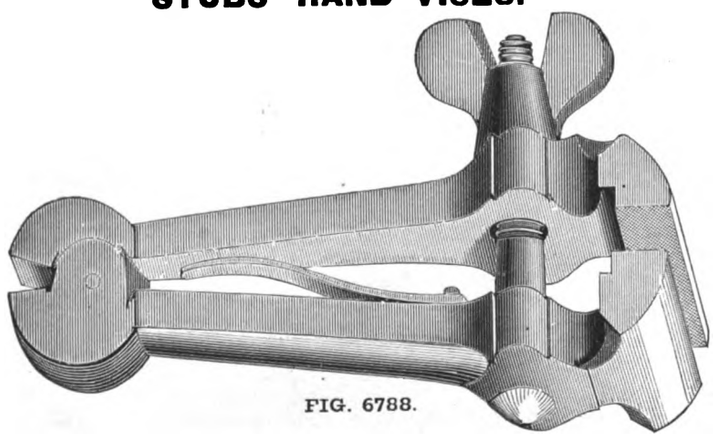


FIG. 6788.

HAND VISES, HANDLED.

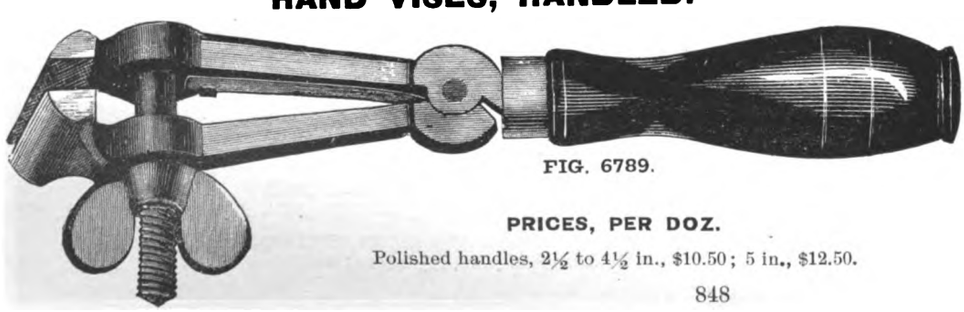


FIG. 6789.

PRICES, PER DOZ.

Polished handles, 2½ to 4½ in., $10.50; 5 in., $12.50.

STERN'S SILENT SAW VISES.

NO. 10. 10 IN. PLANED JAWS.

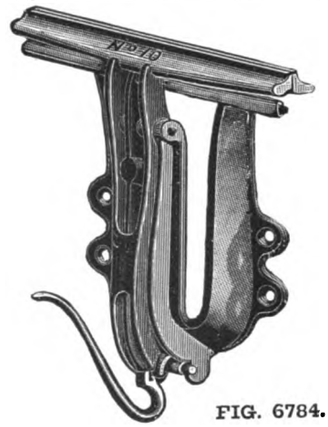


FIG. 6784.

NO. 33. 10 IN. PLANED JAWS.

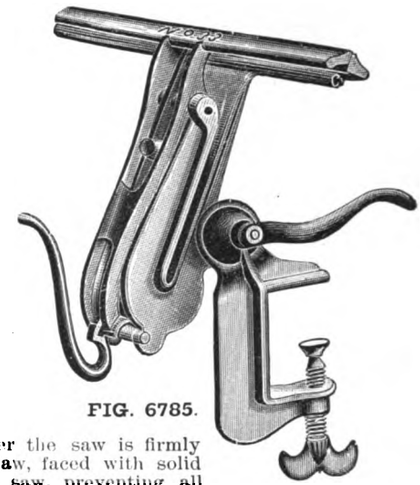


FIG. 6785.

By one movement of the lever the saw is firmly clamped, after which, a third jaw, faced with solid rubber, is pressed against the saw, preventing all noise or vibration. The No. 33 has our patent ball and socket joint, allowing favorable adjustment to light.

PRICES. PER DOZ.

No. 10.....$15.00
No. 33..... 18.00

SAW FILERS' VISES.

PRICES, FIG. 6786.

Vise, with loop...each, $2.50
Vise, without loop, for machinists.....each, 2.25
Vise strap, best quality.....each, 1.00

PRICES, FIG. 6787.

This vise is made expressly for holding saws for filing. The jaws are faced with leather, hold the saw very tightly, and avoid the danger of springing it.

No. 43. Each.....$4.00
Length of jaws, 9 in.

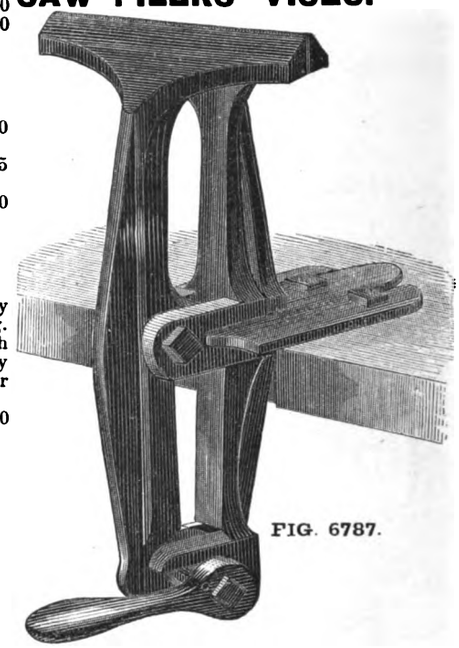


FIG. 6787.

PRICES, FIG. 6788.

PER DOZ.

3 in.....$12.00
3½ " 13.00
4 " 14.00
4½ " 16.00
5 " 20.00
5½ " 24.00
6 " 34.00

HALL'S VISES, WITH ADJUSTABLE FACES.

PRICES, FIG. 6790.

PER DOZ.

5 in., plain.....$25.00
6 " " 34.00
5 " with ring.... 28.00
6 " with ring.... 37.00
Extra rings..... 3.00
" jaws..... 3.00
" thumb nuts.. 2.50

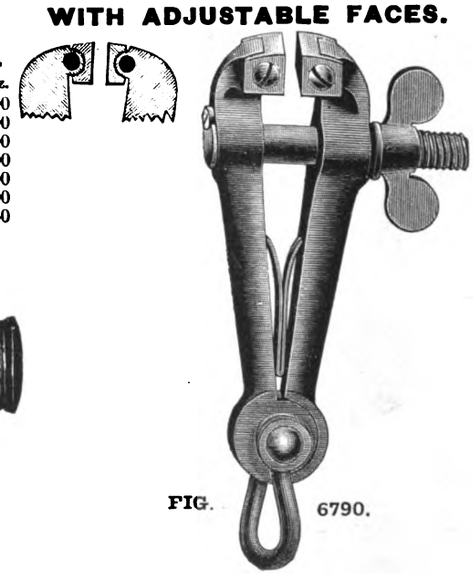


FIG. 6790.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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HAND AND JEWELERS' VISES.

IMPROVED HAND VISE.



FIG. 6791.

PRICES, FIG. 6791.

It is of metal throughout, the jaws being of forged steel. For holding wire, there is a hole through the handle and screw. It weighs eight ounces.

PER DOZEN, $18.00.

JEWELER'S PIN VISE.



FIG. 6792.

PRICES, FIG. 6792.

Common size, $15.00 per doz.
Small " 12.00 "

MOSS' PIN TONGUE VISE.

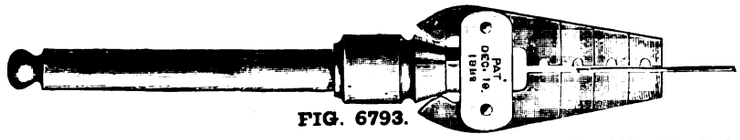


FIG. 6793.

PRICES, FIG. 6793, $15.00 PER DOZ.

FORGED, NO. 140.

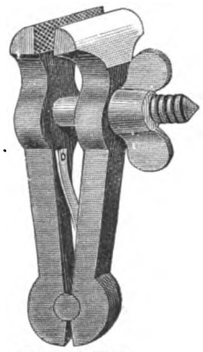


FIG. 6794.

FORGED, NO. 146.

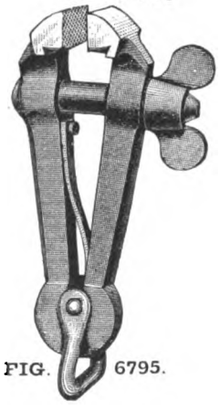


FIG. 6795.

PRICES, PER DOZEN.

	Inch, to 3½	4	4½	5	5½	6
No. 140. Black, bright jaws	$3.00	$3.25	$3.75	$4.50	$5.60	$6.60
No. 142. C. S., extra quality	7.50	7.50	7.50	9.00	....	13.60
No. 144. Handled, bright jaws	4.00	4.25	4.60	5.40	....	....
No. 145. Handled, extra quality	10.00	10.00	10.00	11.00	....	....

ALFORD HAND VISE.

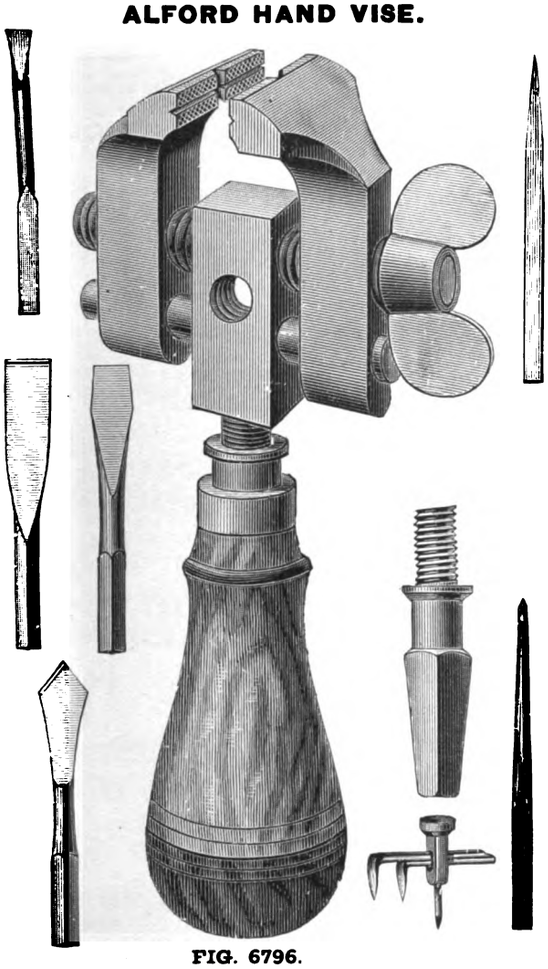


FIG. 6796.

PRICE, $1.75 EACH.

Handle is hollow to receive small tools. Jaw is 1¼ inch wide, opens 1⅛ inch. Of forged and tempered steel.

HALL'S SUDDEN GRIP.

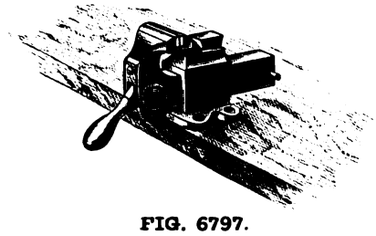


FIG. 6797.

PRICES.

Length of jaws, 2 inches.....each, $4.00

TELEGRAPH VISES, WITH LOOP.

PRICES.

	Inch, 5½	6
No. 146. Black, C. S., extra quality, per dozen	$15.00	$18.00

FLAT BASE, AUTOMATIC.

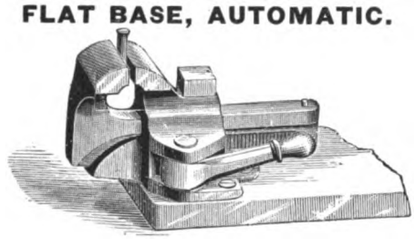


FIG. 6798.

Solid steel bar and anvil.

PRICES.

No. 2. 2 inch automatic jaw..... $4.50
No. 18. 2 " " " nickel-plated 6.50

PROJECTING SWIVEL.

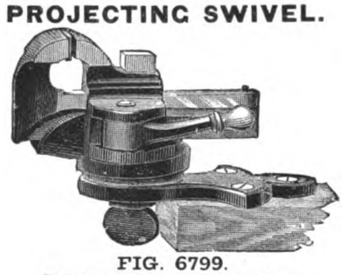


FIG. 6799.

Steel faced or solid steel bar.

PRICES.	Steel-faced.	Solid steel.
No. 21. 2 inch automatic jaw, steel anvil	$4.50	$5.25
No. 19. 2 inch nickel-plated and anvil	6.50	7.25

SELF-ADJUSTING TAPER ATTACHMENT.

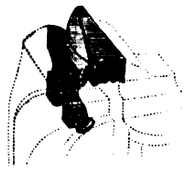


FIG. 6800.

Is quickly adjusted to the vise for irregular work.

PRICES.

2 inch for jeweler's vise.....$1.25
Nickel-plated, extra, 1.00

EXTRA TABLE CLAMPS FOR JEWELER'S VISE.



FIG. 6801.

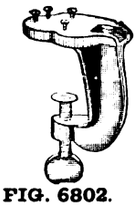


FIG. 6802.

PRICES.

For swivel vise, $1.50
Nickel..... 2.50

For flat vise.

PRICE, 75 CTS.

BRASS CAP ATTACHMENT.



FIG. 6803.

Valuable for finishing work, and fit any vise.

PRICE, 50 CENTS.

Nickel-plated, $1.00.

FLAT BASE.

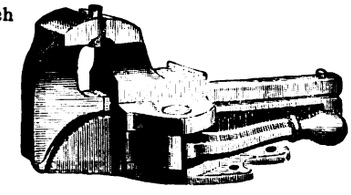


FIG. 6804.

Width of jaw, 2 inches. Opens 2¼ inches. Weight, 2 lbs. Solid steel bar.

PRICES.

No. 1.	Flat base	$3.75
No. 13.	" " nickel-plated	5.75
No. 12.	" " with anvil	4.25
No. 14.	" " " " nic'l-plt'd,	6.25

SWIVEL BASE.

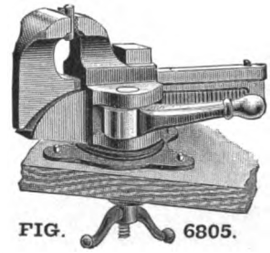


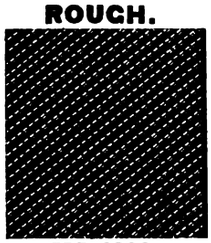
FIG. 6805.

Width of jaw, 2 inches. Opens 2¼ inches. Weight, 3 lbs. Steel faced or solid steel bar.

PRICES.	Steel-faced.	Solid steel.
No. 20. Swivel base	$3.75	$4.50
No. 16. " " nickel-plated	5.75	6.50
No. 15. " " with anvil	4.25	6.00
No. 17. " " " " nic'l-p'd,	6.25	7.00

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CUTS OF FILES AND RASPS.


FIG. 6806.

ROUGH.


FIG. 6807.

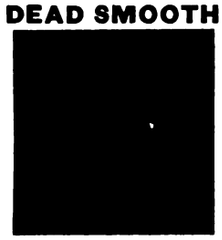
BASTARD.


FIG. 6808.

2ND CUT.


FIG. 6809.

SMOOTH.

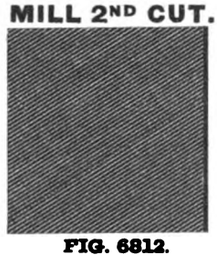

FIG. 6810.

DEAD SMOOTH.

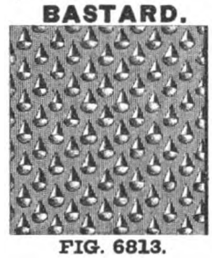

FIG. 6811.

MILL BAST'D.

RASPS


FIG. 6812.

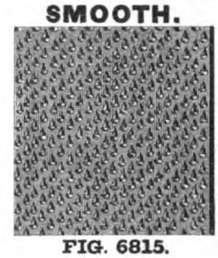
MILL 2ND CUT.


FIG. 6813.

BASTARD.

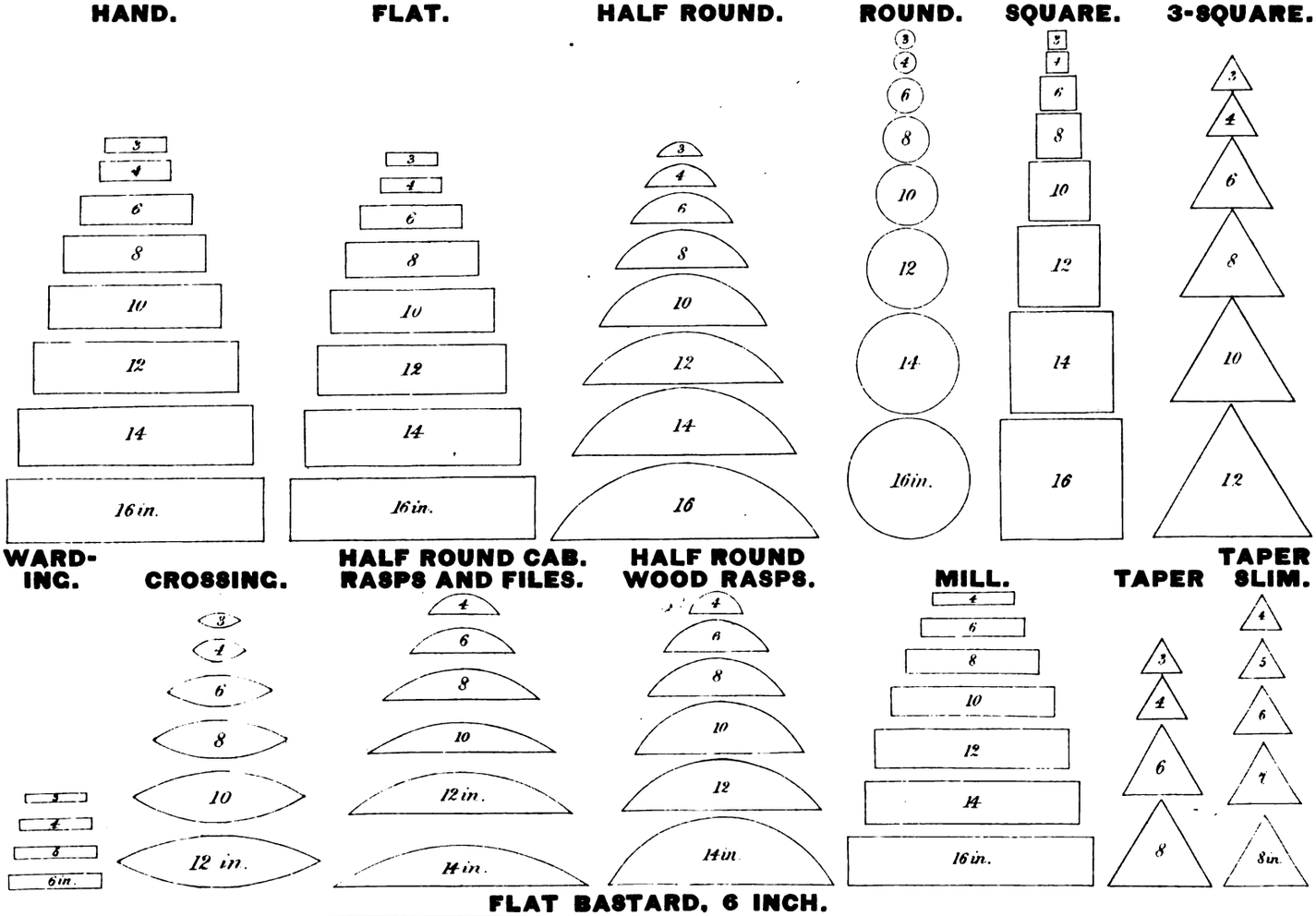

FIG. 6814.

2ND CUT.

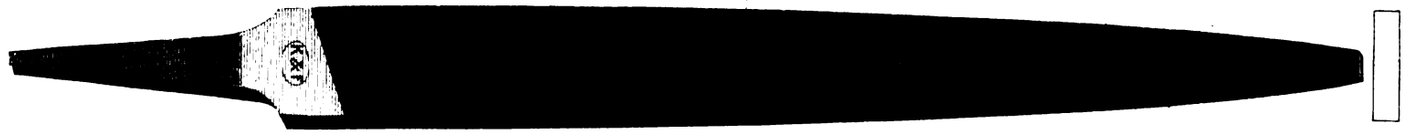

FIG. 6815.

SMOOTH.

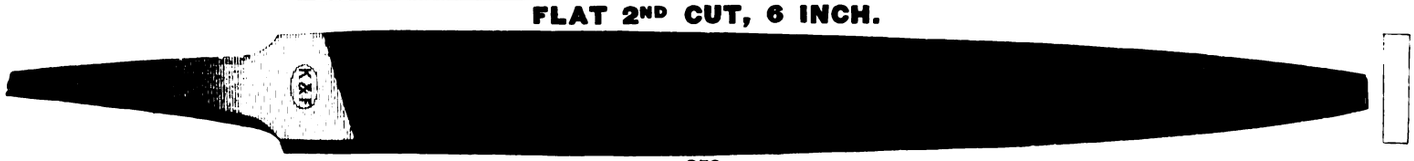
DIAGRAMS OF SECTIONS OF STANDARD SIZES OF REGULAR FILES.



FLAT BASTARD, 6 INCH.



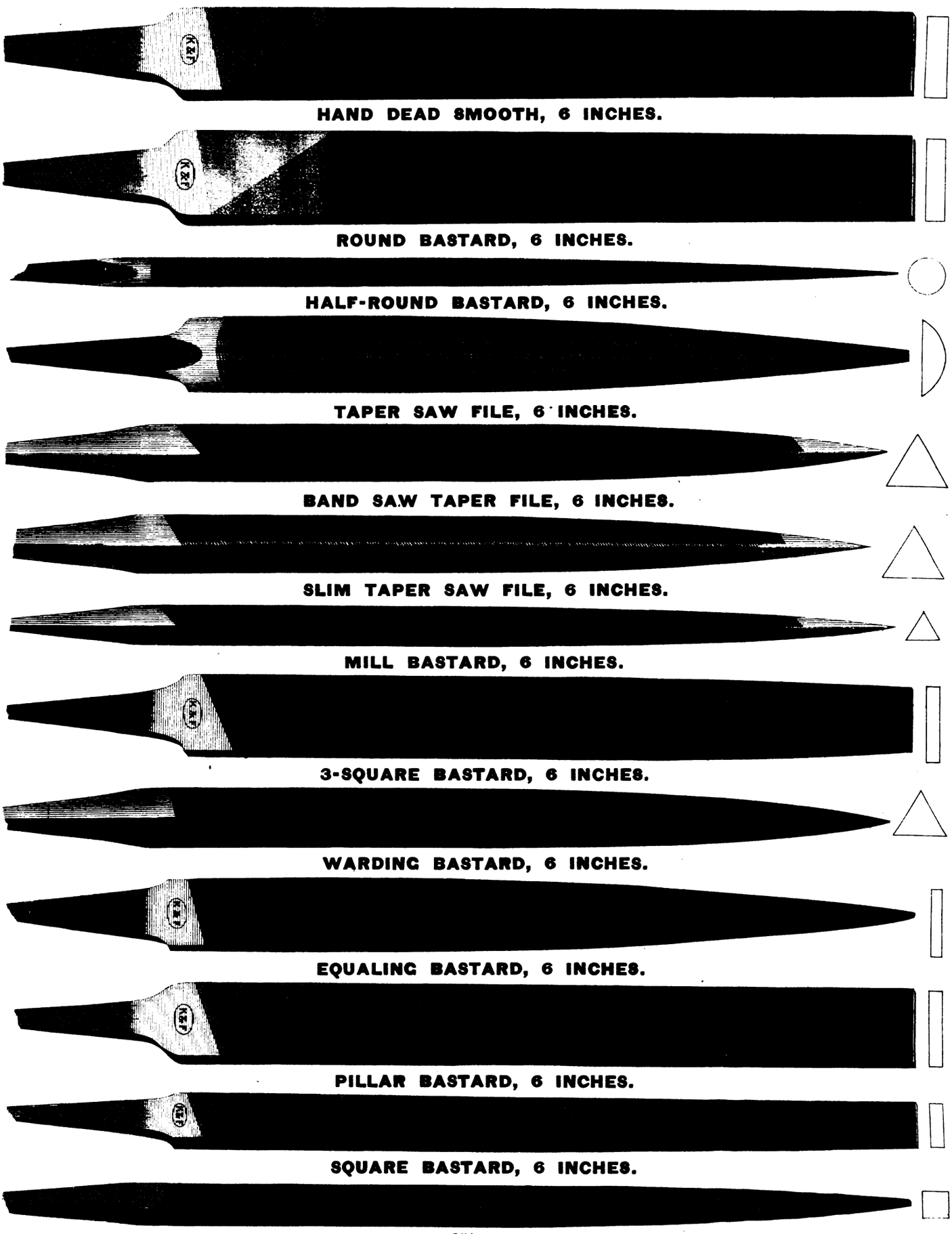
FLAT 2ND CUT, 6 INCH.



MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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FILES.

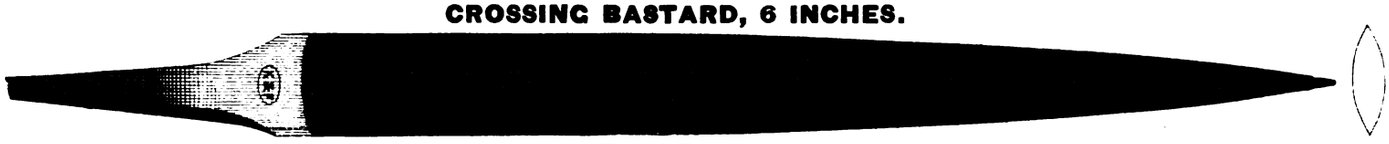


MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

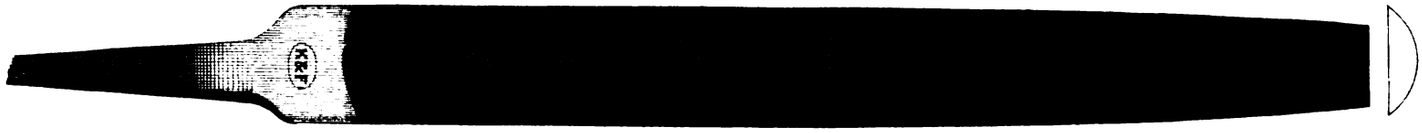
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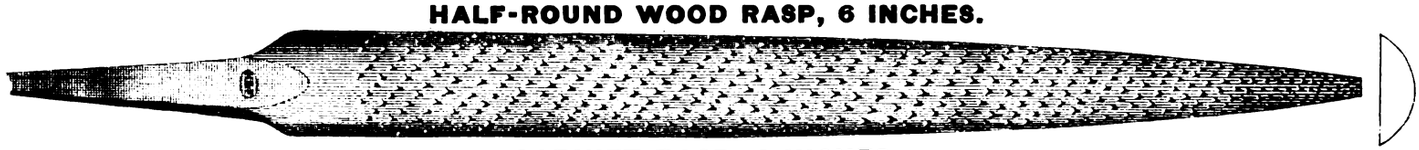
CROSSING BASTARD, 6 INCHES.



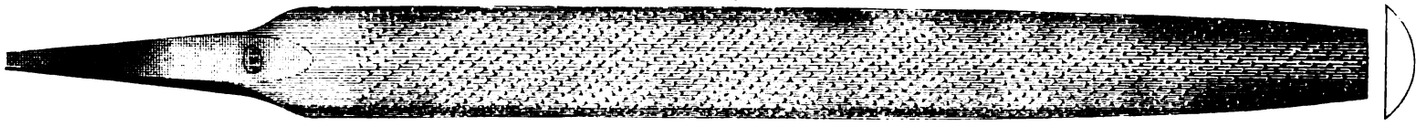
CABINET FILE, 6 INCHES.



HALF-ROUND WOOD RASP, 6 INCHES.



CABINET RASP, 6 INCHES.



PRICES, FILES AS ILLUSTRATED, PAGES 850, 851 AND 852.

MILL AND ROUND.				FLAT AND SQUARE.				HAND, WARDING AND PILLAR.				HALF-ROUND AND THREE-SQUARE.			
Inch.	Bastard.	2nd cut.	Smooth.	Inch.	Bastard.	2nd cut.	Smooth.	Inch.	Bastard.	2nd cut.	Smooth.	Inch.	Bastard.	2nd cut.	Smooth.
4	$1.80	$2.15	$2.40	4	$2.00	$2.40	$2.65	4	$2.25	$2.70	$3.00	4	$2.50	$3.00	$3.30
5	2.00	2.40	2.65	5	2.20	2.60	2.90	5	2.50	3.00	3.30	5	2.80	3.35	3.70
6	2.25	2.65	2.95	6	2.50	2.95	3.25	6	2.80	3.30	3.65	6	3.20	3.80	4.15
7	2.55	3.00	3.30	7	2.90	3.40	3.75	7	3.20	3.75	4.15	7	3.70	4.35	4.80
8	2.90	3.40	3.70	8	3.40	4.00	4.35	8	3.70	4.35	4.75	8	4.30	5.00	5.50
9	3.30	3.85	4.20	9	4.00	4.70	5.10	9	4.35	5.10	5.55	9	5.00	5.85	6.40
10	3.80	4.40	4.80	10	4.70	5.45	5.90	10	5.20	6.00	6.55	10	5.80	6.75	7.30
11	4.50	5.20	5.65	11	5.60	6.50	7.05	11	6.30	7.30	7.95	11	6.70	7.75	8.45
12	5.40	6.20	6.75	12	6.70	7.70	8.40	12	7.50	8.60	9.40	12	7.80	9.00	9.75
13	6.50	7.45	8.05	13	8.00	9.15	10.00	13	8.90	10.20	11.00	13	9.10	10.40	11.25
14	7.80	8.90	9.65	14	9.50	10.90	11.80	14	10.50	12.00	13.00	14	10.60	12.10	13.10
15	9.30	10.60	11.45	15	11.20	12.75	13.75	15	12.30	14.00	15.10	15	12.40	14.15	15.25
16	11.00	12.50	13.40	16	13.10	14.85	16.00	16	14.30	16.20	17.50	16	14.50	16.50	17.70
17	12.90	14.60	15.60	17	15.25	17.25	18.45	17	16.60	18.75	20.10	17	16.90	19.10	20.50
18	15.10	16.90	18.10	18	17.65	19.75	21.20	18	19.20	21.50	23.00	18	19.60	22.00	23.50
19	17.60	19.70	21.10	19	20.30	22.75	24.35	19	22.10	24.75	26.50	19	22.60	25.30	27.10
20	20.40	22.85	24.50	20	23.20	26.00	27.85	20	25.30	28.35	30.35	20	26.00	29.10	31.20

EXTRAS.
Mill double cut.....advance 1 inch.
Mill narrow points.. " 1 "
Gt. Am. cross-cut, blunt, " 2 "

EXTRAS.
Cant, blunt, double cut, adv. 2 inch.

EXTRAS.
Gin saw, single, take bastard price.
Slotting, blunt, advance 2 inches.

EXTRAS.
Knife.....advance 1 in.
High back, hf.-rd., blunt, " 2 "
Cross, blunt..... " 2 "
Feather edge, blunt.. " 2 "

Inch.		3	3½	4	4½	5	5½	6	7	8	9	10	11	12	13	14
Tapers,	single cut	$1.10	$1.10	$1.20	$1.40	$1.70	$2.00	$2.40	$3.00	$3.80	$4.60	$5.70	$7.20	$9.00	$11.00	$13.20
"	double "	1.60	1.60	1.75	2.00	2.40	2.75	3.25	4.00	4.95	5.90	7.10	8.80	10.80	12.90	15.20
Slim tapers,	single "	1.20	1.20	1.30	1.45	1.70	1.90	2.10	2.50	3.00	3.70	4.50	5.50	6.80	8.30	10.00
" "	double "	1.80	1.80	1.90	2.10	2.40	2.60	2.85	3.30	3.90	4.70	5.60	6.75	8.20	9.75	11.50
Pitsaw blunt,	single "	2.10	2.10	2.20	2.30	2.50	2.80	3.20	3.70	4.30	5.00	5.80	6.70	7.70	.....	.....
Hooktooth "	" "	.....	.....	.....	.....	.....	.....	3.60	3.90	4.40	5.10	6.00	7.10	8.40	.....	.....

EXTRAS.
Bandsaw, heavy, blunt, take taper double cut price. } Taper points, same price.
" light, " " slim taper " " " }
Cantsaw, " single cut, } take pitsaw price.
Round gulleting, " " " }
Round-off " " " take hooktooth price.
Reversible taper saw, No. 7, $2.55; No. 8, $2.80; No. 9, $3.15; No. 10, $3.70 per dozen.

Inch.		.6	7	8	9	10	11	12	13	14	15	16	17	18
Horse rasps,	plain	.....	.....	.....	.....	$6.50	$7.50	$9.00	$10.70	$12.70	$15.00	$17.60	$20.50	$23.70
	beveled and ¾ rasp	.....	.....	.....	.....	7.20	8.30	10.00	11.80	14.00	16.50	19.40	22.50	26.00
	tanged	.....	.....	.....	.....	9.00	10.25	12.00	14.00	16.50	19.50	23.00	.....	.....
Wood rasps,	half-round and flat..	$4.20	$5.00	$6.10	$7.30	8.75	10.40	12.30	14.50	16.90	19.60	22.50	.....	.....
Cabinet,	rasps	6.00	7.00	8.20	9.60	11.20	13.00	15.00	17.20	19.60	22.20	25.00	.....	.....
	files	4.20	5.00	6.10	7.30	8.75	10.40	12.30	14.50	16.90	19.60	22.50	.....	.....
Shoe rasps,	half-round and flat	4.60	5.30	6.10	7.00	8.00	9.10	10.30	11.60	13.00	.....	.....	.....	.....
	oval	5.30	6.10	7.00	8.00	9.10	10.30	11.60	.....	.....	.....	.....	.....	.....

EXTRAS.
File rasps, flat and half-round, take flat and half-round wood rasp price.
Wood files, " " " " " " " bastard "
Last makers' rasps, one inch advance on cabinet.

EXTRAS, GENERAL.

One round edge, advance 7½ per cent., and two round edges, 15 per cent. on respective kinds and cuts.
Blunt files, not specified, advance one inch on respective kinds and cuts. Dead smooth, double the price of bastard cut.
Equalings, bellied, advance 2 inches on respective kinds and cuts.
Sizes below 4 inches, not extended, take 4 inch price; ½ inches, not specified, take next higher full inch price.
Rough, coarse, union-cut brass, or other than regular cuts, not specified, made upon regular or standard shaped blanks, advance one inch on respective kinds and cuts.
Single or float cut, not specified, on regular shapes, take double cut price.
Irregular goods.—All lengths above those listed, and files varying from standard sizes, to be classed as irregular and subject to special prices.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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AMERICAN FILES, SWISS PATTERNS.

Description.	Inch.	2	2½	3	3½	4	4½	5	6	7	8
Hand, one safe edge	Cut No. 0	$1.55	$1.65	$1.75	$1.85	$2.15	$2.40	$2.65	$3.25	$4.00	$4.90
	" " 1	1.65	1.75	1.85	2.00	2.30	2.50	2.75	3.40	4.25	5.15
	" " 2	1.75	1.85	2.00	2.15	2.40	2.65	2.90	3.60	4.50	5.45
	" " 3	1.85	1.95	2.10	2.30	2.50	2.75	3.05	3.80	4.70	5.75
	" " 4	1.95	2.05	2.20	2.40	2.65	2.90	3.20	4.00	4.90	6.00
	" " 5	2.05	2.15	2.30	2.50	2.75	3.00	3.35	4.15	5.15	6.30
	" " 6	2.15	2.25	2.40	2.60	2.85	3.15	3.50	4.30	5.40	6.60
	" " 7	2.25	2.35	2.50	2.70	2.95	3.30	3.65	4.50	5.65	6.90
	" " 8	2.35	2.45	2.60	2.80	3.05	3.40	3.80	4.70	5.80	7.20
Pillar, Two safe edges	Cut No. 0			1.60	1.60	2.05	2.50	2.95	3.40	4.00	4.60
" narrow, Two safe edges	" " 1			1.60	1.65	2.15	2.60	3.15	3.60	4.20	4.85
" extra narrow, Two safe edges	" " 2			1.60	1.70	2.25	2.75	3.30	3.80	4.45	5.10
	" " 3	Below 3 inches, take 3 inch price.		1.60	1.75	2.35	2.85	3.45	4.00	4.65	5.35
	" " 4			1.60	1.80	2.40	3.00	3.60	4.20	4.90	5.60
	" " 5			1.60	1.85	2.50	3.10	3.80	4.40	5.10	5.85
If cut on one edge, 5 per cent. extra.	" " 6			1.60	1.90	2.60	3.25	3.95	4.60	5.35	6.10
" " two " 10 " "	" " 7			1.60	1.95	2.70	3.35	4.10	4.80	5.60	6.35
	" " 8			1.60	2.00	2.75	3.50	4.25	5.00	5.80	6.60
Three square, slim	Cuts No. 0, 1, 2	$1.50	$1.60	$1.70	$1.85	$2.05	$2.35	$2.65	$3.25	$3.85	$4.45
" " metal saw	" " 3, 4, 5	1.70	1.80	1.90	2.10	2.25	2.60	2.95	3.60	4.25	5.00
Slitting, equaling	" " 6, 7, 8	1.85	2.00	2.15	2.30	2.45	2.80	3.20	3.95	4.75	5.45
Warding and knife											
Half round, slim	all numbers,	1.80	1.80	1.80	2.00	2.30	2.80	3.30	3.90	4.60	5.30
Crossing and barrette	" "	1.60	1.60	1.60	1.80	2.30	2.80	3.30	3.90	4.60	5.30
Square, slim	" "	1.25	1.25	1.25	1.40	1.80	2.20	2.60	3.10	3.90	4.90
Round slim	" "	1.10	1.10	1.10	1.25	1.70	2.10	2.50	2.90	3.70	4.50
Round, slim, straight	" "	.90	.90	1.20	1.30	1.70	2.15	2.65	3.25	3.95	4.75
Drill or joint, round or square edges	" "			1.40	1.60	1.85	2.25	2.70	3.25		
Cant and barrette, cut on three sides	" "			1.80	2.10	2.70	3.30	3.90	4.60		
Width in decimal parts of an inch, stated as near as practicable. Hand		.33	.38	.43	.48	.53	.58	.62	.72	.81	.90
Pillar		.23	.26	.29	.32	.35	.38	.42	.48	.54	.60
" narrow		.17	.19	.22	.24	.27	.29	.31	.36	.41	.45
" extra narrow		.12	.13	.14	.16	.18	.19	.21	.24	.27	.30
Thickness of drill or joint files				.02	.03	.04	.05	.06	.08		
				.06	.07	.08	.09	.10	.12		

Miscellaneous.	Inch.	No tang.	With tang.	With handles.	Double.
Pivots, right and left cut, sharp corners; " " " " conical corners; " " " " burnishers, sharp corners	2½		$2.80	$3.25	$5.00
Die sinkers' files, 12 in a set, assorted shapes	3½		1.40		
Screw head, watch	3	$1.50	1.60		
Ratchet	3	1.50			

Broach files, from gauge 40 to 65 inclusive, 90 cents per doz. Crotchet, advance 1 inch on warding.

NEEDLE FILES.*

Put up in dozens, either assorted, one of each kind, or in kinds.
Assorted dozens will always be sent when order does not state otherwise.

Round handle, 10 cm. or 4 inch, $0.80 per doz.; 12 " or 4¾ " .90 " "; 14 " or 5½ " 1.00 " "; 16 " or 6¼ " 1.20 " "

Square handle and escapement, 14 " or 5½ " 1.30 " "

Of the following twelve varieties, viz: round, half-round, flat, oval, knife, square, 3-square, equaling, slitting, joint, barrette, and marking, if round handle, or half-round blunt, if square handle.

* Length of needle files includes file and handle.

F. L. GROBET'S SWISS FILES.

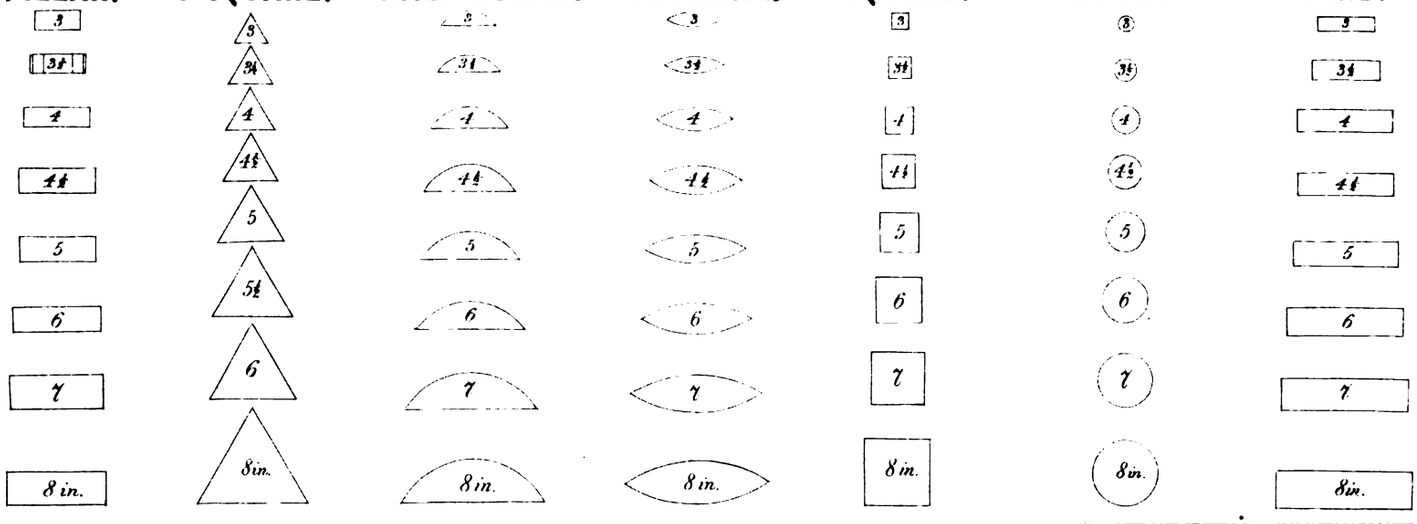
Description.	Inch.	2	2½	3	3½	4	4½	5	6	7	8	9	10
Hand, No. 00 and 0				$1.75	$1.85	$2.75	$2.95	$3.15	$3.60	$4.20	$4.95	$7.05	$8.10
" " 1				1.85	2.10	2.90	3.15	3.35	3.85	4.55	5.25	7.40	8.45
" " 2				2.10	2.30	3.15	3.35	3.60	4.05	4.90	5.60	7.55	8.75
" " 3				2.30	2.50	3.35	3.60	3.85	4.30	5.20	5.95	8.05	9.10
" " 4				2.30	2.50	3.35	3.60	3.85	4.30	5.55	6.25	8.40	9.45
" " 5				2.50	2.70	3.60	3.80	4.05	4.50	5.90	6.60	8.70	9.75
" " 6				2.70	2.95	3.85	4.05	4.30	4.80	6.20	6.95	8.85	10.10
" " 8				3.20	3.40	4.25	4.55	4.80	5.25	6.85	7.55		
Pillar, 2 safe edges, No. 00 and 0		$1.60	$1.60	1.60	1.70	2.60	2.75	2.95	3.35	3.40	4.70	6.75	7.60
" " " " 1		1.60	1.60	1.60	1.70	2.60	2.95	3.15	3.60	3.80	5.00	7.05	7.95
" " " " 2		1.60	1.60	1.60	1.70	2.60	3.15	3.35	3.85	4.10	5.30	7.40	8.25
" " " " 3		1.60	1.60	1.60	1.75	2.75	3.35	3.60	4.05	4.40	5.65	7.70	8.60
" " " " 4		1.60	1.60	1.60	1.75	2.75	3.35	3.60	4.05	4.80	6.00	8.05	8.90
" " " " 5		1.60	1.60	1.60	1.75	2.75	3.60	3.85	4.30	5.10	6.30	8.40	9.25
" " " " 6		1.60	1.60	1.60	1.95	2.90	3.80	4.05	4.55	5.40	6.65	8.70	9.60
" " " " 8		1.60	1.60	1.60	1.95	2.90	4.35	4.55	5.05	6.10			
Half round		1.80	1.80	1.80	1.85	2.75	3.00	3.30	3.95		5.35		
Barrette		1.60	1.60	1.60	1.70	2.60	3.00	3.30	3.95				
Square		1.25	1.25	1.25	1.35	2.25	2.40	2.60	3.10				
Round		1.10	1.10	1.10	1.20	2.20	2.30	2.50	2.90	3.55	4.55		
Crossing		1.60	1.60	1.60	1.70	2.75	3.00	3.30	3.95				
Equaling		1.60	1.60	1.60	1.70	2.65	3.00	3.30	3.95				
Taper flat		1.60	1.60	1.60	1.70	2.75	3.00	3.30	3.95				
Knife				1.60	1.70	2.75	3.00	3.30	3.95				
Three-square		1.85	2.00	2.15	2.25	3.05	3.20	3.30	3.55				
Cant or barrette, three sides cut				2.00	2.15	3.40		4 05	4.75				
Round edge joints						2.25		2.60	3.25				
Parallel round		.90	.90	1 20	1.20	2.25	2.55	2.70					
Slitting, with tang			1.60	1.60	1.70	2.60							
Slitting, without tang		1.45		1.45	1.45								
Crochet				1.60		2.40		3.15					
Pivot, right or left		2.25											

Escapement, three-square .....$1.60 Round .....$1.10 Square.....$1.25 All other shapes.....$1.45
Needle files, per gross... 12 cm., 11.50 14 cm.....12.15 16 cm.....13.15
Pillar, one safe edge, 15 cents per dozen more than regular pillar.

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DIAGRAMS OF SECTIONS, PETER STUB'S FILES, AND PRICES.

PILLAR. 3-SQUARE. HALF-ROUND. CROSSING. SQUARE. ROUND. FLAT AND HAND.



SAW FILES, TAPER OR BLUNT, SINGLE OR DOUBLE CUT.

1 to 3 in.	3½ in.	4 in.	4½ in.	5 in.	5½ in.	6 in.	6½ in.	7 in.	8 in.	9 in.	10 in.
$1.70	$1.80	$2.00	$2.80	$3.10	$3.30	$3.50	$3.90	$4.25	$5.25	$7.05	$7.80

HAND OR POTTANCE.

Inches.	Bastard.	Smooth.	Super.
1 to 3½	$1.85	$2.05	$2.70
4	1.95	2.30	3.10
4½	2.90	3.35	4.10
5	2.95	3.55	4.30
6	3.75	4.30	5.05
7	4.30	5.05	5.80
8	5.05	5.80	6.95
9	7.05	7.80	9.35
10	7.80	8.60	10.10
12	10.10	10.85	13.15

TAPER 3-SQUARE FILES.

Inches.	Bastard.	Smooth.	Super.
1 to 3	$1.65	$1.95	$2.15
3½	1.75	2.15	2.40
4	1.95	2.30	2.70
4½	2.80	3.15	3.75
5	2.95	3.55	4.10
6	3.35	3.90	4.85
7	3.90	4.70	5.80
8	5.05	5.80	6.60
9	7.05	7.80	9.35
10	7.80	8.60	10.10
12	10.10	10.85	13.15

TAPER FLAT, PILLAR AND COTTER.

Inches.	Bastard.	Smooth.	Super.
1 to 3½	$1.85	$2.05	$2.70
4	1.95	2.30	3.10
4½	2.90	3.35	4.10
5	2.95	3.55	4.30
6	3.75	4.30	5.05
7	4.30	5.05	5.80
8	5.05	5.80	6.60
9	7.05	7.80	8.60
10	7.80	8.60	9.35
12	9.35	10.10	12.40

HALF-ROUND AND ROUND EDGE JOINT, OR DRILL FILES, AND FLAT, BACK HALF-ROUND OR HALF-OVAL.

Inches.	Bastard.	Smooth.	Super.
1 to 3	$1.95	$2.15	$2.70
3½	2.15	2.40	2.90
4	2.50	2.70	3.25
4½	3.35	3.65	4.30
5	3.55	3.90	4.70
6	4.30	4.70	5.45
7	4.70	5.45	6.60
8	5.05	5.80	7.35
9	7.05	8.20	10.10
10	8.20	9.35	10.85
12	10.10	11.60	13.90

ROUND FILES, TAPER.

Inches.	Bastard.	Smooth.	Super.
1 to 3	$1.75	$2.15	$2.70
3½	1.85	2.30	2.90
4	1.95	2.50	3.25
4½	2.80	3.35	4.30
5	2.95	3.55	4.70
6	3.35	4.30	5.80
7	3.90	5.05	6.95
8	5.05	5.80	7.35
9	7.05	8.20	10.10
10	7.80	9.35	10.85
12	9.35	11.60	13.90

EQUALING FILES.

Inches.	Bastard.	Smooth.	Super.
1 to 2½	$1.75	$1.95	$2.50
3 & 3½	1.95	2.15	2.70
4	2.15	2.30	3.10
4½	2.95	3.35	4.10
5	3.15	3.55	4.30
6	3.55	4.30	5.05
7	3.90	4.70	5.80
8	4.70	5.80	6.95
9	6.70	7.80	9.35
10	7.80	8.60	10.10
12	10.10	10.85	13.15

CROSSING FILES.

Inches.	Bastard.	Smooth.	Super.
1 to 3	$2.30	$2.50	$2.90
3½	2.50	2.70	3.25
4	2.70	2.90	3.65
4½	3.55	3.90	4.70
5	3.75	4.30	5.05
6	4.70	5.05	5.80
7	5.45	6.20	7.35
8	5.80	6.60	8.10
9	7.80	8.95	10.85
10	8.60	10.10	11.60

WARDING FILES.

Inches.	Bastard.	Smooth.	Super.
1 to 3½	$1.75	$1.95	$2.70
4	1.95	2.25	2.90
4½	2.70	3.15	3.90
5	2.80	3.35	4.30
6	3.55	4.10	5.05
7	4.10	4.70	5.80

BLUNT ROUND FILES.

Inch....	3½	4	4½	5	6
Bastard.	$1.85	1.95	2.90	2.95	3.75

SLITTING FILES.

Inches.	Bastard.	Smooth.	Super.
1½	$1.75	$1.95	$2.50
2	1.95	2.15	2.70
2½	2.30	2.50	2.90
3	2.50	2.90	3.25
3½	2.70	3.10	3 65
4	2.90	3.25	4.20
4½	3.75	4.20	5.05
5	3.90	4.85	5.45
6	4.70	5.05	6.40
8	6.20	7 35	8.85

SQUARE EDGE JOINT FILES.

4 in., bastard.....	$2.15

CANT.

3	3½	4	4½	5	6
$2.50	$2.70	$2.90	$3.75	$3.90	$4.70

ROUND-OFF FILES.

5 in., smooth.....	$3.75
6 " "	4.10

SQUARE.

Inches.	Bastard.	Smooth.	Super.
1 to 3	$1.75	$1.95	$2.50
3½	1.85	2.15	2.70

4 in. and larger, same price as taper flat.

KNIFE.

Inches.	Bastard.	Smooth.	Super.
1 to 3	$1.75	$1.95	$2.50

3½ in. and larger, same price as hand.

FORK FILES.

Inches.	Bastard.	Smooth.
5	$3.90	
6	4.70	$5.05

PINION FILES.

3 in., bastard.....	$1.95
4 " "	2.15

CHEQUERING.

4 in.....	$1.95

DENTISTS' SEPARATING FILES.

Per doz.....	$1.95

FILE HANDLES.



FIG. 6819.

PRICES, FIG. 6819.

		Per gross.
No. 1.	Hardwood, polished brass ferrules, assorted, 4 sizes	$4.00
" 2.	" " " " " 3 large sizes	4.50
" 3.	" " iron " " 4 sizes	4.00
" 4.	" " " " " 3 large sizes	4.50
" 7.	Softwood, brass ferrules, assorted, 4 sizes.	3.25
" 8.	" " " " 3 large sizes	3.50
" 9.	" iron " " 4 sizes	3.25
" 10.	" " " " 3 large sizes	3.50
" 11.	Jewelers' assorted black walnut, apple and cherry woods, brass ferrules	3.75

Nos. 1 to 10, one doz. in a box. No. 11, three doz. in a box.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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FILE HANDLES, CLEANERS AND HOLDERS.

PRICES.

	Per gross.
No. 1, for files 13 inches and larger	$6.00
" 2, " 9 to 12 inches	5.50
" 3, " 7 " 10 "	5.25
" 4, " 5 " 8 "	5.00
" 4½, " 4 " 7 "	4.75
" 5, " 2 " 5 "	4.50
Assorted, Nos. 1 to 5	5.00
No. 6, for tinners' soldering coppers	8.00

Packed in paper boxes. If sold in bulk, list price, 25 cents per gross less.

LOCK JAW FILE HANDLE.



FIG. 6820.

FILE HOLDER.

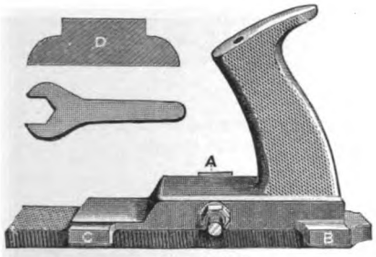


FIG. 6823.

PRICE, EACH, $1.00.

FILE CARD.



FIG. 6821. PRICE, PER DOZEN, $2.50.

FILE BRUSH.



FIG. 6822.

PRICE, PER DOZEN, $4.40.

FILE CARDS AND BRUSHES.

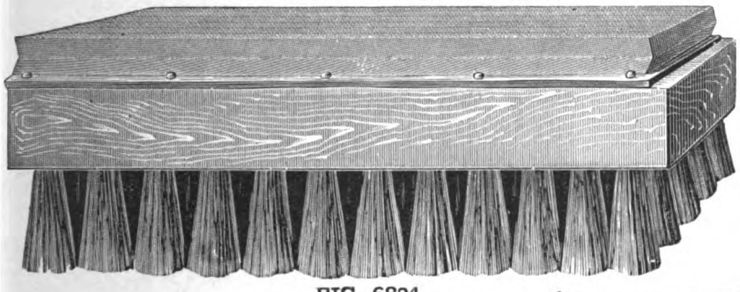


FIG. 6824.

PRICE, PER DOZEN, $3.00.

OAK LEATHER RETANNED FILE CARD.

PRICE.

In strips, per square foot $1.75

SURFACE FILE HOLDER.



FIG. 6825.

PRICES. No. 4, $1.00. No. 5, $1.25.

SMALL POWER BLOWERS.

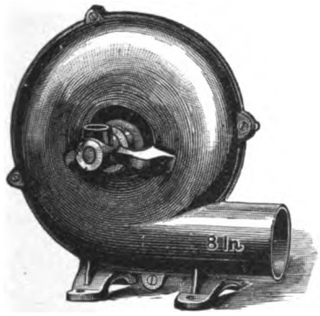


FIG. 6826.

PRICES.

No. 00, 8 inch	$8.00
" 0, 12 "	10.00
" ½, 18 "	14.00

Arranged for exhausting purposes, $2.00 extra.

STUB FILES AND HOLDERS.



FIG. 6827.

PRICE, WITH 6 FILES, $5.00.

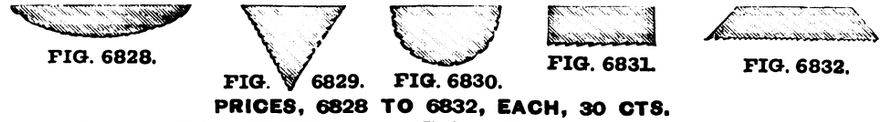


FIG. 6828. FIG. 6829. FIG. 6830. FIG. 6831. FIG. 6832.

PRICES, 6828 TO 6832, EACH, 30 CTS.

ROOTS' HAND BLOWER.

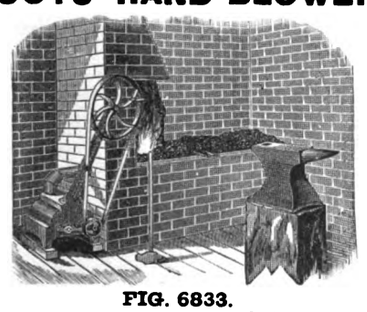


FIG. 6833.

Size.	By hand.	Power.
¼, ⅓ c. f. air, per revo	$35.00	$30.00
½, for 1 fire	45.00	40.00
1, " 1 " large	56.00	51.00
2, " 1 or 2 fires	80.00	75.00

ACME HAND BLOWER.

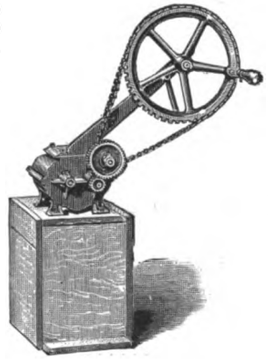


FIG. 6834.

PRICES, FIG. 6835.

No. 2 or 3, suitable for ordinary up to largest class fire, or two fires, made for right and left hand fires.

They are also made to run by power only, with tight or tight and loose pulleys.

No. 4, for power only, ⅜ cubic foot per revolution, $70.

Size.	By hand.	Power.
2, for 1 fire	$28.00	$28.00
3, " largest class fire	28.00	28.00

POWER OR HAND BLOWER.

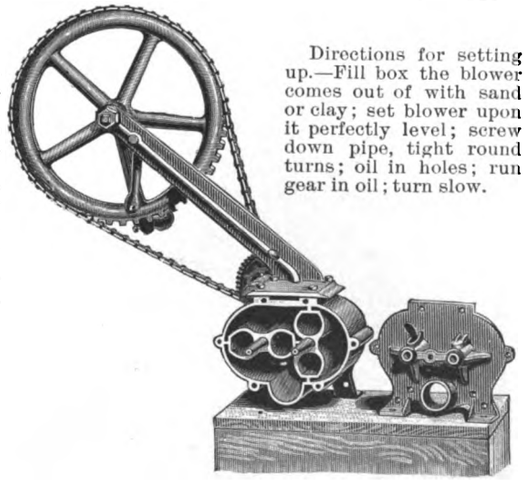
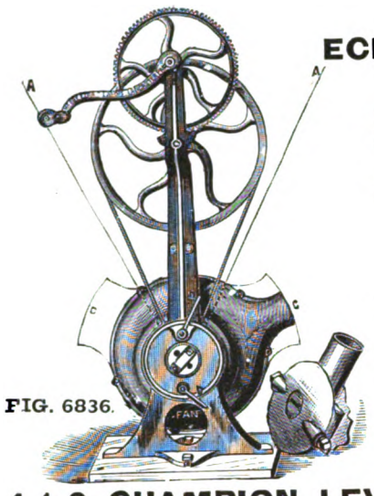


FIG. 6835. SECTION.

Directions for setting up.—Fill box the blower comes out of with sand or clay; set blower upon it perfectly level; screw down pipe, tight round turns; oil in holes; run gear in oil; turn slow.

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FAN BLOWERS, WITH TUYERS.
ECLIPSE, WITH EITHER CRANK OR LEVER.


FIG. 6836.

Our tuyer iron is one of the latest improved pattern, and is furnished with the blower. Size of No. 1 case is 16 inches in diameter; outlet, 3 inches. No. 2 case is 13 inches in diameter; outlet, 2¾ inches.

PRICES.

Improved "Eclipse" fan blower and tuyer iron, complete	No. 1,	$22.00	No. 2,	$17.00
" " " " without tuyer iron	"	20.00	"	15.00
" " " " complete, with lever attachment	"	25.00	"	19.00
" " " " without tuyer iron and with lever attachment	"	23.00	"	17.00
Tuyer iron alone	"	2.50		

The above includes a patent adjustable elbow and pipe, oil can, etc.

Exhausters for ventilating mines, complete. No. 1, $25.00 No. 2, $19.00

NO. 4 CHAMPION LEVER BLOWER.

DESCRIPTION, FIGS. 6837 AND 6838.

The Nos. 4 and 4½ champion lever blowers are now made with 16 inch fan only, and will produce a welding heat on 3½ and 4 inch iron in ten minutes.

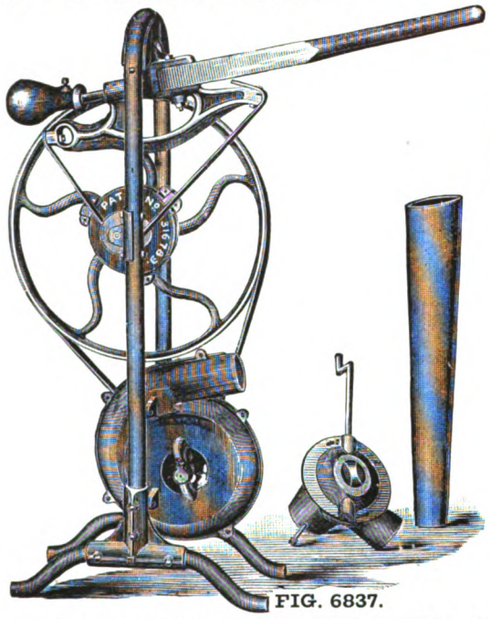
PRICES, FIG. 6837.

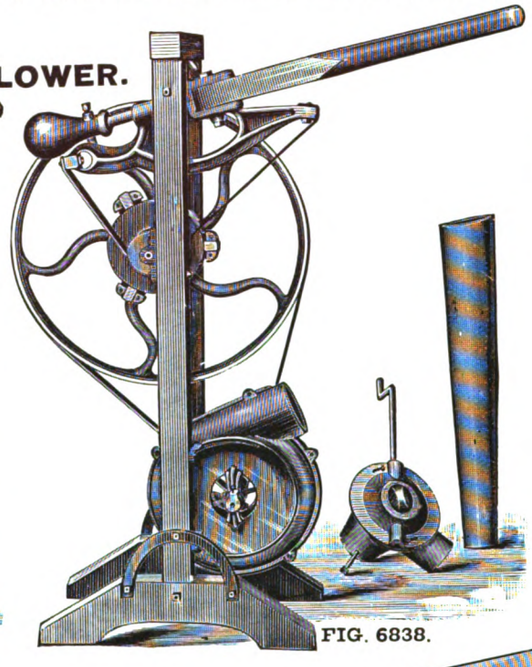
No. 4½ champion lever blower, iron frame, fan 16 inches, complete, with tuyer iron and piping.....$22.00

PRICES, FIG. 6838.

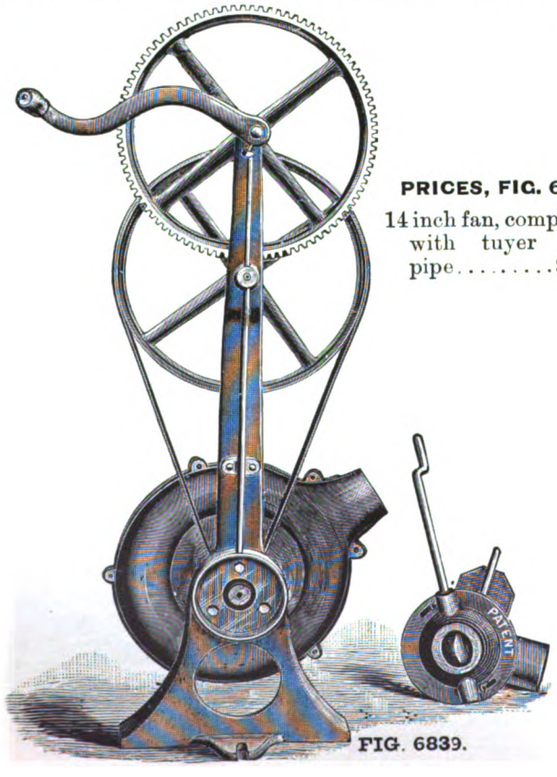
No. 4 champion lever blower, wood frame, fan 16 inches, complete, with tuyer iron and piping.....$20.00

4 1-2 CHAMPION LEVER BLOWER.


FIG. 6837.


FIG. 6838.

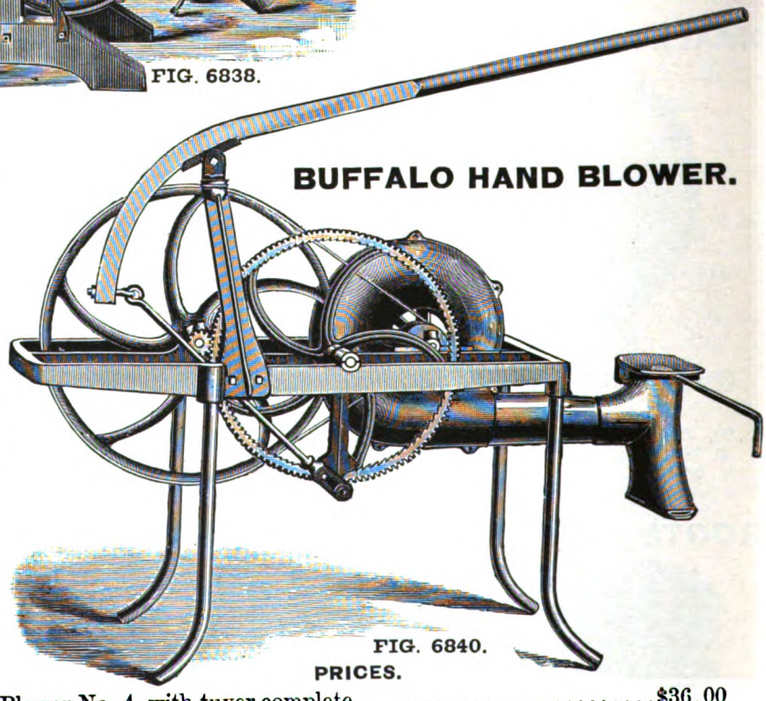
CHAMPION COG-GEARED BLOWER.


FIG. 6839.

PRICES, FIG. 6839.

14 inch fan, complete, with tuyer and pipe.....$12.00

BUFFALO HAND BLOWER.


FIG. 6840.

PRICES.

Blower No. 4, with tuyer complete	$36.00
" " " without tuyer	34.00
" No. 2, with tuyer complete	32.00
" " without tuyer	30.00
Tuyers	3.50

Blower No. 4—Size of fan, 17 inches; height, 35 inches; length, 35 inches; weight, 225 pounds.

Blower No. 2—Size of fan, 14 inches; height, 35 inches; length, 32 inches; weight, 130 pounds; with tuyer, 150 pounds.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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FAN BLOWERS AND FORCES.

BUFFALO, RIGHT OR LEFT HAND.

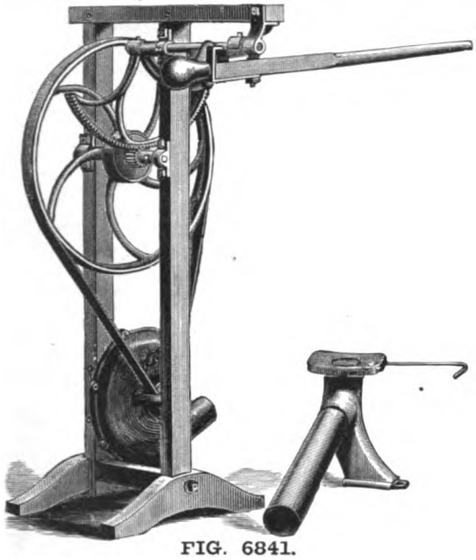


FIG. 6841.

PRICES.

With tuyer.....$25.00
Without tuyer..... 23.00

CRANK.

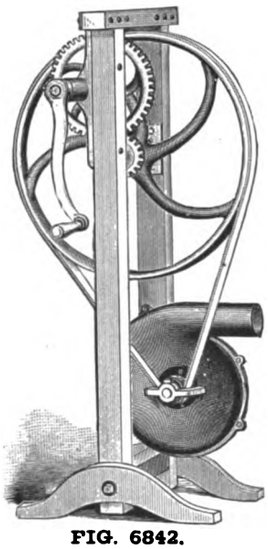


FIG. 6842.

PRICES.

With tuyer.....$20.00
Without tuyer..... 18.00

WATSON'S FORCE BLOWER.

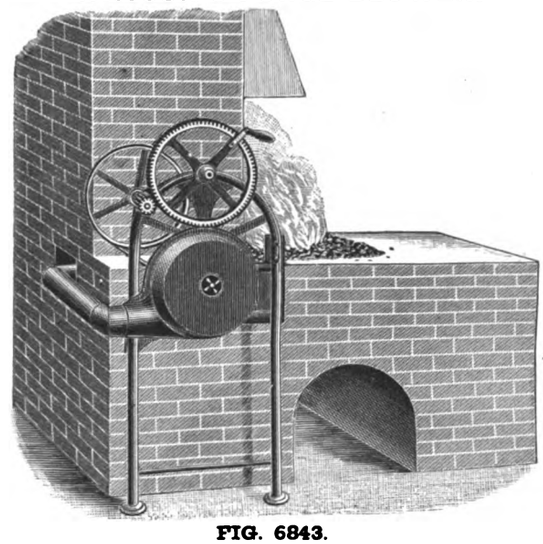


FIG. 6843.

PRICE, $23.00. PRICE, WITH TUYER, $25.00.

KEYSTONE HAND BLOWER.

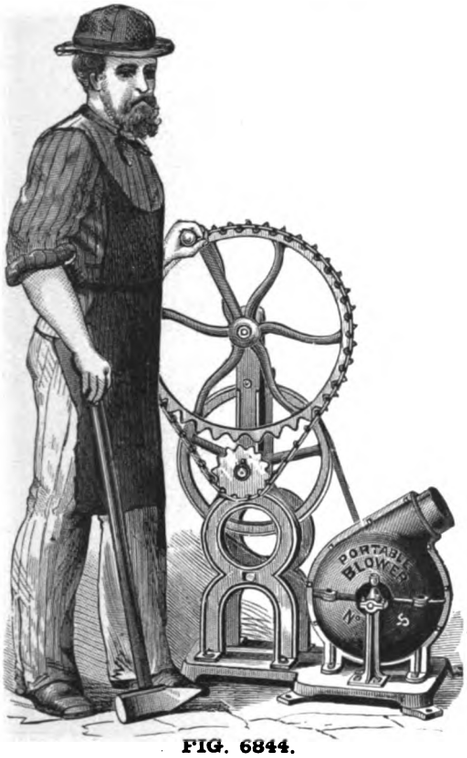


FIG. 6844.

PRICES, FIG. 6844.

Hand blower No. 5. Diameter of fan, 16 inches.

PRICE, $30.00.

For attaching to brick forge, with chain gear or leather belt, equal to largest bellows.

Hand blower No. 4. Diameter of fan, 12 inches.

PRICE, $25.00.

Hand blower No. 4 is same style as No. 5, above, has 12 inch driving wheel, is equal to 36 inch bellows. Improved ball tuyer and plate. Price, $2.50 extra.

WESTERN HAND BLOWER.

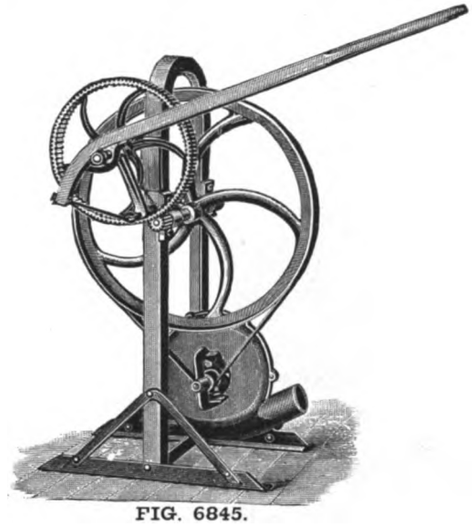


FIG. 6845.

PRICES, FIG. 6845.

No. 1. Power or hand.....Price, $29.00
No. 1. Hand..... " 25.00

This blower is made with a wrought iron frame, without wood or leather, except the handle and belt.

When ordered, we make it with pulleys on the main shaft, and by removing the gear wheel and handle, power can be applied.

This blower, when worked by hand, gives blast enough for two ordinary fires; operated by power, it gives blast enough for three or four, according to the size of the fires.

For hand use, weight 130 lbs. For power, weight 140 lbs. Diameter of fan, 14 inches.

KEYSTONE RIVETING FORGE.



FIG. 6846.

PRICE, $50.00.
See description above.

DESCRIPTION, FIG. 6846.

The frame is strong and firmly braced to stand rough usage. The pot has three doors, giving employment either to one, two or three rivet boys, as desired. The doors, or openings, when not in use, are closed by a falling lid. The top of the pot is covered with a heavy lid, which is thrown open to kindle the fire, and closed when heating rivets.

NAVY FORGE.

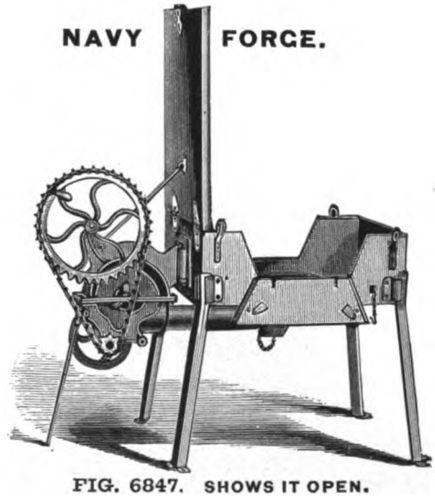


FIG. 6847. SHOWS IT OPEN.

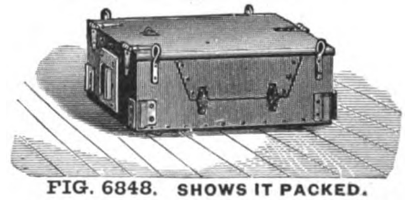


FIG. 6848. SHOWS IT PACKED.

PRICES, FIGS. 6847 AND 6848.

Navy forge; height, 22 inches; size of fire pan, 22 x 27 inches; weight, 200 lbs.; diameter of fan, 9 inches. Price, $60.00.

Navy forge, packed; size, 22 x 27 x 10 inches.

The fire pan is made of wrought iron, and is 10 inches deep, containing all the other parts of the forge when packed for transportation.

The blower and gearing are compactly framed together, and fit into a slot on the end of the forge when in use. It has the chain gear.

The legs, made of angle iron, fit into slots at the corners of the fire pan.

The tuyer box fits into a slot under the hearth.

The hearth is made of heavy cast iron, and is bolted to the bottom of the fire pan.

This forge will produce a quick welding heat on iron three inches diameter, and on larger iron if required, as there is plenty of spare blast. For use on ships and steamers, and on land for army purposes, miners, wagon trains, circus companies, lumber camps, etc., wherever exposed to rough handling and use in transportation, by land or sea.

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KEYSTONE FORGES, HAND AND POWER.

NO. 4 FORGE.

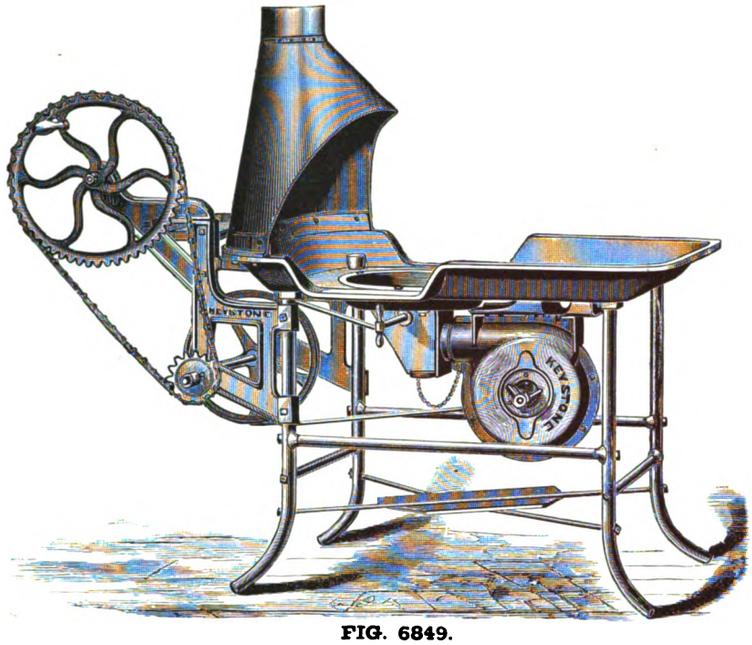


FIG. 6849.

NOS. 2 1-2 AND 3 FORGES.

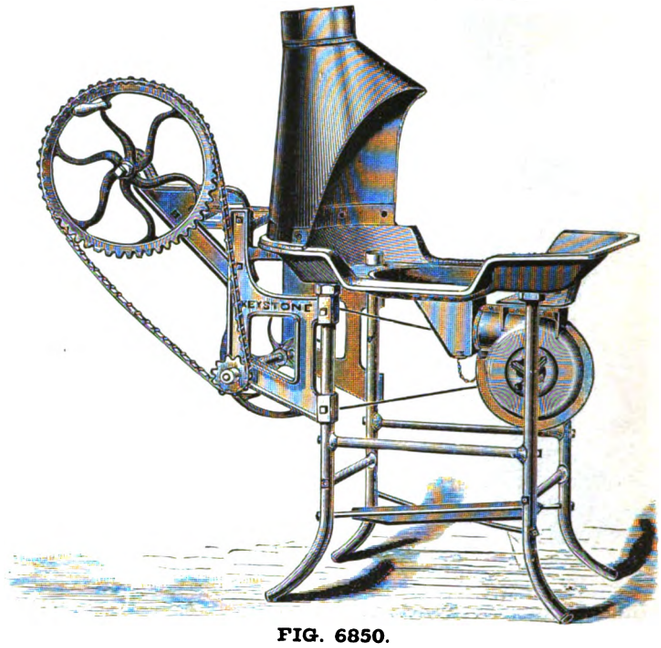


FIG. 6850.

NOS. 1 AND 2 FORGES.

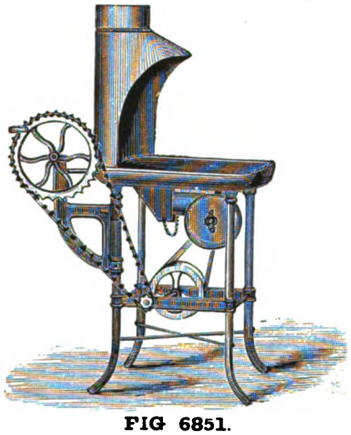


FIG 6851.

NO. 1, NO HOOD.



FIG. 6852.

POWER FORGES.

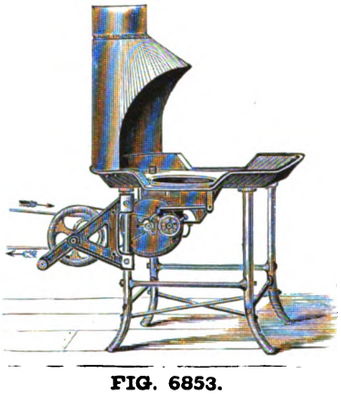


FIG. 6853.

JEWELERS', WITH CLOSE HOODS.

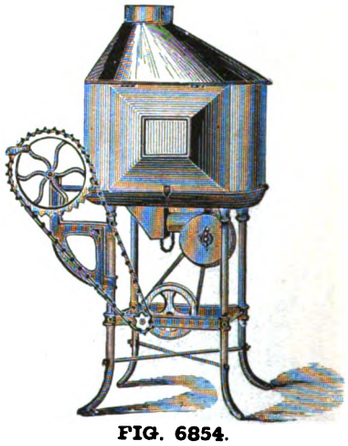


FIG. 6854.

PRICES, FIG. 6849.

Forge No. 4, with hood. Height, 25 in.; fire pan, 30 x 40 in.; weight, 200 lbs.; fan, 16 in.....$60.00

PRICES, FIG. 6850.

Forge No. 3, with hood. Height, 25 in.; fire pan, 24 x 30 in.; weight, 160 lbs.; fan, 12 in.....$50.00

It will produce a quick welding heat on iron three inches in diameter, or on heavier iron if desired. It has our latest improved revolving ball tuyer.

PRICES, FIG. 6850.

Forge No. 2½, with hood. Height, 25 in.; fire pan, 21 x 27 in.; weight, 150 lbs.; fan, 10 in.....$40.00

It will produce a quick welding heat on iron two inches in diameter, and on heavier iron if required.

PRICES, FIG. 6851.

Forge No. 2, with hood. Height, 30 in.; fire pan, 20 x 24 in.; weight, 104 lbs.; fan, 8 in.....$35.00

It will produce a quick welding heat on iron one and a half inches diameter.

PRICES, FIG. 6851.

Forge No. 1, with hood. Height, 30 in.; fire pan, 17 x 20 in.; weight, 88 lbs.; fan, 6 in.....$25.00

PRICES, FIG. 6852.

Forge No. 1, with back. Height, 30 in.; fire pan, 17 x 20 in.; weight, 88 lbs.; fan, 6 in.....$25.00

It will produce a quick welding heat on iron one inch diameter. Heavier work can be done on it.

This forge is used by tank builders, elevated railroads, miners, boiler makers, etc. Being light and strong and compact it is easily carried about.

PRICES, FIG. 6853.

PORTABLE FORGES, NOS. 2 1-2, 3 AND 4 POWER.

Forge No. 2½, power, with hood. Height, 25 in.; size of fire pan, 21 x 27 in.; weight, 140 lbs.; diameter of fan, 9 in.....$45.00

Forge No. 3, power, with hood. Height, 25 in.; size of fire pan, 24 x 30 in.; weight, 150 lbs.; diameter of fan, 10 in.....$55.00

Forge No. 4, power, with hood. Height, 25 in.; size of fire pan, 30 x 40 in.; weight, 200 lbs.; diameter of fan, 12 in.....$65.00

Forge No. 2½ will produce a quick welding heat on iron two inches diameter; forge No. 3 on 3-inch iron, and forge No. 4 on 4-inch iron. They will work heavier iron if required, as there is plenty of spare blast.

They have a cut-off for the blast, by which it can be regulated to any degree.

PRICES, FIG. 6854.

Forge No. 2, with close hood. Size and capacity same as forge No. 2, Fig. 6851.....$40.00

Forge No. 1, with close hood. Size and capacity same as forge No. 1, Fig. 6852.....$30.00

These forges have closed hoods with large double doors, thus preventing the escape of sparks or fumes and smoke when starting the fire. It is especially adapted for cabinet makers, jewelers, locksmiths, plumbers, paper mills, planing mills, and for heating and tempering tools in factories where combustible matter is used.

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BLACKSMITHS' FORCES.

BUFFALO LEVER.

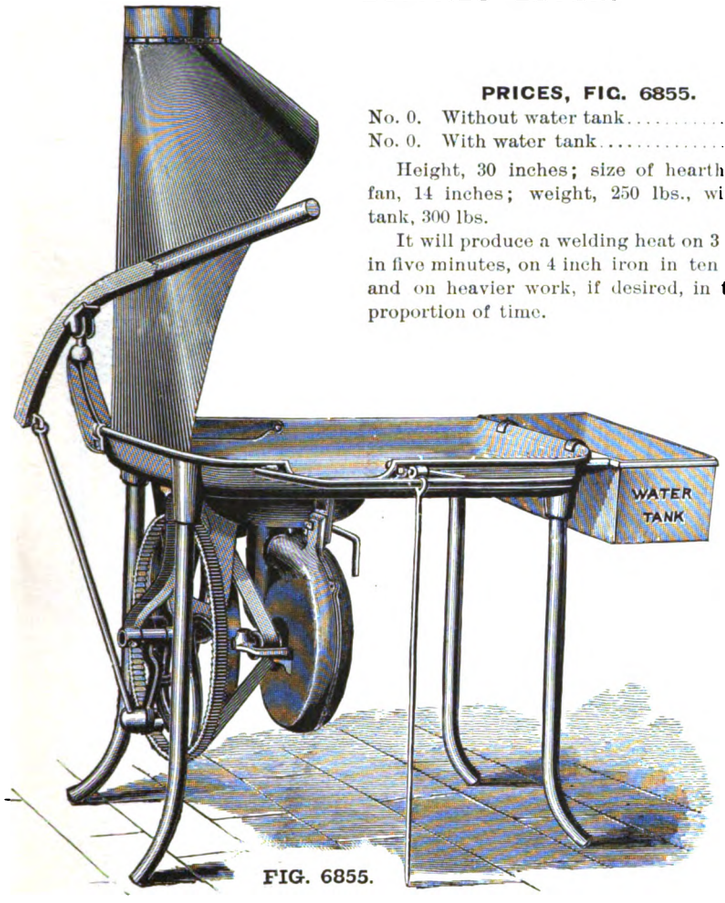


FIG. 6855.

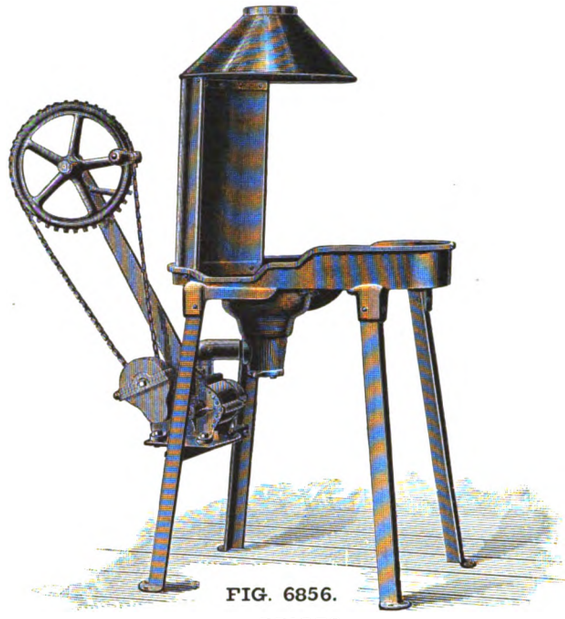
PRICES, FIG. 6855.

No. 0. Without water tank..... $50.00
No. 0. With water tank..... 54.00

Height, 30 inches; size of hearth, 28 x 40; fan, 14 inches; weight, 250 lbs., with water tank, 300 lbs.

It will produce a welding heat on 3 inch iron in five minutes, on 4 inch iron in ten minutes, and on heavier work, if desired, in the same proportion of time.

ROOTS' ACME FORCES.


FIG. 6856.

PRICES.

1. Without hood, 21½ x 13 inches. $45.00
   Blast equal to 30 inch bellows.
2. With hood, 24 x 16 inches..... 52.00
   Blast equal to 40 inch bellows.
3. With hood, 20 x 30 inches 58.00
   Blast equal to 50 inch bellows.
4. With hood, 37½ x 25 inches..... 65.00
   Blast equal to 60 inch bellows.
5. With hood, 46½ x 31 inches.. ..... 80.00
   Blast much stronger than largest size bellows made.

BUFFALO POWER.

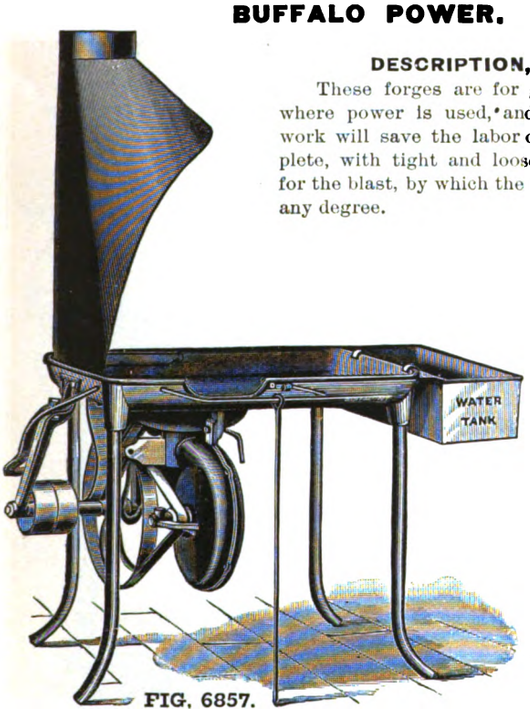


FIG. 6857.

DESCRIPTION, FIG. 6857.

These forges are for general work in shops where power is used, and on a great variety of work will save the labor of a helper. Built complete, with tight and loose pulleys; also, cut-off for the blast, by which the fire can be regulated to any degree.

DESCRIPTION, FIG. 6858.

On this we place a "closed hood," which is strongly made of sheet iron, completely enclosing the fireplace, and having a large sliding door in front and small one in rear, for manipulating the fire, etc. The closed hood prevents the escape of sparks or fumes and smoke, and is especially adapted for planing mills, furniture factories, saw mills, oil refineries, sugar works, varnish works, jewelers, dentists, locksmiths, tinsmiths, etc.; also for annealing and refining metals.

PRICES.

No. 0. Power, with water tank.....$58.00
No. 0. " without water tank..... 54.00
No. 0. " with water tank and hand power attachments, 62.00
No. 0. " " hand power and without water tank.. . 58.00
No. 1. " 45.00
No. 1. " with hand power attachments..... 48.00
No. 0. Fan, 14 inches; size, 28 x 50 inches; weight, 250 lbs.
No. 1. Fan, 10 inches; size, 21 x 27 inches; weight, 150 lbs.

MACHINISTS' PORTABLE.


FIG. 6858.

PRICE.

Closed hood, same dimensions as Fig. 6859.....$42.00

WEIGHT, 150 LBS.

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BUFFALO MACHINISTS'.

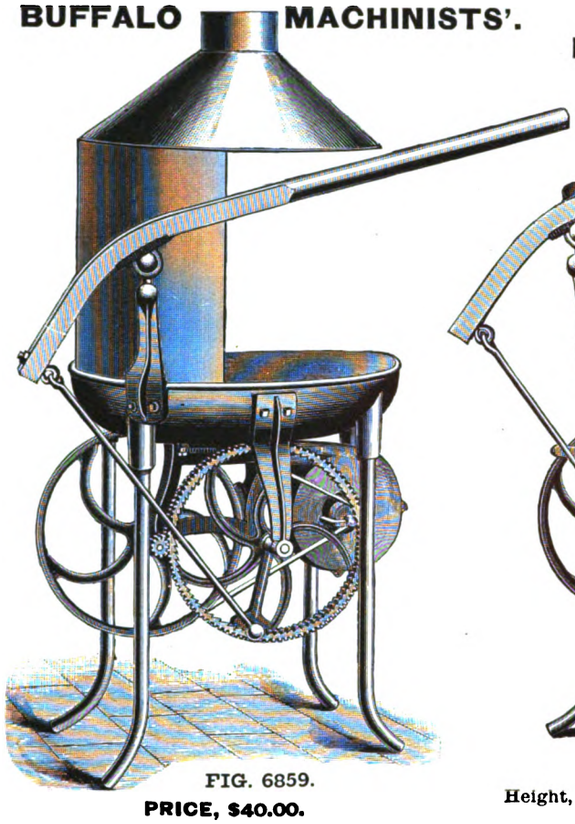


FIG. 6859.

PRICE, $40.00.

Height, 29 in.; fan, 10 in.; hearth, 21 x 27 in.; weight, 140 lbs.

This forge is guaranteed to produce a welding heat on 2½ to 3 inch iron in from five to ten minutes, and on heavier work, if required.

BUFFALO BOILER MAKERS' FORGE.

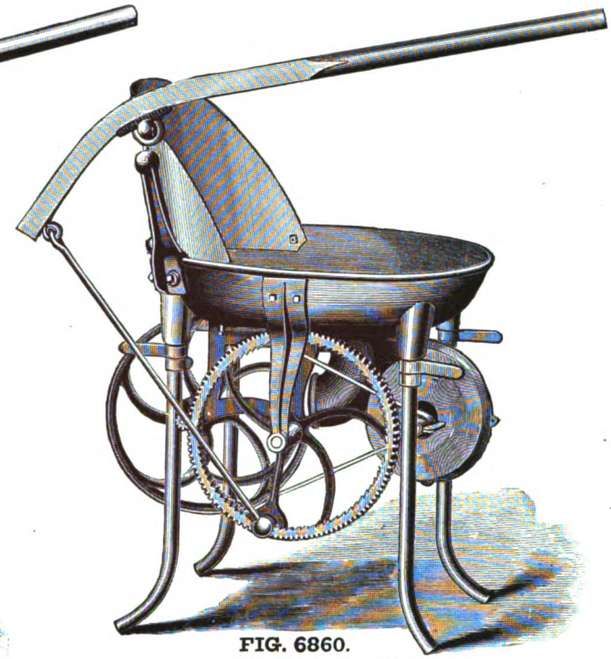


FIG. 6860.

PRICE, $36.00.

Height, 29 in.; fan, 10 in.; hearth, 21 x 27 in.; weight, 140 lbs.

It has four swinging handles, for convenience of moving from place to place, with deep fire-place, and is peculiarly adapted for heating rivets, with capacity guaranteed sufficient for one boy to supply from three to four gangs of riveters.

TOOL MAKERS' FORGE.

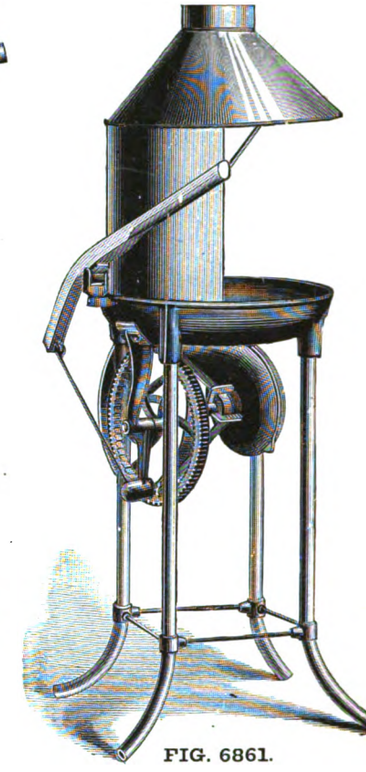


FIG. 6861.

PRICE, NO. 4, $27.00.

Forge No. 4, half open hood; height, 33 in.; size of hearth, 18 in. diam.; weight, 75 lbs.

Forge No. 4 will produce a welding heat on iron, 1½ in. in diameter, in five minutes, and on heavier work, if required.

JEWELERS' FORGE.



FIG. 6862.

PRICE, $30.00.

Closed hood, weight 80 lbs.
Capacity, etc., same as Fig. 6861.

MACHINISTS' FORGES.



FIG. 6863.

PRICES.

No.	7 forge, with back	$33.00
No.	8 " " hood	36.00
No.	9 riveting forge, with ring	37.00
No.	10 forge, with closed hood	39.00

Fire pan	16 x 21 inches.
Height of forge	33 inches.
Weight of forge	100 lbs.
Welding capacity	2½ inch iron.

PORTABLE RIVET FORGE.



FIG. 6864.

PRICE, NO. 5, $24.00.

Forge No. 5, height, 33 in.; size of hearth, 18 in. diam.; weight, 70 lbs.

Forge No. 5, same capacity as No. 4.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BLACKSMITHS' FORGES.

NOS. 1, 2 AND 3.

DIMENSIONS AND WEIGHTS.

No.	1	2	3	4	5
Height of pan.	34½ in.	34½ in.	34½ in.	32½ in.	32½ in.
Size of pan.	Round 21 diam.	Round 21 diam.	Round 21 diam.	22 x 33	26 x 38
Diam. of blower.	10	10	10	10	10
Weight.	117	127	140	157	173

PRICES, FIG. 6865.

No. 1, no hood.....
No. 2, as shown. ....
No. 3, close hood..... } $20.00 each.

PRICES, FIG. 6866.

No. 4, as shown..... .....$15.00
No. 5, " " 18.00

PRICES, FIG. 6867.

No. 1, as shown.....
No. 2, " " .....
No. 3, " " .. ..
No. 4, " " ... . } All $20.00 each.
No. 5, " " $25.00

The blower is made in the same manner as the regular Sturtevant steel pressure blowers, with babbitted journal boxes, steel shaft and galvanized steel blast wheel, guaranteed to give a stronger blast than any other wheel made. The hoods are of sheet steel in place of stove pipe iron, and the fire pan is of double thickness, lined with asbestos to prevent the heat from cracking the main pan.

NOS. 4 AND 5.



FIG. 6865.

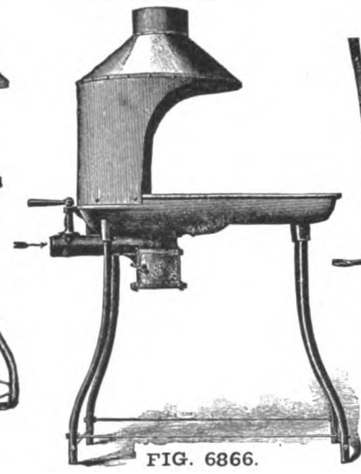


FIG. 6866.

POWER, NOS. 1, 2, 3, 4 AND 5.

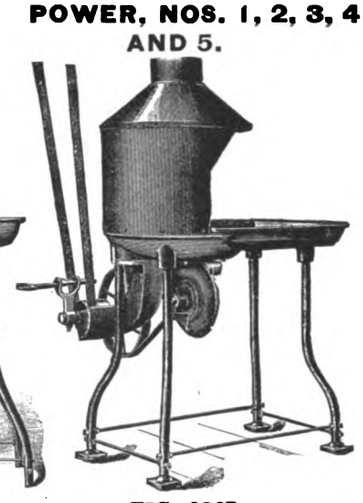


FIG. 6867.

DESCRIPTION, FIG. 6865.

Nos. 1, 2 and 3 are exactly the same as regards pan, legs, blower and running gear, the only difference being in the hoods, which are designed to meet the varied wants of customers. No. 1 has no hood, but simply a back plate or visor, and is useful whenever the escaping smoke is not objectionable. No. 2 is built as shown above. No. 3 has a hood, provided with doors, and entirely surrounding the pan. The smoke may be carried away from the tops of Nos. 2 and 3 by pipes connected with a chimney, or, better still, the smoke from any number may be removed by a single exhausting fan connecting with them.

DESCRIPTION, FIG. 6866.

When any number of forges are in use, convenience and economy are secured by adopting this design, and furnishing the blast for all by a single blower of sufficient size, placed in any convenient position. The blast is regulated by a well-fitted valve attached to each forge.

DESCRIPTION, FIG. 6867.

This form of forge is particularly adapted to shops run by power, where connection may be made by belt directly to the line or countershaft. By the arrangement of tight and loose pulleys, a continuous blast may be had whenever desired, independent of hand power or of other forges, without the expense of a special blower or the loss of power incident to running the forge continuously, whether in use or not. Immediately beneath the pan is a blast gate, by means of which the blast may be adequately regulated.

NO. 4 WATSON PORTABLE FORGE.

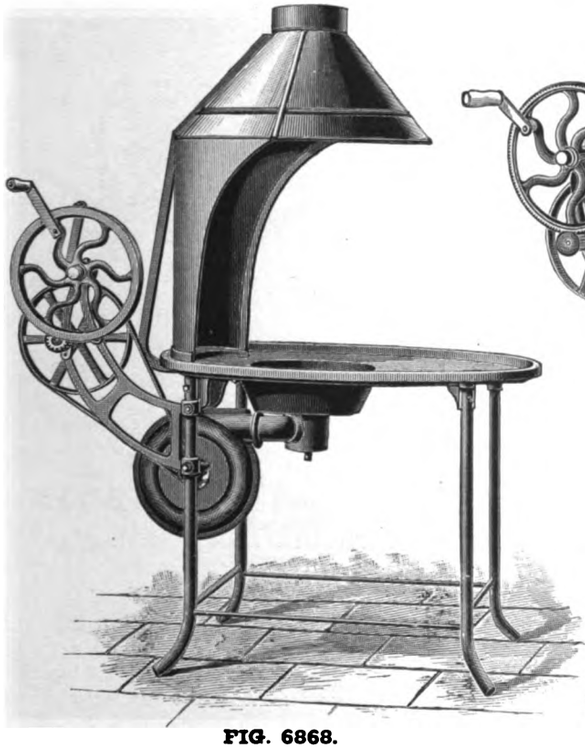


FIG. 6868.

This forge is large enough for any common blacksmithing. The fan is 11½ in.; fire pan is 30 x 40 in.; height, 28 in., and weight, 163 lbs. We make the above size forge with or without hood.

PRICES.

No. 4. With hood.....$45.00
No. 4. Without hood..... 40.00

NOS. 1 AND 2 WATSON PORTABLE FORGES.



FIG. 6869.

These forges are made with steel shafts, which run in brass bushings. The crane containing all the machinery can be swung under the center of forge while being transported.

Size of fan, No. 1 forge, 7½ in. Size of fan, No. 2 forge, 8½ in.

PRICES.

No. 1. With hood.....$25.00
No. 1. Without hood..... 23.00
No. 2. With hood..... 30.00
No. 2. Without hood..... 28.00

TOOL MAKERS' FORGE.



FIG. 6870.

PRICES.

No. 11 forge, with back.....$40.00
No. 12 forge, with hood..... 43.00
No. 13 forge, with closed hood, 46.00
Fire pan.....22 in. diam.
Height of forge. ..... 33 in.
Weight of forge.....125 lbs.
Welding capacity.....3 in. iron.

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BLACKSMITHS' FORGES.

NO HOOD, NO BELTS.

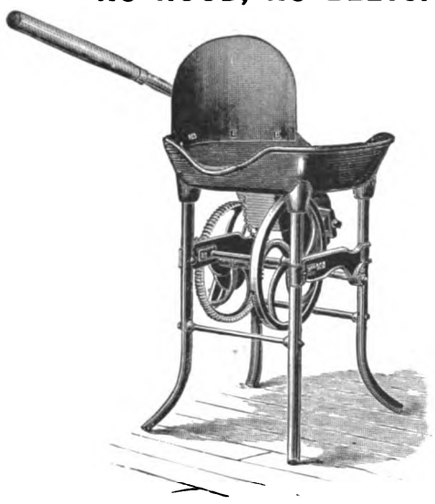


FIG. 6871.

PRICES.

No. 10. Without hood. Pipe legs. Swivel handle. Fire pan, 17 x 19 in. Height, 29 in. Fan, 8 in. Weight, 90 lbs.... $27.00
No. 9. Without hood. Pipe legs. Swivel handle. Fire pan, 21 x 27 in., 5½ in. deep. Fan, 10 in. Height, 29 in. Weight, 150 lbs..... 36.00
With iron fire ring around tuyer....extra, 1.00
Water tank ..... " 4.00

WITH HOOD, NO BELTS.



FIG. 6872.

PRICES.

No. 10. With hood. Pipe legs. Swivel handle. Fire pan, 17 x 19 in. 8 in. fan. 29 in. high. Weight, 110 lbs.....$30.00
No. 9. With hood. Pipe legs. Swivel handle. Fire pan, 21 x 27 in., 5½ deep. 10 in. fan. 29 in. high. Weight, 160 lbs., 40.00
With iron fire ring around tuyer....extra, 1.00
Water tank ..... " 4.00

PORTABLE MINER'S FORGE.

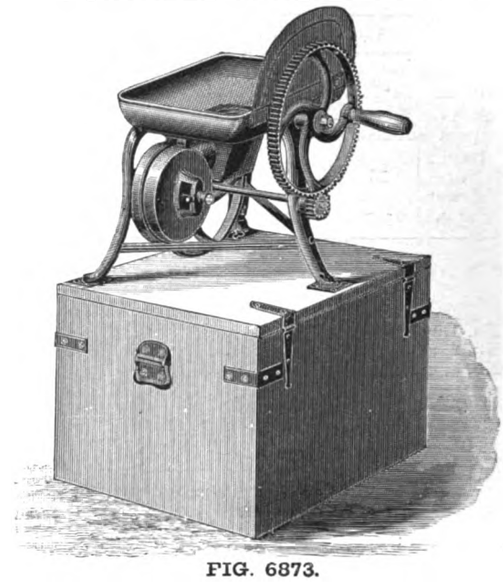


FIG. 6873.

PRICES.

Legs, braces and gears made of the best malleable iron. It is light, compact and strong, and easily transported from place to place. It can be taken out of the case, set up on the lid and ready for use in one minute. It will heat a 2 in. bar, if necessary, to a welding heat.

Miner's forge. Fan, 7 in. Size, 12 x 17 in. Height, 15 in. Weight, 50 lbs..... ...$20.00
Case, 23 in. long, 19 in. wide, 16 in. deep. Weight, 20 lbs..... 4.00

WITH BACK.

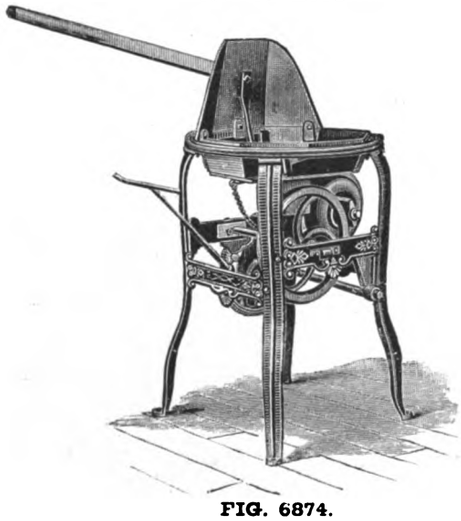


FIG. 6874.

PRICES.

No. 1. Fan, 8 in. Diam., 25 in. Height, 42 in. Weight, 140 lbs.....$35.00
No. 2. Fan, 10 in. Diam., 27 in. Height, 45 in. Weight, 230 lbs..... 45.00

WITH HOOD.

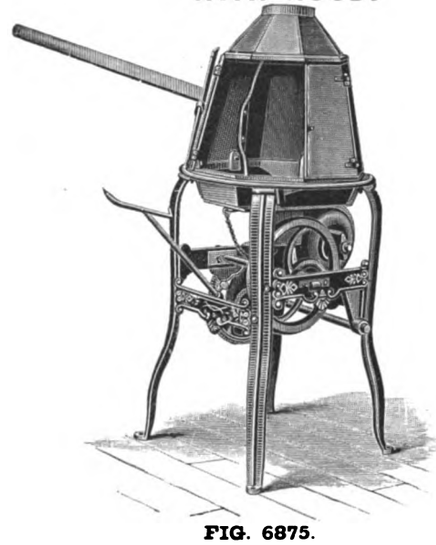


FIG. 6875.

PRICES.

No. 0. Fan, 8 in. Diam., 22 in. Height, 46 in. Weight, 160 lbs.....$35.00
No. 1. Fan, 8 in. Diam., 25 in. Height, 48 in. Weight, 170 lbs 40.00
No. 2. Fan, 10 in. Diam., 27 in. Height, 51 in. Weight, 270 lbs..... 50.00
No. 3. Fan, 10 in. Diam., 31 in. Height, 54 in. Weight, 285 lbs..... 60.00

POWER AND HAND, WITH HOOD.

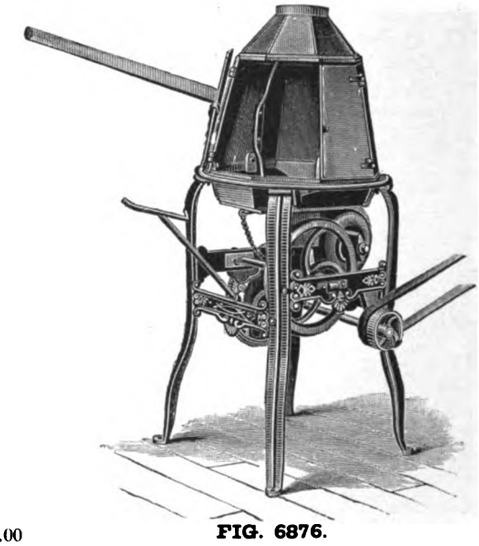


FIG. 6876.

PRICES.

No. 2. Fan, 10 in. Diam., 27 in. Height, 51 in. Weight, 290 lbs.....$55.00
No. 3. Fan, 10 in. Diam., 31 in. Height, 54 in. Weight, 300 lbs..... 65.00

FORGE NO. 8.

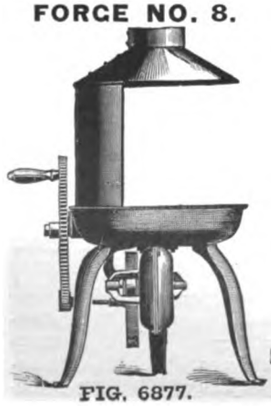


FIG. 6877.

FORGE NO. 9.

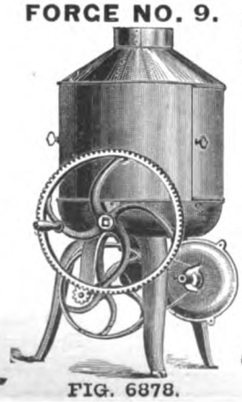


FIG. 6878.

FORGE NO. 7.

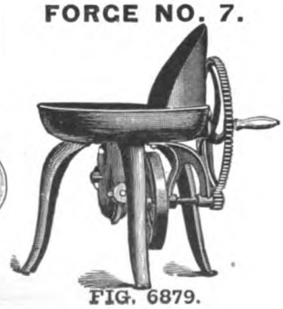


FIG. 6879.

PRICES, FIGS. 6877 TO 6879.

Forge No. 8. Height, 15 in. Hearth, 15 in. diam. Fan, 6 in. Weight, 50 lbs. Price $18.00

Forge No. 9. Size of hearth, 15 in. diam. Fan, 6 in. Weight, 55 lbs. Price..... 20.00

Forge No. 7, with dash. Height, 15 in. Hearth, 15 in. diam. Fan, 6 in. Weight, 40 lbs..... 16.00

The case we furnish with this forge is 19 x 19 x 19 inches; weight, 15 lbs.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BLACKSMITHS' FORCES.

PORTABLE BELLOWS FORCE.



FIG. 6880.

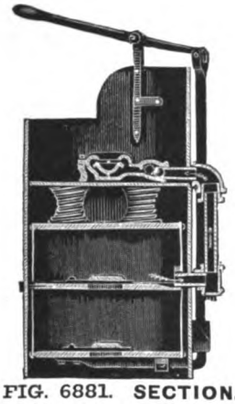


FIG. 6881. SECTION.

Size of hearth.	Height of fireplace.	Weight.	Price.
19 in. diam.	30 in.	100 lbs.	$40.00

MINERS' AND PROSPECTORS' FORCE.

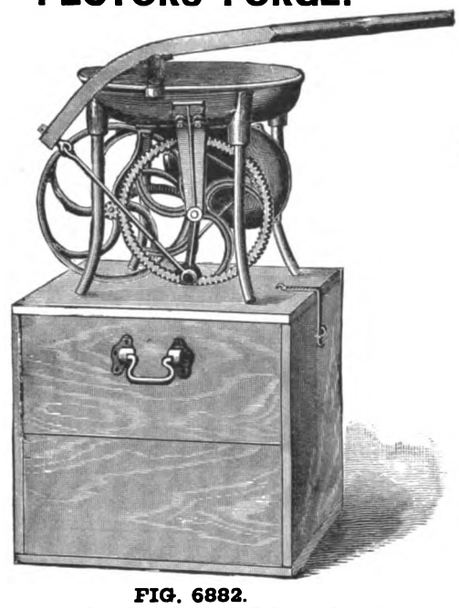


FIG. 6882.
PRICE, WITH CASE, $26.00.

RAILROAD AND BRIDGE BUILDERS' FORCE.



FIG. 6883.
PRICE, $32.00.

KEYSTONE POWER FORCES, NOS. 5 AND 6.

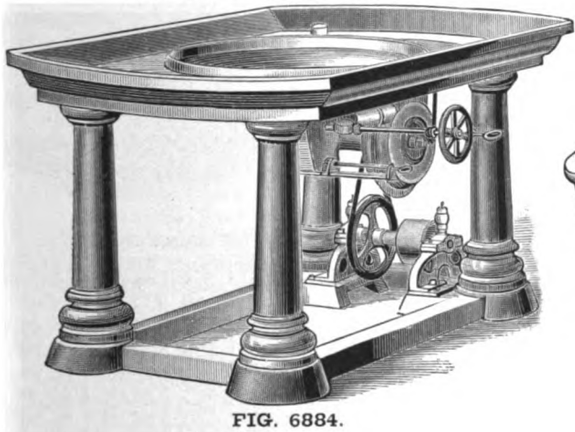


FIG. 6884.

PRICES.

Power forge No. 5. Price, $115.00.
Height, 22 in.; size of fire pan, 36 x 54 in.; weight, 500 lbs.
These forges are for general use in all shops where power is used.
They should be run about 3,000.

Power forge No. 6. Price, $125.00.
Height, 22 in.; size of fire pan, 54 x 54 in.; weight, 600 lbs.
Power forge No. 6 is like No. 5 in all respects, except that the bed is circular.
These forges have been greatly improved in the arrangement of the gearing, strength of blast and general working capacity. Are furnished with revolving ball tuyer.

KEYSTONE STATIONARY BLAST FORCE.

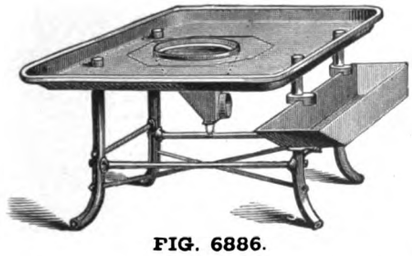


FIG. 6886.

PRICES.

Stationary blast forge, with slack tub, price, $35.00.
Height, 25 in.; size of fire pan, 40 x 40 in.

STATIONARY BLAST FORCE.

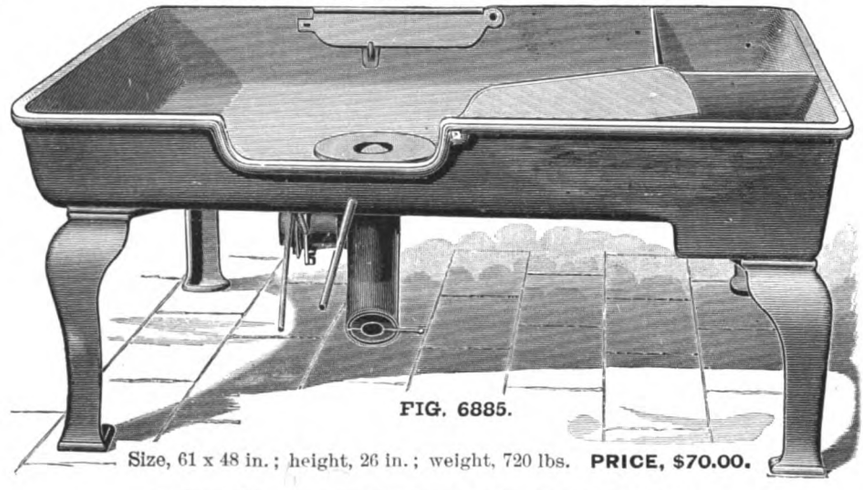


FIG. 6885.

Size, 61 x 48 in.; height, 26 in.; weight, 720 lbs. **PRICE, $70.00.**

STATIONARY BLAST FORCE.

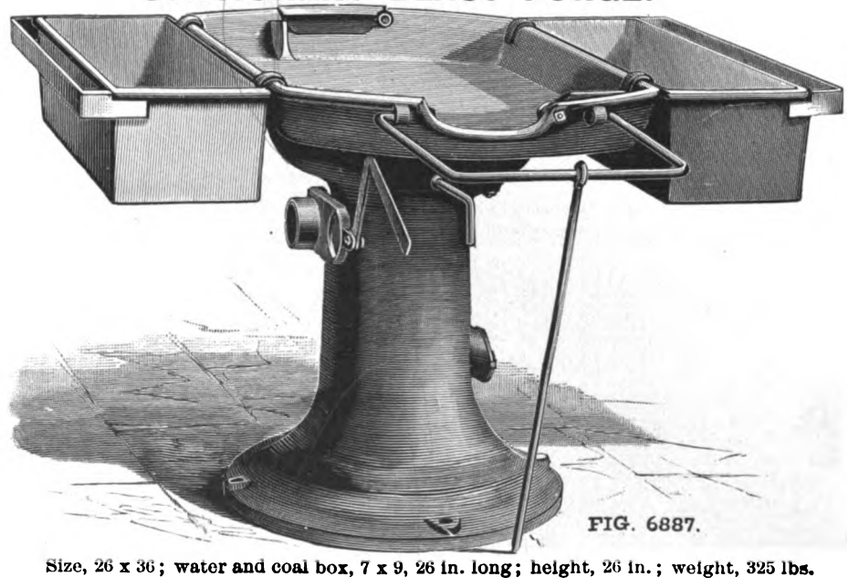


FIG. 6887.

Size, 26 x 36; water and coal box, 7 x 9, 26 in. long; height, 26 in.; weight, 325 lbs.
PRICE, $34.00.

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BLACKSMITHS' FORCES AND BELLOWS.

STATIONARY BLAST FORCES.

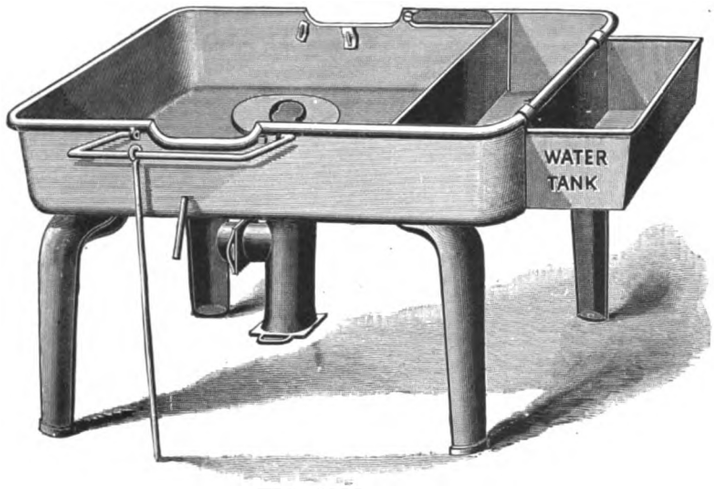


FIG. 6888.

Height, 26 in. ; size, 38 x 51 in. ; price.....$40.00

STATIONARY BLAST FORCES.

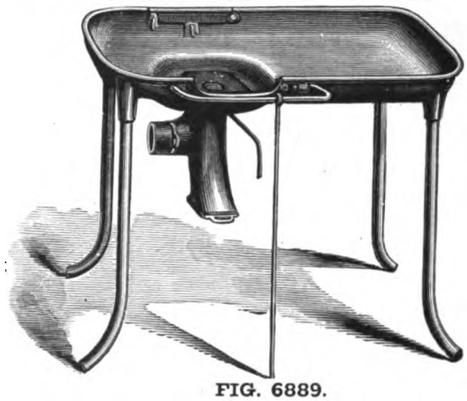


FIG. 6889.

PRICES, FIG. 6889.

No. 0. Height, 26 in.; fire pan, 28 x 40 in.
PRICE, $20.00.

No. 1. Height, 27 in.; fire pan, 21 x 27 in.
PRICE, $15.00.

FARRIER'S.

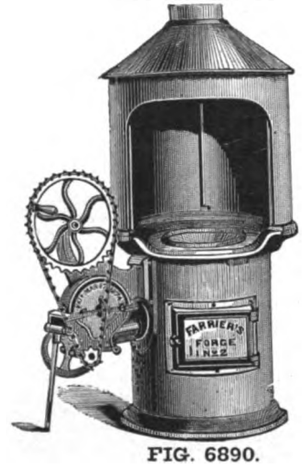


FIG. 6890.

Farrier's forge, with hood; height, 25 in. ; diam. of fire pan, 30 in. ; diam. of fan, 10 in. Price, $65.00.

FARRIER'S.

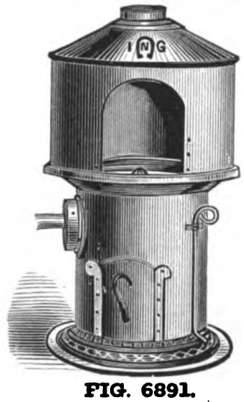


FIG. 6891.

PRICES.

With canopy $30.00
No " 23.00

NOS. 0, 1 AND 2.

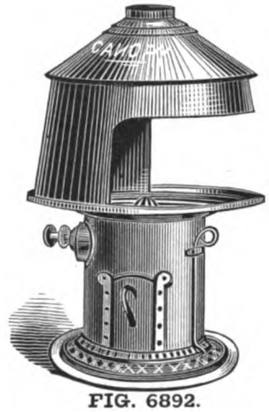


FIG. 6892.

PRICES, ATTACHMENTS TO NO. 1.

Blower.....$8.00
Attached belt wheel. 6.00
Detached..... 6.00
Countershaft..... 6.00

NOS. 4 AND 4 1-2. NOS. 5, 5 1-2 AND 6.

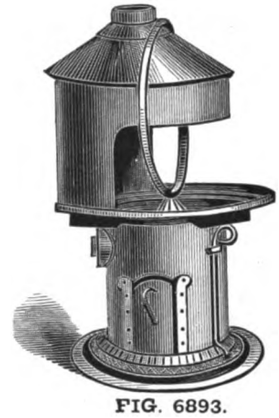


FIG. 6893.



FIG. 6894.

PRICES, 6892 TO 6894.

No.		Weight, lbs.	Without canopy.	With canopy.
0	Small rivet fire.....	80	$12.00	$14.00
1	Boiler-makers' rivet fire.	100	12.00	15.00
2	Tool repairers' fire.....	150	15.00	23.00
4	Carriage-makers' fire...	250	28.00	35.00
4½	For machine shops.....	500	34.00	45.00
5	Capacity for heavy work.	500	45.00	55.00
5½	Forge for railroads.....	650	50.00	60.00
6	Superior capacity.. ...	750	55.00	65.00

STANDARD BLACKSMITHS' BELLOWS.

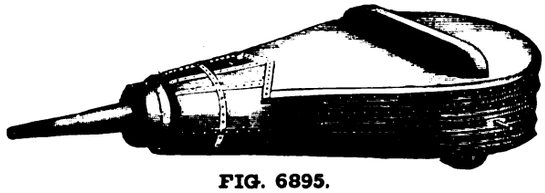


FIG. 6895.

PRICES, FIG. 6895.

BLACKSMITHS'. ORDINARY.		BLACKSMITHS'. EXTRA.		DOUBLE EXTRA OR CUSTOM.	
18 inch to 22 inch .	$10.00	24 inch.....	$12.00	34 inch.....	$22.00
24 "	10.00	26 "	13.00	36 "	24.00
26 "	11.00	28 "	14.00	38 "	28.00
28 "	12.00	30 "	16.00	40 "	32.00
30 "	13.00	32 "	18.00	42 "	38.00
32 "	14.00	34 "	20.00	44 "	44.00
34 "	16.00	36 "	22.00	46 "	50.00
36 "	18.00	38 "	24.00	48 "	60.00
38 "	20.00	40 "	28.00	50 "	70.00
40 "	23.00	42 "	34.00		
42 "	27.00	44 "	38.00		
44 "	32.00	46 "	44.00		
		48 "	50.00		
		50 "	60.00		

MOULDERS' BELLOWS.

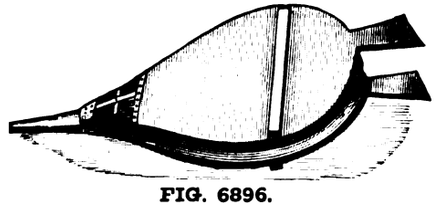


FIG. 6896.

PRICES, FIG. 6896.

9 inch ; per dozen.....$15.00
10 " " 17.00
11 " " 20.00
12 " " 24.00
13 " " 26.00
14 " " 28.00
16 " " 33.00

HAND BELLOWS.



FIG. 6897.

PRICES.

5 inch ; per dozen..... $7.00
6 " " 8.00
7 " " 9.00
8 " " 10.00
9 " " 11.00
10 " " 12.00
12 " " 14.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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TUYER IRONS.

WESTERN.



FIG. 6898.

With revolving center. For cleaning fire or changing size and direction of blast.

PRICE, $2.00.

ADJUSTABLE BALL TUYERS.

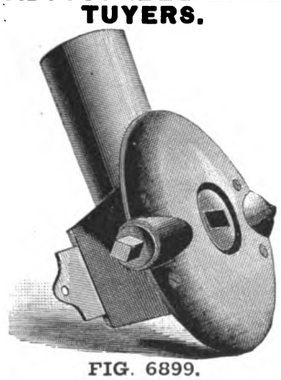


FIG. 6899.

PRICE, $2.50.
For right or left hand hearth.

NOZZLE TUYER.

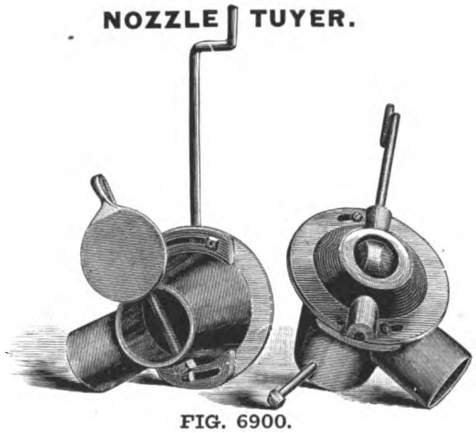


FIG. 6900.

PRICE, $2.50.

BIRD-NEST OR DUCK PATTERN.

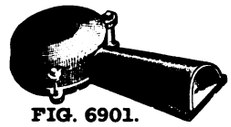


FIG. 6901.

PRICE, 90 CENTS EACH.

BERRY PATTERN.



FIG. 6902.

PRICES.

No. 1.....$6.00
No. 2..... 7.00

DUCK-NEST.

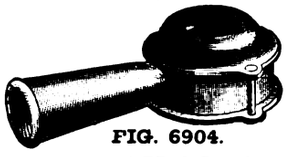


FIG. 6904.

PRICES, PER DOZEN.

No. 1. Single; weight, 11 lbs.....$8.00
No. 2. " " 15 " 10.00
No. 3. " " 18 " 12.00
No. 2. Double; " 17 " 12.00

WATER TUYER.



FIG. 6905.

PRICE, $9.00 EACH.

HOT BLAST TUYER, WITHOUT WATER.

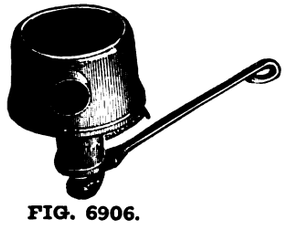


FIG. 6906.

PRICES.

No. 3. Without water.....$5.00
No. 4. " " 7.50
No. 3. With pipes and tank.....10.00
No. 4. " " " 12.00
No. 3. Without tank..... 8.00
No. 4. " " 10.00

PORTER PATTERN.



FIG. 6903.

PRICE, $3.00 EACH.

3-CORNERED BALL.

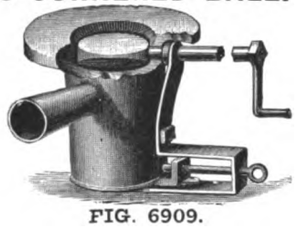


FIG. 6909.

PRICE, $6.00 EACH.

BAYLISS' HOT BLAST AND WATER TUYER AND FORCE.

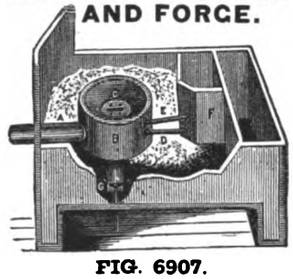


FIG. 6907.

EMPIRE ADJUSTABLE.



FIG. 6908.

PRICE, $3.50.

ACME.

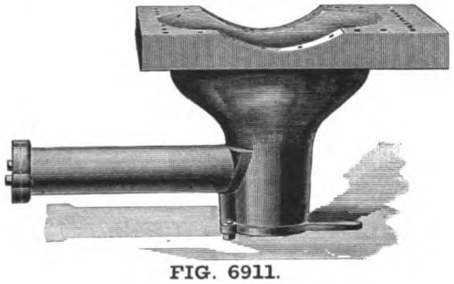


FIG. 6911.

PRICES, FIG. 6911.

No. 3. For ordinary smith shop..... 6.50
No. 4. For machine shop forge..... 9.50

PRICES, FORGES WITH TUYERS.

No. 3. 28 in. square, tuyer without water $25.00
No. 4. 36 in. square, tuyer without water 30.00
No. 5. 36 in. square, with water pipes and tank.... 35.00
No. 6. 36 in. square, with water pipes and tank, for very heavy work 45.00
Horse shoer's forge 30.00

These forges are provided with double hoods, which protect the smith's face from the fire.

BURBRIDGE.

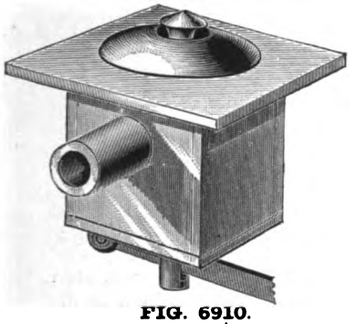


FIG. 6910.

PRICES, FIG. 6910.

No. 1. For light forging.. .....each, $4.00
No. 2. For general work, up to 150 lbs..... ..... " 6.00
No. 3. For general work, up to 300 lbs..... " 12.00
No. 4. For extra heavy work, up to 700 lbs..... " 25.00

WARREN'S.

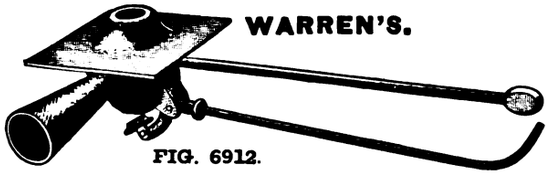


FIG. 6912.

WEIGHT, 31 LBS. PRICE, PER DOZ., $26.00.

ROOT'S FIRE BED AND TUYER.

PRICES, FIG. 6913.

No. 1. For small forges.....$4.50
No. 2. For gunsmiths' forges..... 6.50
No. 3. For ordinary smiths' shops, carriage shops and general smithies. 8.50
No. 4. For machine shops and heavy forges.....12.50

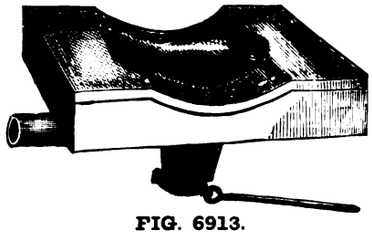


FIG. 6913.

HARRIS TUYERS.

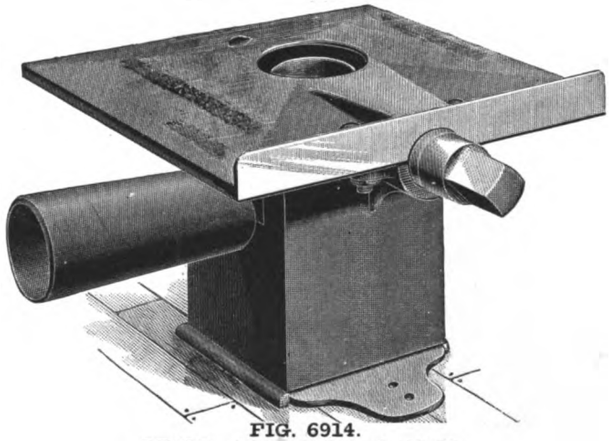


FIG. 6914.

PRICE, right or left, each, $5.00.

DIRECTIONS FOR SETTING TUYER.

The forge should be constructed with inside cross-walls, 17 inches apart in the clear; the space underneath the fire bed and the tuyer should be left entirely open, to allow the free circulation of air.

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EXHAUST DISK WHEELS.

DIRECT ENGINE ATTACHED.

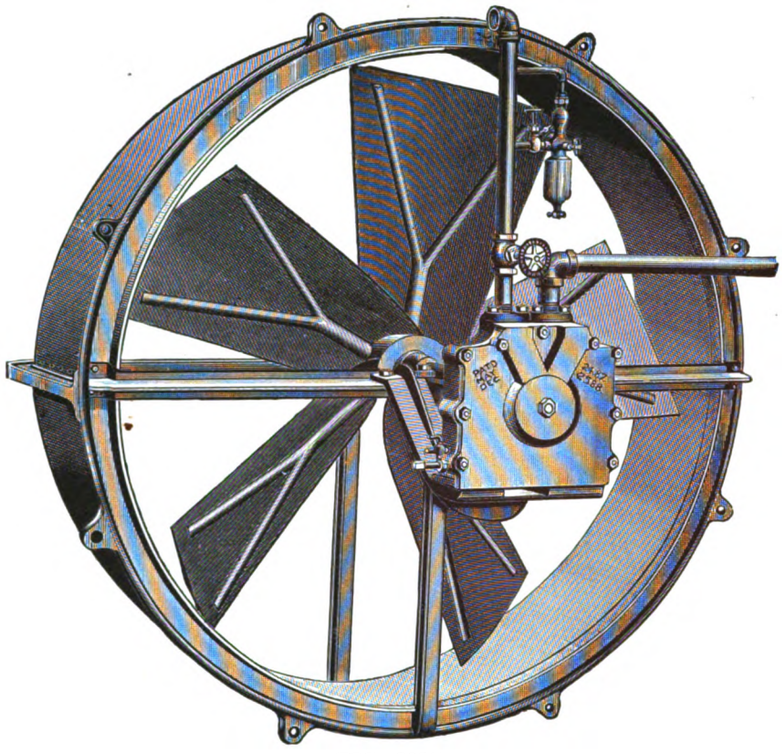


FIG. 6915.

BELT DRIVEN IN A WINDOW.

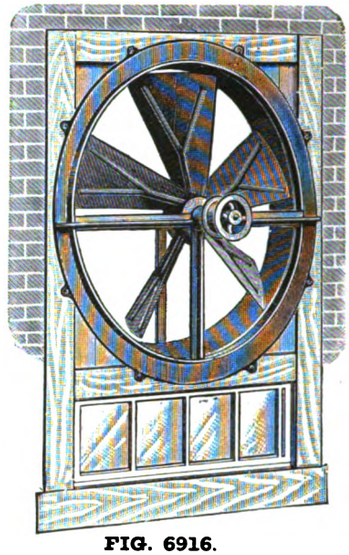


FIG. 6916.

Diam. of wheel, inches.	Prices.	Diam. of pulley.	Face of pulley.
18	$40.00	4	2
24	50.00	4	2
30	65.00	6	2
36	85.00	7	3
42	110.00	8	3½
48	125.00	9	4
54	175.00	9	4
60	250.00	10	5
72	300.00	12	5½
84	350.00	14	6

PRICES, FIG. 6915.

Diam. of wheel, in inches.	Prices, with engine.	Diam. of wheel, in inches.	Prices, with engine.
18	$110.00	48	$230.00
24	120.00	54	355.00
30	160.00	60	415.00
36	175.00	72	500.00
42	210.00	84	540.00

BLACKMAN AIR PROPELLERS.



FIG. 6917.

PRICES, FIG. 6917.

12	inch,	with	frames,	$30.00	each;	area	of	circle,	0.78	square	feet;	pulley,	3 inch x ½ inch.
18	"	"	"	40.00	"	"	"	1.77	"	"	4	"	x 1½ "
24	"	"	"	60.00	"	"	"	3.14	"	"	5	"	x 2 "
30	"	"	"	80.00	"	"	"	4.01	"	"	6	"	x 2½ "
36	"	"	"	100.00	"	"	"	7.06	"	"	7	"	x 3 "
42	"	"	"	125.00	"	"	"	9.62	"	"	8	"	x 3 "
48	"	"	"	150.00	"	"	"	12.56	"	"	9	"	x 4 "
60	"	"	"	275.00	"	"	"	19.63	"	"	12	"	x 6 "
60	"	without	"	225.00	"	"	"	19.63	"	"	12	"	x 6 "
72	"	"	"	300.00	"	"	"	28.27	"	"	15	"	x 6 "
84	"	"	"		"	"	"	38.48	"	"	18	"	x 6 "
96	"	"	"		"	"	"	50.27	"	"	20	"	x 8 "
108	"	"	"		"	"	"	63.62	"	"	22	"	x 8 "
120	"	"	"		"	"	"	78.54	"	"	24	"	x 10 "

Prices for 84 inch, 96 inch, 108 inch and 120 inch wheels will be given when desired.

PERKINS' VENTILATING FANS.



FIG. 6918.

PRICES, SPECIAL BLADES, FIG. 6917.

KALAMEIN IRON BLADES.

12	in.;	pulleys,	3	in.	x ½	in.;	price,	$30.50
18	"	"	4	"	x 1½	"	"	40.70
24	"	"	5	"	x 2	"	"	61.00
30	"	"	6	"	x 2½	"	"	82.00
36	"	"	7	"	x 3	"	"	104.00
42	"	"	8	"	x 3	"	"	130.00
48	"	"	9	"	x 4	"	"	159.00

COPPER BLADES.

12	in.;	pulleys,	3	in.	x ½	in.;	price,	$34.50
18	"	"	4	"	x 1½	"	"	50.00
24	"	"	5	"	x 2	"	"	75.00
30	"	"	6	"	x 2½	"	"	120.00
36	"	"	7	"	x 3	"	"	147.00
42	"	"	8	"	x 3	"	"	193.00
48	"	"	9	"	x 4	"	"	247.00

BRASS BLADES.

12	in.;	pulleys,	3	in.	x ½	in.;	price,	$33.50
18	"	"	4	"	x 1½	"	"	48.00
24	"	"	5	"	x 2	"	"	72.00
30	"	"	6	"	x 2½	"	"	112.00
36	"	"	7	"	x 3	"	"	142.00
42	"	"	8	"	x 3	"	"	179.00
48	"	"	9	"	x 4	"	"	227.00

PHOSPHOR-BRONZE BLADES.

12	in.;	pulleys,	3	in.	x ½	in.;	price,	$37.00
18	"	"	4	"	x 1½	"	"	54.00
24	"	"	5	"	x 2	"	"	82.00
30	"	"	6	"	x 2½	"	"	135.00
36	"	"	7	"	x 3	"	"	176.00
42	"	"	8	"	x 3	"	"	220.00
48	"	"	9	"	x 4	"	"	286.00

PRICES, FIG. 6918.

12	in.	diam.;	9	in.	wide;	pulley,	3 x 2	in.,	$25.00	42	in.	diam.;	14	in.	wide;	pulley,	8 x 4	in.,	$85.00
18	"	"	10	"	"	"	4 x 2	"	35.00	48	"	"	16	"	"	"	8 x 4	"	110.00
24	"	"	11	"	"	"	5 x 3	"	45.00	54	"	"	18	"	"	"	9 x 4	"	135.00
30	"	"	12	"	"	"	6 x 3	"	55.00	60	"	"	19	"	"	"	10 x 6	"	175.00
36	"	"	13	"	"	"	6 x 3	"	70.00										

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PORTABLE FURNACE AND CALDRON.

WITH RAISED CURB FOR COAL OR WOOD.



FIG. 6919.

FOR HARD OR SOFT COAL.

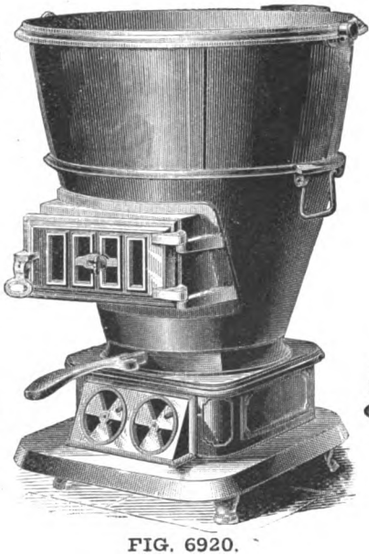


FIG. 6920.

FOR COAL OR WOOD.



FIG. 6921.

PRICES, FIG. 6919.

Sizes, in gallons.	Furnace and caldron, for wood.	Furnace and caldron, for coal.	Caldrons only.
140 gallons.	$83.00	$95.00	$40.00
170 "	90.00	102.00	47.00
200 "	103.00	115.00	60.00

Note.—The 140 gallon caldron has a 4 inch curb, the 170 gallon an 8 inch curb, and the 200 gallon a 12 inch curb. Prices of copper caldrons on application.

PRICES, FIG. 6920.

22 gallons	$22.00	45 gallons	$35.00
30 "	27.00	60 "	46.00

The fire box is round and lined with fire brick. The fire door is large enough to feed with an ordinary shovel.

PRICES, FIG. 6921.

Sizes, in gallons.	Furnace and caldron, for wood.	Furnace and caldron, for coal.	Caldrons only.	Cover extra.
10 gallons.	$10.00	$12.00	$3.00	$1.50
15 "	12.00	14.25	3.50	2.00
22 "	15.00	17.75	5.00	2.50
30 "	20.00	23.50	6.00	2.75
45 "	26.00	30.50	9.00	3.50
60 "	32.00	38.00	12.00	4.50
90 "	50.00	58.00	18.00	6.00
120 "	70.00	82.00	27.00	8.00

We can furnish copper caldrons for use in above furnaces instead of the iron caldrons; also copper caldrons for use inside the iron caldrons, i. e., when double caldrons are wanted. Prices on application.

PRICES, FIG. 6922.

Actual capacity.	Extreme height.	Prices, including legs.
37 gallons, same as 28 gallons, with 5½ inch curb.	36 inches.	$55.00
60 " " 47 " " 6 " "	38 "	77.00
100 " " 76 " " 7 " "	40½ "	115.00
150 " " 130 " " 5 " "	39½ "	170.00
208 " " 180 " " 5 " "	42¾ "	235.00
230 " " 180 " " 10 " "	47¾ "	245.00
250 " " 180 " " 15 " "	52¾ "	255.00
268 " " 180 " " 20 " "	57¾ "	270.00
286 " " 180 " " 25 " "	62¾ "	280.00
300 " " 180 " " 30 " "	67¾ "	290.00

Inside caldrons made of copper to order.

PRICES, FIG. 6923.

Capacity.	Diam., including rim.	Depth inside.	Prices.	Capacity.	Diam., including rim.	Depth inside.	Prices.
5 gal.	17 in.	9½ in.	$1.75	69 gal.	39½ in.	21½ in.	$12.00
7 "	18 "	10 "	2.00	83 "	42½ "	22½ "	15.00
9 "	20½ "	11 "	2.50	105 "	45½ "	23¼ "	22.00
11 "	22½ "	12¼ "	3.00	135 "	49 "	24 "	28.00
15 "	25½ "	14½ "	4.00	158 "	51½ "	26 "	32.00
21 "	27½ "	16 "	5.00	190 "	55½ "	27½ "	45.00
27 "	29½ "	17 "	6.00	222 "	58 "	29¼ "	55.00
32 "	31 "	17 "	7.00	250 "	61 "	31 "	65.00
43 "	34 "	18¾ "	9.00	300 "	59 "	40 "	110.00
54 "	36½ "	20 "	10.00	500 "	74 "	47½ "	275.00

Any slight alteration in pattern, such as casting on bosses and tapping same, will be done to order; can also be furnished with movable legs.

DOUBLE JACKET STEAM KETTLES,

WITH MOVABLE LEGS AND CURB.

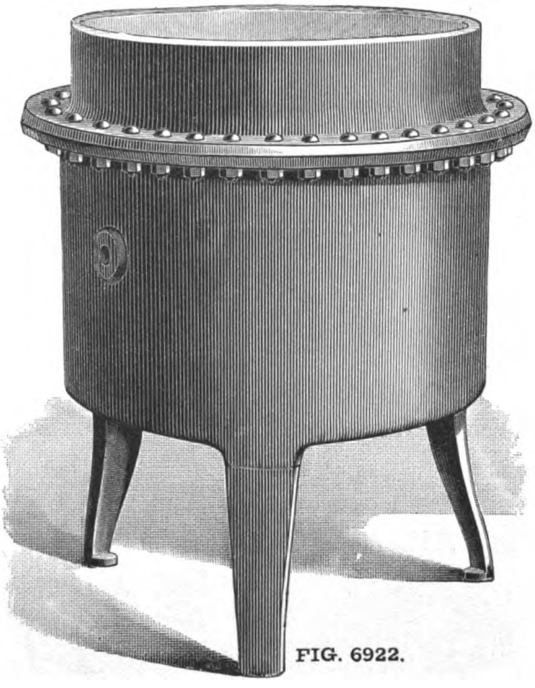


FIG. 6922.

CALDRONS TO SET IN BRICK WORK.



FIG. 6923.

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ANVILS.

EAGLE ANVILS AND MINIMS.

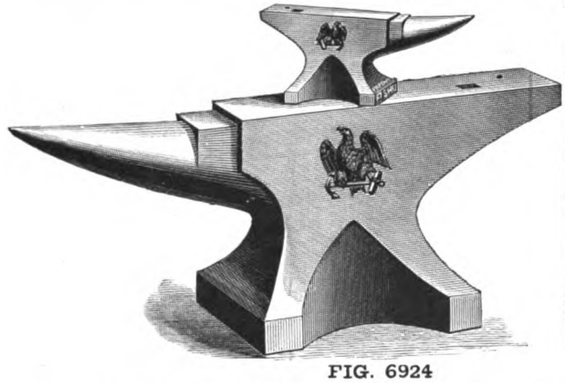


FIG. 6924

PRICES, 100 TO 800 LBS., PER LB., 9 CTS.

PRICES, FIG. 6924.

SMALL ANVILS.

No.	Weighing about.	Prices.
000	½ lb.	$1.00
00	4 "	1.75
0	10 "	2.25
1	15 "	2.75
2	20 "	3.00
3	30 "	3.75
4	40 "	4.25
5	50 "	5.00
6	60 "	5.50
7	70 "	6.00
8	80 "	7.00
9	90 "	8.00

TRENTON WROUGHT IRON, STEEL FACED.

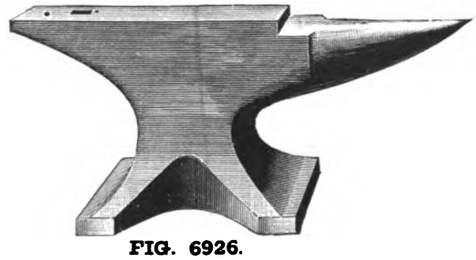


FIG. 6926.

Peter Wright's pattern.

	cts. per lb.	
85 lbs. and over		
70 to 84 lbs.	1 " "	advance.
60 to 70 "	1½ " "	"
50 to 60 "	2 " "	"
40 to 50 "	3 " "	"
30 to 40 "	5 " "	"

PETER WRIGHT'S.

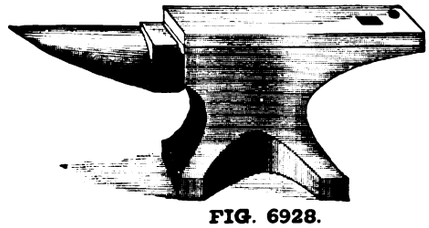


FIG. 6928.

Weights from 84 to 500 lbs.		cts. per lb.	
" " 70 to 84	" advance	1 "	"
" " 60 to 70	" "	1½ "	"
" " 50 to 60	" "	2 "	"
" " under 50	" "	3 "	"

HILL'S SOLID STEEL ANVILS.

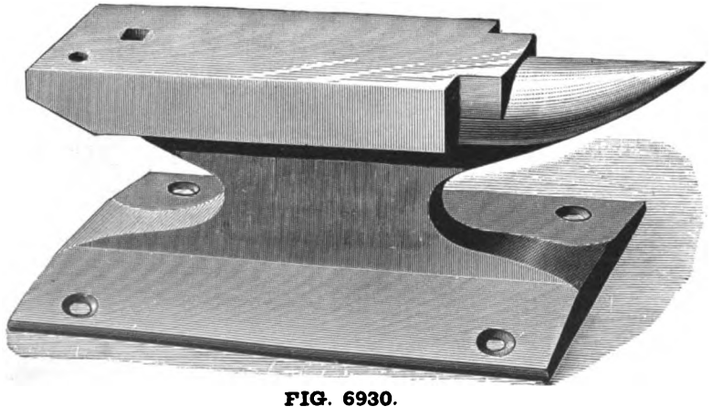


FIG. 6930.

No.	Long.	Wide.	Weight.	Prices.
1	5 inches.	1½ inches.	5 lbs.	$2.00
2	6 "	2 "	7 "	2.50
3	7 "	2 "	9 "	3.00

EAGLE HORSE SHOER.

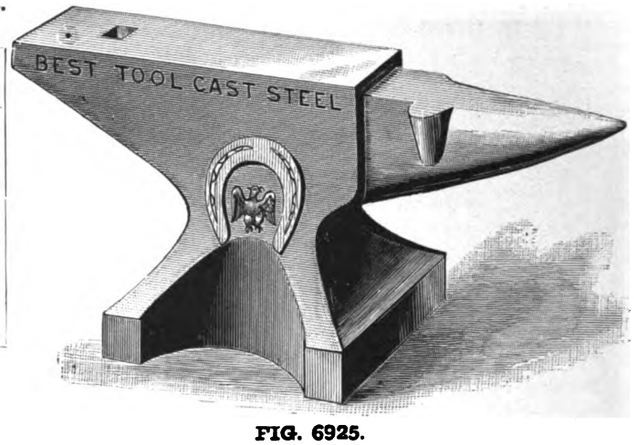


FIG. 6925.

150 LBS., PRICE, 9 CTS. PER LB.

Face, 15 inches long and 4 inches wide. Solid steel horn, 10 inches long, with side clip 1¼ inches long. Cutter hole, ⅞ of inch square.

TRENTON HORSE SHOER ANVIL.



FIG. 6927.

PRICE, PER LB.

The Trenton horse shoers' anvils are made in weights from 120 to 200 lbs., with face 3½ to 4 inches wide.

We also carry in stock horse shoers' anvils without th e clip horn.

AMERICAN HORSE SHOER.

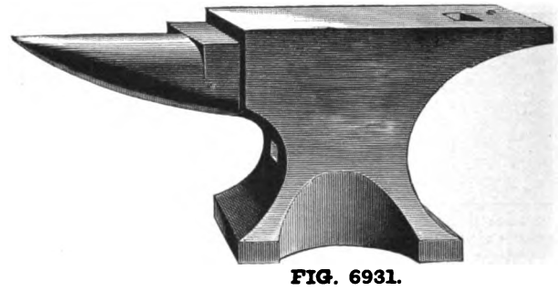


FIG. 6931.

PRICE, CTS.-PER LB.

All "Horse Shoers'" anvils are warranted to be sound, to be free from flaws, and to have faces hard and true.

ARMITAGE MOUSE HOLE.

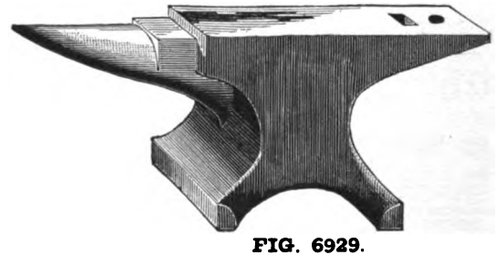


FIG. 6929.

Weights from 84 to 500 lbs.		cts. per lb.
" " 65 to 84	" advance	1 " "
" " 50 to 65	" "	1½ " "

DESCRIPTION, FIG. 6930.

These anvils are not cast into this shape, but are forged from solid steel, and have a suitable anvil temper throughout.

The horn is 2 inches long in addition to the length of face given above. The face, sides and horn are nicely polished. The bottom part is japanned.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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MACHINISTS' HAMMERS, SOLID CAST STEEL.

OCTACON PATTERN.

OIL FINISHED, POLISHED SIDES, FACE AND PENE.

BALL PENE.



FIG. 6932.

ROUND PATTERN.

FULL POLISHED.

BALL PENE.

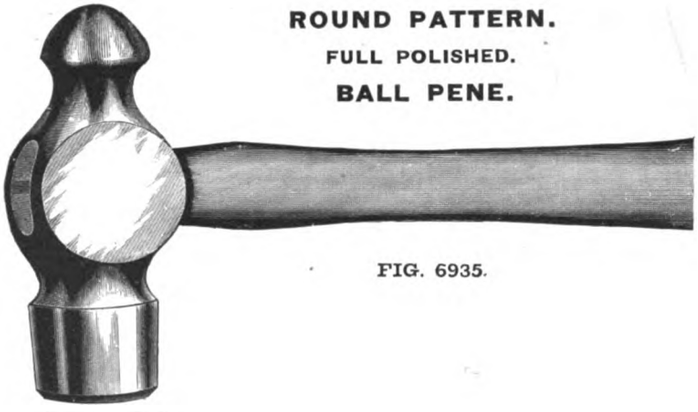


FIG. 6935.

STRAIGHT PENE.

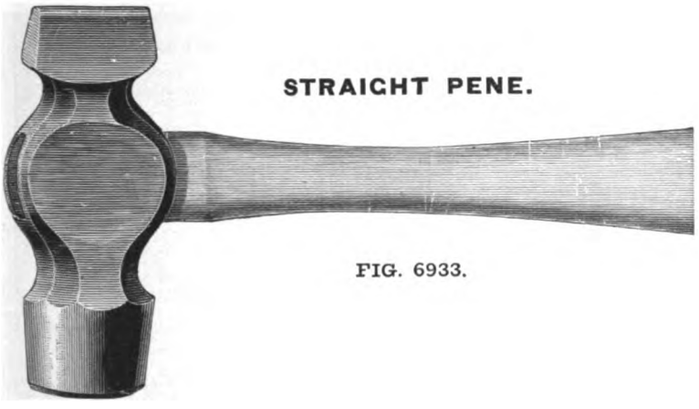


FIG. 6933.

STRAIGHT PENE.

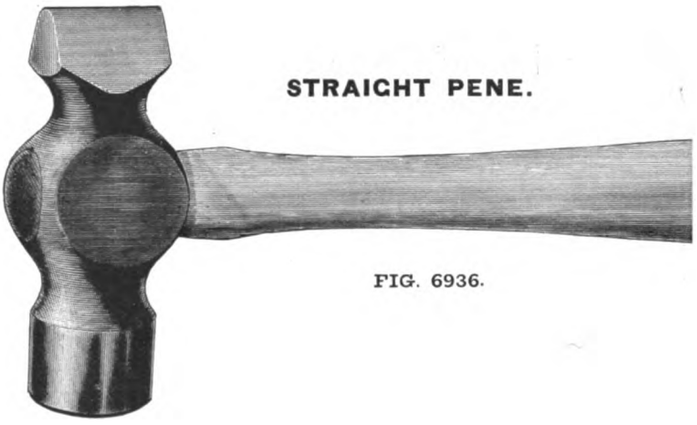


FIG. 6936.

CROSS PENE.

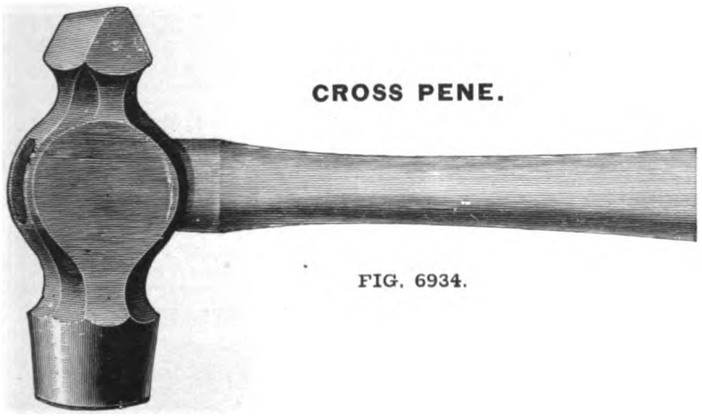


FIG. 6934.

CROSS PENE.

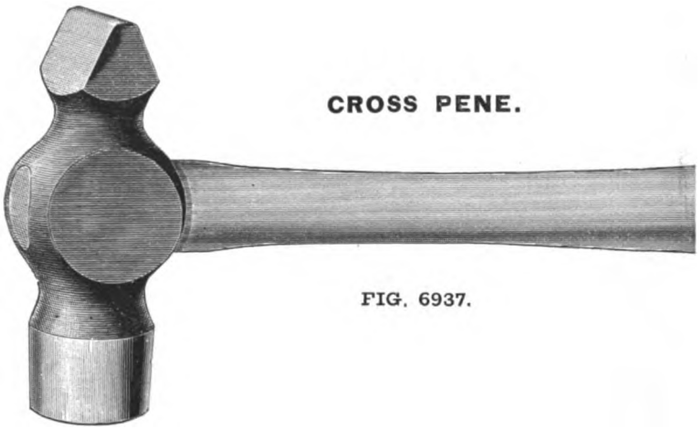


FIG. 6937.

Ball pene. Fig. 6932. No.	Straight pene. Fig. 6933. No.	Cross pene. Fig. 6934. No.	Size.	Weight.	Prices. Per dozen.
370	390	410	0000	6 oz.	$12.00
371	391	411	000	8 oz.	12.00
372	392	412	00	12 oz.	12.00
373	393	413	0	1 lb.	12.50
374	394	414	1	1 lb. 4 oz.	13.50
375	395	415	2	1 lb. 8 oz.	14.50
376	396	416	3	1 lb. 12 oz.	15.50
377	397	417	4	2 lb.	16.50
378	398	418	5	2 lb. 4 oz.	17.50
379	399	419	6	2 lb. 8 oz.	19.00
380	400	420	7	2 lb. 12 oz.	20.50
381	401	421	8	3 lb.	22.00
382	402	422	9	3 lb. 8 oz.	24.00

Packed one-third dozen in a paper box.
Weights do not include handle.

	No.	Size.	Weight.	Prices. Per doz.
BALL PENE. FIG. 6935.	330	00	8 oz.	$15.00
	331	0	12 oz.	15.00
	332	1	1 lb. 8 oz.	17 50
	333	2	2 lb.	19.50
	334	3	2 lb. 4 oz.	20.50
	335	4	2 lb. 8 oz.	22.00
	336	5	3 lb.	25.00
	337	6	3 lb. 8 oz.	27.00
STRAIGHT PENE. FIG. 6936.	340	00	8 oz.	15.00
	341	0	12 oz.	15.00
	342	1	1 lb. 8 oz.	17.50
	343	2	2 lb.	19.50
	344	3	2 lb. 4 oz.	20.50
	345	4	2 lb. 8 oz.	22.00
	346	5	3 lb.	25.00
	347	6	3 lb. 8 oz.	27.00
CROSS PENE. FIG. 6937.	350	00	8 oz.	15.00
	351	0	12 oz.	15.00
	352	1	1 lb. 8 oz.	17.50
	353	2	2 lb.	19.50
	354	3	2 lb. 4 oz.	20.50
	355	4	2 lb. 8 oz.	22.00
	356	5	3 lb.	25.00
	357	6	3 lb. 8 oz.	27.00

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SOLID CAST STEEL HAMMERS.

ENGINEER'S FACE AND PENE.

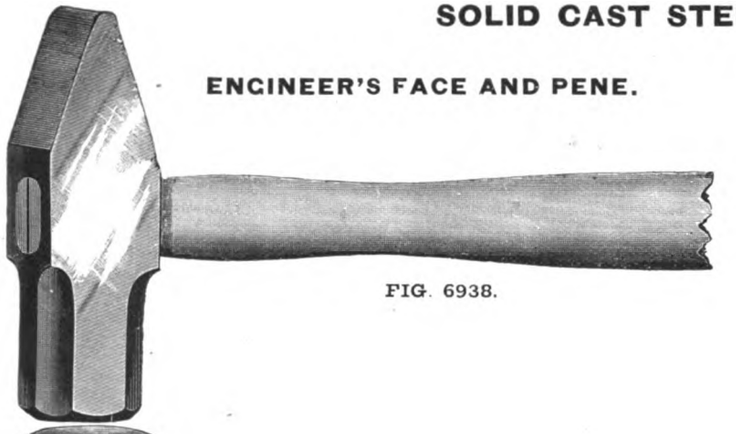


FIG. 6938.

PRICES, FIG. 6938.

Material.	No.	Size.	Weight.	Per doz.
Solid cast steel.	260	0	1 lb. 2 oz.	$12.00
"	261	1	1 lb. 10 oz.	13.00
"	262	2	2 lb.	14.00
"	263	3	2 lb. 8 oz.	15.00
"	264	4	3 lb.	16.00
"	265	5	3 lb. 8 oz.	17.00
"	266	6	4 lb. 8 oz.	19.00

ENGINEER'S DOUBLE FACE.

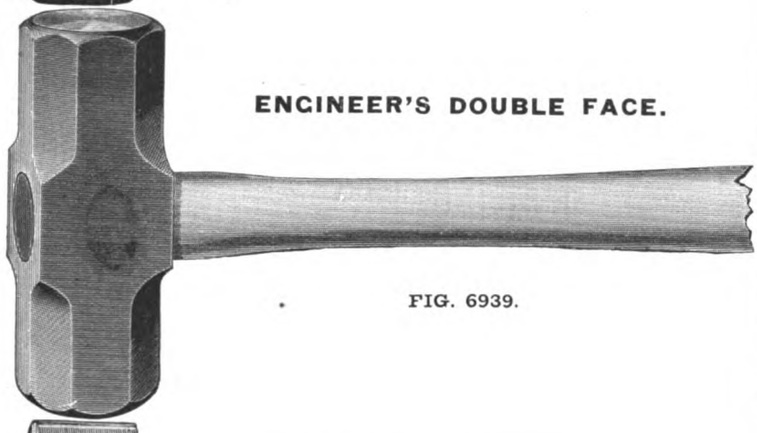


FIG. 6939.

PRICES, FIG. 6939.

Material.	No.	Size.	Weight.	Per doz.
Solid cast steel.	270	0	1 lb. 8 oz.	$14.50
"	271	1	2 lb.	15.50
"	272	2	2 lb. 6 oz.	16.50
"	273	3	3 lb.	18.00
"	274	4	3 lb. 10 oz.	19.50

CHIPPING HAMMERS.

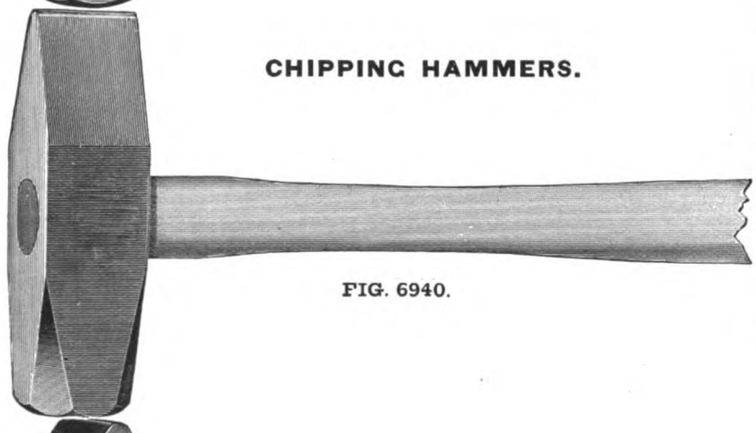


FIG. 6940.

PRICES, FIG. 6940.

Material.	No.	Size.	Weight.	Per doz.
Solid cast steel.	300	0	1 lb.	$12.50
"	301	1	1 lb. 4 oz.	13.00
"	302	2	1 lb. 8 oz.	13.50
"	303	3	2 lb.	14.50
"	304	4	2 lb. 8 oz.	15.50
"	305	5	2 lb. 14 oz.	16.50

PRICES, FIG. 6941.

Material.	No.	Size.	Weight.	Per doz.
Solid cast steel.	280	0	1 lb. 10 oz.	$13.00
"	281	1	2 lb.	14.00
"	282	2	2 lb. 10 oz.	15.00
"	283	3	3 lb.	16.00
"	284	4	3 lb. 8 oz.	17.00
"	285	5	4 lb. 8 oz.	19.00

Above packed one-third dozen in a paper box.
Weights do not include handles.

BLACKSMITH'S HAND.

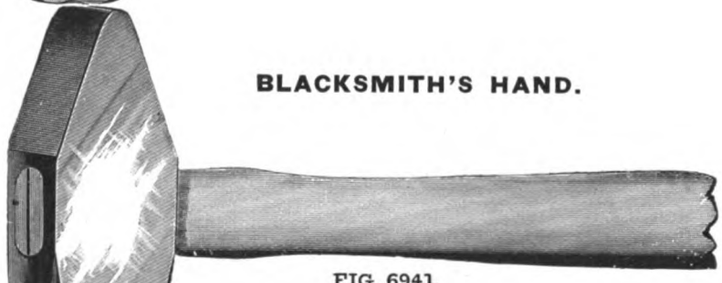


FIG. 6941.

PRICES, FIG. 6942.

Style.	No.	Weight.	Per lb.
Oil finished, polished face..	1,100	Under 3 lb.	$0.45
" " "	1,100	3 to 5 lb.	.36

BLACKSMITH'S HAND, NO HANDLES.

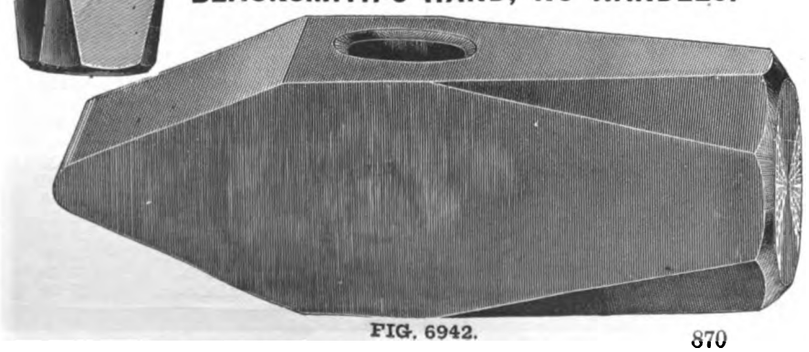


FIG. 6942.

PLANISHING HAMMERS.

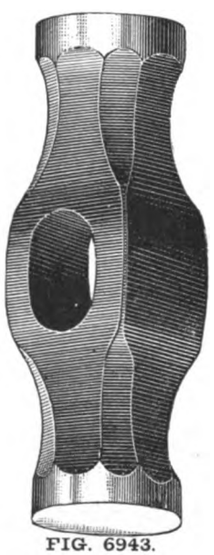


FIG. 6943.

PRICES.

½ to 1 lb. . each, $0.60
Over 1 lb. per lb., .60

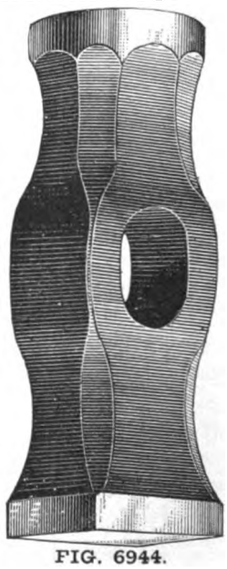


FIG. 6944.

PRICES.

Square and round head,
½ to 1 lb. . . . . each, $0.60
Square and round head,
over 1 lb. . . . . per lb., .60

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SOLID CAST STEEL BLACKSMITHS' SLEDGES.

DOUBLE FACE.

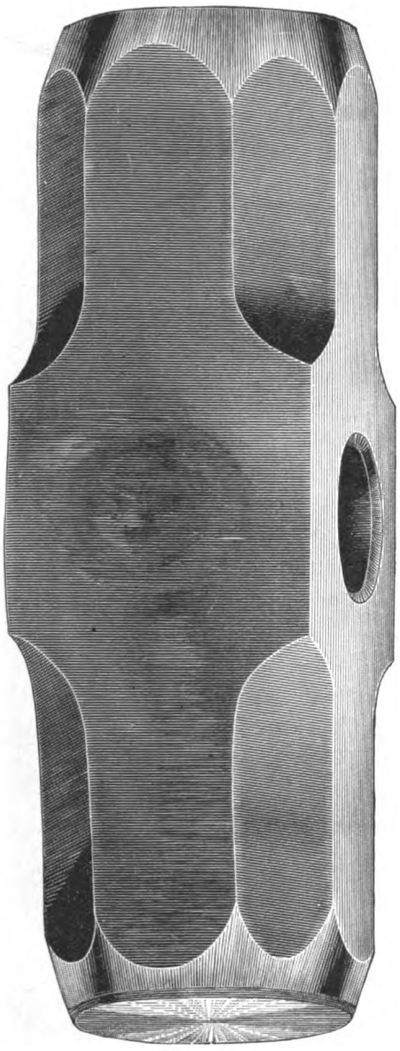


FIG. 6945.

STRAIGHT PENE.

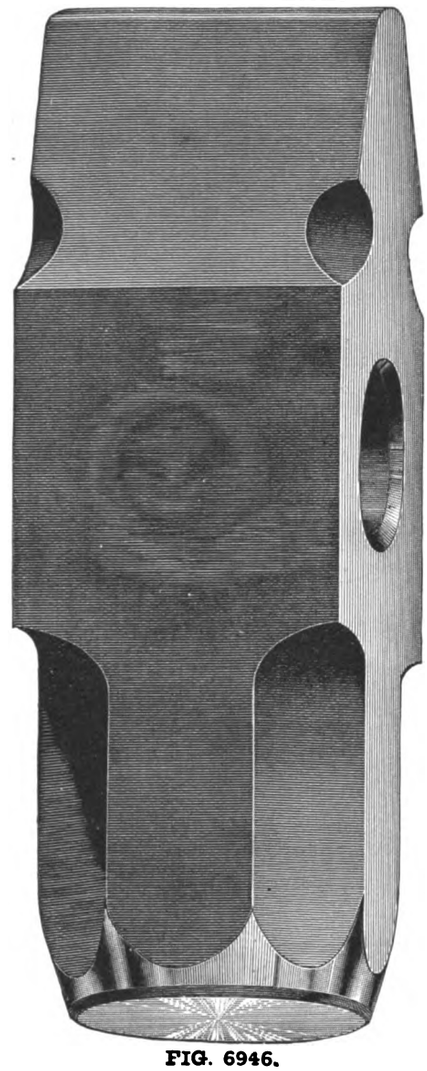


FIG. 6946.

CROSS PENE.

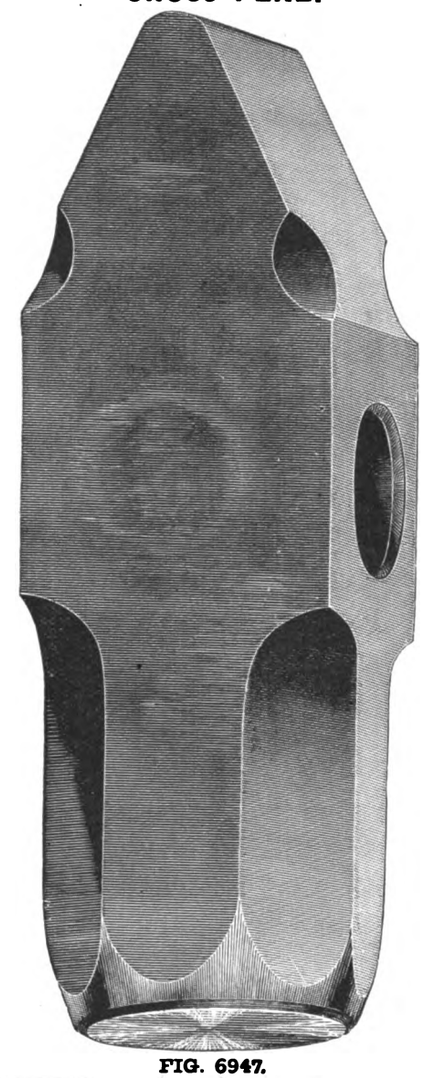


FIG. 6947.

PRICES.

Oil finish, polished faces and penes, either style, Figs. 6945 to 6948.

Weight.	Per lb.
Under 3 lb.	$0.45
3 to 5 lb.	.36
5 lb. and above	.30

NEW ENGLAND PATTERN.

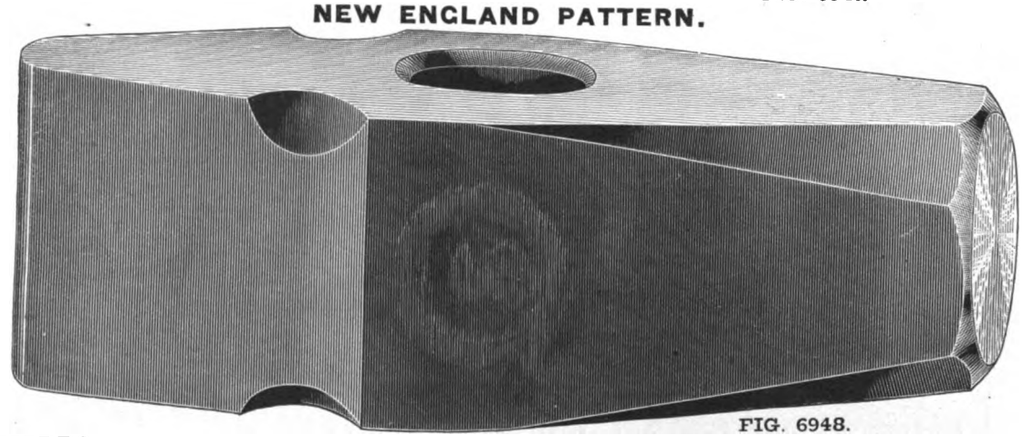


FIG. 6948.

BOILER MAKERS' HAMMERS.

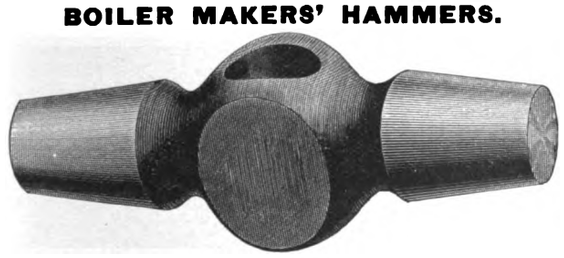


FIG. 6950.

PRICE.

Style.	No.	Weight.	Per lb.
Oil finished, polished faces.	1110	2 to 3 lbs.	$0.50

OIL FINISH NAPPING HAMMERS.

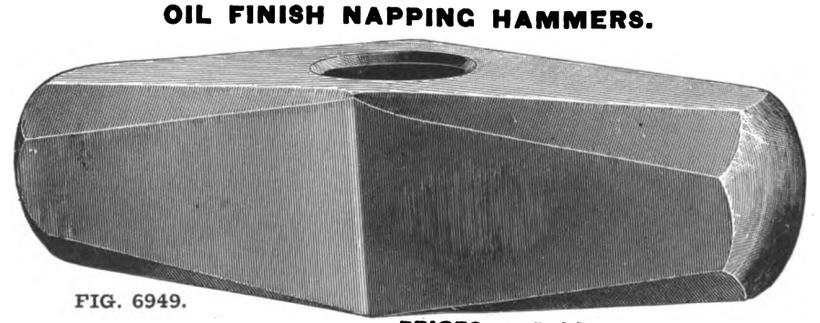


FIG. 6949.

PRICES, PER LB.

Under 3 lb., $0.45 — 3 to 5 lb., $0.36 — 5 lb. and over, $0.30

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CALIFORNIA HAND DRILLING.

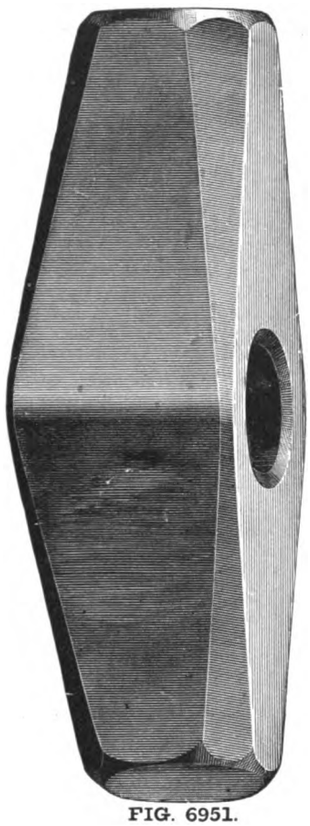


FIG. 6951.

NEVADA STRIKING.

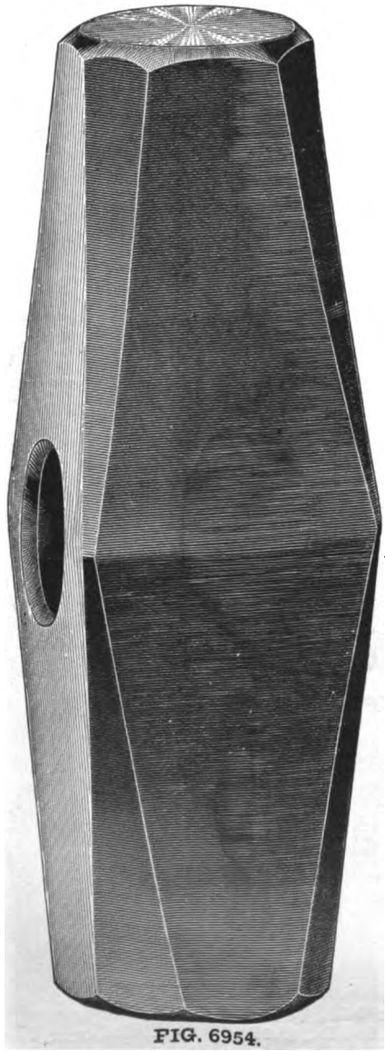


FIG. 6954.

SOLID CAST STEEL STRIKING AND HAND DRILLING HAMMERS.

OREGON STRIKING.

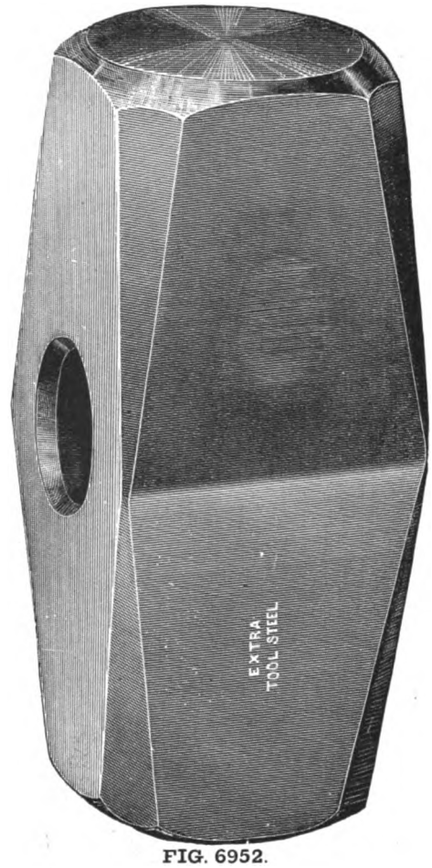


FIG. 6952.

PRICES.

Finish.	Weight.	Figs. 6952 and 6954. Per lb.	Figs. 6951 and 6953. Per lb.
Polished faces, oil finished	Under 3 lb.	$0.45	$0.45
Polished faces, oil finished	3 to 5 lb.	.36	.40
Polished faces, oil finished	5 lb. and above.	.30	
Polished faces, oil finished, and handled.	Under 3 lb.	.52½	.52½
Polished faces, oil finished, and handled.	3 to 5 lb.	.43½	.47½
Polished faces, oil finished, and handled.	5 lb. and above.	.37½	
Full polished	Under 3 lb.	.52½	.52½
Full polished	3 to 5 lb.	.43½	.47½
Full polished	5 lb. and above.	.37½	
Full polished and handled	Under 3 lb.	.60	.60
Full polished and handled	3 to 5 lb.	.51	.55
Full polished and handled	5 lb. and above.	.45	

Packed, unhandled, three dozen in a case. Handled, half dozen in a case.

MACADAMIZING HAMMERS.



FIG. 6955.

Price, 1¼ to 2 lbs.....per lb., $0.75

PRICES, FIG. 6956.

Under 3 lb., $0.45 3 to 5 lb., $0.36 5 lb. and above, $0.30

STONE CUTTER'S HAND DRILLING.

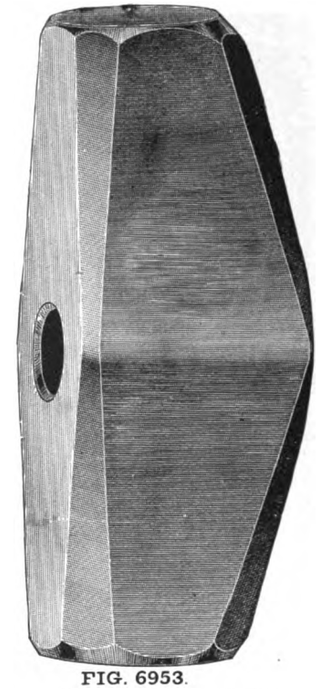


FIG. 6953.

STONE SLEDGE, ROUND OR FLAT FACES.

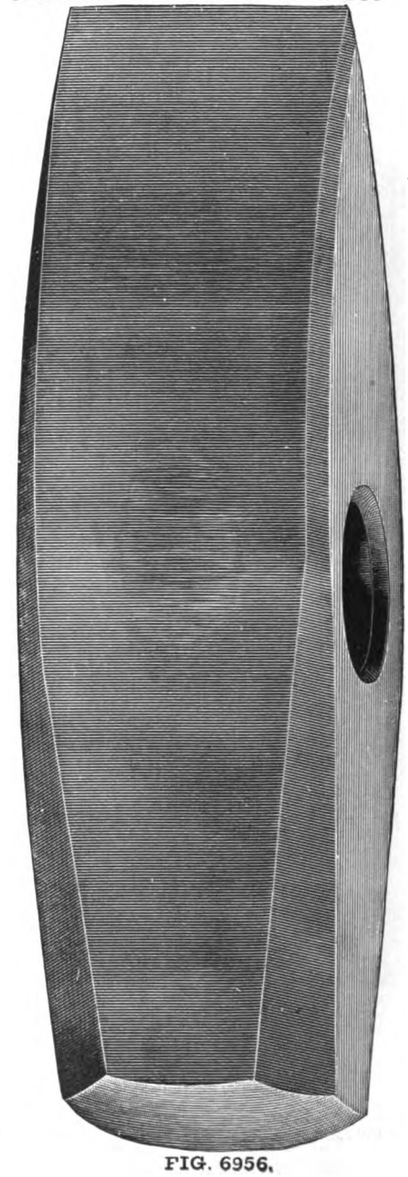


FIG. 6956.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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STONE OR SPAULING HAMMERS.

DOUBLE FACE.

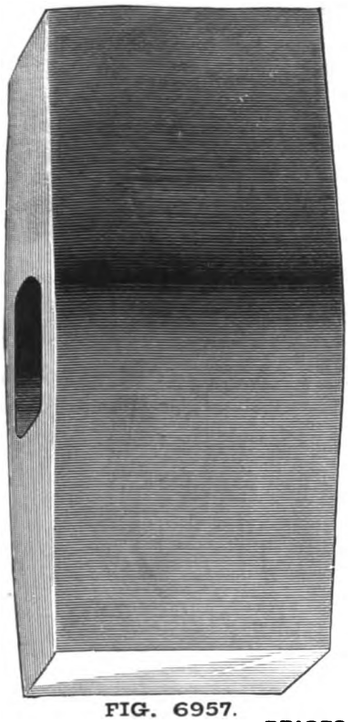


FIG. 6957.

SINGLE FACE.

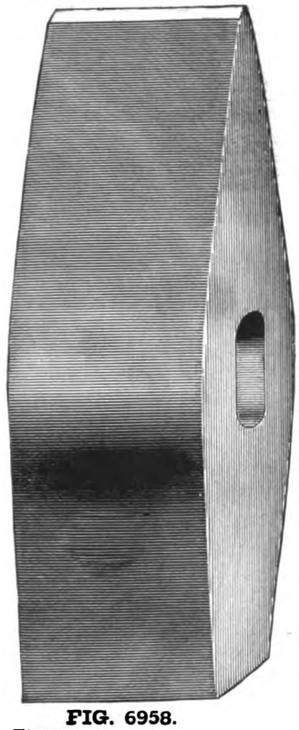


FIG. 6958.

PRICES, OIL FINISH.

Weight, under 3 lbs., per lb.,	polished faces,	45c.;	polished faces and pene,	45c.
" 3 to 5 lbs.	"	"	40c.	"	"	40c.
" 5 lbs. and above	"	"	36c.	"	"	36c.

MASONS HAMMERS.

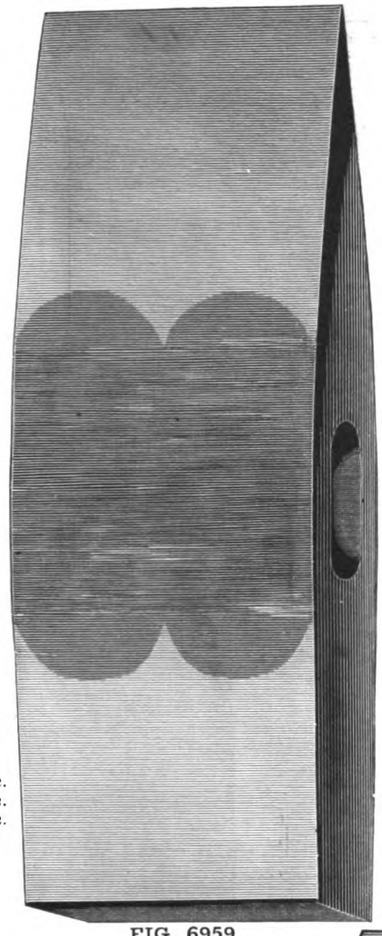


FIG. 6959.

ASSORTING HAMMERS.

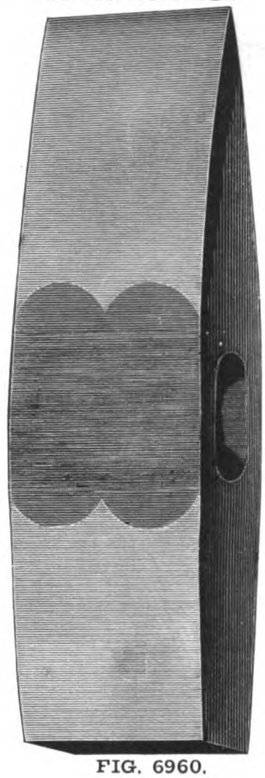


FIG. 6960.

BUSH HAMMERS.

CUT TEETH.

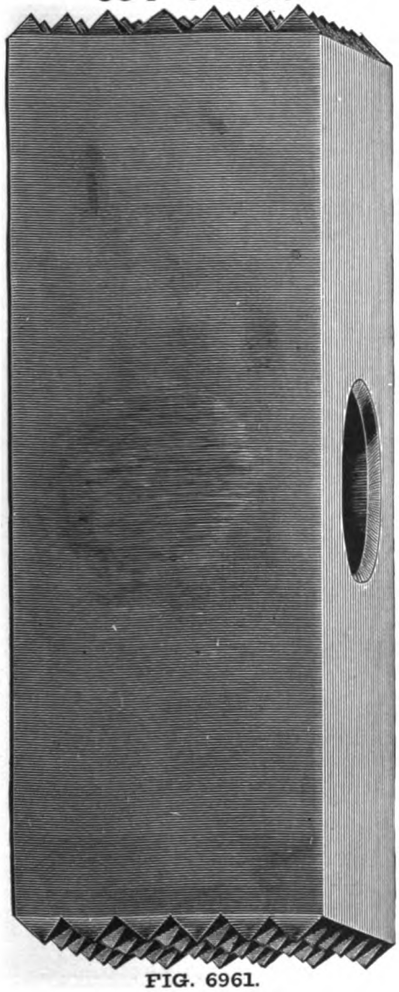


FIG. 6961.

PRICE, 3 TO 6 LBS., $1.00 PER LB.

PRICES, FIG. 6959.

Weight, under 3 lbs., per lb	50c.
" 3 to 5 lbs. "	45c.
" 5 lbs. and above "	40c.

PRICES, FIG. 6960.

Weight, 1¼ to 2½ lbs., per lb. ..... 50c.

STONE AXES.

PLAIN.

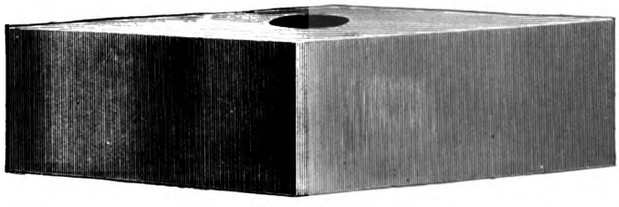


FIG. 6962.

WITH TEETH.



FIG. 6963.

PRICES, OIL FINISH.

3 to 5 lbs., per lb.,	Fig. 6962,	55c.,	Fig. 6963,	60c.
5 lbs. and above "	"	50c.,	"	55c.

In ordering Fig. 6961 and 6963 state number of teeth to inch wanted, and in 6964 the number of blades.

BUSH HAMMERS.

PATENT BLADES.

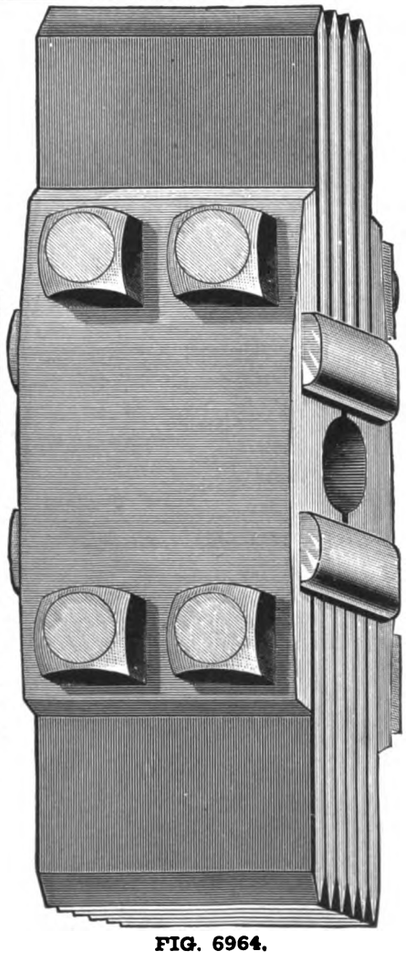


FIG. 6964.

PRICE, EACH, $8.00.

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COAL SLEDGES.



FIG. 6965.

PRICES, FIG. 6965.
Oil finish, polished faces.

Weight.	Per lb.
3 to 5 lb.	$0.36
5 lb. and above.	.30

BOILER PICK.



FIG. 6966.

MILL PICK.



FIG. 6967.

STONE PICK.



FIG. 6968.

PRICE, FIG. 6966.
1½ to 2½ lb. ....90 cents per lb.

PRICE, FIG. 6967.
1½ to 3 lb. ....75 " "

PRICE, FIG. 6968.
5 to 8 lb. ....40 " "

PRICE, FIG. 6969.
Assorted 1¼ to 1¾ inches..... $10.00 per dozen.

PROSPECTING PICKS.

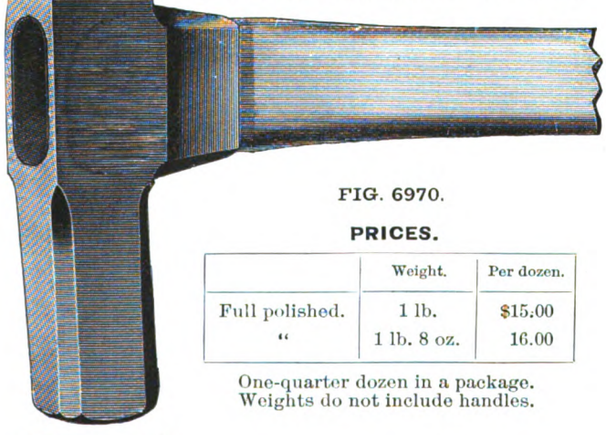


FIG. 6970.

PRICES.

	Weight.	Per dozen.
Full polished.	1 lb.	$15.00
"	1 lb. 8 oz.	16.00

One-quarter dozen in a package.
Weights do not include handles.

BRICK HAMMERS.

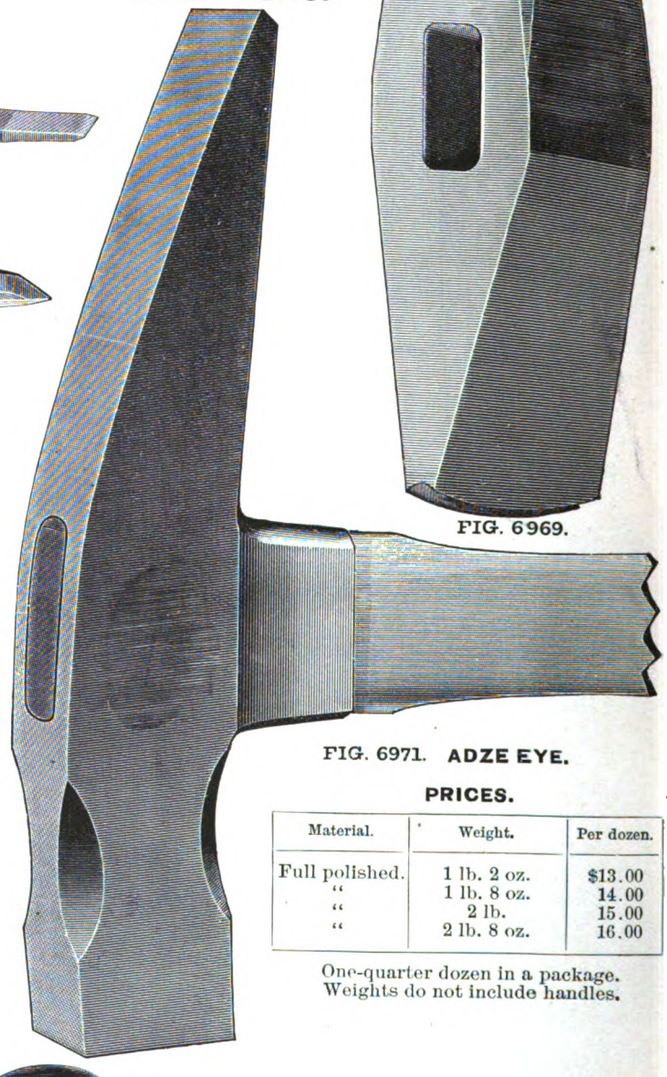


FIG. 6969.

FIG. 6971. ADZE EYE.

PRICES.

Material.	Weight.	Per dozen.
Full polished.	1 lb. 2 oz.	$13.00
"	1 lb. 8 oz.	14.00
"	2 lb.	15.00
"	2 lb. 8 oz.	16.00

One-quarter dozen in a package.
Weights do not include handles.

COOPERS' HAMMERS.

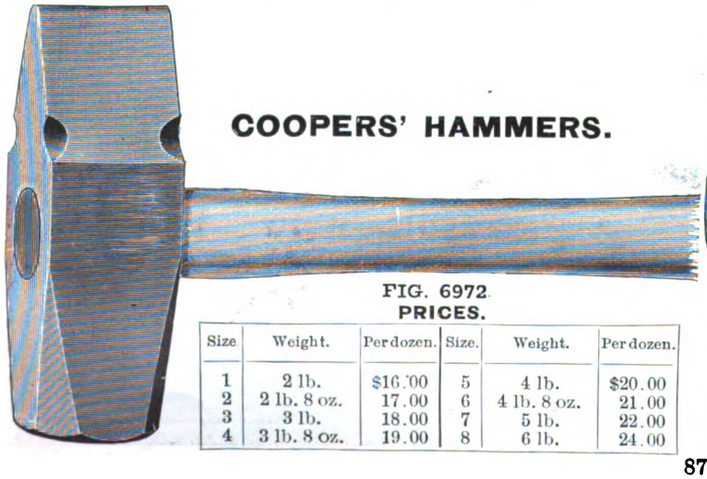


FIG. 6972.
PRICES.

Size.	Weight.	Per dozen.	Size.	Weight.	Per dozen.
1	2 lb.	$16.00	5	4 lb.	$20.00
2	2 lb. 8 oz.	17.00	6	4 lb. 8 oz.	21.00
3	3 lb.	18.00	7	5 lb.	22.00
4	3 lb. 8 oz.	19.00	8	6 lb.	24.00

CARRIAGE IRONERS' HAMMERS.

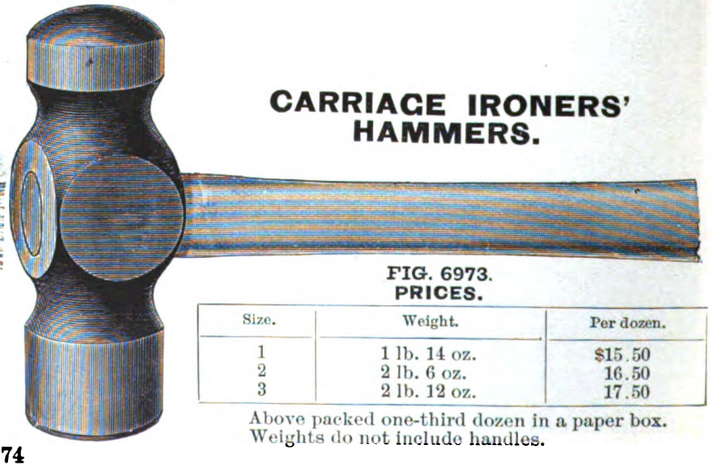


FIG. 6973.
PRICES.

Size.	Weight.	Per dozen.
1	1 lb. 14 oz.	$15.50
2	2 lb. 6 oz.	16.50
3	2 lb. 12 oz.	17.50

Above packed one-third dozen in a paper box.
Weights do not include handles.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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FARRIER'S SOLID CAST STEEL TOOLS.

HORSE SHOER'S TURNING HAMMERS.

CHICAGO PATTERN.



FIG. 6974.

PRICES, FIG. 6974.

Style.	Material.	Weight.	Per doz.
Half polished	Solid cast steel	2 to 3 lbs.	$30.00
Full "	" " "	" "	34.00

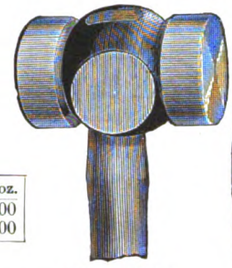


FIG. 6975.

PRICE, FIG. 6975.

2 to 3 lbs.....per doz., $30.00

NEW YORK PATTERN.

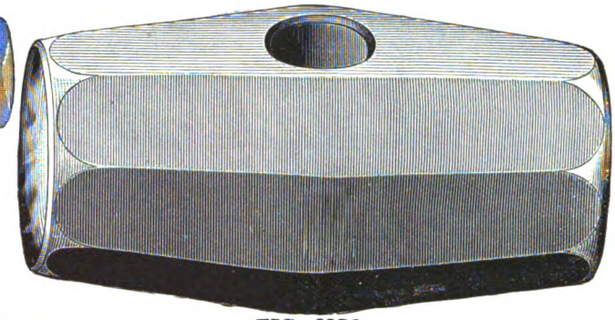


FIG. 6976.

PRICE.

Oil finish, polished faces, 6 to 10 lbs.....per lb., $0.40

FARRIER'S HAMMERS.

ADZE EYE, BOSTON PATTERN.

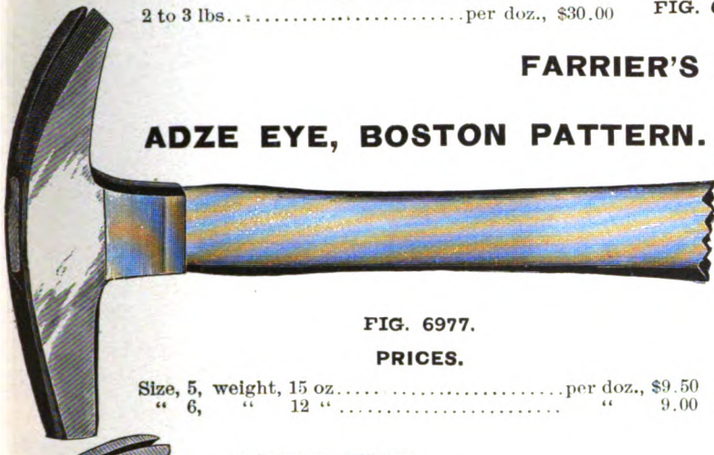


FIG. 6977.

PRICES.

Size, 5, weight, 15 oz.....per doz., $9.50
" 6, " 12 " " 9.00

ADZE EYE, CINCINNATI PATTERN, OCTAGON POLE.

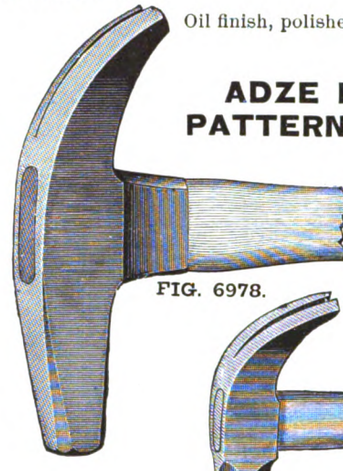


FIG. 6978.

PRICES, FIG. 6978.

Weight, 10 oz.....per doz., $8.00

PLAIN EYE, ROUND POLE.



FIG. 6979.

PRICE.

Weight, 7 oz.....per doz., $6.25

ADZE EYE, OCTAGON POLE.



FIG. 6980.

PRICES.

No. 173. Size, 2, weight, 10 oz ..per doz., $7.75
" 174. " 3, " 7 " ... " 7.50

PLAIN EYE, OCTAGON POLE.

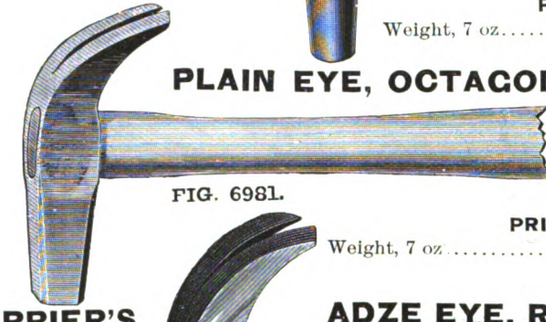


FIG. 6981.

PRICE.

Weight, 7 oz.....per doz., $6.25

ADZE EYE, CINCINNATI PATTERN, ROUND POLE.



FIG. 6982.

PRICE.

Weight, 10 oz.....per doz., $8.00

All Farrier's hammers are packed half dozen in a paper box. Weights do not include handles.

FARRIER'S PRITCHELS.



FIG. 6985.

PRICE,
60 CENTS PER LB.

ADZE EYE, ROUND POLE.

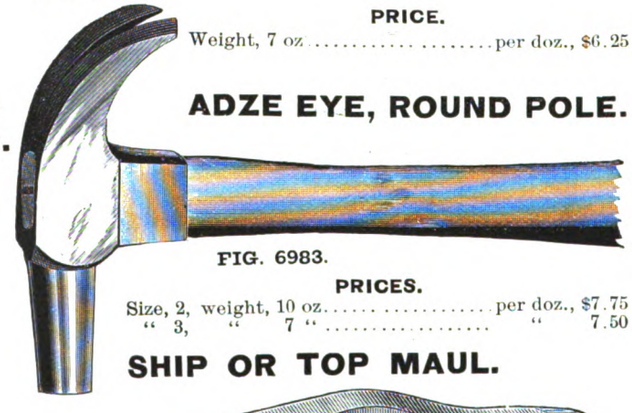


FIG. 6983.

PRICES.

Size, 2, weight, 10 oz.....per doz., $7.75
" 3, " 7 " " 7.50

SHIP OR TOP MAUL.

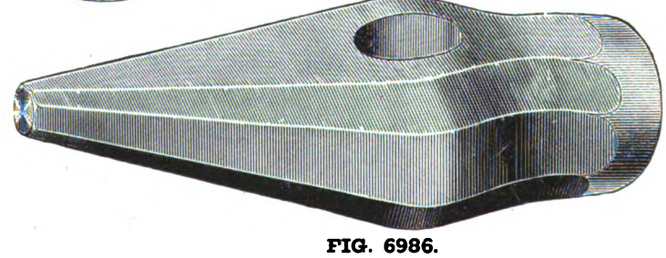


FIG. 6986.

PRICES.

Oil finished, polished face..... per lb., $0.42
Full polished..... " .45
" " and handled..... " .50

WOOD CHOPPERS' MAULS.

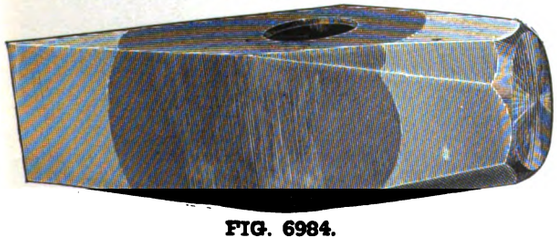


FIG. 6984.

PRICE.

Axe finish, painted blue, weight, 6 to 12 lbs.....per lb., $0.35

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STEEL WEDGES.

REGULAR.

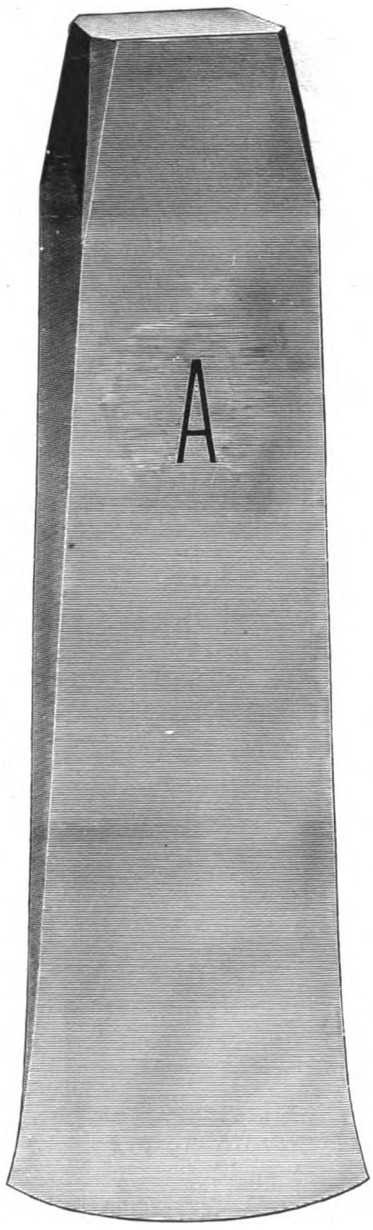


FIG. 6987.

TRUCKEE.

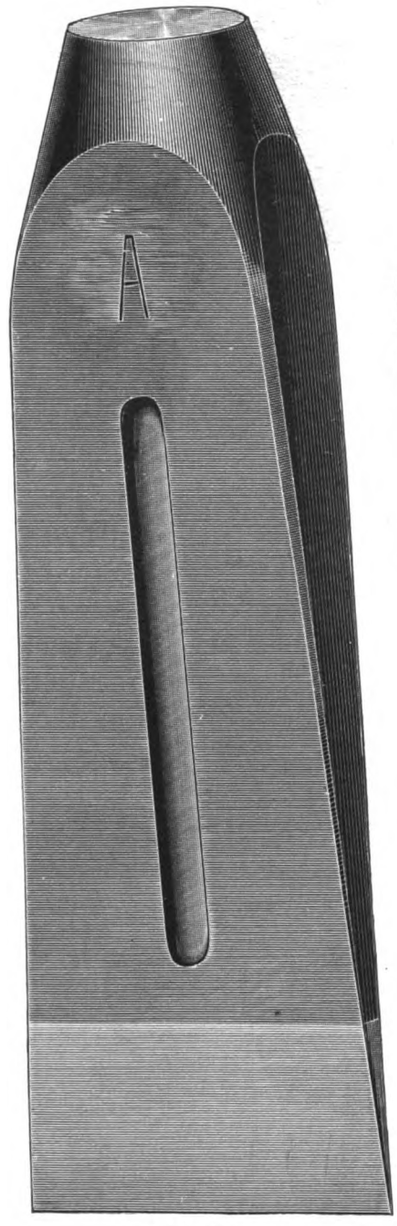


FIG. 6988.

PRICE, FIG. 6987.

Axe finish, assorted 3 to 10 lbs., 15c. per lb.
Packed one dozen in case.

PRICES, FIG. 6988.

1st quality, forge finished and oiled, assorted as wanted.....25c. per lb.
2d quality, forge finished and oiled, assorted as wanted.....20c. per lb.
Packed one dozen in case.

COAL WEDGES.

SQUARE.

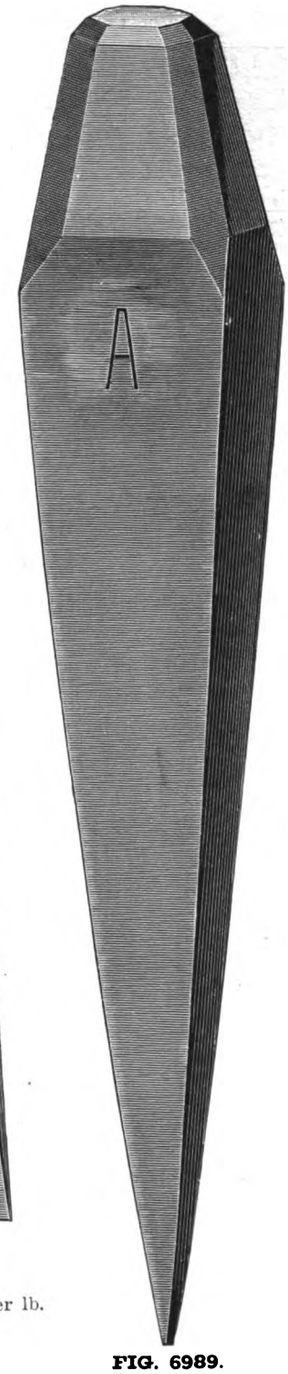


FIG. 6989.

OCTAGON.

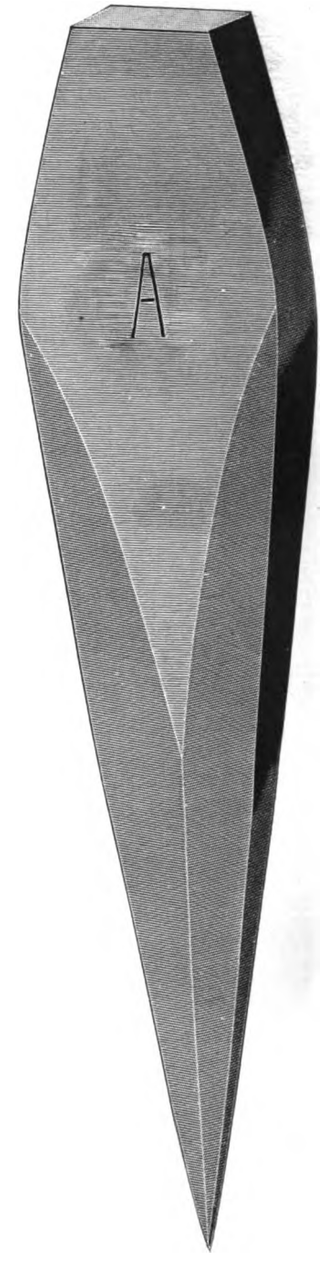


FIG. 6990.

PRICE, FIGS. 6989 AND 6990.

1½ to 4 lbs.....20c. per lb.

PLUG AND FEATHERS.

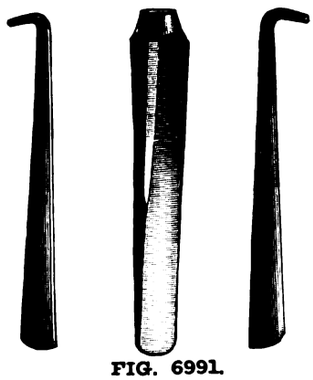


FIG. 6991.

PRICE, 40 CENTS PER LB.

HAND COLD CHISELS, HIGH GRADE TOOL STEEL.



PRICE, FIG. 6992, 50 CENTS PER LB.

CAPE CHISELS, HIGH GRADE TOOL STEEL.



PRICE, FIG. 6993, 60 CENTS PER LB.

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SOLID CAST STEEL BLACKSMITHS' TOOLS.

TOP SWEDGE.

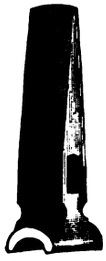


FIG. 6994.

BOTTOM SWEDGE.



FIG. 6995.

TOP FULLER.

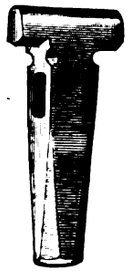


FIG. 6996.

BOTTOM FULLER.

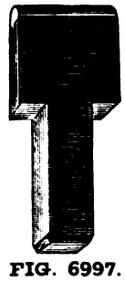


FIG. 6997.

HARDY.

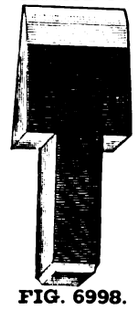


FIG. 6998.

SET HAMMER.



FIG. 6999.

FLATTER.

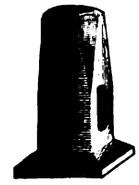


FIG. 7000.

PRICES, FIGS. 6994 TO 7000, 40 CENTS PER LB.

CREASERS, ADZE EYE.

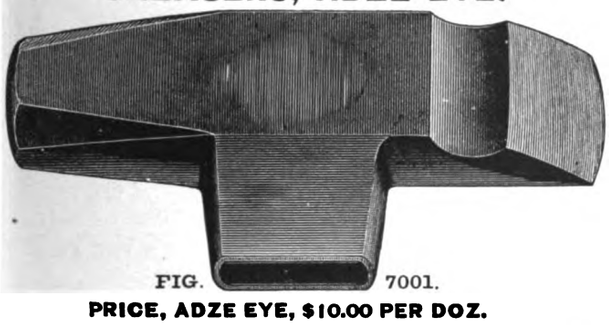


FIG. 7001.

PRICE, ADZE EYE, $10.00 PER DOZ.

HOT CHISEL.

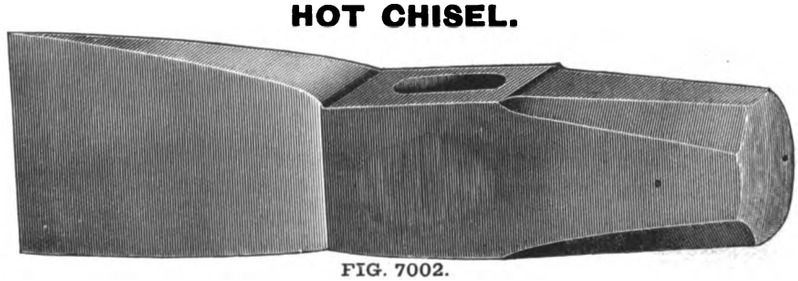


FIG. 7002.

CAST STEEL CENTER PUNCHES.



FIG. 7003.

PRICE, packed one dozen in a box, $2.25 PER DOZ.

COLD CHISEL.

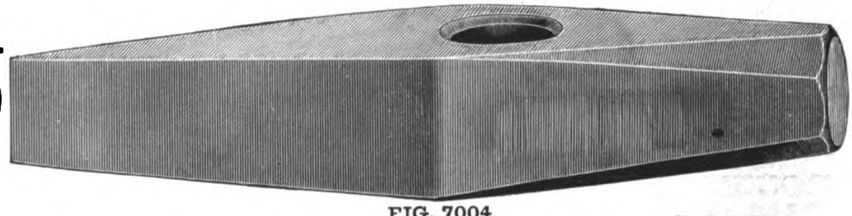


FIG. 7004.

PRICES, FIGS. 7002 AND 7004, 40 CTS. PER LB.

BLACKSMITHS' HEADING TOOLS.

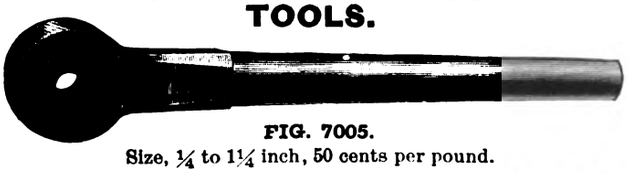


FIG. 7005.

Size, ¼ to 1¼ inch, 50 cents per pound.

ROUND PUNCHES.

SQUARE PUNCHES.

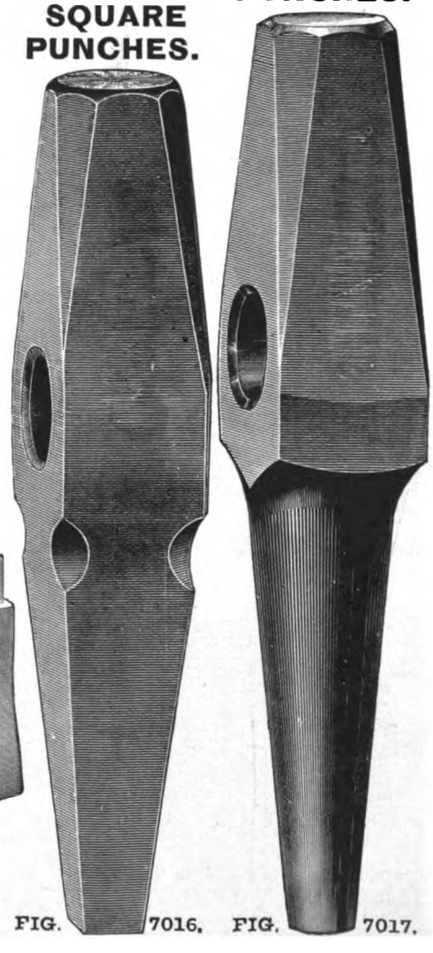


FIG. 7016. FIG. 7017.

STEAM DRILL TOOLS.

NO. 1A.

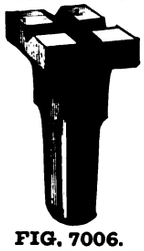


FIG. 7006.

NO. 2A.

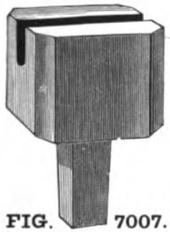


FIG. 7007.

NO. 3A.



FIG. 7008.

NO. 5A.



FIG. 7009.

NO. 4A.



FIG. 7010.

PRICES, FIGS. 7006 TO 7010, 60 CENTS PER LB.

SWAGE BLOCKS AND STANDS.

NO. 3. NO. 2. NO. 1.

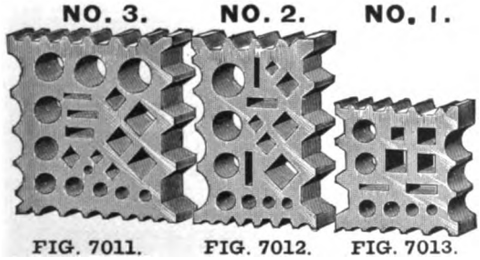


FIG. 7011. FIG. 7012. FIG. 7013.

PRICES, 7011 TO 7015.

	Regular.	Planed both sides.
Swage block No. 1, 12¼ x 12¼ x 4¼ in.	$4.80	$5.80
Stand for No. 1 swage blocks	4.80	
Swage block No. 2, 13 x 18 x 4¼ in.	7.40	8.90
Stand for No. 2 swage blocks	7.40	
Swage block No. 3, 18¼ x 18¼ x 4¼ in.	11.75	13.75
Stand for No. 3 swage blocks	11.75	

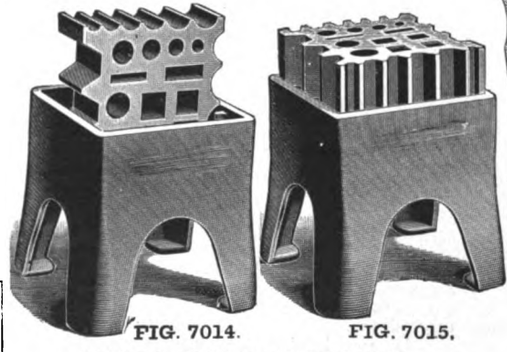


FIG. 7014. FIG. 7015.

PRICES, FIGS. 7016 AND 7017.

Round and square, ¼ to 1 inch, 55 cents per lb.

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PATENT TAPER MANDRELS.

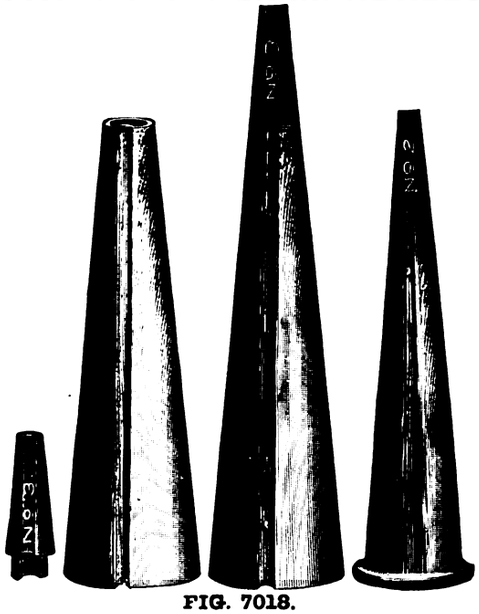


FIG. 7018.

The groove, running the whole length of the cone, gives room for grasping work with the tongs. When a ring with an eye-bolt is being made, the eye and bolt lie in the groove while the ring is being rounded up. The tips are made so that they may be taken off, and, having shanks, can be conveniently used in the vise for rounding small bands.

PRICES.

No. 2. 10 in. base, point 2 in. diameter, 47 in. high.....$8.00
No. 3. 14 " " " 2¾ " " 58 " " 14.25
No. 4. Not shown in cut, 20 in. base, 30 in. high, 14 in. diameter at top, open top, no loose tip.....15.00

CONES.

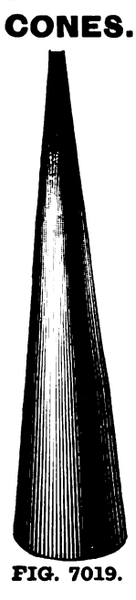
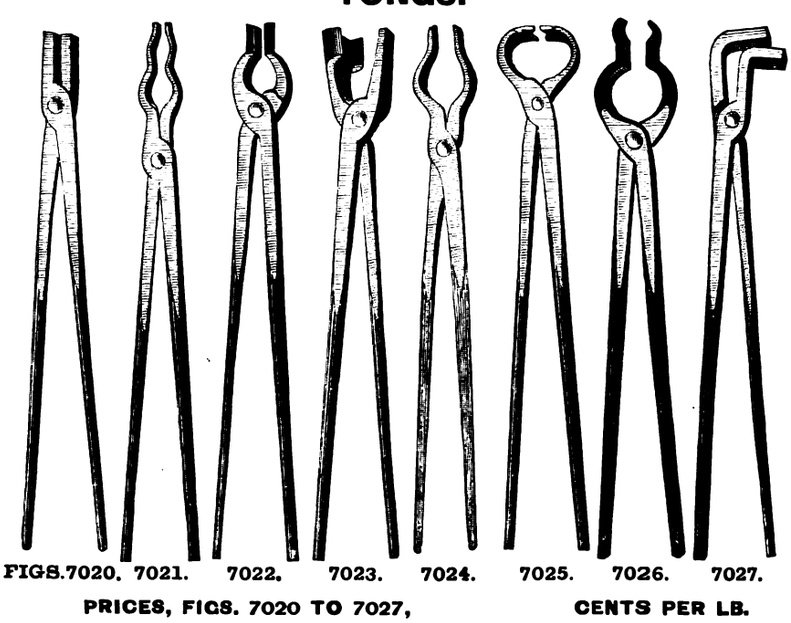


FIG. 7019.

TONGS.



FIGS. 7020. 7021. 7022. 7023. 7024. 7025. 7026. 7027.

PRICES, FIGS. 7020 TO 7027, CENTS PER LB.

PRICES AND DIMENSIONS, FIG. 7019.

Size.	Height.	Diam. at base.	Diam. at top.	Weight.
No. 1	32 inches.	8 inches.	1 inch.	About 55 pounds.
" 1½	40 "	10 "	1 "	" 90 "
" 2	48 "	12 "	1 "	" 115 "
" 3	52 "	14 "	1 "	" 140 "
" 4	54 "	16 "	2 "	" 200 "

PRICE, PER LB., CENTS.

DOUBLE AND SINGLE GEARED TIRE BENDER.

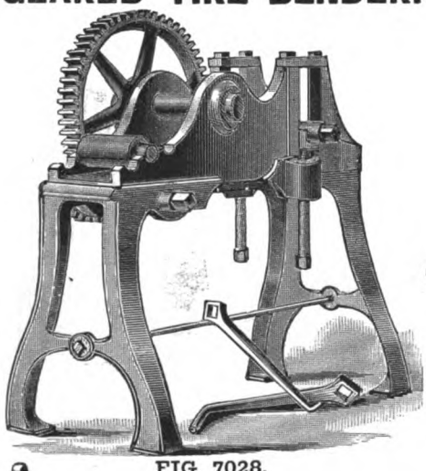


FIG. 7028.

BENCH TIRE BENDER.

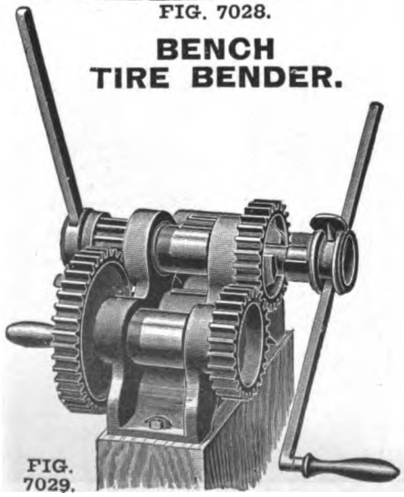


FIG. 7029.

NOS. 1 AND 2 TIRE BENDER.

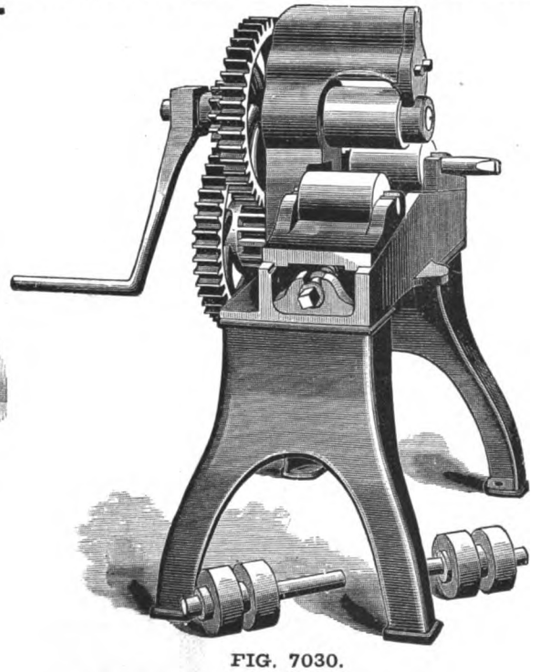


FIG. 7030.

DESCRIPTION AND PRICE, FIG. 7029.

The important and valuable feature about this machine is that the power may be increased or diminished more than threefold, by simply sliding the crank-heads, which are connected, in or out of gear, from left to right, or right to left. It bends with ease heavy tires, and with quickness light ones.

It will bend accurately and easily tires from the lightest to 3 inches in width by ⅜ inch thick. The size of the circle is fixed by sliding the loose roller up or down.

This machine is strongly geared, and two cranks may be used. Weight, 90 pounds.

PRICE, $18.00.

DESCRIPTION AND PRICES, FIG. 7028.

This machine is designed for blacksmiths especially, but is also well adapted for machine shops. The rolls are of forged iron, and furnished with collars for bending fifth wheels. It is so constructed that the upper roll can easily be taken out, thus enabling the user to remove the tire without springing it. The back roll is readily adjusted by means of steel thumb-screws. It will bend iron 6 x 1¼ in.

PRICES.

No. 6, single geared, complete, with legs and 2 cranks.....$49.00
Same, double geared.....54.00
Without legs.....$5.00 less.
" cranks.....2.00 "

DESCRIPTION AND PRICES, FIG. 7030.

NO. 1.

It has an open side, so that tires can be taken out without springing. The bearings or track of carriages are planed perfectly parallel, which insures the tire going through the rolls and ends coming together perfectly square. A pair of grooved rolls for bending iron edgewise is furnished when ordered. Also tight and loose pulleys can be fitted to the machine for power when desired. It will bend tires from the lightest to ¾ in. thick by 5 wide. Weight, 500 pounds. Geared, 9 to 1.

Price.....$45.00
" with grooved rolls.....60.00
" " 16 x 3½ tight and loose pulleys, extra.....15.00

NO. 2 TIRE BENDER.

Same as No. 1, but smaller; bending iron to ⅝ inch thick by 3 inches wide. Weight, 250 pounds. Geared, 9 to 1.

Price.....$24.00
" with grooved rolls.....36.00
" " 14 x 3 tight and loose pulleys, extra.....12.00

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SAMSON TIRE SHRINKER.

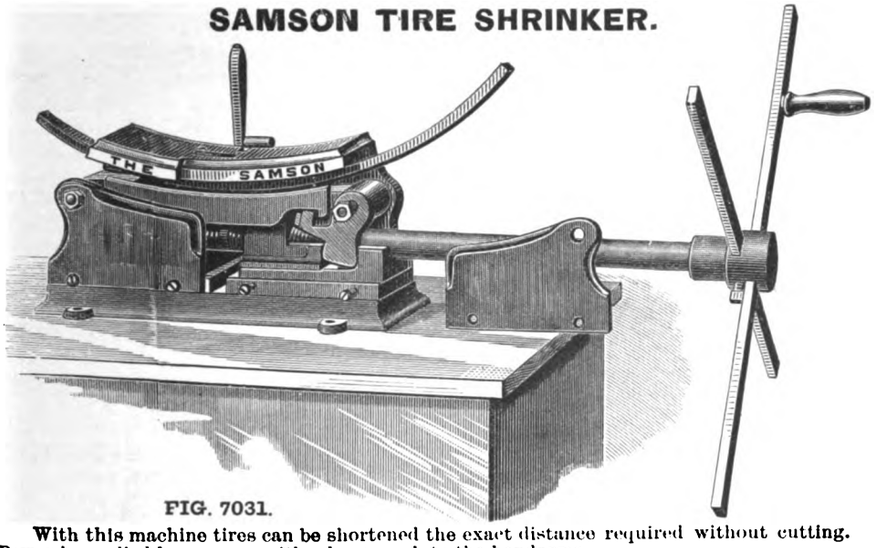


FIG. 7031.

With this machine tires can be shortened the exact distance required without cutting. Power is applied by a screw with a long reach to the handarms.

The tire is held so that it cannot double up. There are no cams to be hammered or put into place by hand before or after the tire is upset; it is sure to hold the tire until it is upset; and sure to loosen it afterward.

No. 2 will upset tires from $\frac{1}{8}$ to $\frac{3}{4}$ inch thick, 4 inches wide.

PRICE, $25.00. WEIGHT ABOUT 220 LBS.

PERFECTED TIRE BENDER.

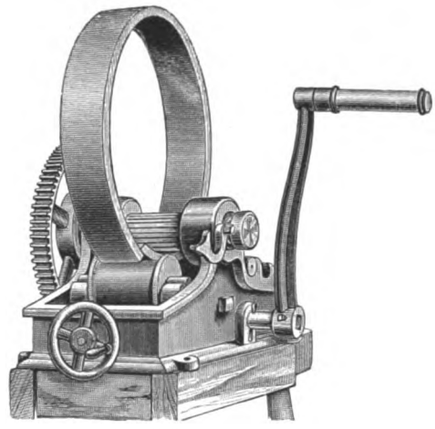


FIG. 7032.

PRICES.

No. 21 will take 4 x $\frac{1}{2}$ in. tire, not geared	$12.00
No. 22 " 4 x $\frac{7}{8}$ " is geared	19.00
No. 23 " 6 x $\frac{3}{4}$, or 4 x $1\frac{1}{4}$ in., is single geared	26.00
No. 24, same as No. 23, with countershaft and pulleys for power	35.00
No. 25 will take 6 x 1 in. or 4 x $1\frac{1}{4}$ in. extra heavy double geared	55.00
No. 26, same as No. 25, with countershaft and pulleys	65.00

NO. 1 TIRE SHRINKER.



FIG. 7033.

No. 1 will shrink tire 2 x $\frac{3}{4}$ inches. **PRICE, $12.00.**

NO. 2 TIRE SHRINKER.

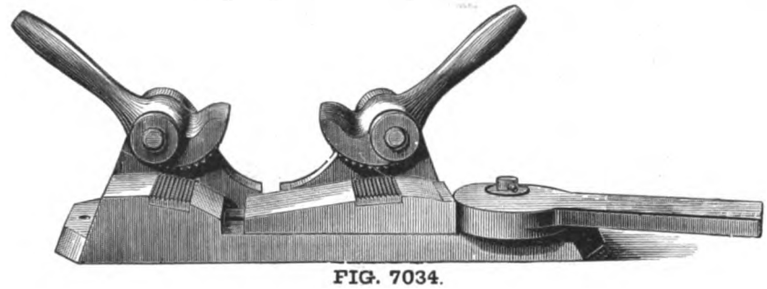


FIG. 7034.

No. 2 will shrink tire 4 x 1 inches. **PRICE, $20.00.**

BOLT AND RIVET CLIPPERS.

EXCELSIOR. LIGHTNING.



FIG. 7035.



FIG. 7036.

PRICES, FIG. 7036.

Cuts $\frac{3}{8}$ and under	$6.50
Ex. Jaws	.75

PRICES, FIG. 7035.

No. 1, cuts $\frac{3}{8}$ inches	$6.00
No. 2, " $\frac{1}{2}$ "	8.00
No. 3, " $\frac{5}{8}$ "	15.00

PLAIN TIRE MEASURING WHEEL.

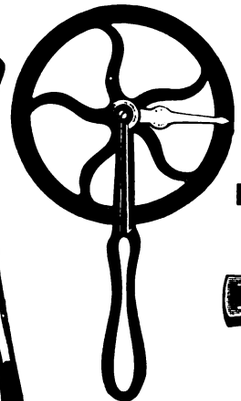


FIG. 7037.

DESCRIPTION, FIG. 7037.

A perfect-running wheel, turned carefully in a lathe, which we supply to wheelwrights at a price cheaper than they can afford to make it. The wheel is a drop-forging.

PRICE, $1.25.

PHILADELPHIA BOLT CLIPPER.



FIG. 7039.

PRICES.

No. 1. For $\frac{3}{8}$-inch bolt or less, each	$7.50
No. 2. " $\frac{1}{2}$-inch " " "	9.00
No. 3. " $\frac{5}{8}$-inch " " "	12.00

GRADUATED TIRE MEASURING WHEEL.

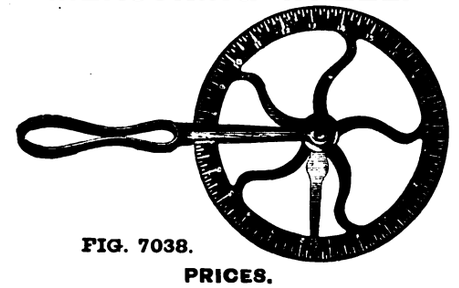


FIG. 7038.

PRICES.

A drop-forging; is made so that the figures and lines are raised above the surface of the wheel and cannot be filled or defaced with rust or dirt. It is a perfect-running wheel, turned carefully in a lathe, exactly 24 inches in circumference, and accurately graduated,

The index hand saves trouble of marking with chalk, and the whole, made of metal, is light, accurately fitted, handy and strong.

PRICE.....$1.50.

EASY BOLT CLIPPER.



FIG. 7040.

PRICES.

No. 1. For $\frac{3}{8}$ bolts and under, each	$6.00
No. 2. For $\frac{1}{2}$ bolts and under, each	8.00

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PAVERS' TOOLS.

COBBLE STONE RAMMER.

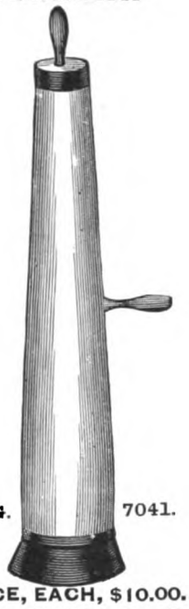


FIG. 7041.

PRICE, EACH, $10.00.

BELGIAN BLOCK RAMMER.

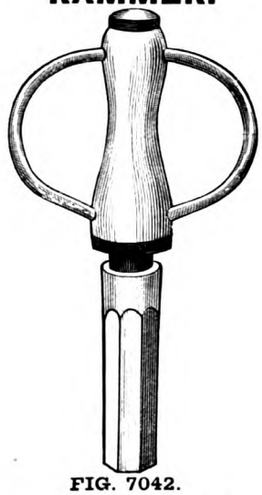


FIG. 7042.

PRICE EACH $12.00.

BELGIAN BLOCK HAMMER.

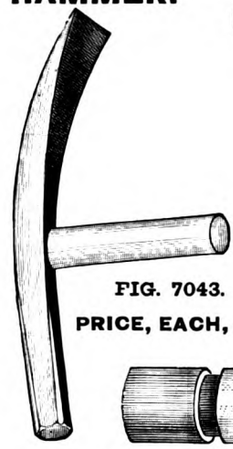


FIG. 7043.

PRICE, EACH, $4.50.

COBBLE STONE HAMMER.

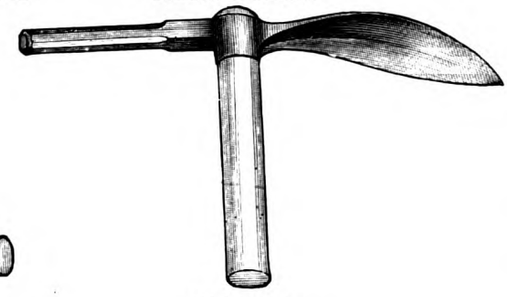


FIG. 7044.

PRICE, EACH, $4.50.

SAND RAMMER.



FIG. 7045. PRICE, EACH, $4.00.

NO. 3. LARGE HAND CART, WITH AND WITHOUT SPRINGS AND THIRD WHEEL.

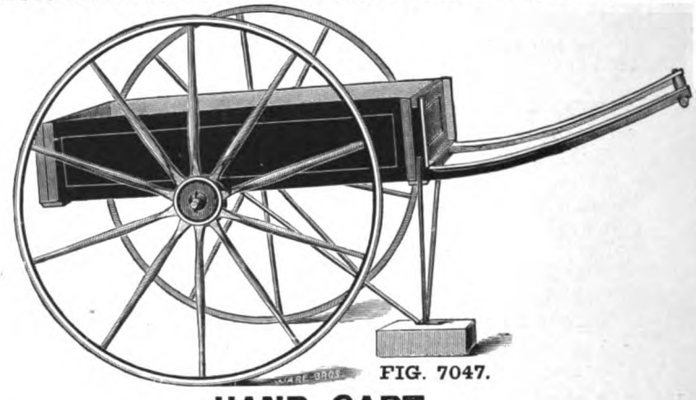


FIG. 7047.

FOUR-WHEEL CONTRACTORS' CARTS.



FIG. 7046.

To cut under or not to. PRICE, $190.00.

HAND CART, WITH THIRD WHEEL AND SPRINGS.



FIG. 7047 A.

SPRINKLING CARTS, WITH AND WITHOUT SPRINGS.



FIG. 7046 A.

Capacity.	Size of axles. Front.	Size of axles. Hind.	Size of tire.	Weight.	Prices. With springs.	Prices. No springs.
1,000 gals.	2⅝ inch.	2¾ inch.	3 inch.	3,600 lbs.	$600.00	
750 "	2¼ "	2½ "	3 "	3,200 "	525.00	$410.00
600 "	2 "	2½ "	2½ "	2,700 "	460.00	375.00
350 "	1¾ "	1⅞ "	1¾ "	2,200 "	425.00	325.00

NO. 2. SMALL HANDCART.

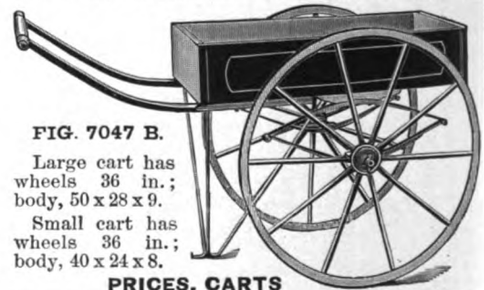


FIG. 7047 B.

Large cart has wheels 36 in.; body, 50 x 28 x 9.

Small cart has wheels 36 in.; body, 40 x 24 x 8.

PRICES, CARTS

	No. 3. Fig. 7047.	No 2. Fig. 7047 B
Without springs	$8.00	$6.50
With springs	10.25	8.65
With third wheel	10.25	8.65
With third wheel and springs	12.50	11.00

Complete with wooden horseshoe tanks, furnished with one large valve wrench, and fitted with our own make patent slope-shouldered spoke wood hub wheels, or patent wheels, pole or shafts; extra if both are wanted. Extra for brake, filling valve and hose, or sunshade.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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IRON AXLE FARM WAGONS, WIDE TRACK.

The prices below include whiffletrees, wrench, stay chains, drop or stiff tongue, with neckyoke or tongue chains; no seat or brake. Note that the sizes of iron axles for capacity compare with cast skeins as follows: $1\frac{3}{8}$ in. iron axle equals $2\frac{1}{8}$ in. thimble skein; $1\frac{1}{2}$ in. $= 2\frac{3}{4}$ in.; $1\frac{5}{8}$ in. $= 3$ in.; $1\frac{3}{4}$ in. $= 3\frac{1}{4}$ in.; 2 in. $= 3\frac{1}{2}$ in.; $2\frac{1}{4}$ in. $= 3\frac{3}{4}$ in.; $2\frac{1}{2}$ in. $= 4$ in.

Front wheels, 3 feet 8 inches; hind wheels, 4 feet 4 inches to 4 feet 6 inches.

PRICES BELOW.

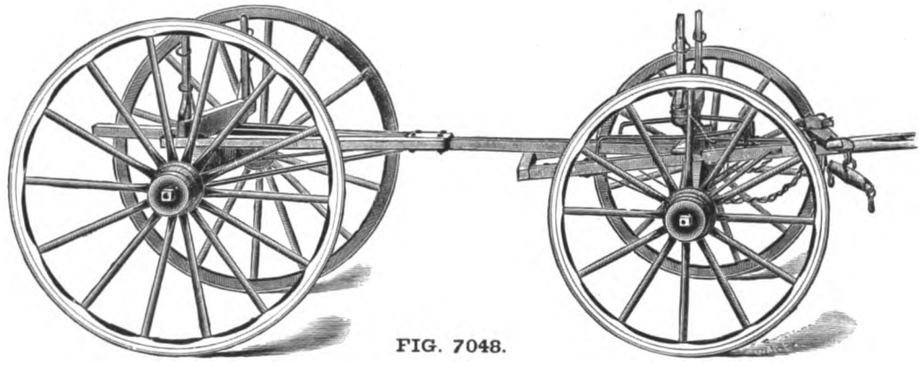


FIG. 7048.

STEEL SKEIN LOG WAGONS, WIDE OR NARROW TRACK, DROP OR STIFF TONGUES AND BRAKES.

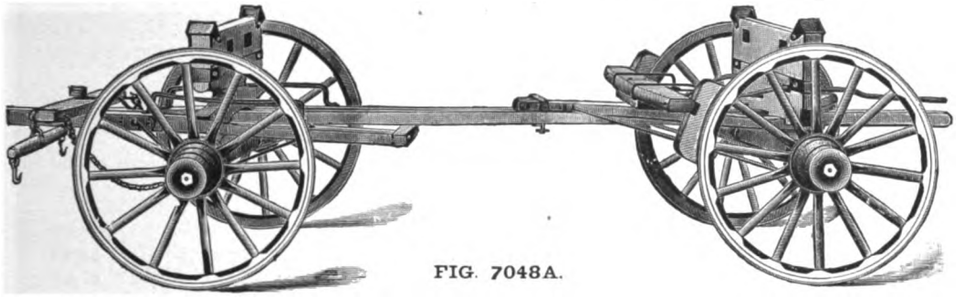


FIG. 7048A.

These wagons will be made of any required dimensions, and with such fixtures and attachments as purchasers may desire, the price varying accordingly. They are especially constructed to meet the wants of lumbermen for a log wagon in all localities.

The prices below do not include whiffletrees or neckyoke, or brake. We make these trucks with 3 feet 4 inch front and 3 feet 8 inch hind wheels, if so ordered.

Size of wheels, 3 feet 5 inches high.

COMMON SENSE STEEL SKEIN LOG WAGONS, 5 FOOT TRACK.

This wagon is made, after long experience, to meet the demands of heavy and rough work.

Made for use with horses or oxen.

In case of breakage, is more easily repaired than swivel, as shown, Fig. 7048C. Front and hind wheels both 3 feet 6 inches high.

PRICES AND EXTRAS BELOW.

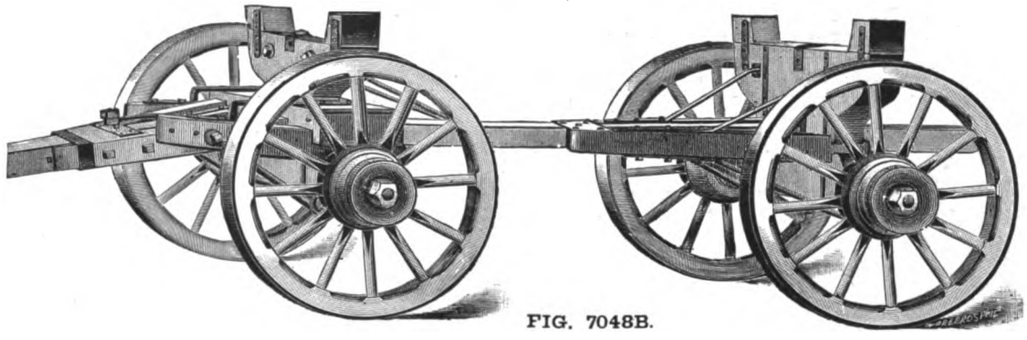


FIG. 7048B.

LOG WAGONS, SWIVEL REACH, STEEL SKEINS.

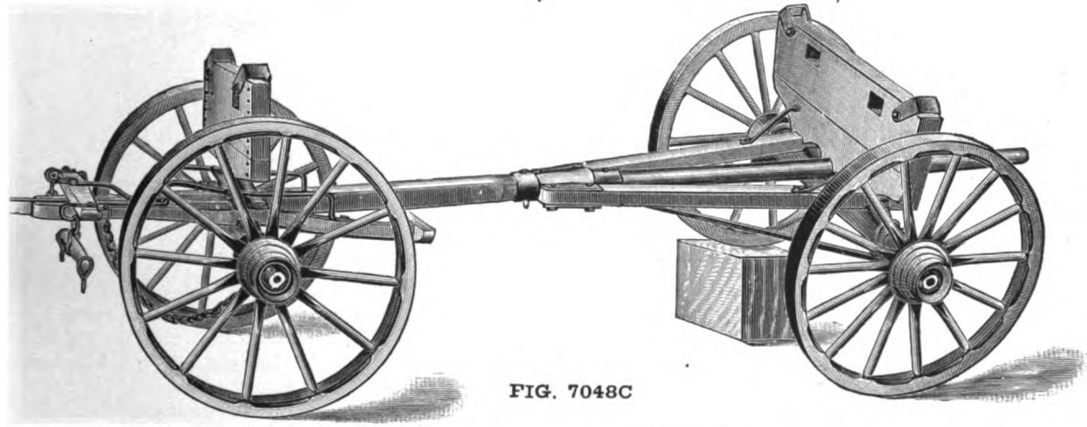


FIG. 7048C

Sizes, etc., same as Fig. 7048B.

The prices are $5.00 each higher, but do not include whiffletrees, stay chains or neckyoke. The prices of extras and fixtures are the same as for regular log wagon, Fig. 7048B.

Front and rear wheels both 3 feet 6 inches high.

PRICES, FIG. 7048.

Size of axles. Inches.	Size of tire. Inches.	Approximate. Weight. Lbs.	Approximate. Capacity. Lbs.	Prices.
$1\frac{3}{8}$ x $7\frac{1}{2}$	$1\frac{3}{8}$ x $\frac{1}{2}$	750	1,500	$66.00
$1\frac{1}{2}$ x 8	$1\frac{1}{2}$ x $\frac{9}{16}$	825	2,000	69.50
$1\frac{5}{8}$ x 9	$1\frac{1}{2}$ x $\frac{5}{8}$	950	3,000	71.50
$1\frac{3}{4}$ x 10	$1\frac{1}{2}$ x $\frac{3}{4}$	1,050	3,500	75.00
2 x 11	2 x $\frac{3}{4}$	1,290	4,500	92.00
$2\frac{1}{4}$ x $11\frac{1}{2}$	2 x $\frac{3}{4}$	1,430	5,000	118.00

PRICES, FIG. 7048A.

Size of skein. Inches.	Size of tire. Inches.	Capacity steel skein. Lbs.	Weight. Lbs.	Prices. Steel skein.
$3\frac{3}{4}$ x 12	3 x $\frac{1}{2}$	7,000	1,000	$102.00
4 x 12	3 x $\frac{1}{2}$	8,000	1,000	118.00

PRICES, FIG. 7048B.

Size of axles. Inches.	Size of tire. Inches.	Approximate. Weight. Lbs.	Approximate. Capacity. Lbs.	Prices.
$3\frac{3}{4}$ x 12	4 x $\frac{1}{2}$	1,000	7,000	$141.00
4 x 12	4 x $\frac{1}{2}$	1,400	8,000	157.50
$4\frac{1}{2}$ x 13	4 x $\frac{5}{8}$	2,000	10,000	197.00

PRICES, FIXTURES, EXTRA, FIGS. 7048A, B & C.

Heavy rear brake	$15.00	Heavy roller brake and side lever	$10.00
Log saddle, with irons	7.50	Lead bars	5.00
Rollers for front bolsters	2.50	Swivel reach	5.00
Whiffletrees, stay chains, neckyoke, or tongue chains	4.00		

We furnish the tires in following sizes: 4 x $\frac{1}{2}$, 3 x $\frac{5}{8}$ and 4 x $\frac{5}{8}$ at extra prices.

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STANDARD THIMBLE SKEIN WAGONS, WIDE AND NARROW TRACK.

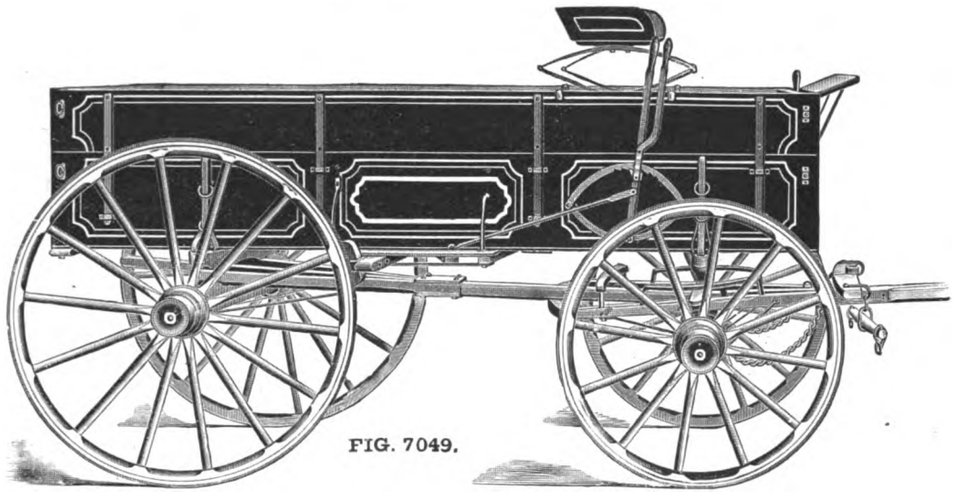


FIG. 7049.

Capacity of steel skeins same as for iron axles. The specifications include whiffletrees, stay-chains, wrench, drop or stiff tongue with neck-yoke or tongue chains, but do not include seat or brake.

In ordering wagons, be very particular to state whether wide or narrow track, drop or stiff tongue are wanted; also state plainly in order the number of wagon, and whether cast or steel skeins are wanted, and whether seat or brake, or both, are desired. By so doing purchasers will be sure to get their goods as wanted.

Wide track is 5 feet, and narrow track 4 feet 6 inches, from center to center of tires on the ground.

PRICES, FIG. 7049.

No.	Size of axles.	Height of wheels.		Size of tire.	Outside dimensions of bed.					Approximate.		Prices.
					Length.	Width.		Depth.				
		Front.	Hind.			Narrow track.	Wide track.	Box.	Top box.	Weight.	Capacity.	
0*	2⅜ x 7 in.	3 ft. 7 in.	4 ft. 2 in.	1¼ x 7/16 in.	9 ft.	3 ft. 2 in.	3 ft. 6 in.	10 in.	6 in.	600 lbs.	1,200 lbs.	$59.00
1	2½ x 8 "	3 " 8 "	4 " 4 "	1⅜ x ½ "	9 " 6 in.	3 " 2 "	3 " 6 "	10 "	6 "	750 "	1,500 "	63.00
2	2¾ x 8 "	3 " 8 "	4 " 4 "	1½ x 9/16 "	10 "	3 " 2 "	3 " 6 "	12 "	8 "	825 "	2,000 "	67.00
3	3 x 9 "	3 " 8 "	4 " 6 "	1½ x 5/8 "	10 " 6 "	3 " 2 "	3 " 6 "	13 "	8 "	950 "	3,000 "	69.50
4	3¼ x 10 "	3 " 8 "	4 " 6 "	1½ x ¾ "	10 " 6 "	3 " 2 "	3 " 6 "	14 "	10 "	1,050 "	3,500 "	71.00
5	3½ x 11 "	3 " 8 "	4 " 6 "	1⅝ x ¾ "	10 " 6 "	3 " 2 "	3 " 6 "	14 "	10 "	1,100 "	4,500 "	75.00
6	3¾ x 12 "	3 " 8 "	4 " 6 "	2 x ¾ "	10 " 6 "	3 " 2 "	3 " 6 "	16 "	12 "	1,280 "	6,000 "	92.00

* No. 0.—2⅜ wagons, with drop or stiff tongue to work in the hounds, are only made in wide track and with steel skeins. Narrow track 2⅜ wagons are all made with cross bars for pole or shafts.

IRON AXLE ONE HORSE WAGONS, WIDE AND NARROW TRACK.

Size of axles	1⅛ x 6½ in.	1¼ x 6½ in.
Height of wheels.		
Front	3 ft. 6 in.	3 ft. 8 in.
Hind	4 ft.	4 ft.
Size of tire	1⅛ x ¼ in.	1⅛ x ¼ in.
Outside dimensions of bed.		
Length	7 ft. 6 in.	7 ft. 6 in.
Width	3 ft. 2 in.	3 ft. 2 in.
Depth	8 in.	10 in.
Approximate		
Weight	400 lbs.	425 lbs.
Capacity	800 lbs.	1,000 lbs.

PRICES, EITHER, $45.00.

Specifications include bent shafts and one spring seat.

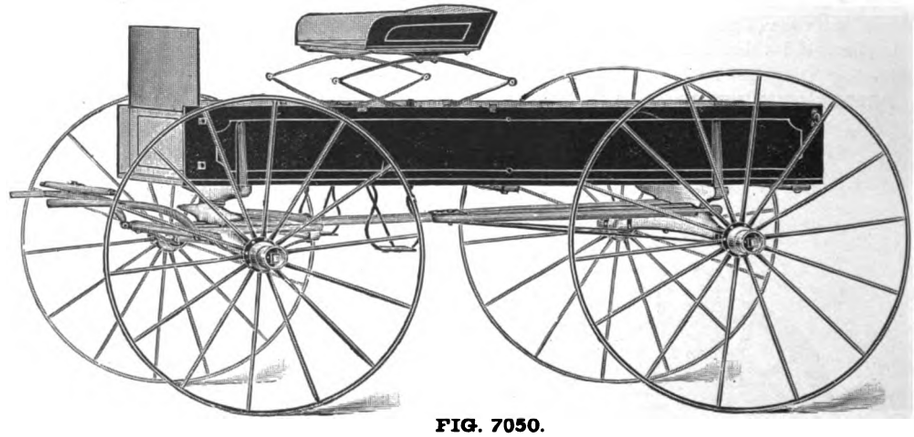


FIG. 7050.

STANDARD DUMP CARTS, CAST SKEINS.

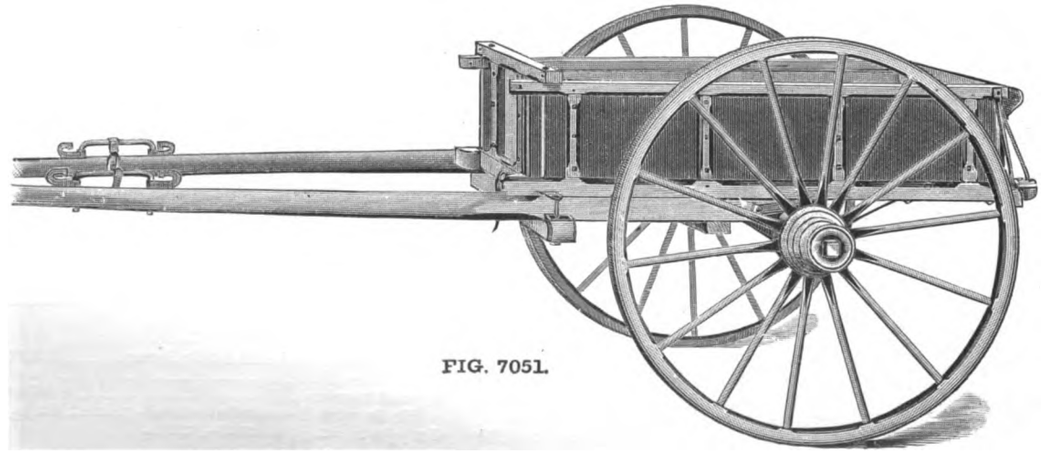


FIG. 7051.

Size of axles	3½ in.
Height of wheels	4 ft. 6 in.
Size of tire	2½ x ½ in.
Inside dimensions of bed.	
Length	5 ft. 4 in.
Average width	33 in.
Depth	13¾ in.
Approximate	
Weight	475 lbs.
Capacity	1,800 lbs.

PRICES, EACH, $56.00.

These carts are made with hard wood beds, and are especially adapted for railroad grading and rock hauling.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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CARTS AND WHEELBARROWS.

TWO WHEEL RUN BARROWS.



FIG. 7052.

For coal, salt, fertilizer, etc.
Sheet iron lined, thoroughly iron strapped, bolted and braced.

PRICES.

Large size; capacity, 1,350 lbs.	Price,	$48.00
Small " " 850 "	"	42.00

WOOD CANAL BARROWS.



FIG. 7054.

PRICES.

	Per doz.
Common nailed barrows	$
No. 1 nailed barrows, as illustrated	20.00

WOOD CANAL BARROWS.



FIG. 7056.

JUMBO BARROWS.

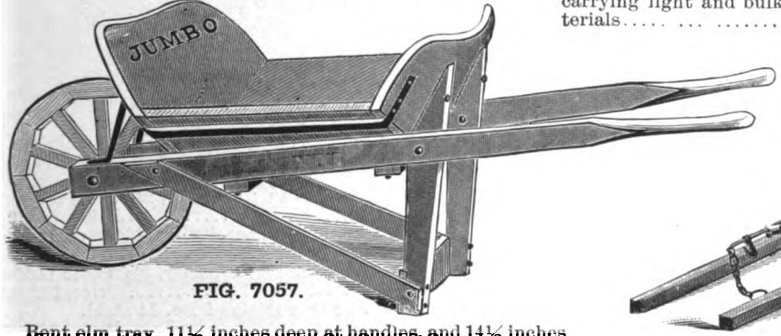


FIG. 7057.

Bent elm tray, 11½ inches deep at handles, and 14½ inches at wheel, by 42 inches wide by 32 inches long on top. Wheel, 17 inches diameter; tire, 1½ x ⅜ inches; spokes, 1 x 1 inch. Axle bolt, ½ inch.
Weight, 60 lbs. Capacity, 9 cubic feet.

PRICE, PER DOZ., $30.00.

SHOWING METHOD OF PACKING.



FIG. 7059.

RAILROAD CARTS.

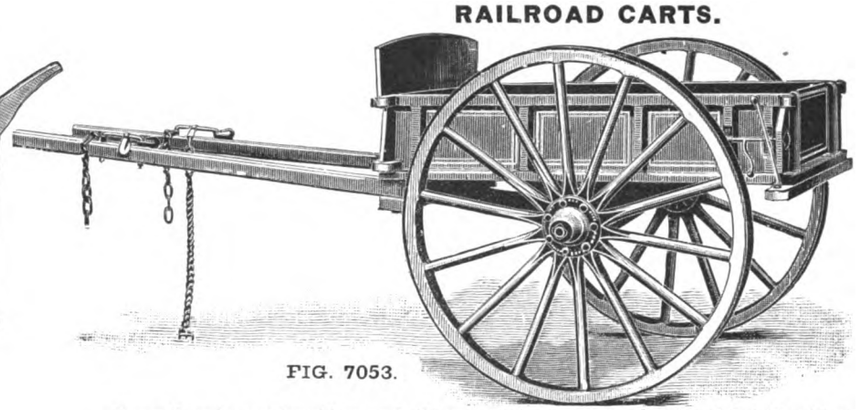


FIG. 7053.

For railroads, road making, and all large contract work. Can furnish with either iron or wood hub wheels. The light gravel cart is designed for southern use.

PRICES.

Railroad cart	$57.50
Extra railroad cart	65.00
Light gravel cart	45.00

CONTRACTOR'S CARTS.

For use on city works and by city contractors, pavers, etc., and where very durable carts are needed for constant use on all kinds of work. These carts are substantially made, and strongly re-enforced by iron braces, bolts and platings. The Boston contractor's cart is especially designed for city use.

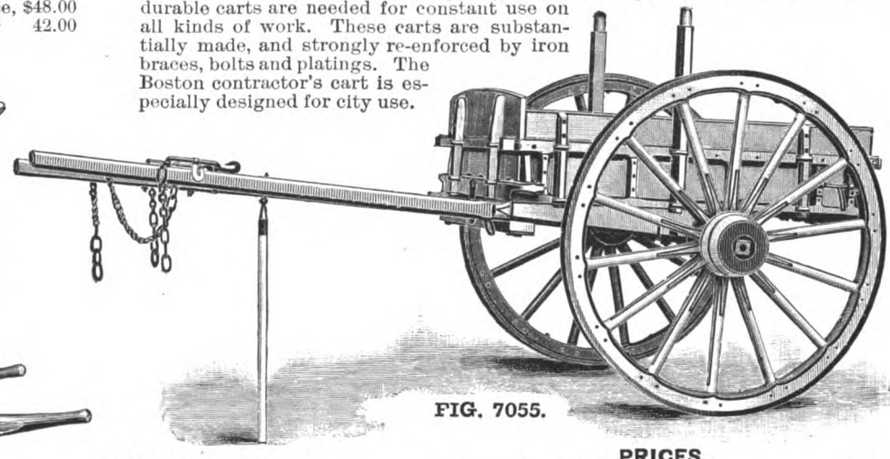


FIG. 7055.

PRICES.

Contractor's cart	$77.50
Boston contractor's cart	85.00

PRICES, FIG. 7056.

	Per doz.
No. 1 improved bolted barrows, as illustrated	$21.00
No. 5 improved bolted barrows, with extra large tray for mills, tanneries, stables, etc., for carrying light and bulky materials	52.50

RAILROAD DUMP CARTS.

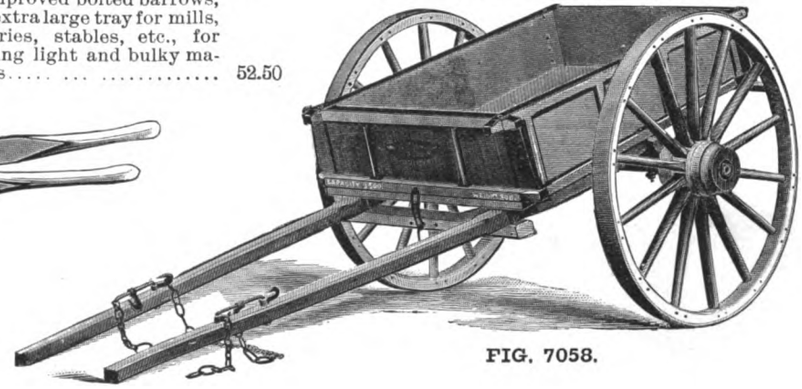


FIG. 7058.

These carts are especially adapted for contractors. Panel bed, made entirely of hard wood, well bolted together, ironed at rear end and well braced.
Steel axle, 2¼ inches square. Skein boxes, 2¼ x 10 inches.
Heavy wood hub wheels, 56 inches in diameter; tire, 3½ x ½ inches; hub, 10 inches diameter by 12 inches long; 14 spokes.
Dimensions of bed: Length, 5 feet 6 inches; width, 3 feet 7 inches; depth, rear, 12 inches; front, 15 inches. All measurements are inside.
The panel rails are 1¾ x 2 inches; bottom boards, 1¾ inches thick; sides and ends, ¾ inch thick.
The shafts are 6 feet 8 inches long and extra strong, being firmly braced and bolted together. They are hinged to axle bolster, which is 4 x 5 inches, by U bolts, and are quickly detached for shipment or storage.
The tail gate has latch or fastener, simple and easily operated.
Price includes all necessary chains and hooks.
Painted steel blue, striped and varnished.
Weight, 800 lbs. Capacity, 22 cubic feet, or 3,500 lbs.

PRICE, $70.00.

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WHEEL BARROWS.

BOLTED, JACOBS' WOOD WHEEL.

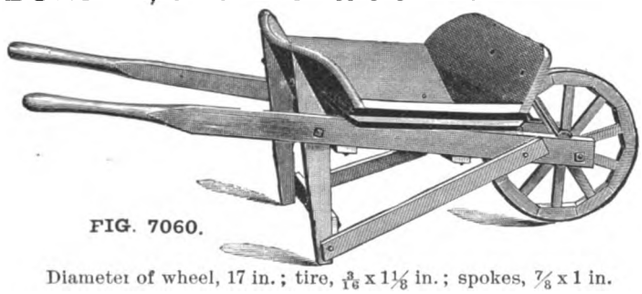


FIG. 7060.

Diameter of wheel, 17 in.; tire, $\frac{3}{16}$ x 1$\frac{1}{8}$ in.; spokes, $\frac{7}{8}$ x 1 in.
Weight, 50 lbs. **PRICE, PER DOZ., $20.00.**

STONE BARROWS.

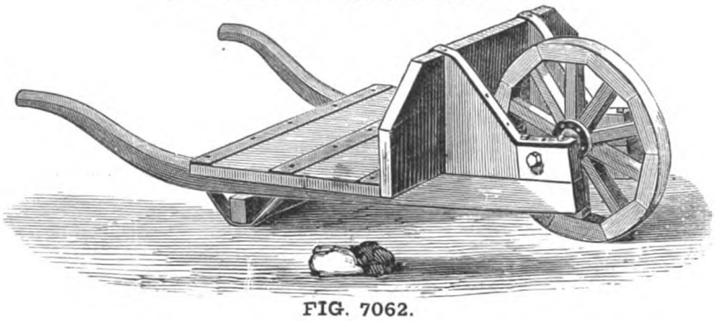


FIG. 7062.

Bent handles, solid bottom, strongly made and well bolted and ironed for rough use.

PRICE, EACH, $5.00.

EXTRA IRON TRAY COAL BARROW.

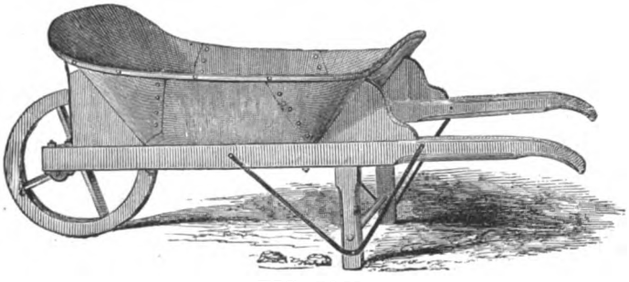


FIG. 7063.

Capacity, 300 lbs. **PRICE, $12.00.**

WOOD, STEEL TRAY, JACOBS' WHEEL.

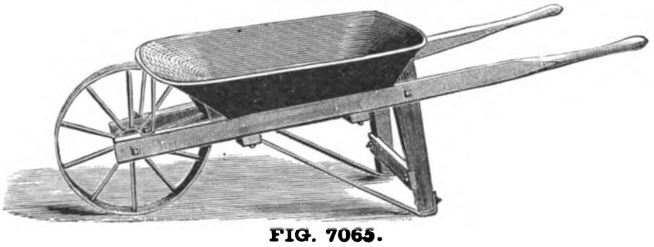


FIG. 7065.

Wheel, 16$\frac{1}{2}$ in. diameter; tire, 1$\frac{3}{8}$ x $\frac{3}{8}$ in.; steel spokes, $\frac{1}{4}$ x $\frac{5}{8}$ in.
Tray of No. 15 steel; flange turned over a $\frac{5}{16}$ in. steel rod, passing entirely around the tray, giving a smooth finish to the edge, preventing breaking, and stiffening and strengthening the tray.
Tray and wheel painted black; frame, brown.

No. 1. Greatest width of tray, 30 in.; greatest length, 34 in.; greatest depth, 7$\frac{1}{2}$ in.; capacity, 3 cubic feet; weight, complete, 65 lbs. Price, $4.00.

No. 2. Greatest width of tray, 28$\frac{1}{2}$ in.; greatest length, 36 in.; greatest depth, 9 in.; capacity, 4 cubic feet; weight, complete, 72 lbs. Price, $4.25.

MINING BARROWS.

SIMILAR TO FIG. 7067.

Size No. 4	$11.50
Size No. 4$\frac{1}{2}$	12.25
Size No. 5	14.25
Size No. 6	15.75

BOLTED, JACOBS' STEEL SPOKE WHEEL.

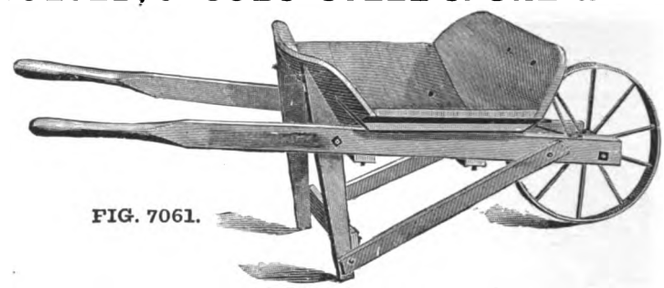


FIG. 7061.

Same as above, but with Jacobs' patent iron and steel wheel.
Diameter of wheel, 16$\frac{1}{2}$ in.; wrought-iron tire, 1$\frac{3}{8}$ in. wide, $\frac{3}{8}$ in. thick; steel spokes, $\frac{5}{8}$ x $\frac{1}{4}$; hub, 6 in. long, $\frac{1}{2}$ in. bore; weight, 55 lbs.

PRICE, PER DOZ., $22.00.

EXTRA WOOD TRAY COAL BARROWS.

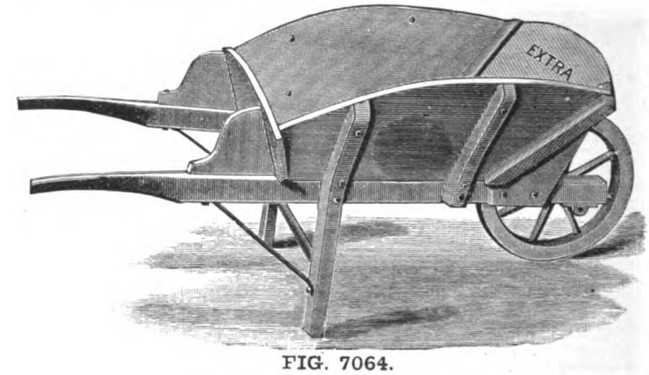


FIG. 7064.

For coal, ore, mortar, etc. Very strong and thoroughly bolted and braced.

PRICES.

No. 1.	Capacity, 250 lbs	$10.00
No. 2.	" 300 "	10.50
No. 3.	" 350 "	11.00

SPECIAL CANAL OR R. R. BARROWS.

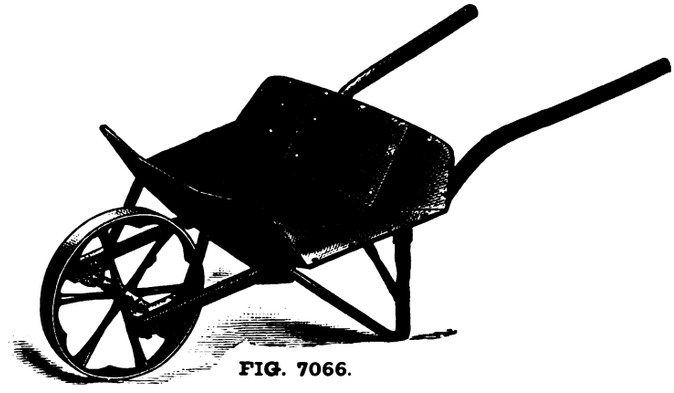


FIG. 7066.

No. 1. Width of tray, 30 in.; depth of tray, 10 in.; capacity, 2$\frac{1}{2}$ cubic feet of earth; 15 in. wheel; tray of No. 16 steel. Price, $10.00

No. 2. Width of tray, 32 in.; depth of tray, 10 in.; capacity, 3 cubic ft. of earth; 15 in. wheel, tray of No. 16 steel. Price, $11.00

No. 3. Width of tray, 34 in.; depth of tray, 12 in.; capacity, 3$\frac{1}{4}$ cubic ft. of earth; 16 in. wheel; tray of No. 16 steel. Price, $12.00

No. 3 A. Size and capacity same as No. 3; tray made of No. 14 steel. Price, $13.00

DIRT BARROWS.

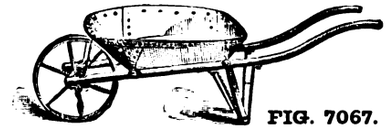


FIG. 7067.

Size No. 4, with tray, made of No. 16 steel, holding 3 cubic ft. of earth. Price, $10.75
Weight of barrow, 65 lbs.

Size No. 4$\frac{1}{2}$, with tray, made of No. 14 steel. Same size as No. 4. Price, $11.50
Weight of barrow, 70 lbs.

Size No. 5, with tray, made of No. 14 steel, holding 4 cubic ft. of earth. Price, $13.50
Weight of barrow, 80 lbs.

Size No. 6, with tray, made of No. 14 steel, holding 5 cubic feet of earth or 225 lbs. of coal, adapted for same use as No. 5 and as a small coal barrow. Price, $15.00
Weight of barrow, 85 lbs.

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WHEEL BARROWS.

DIRT BARROWS.

PRICES, FIG. 7068.



FIG. 7068.

Size No. 4, with tray, made of No. 16 iron, holding 3 cubic feet of earth....Price, $10.75
Size No. 4½, with tray, made of No. 14 iron, same capacity as No. 4.....Price, $11.50
Size No. 5, with tray, made of No. 14 iron, holding 4 cubic feet of earth....Price, $13.50
Size No. 6, with tray made of No. 14 iron, holding 5 cubic feet of earth or 225 lbs. of coal, adapted for same use as No. 5, and as a small coal barrow.....Price, $15.00

MINING BARROWS.

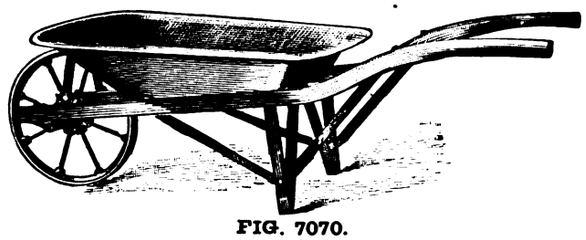


FIG. 7070.

PRICES.

Nos.	Cubic feet.	Tray No.	Handles No.	Weight.	Prices.
A 1.	3	15	13	68	$11.50
A 2.	3	14	12	74	12.00
A 3.	3	13	12	80	12.50
A 4.	3	12	10	86	14.00
A 5.	4	12	10	92	15.50

Wheels, 16 in. diameter.

FIGS. 7069, 7073 AND 7074, PACKED FOR SHIPMENT.

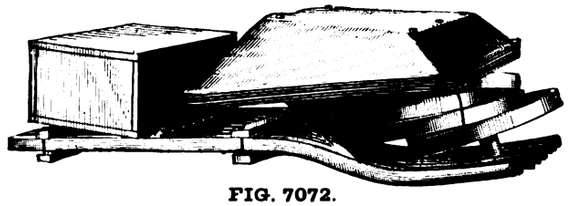


FIG. 7072.

PRICES, 7074, GRADE A.

No. 4 A. Greatest width of tray, 29 in.; greatest length of tray, 32 in.; 16 in. wheel; tray of Nos. 12 and 10 steel; capacity, 3 cubic ft.
Price, $14.00

No. 5 A. Greatest width of tray, 31½ in.; greatest length of tray, 36 in.; 16 in. wheel; tray of Nos. 12 and 10 steel; capacity, 4 cubic ft.
Price, $15.00

No. 6 A. Greatest width of tray, 32 in.; greatest length of tray, 38 in.; 16 in. wheel; tray of Nos. 12 and 10 steel; capacity, 4½ cubic ft.
Price, $16.50

No. 7 A. Greatest width of tray, 36 in.; greatest length of tray, 39 in.; 16 in. wheel; tray of Nos. 12 and 10 steel; capacity, 5½ cubic ft.
Price, $20.00

No. 8 A. Greatest width of tray, 40 in.; greatest length of tray, 45 in.; 16 in. wheel; tray of Nos. 12 and 10 steel; capacity, 7½ cubic ft.
Price, $22.00

PRICES, FIG. 7074, GRADE A A.

No. 4 AA. Greatest width of tray, 29 in.; greatest length of tray, 32 in.; 16 in. wheel; tray of Nos. 12 and 8 steel; capacity, 3 cubic ft.
Price, $15.00

No. 5 AA. Greatest width of tray, 31½ in.; greatest length of tray, 36 in.; 16 in. wheel; tray of Nos. 12 and 8 steel; capacity, 4 cubic ft.
Price, $16.00

No. 6 AA. Greatest width of tray, 32 in.; greatest length of tray, 38 in.; 16 in. wheel; tray of Nos. 12 and 8 steel; capacity, 4½ cubic ft.
Price, $17.50

No. 7 AA. Greatest width of tray, 36 in.; greatest length of tray, 39 in.; 16 in. wheel; tray of Nos. 12 and 8 steel; capacity, 5½ cubic ft.
Price, $21.00

No. 8 AA. Greatest width of tray, 40 in.; greatest length of tray, 45 in.; 16 in. wheel; tray of Nos. 12 and 8 steel; capacity, 7½ cubic ft.
Price, $23.00

DIRT BARROWS.

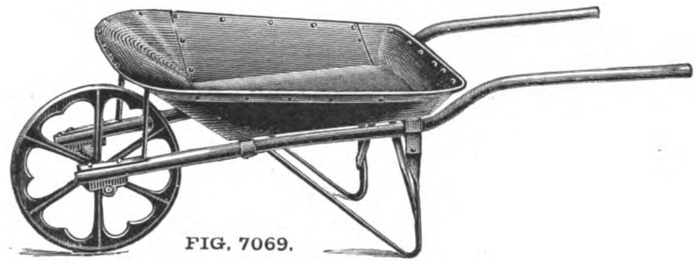


FIG. 7069.

PRICES.

No. 4. Greatest width of tray, 29 in.; greatest length of tray, 32 in.; capacity, 3 cubic ft. of earth; 15 in. wheel; tray of No. 16 steel.
Price, $10.75

No. 4½. Size and capacity same as No. 4; tray of No. 14 steel.
Price, $11.50

No. 5. Greatest width of tray, 31½ in.; greatest length of tray, 36 in.; capacity, 4 cubic ft. of earth; 16 in. wheel; tray of No. 14 steel.
Price, $13.50

SPECIAL MINING BARROWS.

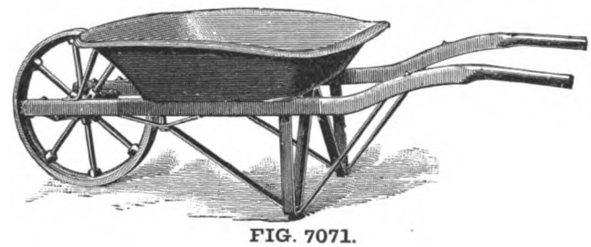


FIG. 7071.

No. A 6. 4 cubic feet. Tray No. 10. Handles No. 10. Weight, 130. Wheels, 19 in. diameter. **PRICE, $22.00.**

MINING BARROWS.



FIG. 7073.

Made to dump forward; will not run back on man; discharges load easily.

PRICES.

No. 4. Greatest width of tray, 29 in.; greatest length of tray, 32 in.; capacity, 3 cubic ft. of earth; 15 in. wheel; tray of No. 16 steel.
Price, $11.50

No. 4½. Size and capacity same as the No. 4; tray of No. 14 steel.
Price, $12.25

No. 5. Greatest width of tray, 31½ in.; greatest length of tray, 36 in.; capacity, 4 cubic ft. of earth; 16 in. wheel; tray of No. 14 steel.
Price, $14.25

FOUNDRY BARROWS.

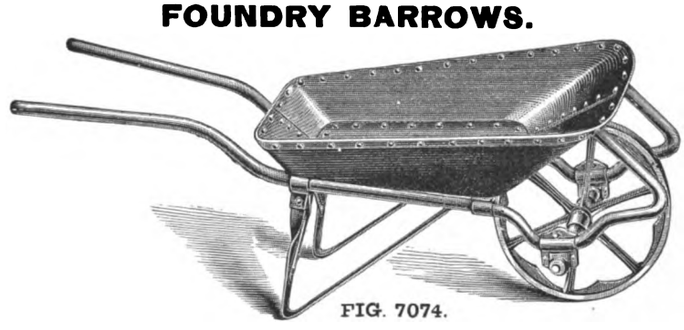


FIG. 7074.

These barrows are made in two grades of thickness of trays, but in each the bottoms are made heavier than the sides.

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STEEL WHEEL BARROWS.

FOUNDRY BARROWS.

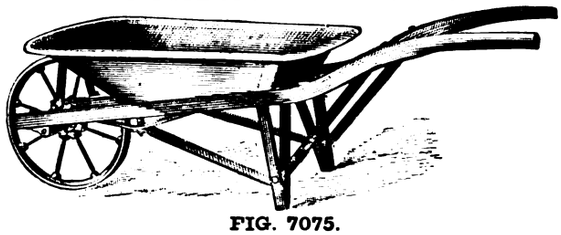


FIG. 7075.

No. 1. 3 cubic ft.; tray No. 13; handles No. 10; weight, 85 lbs.. Prices, $14.00
No. 2. 3 " " " " 12; " " 10; " 100 " " 16.50
No. 3. 4 " " " " 12; " " 10; " 110 " " 18.50
Wheels, 16 in. diameter.

SMELTING FURNACE BARROWS.

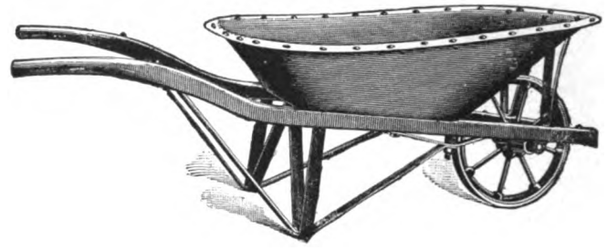


FIG. 7076.

325 lbs.; tray No. 12; handles No. 10; weight, 130 lbs..... Price, $25.00
Wheels, 16 in. diameter. Suspension braces.
*All parts extra heavy.

PIC METAL AND INGOT BARROW.

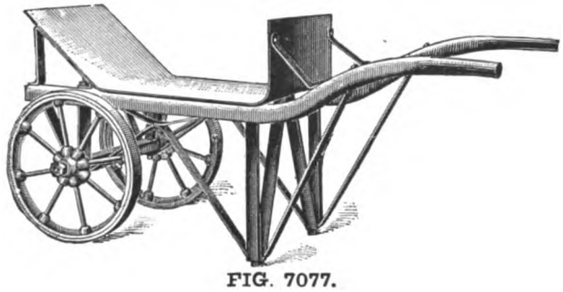


FIG. 7077.

Bed No. 4; handles No. 10; weight, 120 lbs..... Price, $30.00
Wheels, 16 in. diameter, extra heavy. Suspension braces.
Bed, front and back of one plate, 14 in. wide.

PIC METAL AND INGOT BARROW.

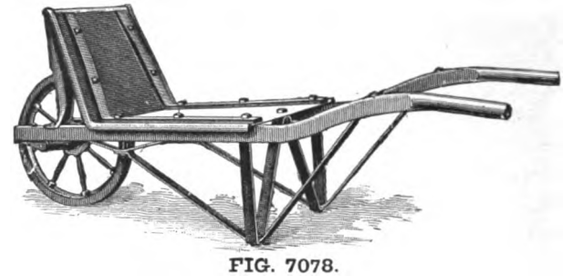


FIG. 7078.

Bed No. 12; handles No. 10; weight, 120 lbs..... Price, $18.00
Wheel, 16 in. diameter, extra heavy. Suspension braces.
Bed, front and front braces of one plate.

BARROW FOR GREEN BRICK.

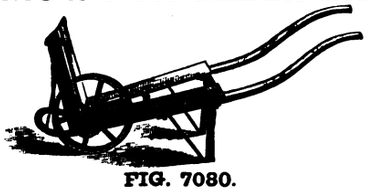


FIG. 7080.

Weight, 80 lbs. Price, 18.00

BARROWS FOR PIC METAL.

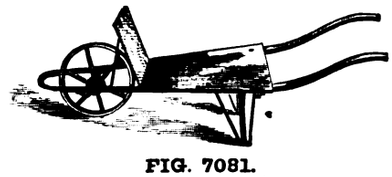


FIG. 7081.

Weight, 78 lbs. Price, $16.00
Fitted to receive wooden sides, price, $17.50

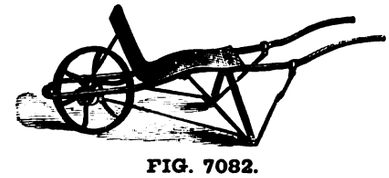


FIG. 7082.

Price, $20.00

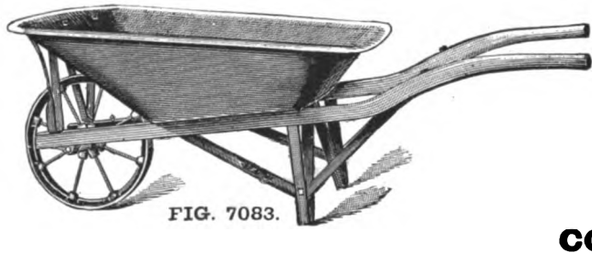


FIG. 7083.

COAL BARROWS, WITH 16 IN. WHEELS.

PRICES, FIG. 7083.

No. B 1. 200 lbs.; tray No. 14; handles No. 12; weight, 78 lbs.... ....Prices, $14.50
No. B 2. 250 " " " 14; " " 12; " 84 " ..... " 18.00
No. B 3. 325 " " " 14; " " 12; " 90 " ..... " 20.00
No. B 3½. 325 " " " 12; " " 10; " 105 " ..... " 22.00
No. B 4. 400 " " " 11; " " 10; " 130 " ..... " 26.00

COAL BARROWS.



FIG. 7084.

These barrows dump forward, have bottoms thicker than the sides; being bolted, they can be taken apart easily.

No. 4. Greatest width of tray, 29 in.; greatest length of tray, 32 in.; capacity, 150 lbs. of coal; 15 in. wheel; tray of Nos. 16 and 12 steel. Price, $12.25

No. 5. Greatest width of tray, 31½ in.; greatest length of tray, 36 in.; capacity, 200 lbs. of coal; 16 in. wheel; tray of Nos. 16 and 12 steel. Price, $14.25

No. 6. Greatest width of tray, 32 in.; greatest length of tray, 38 in.; capacity, 225 lbs. of coal; 16 in. wheel; tray of Nos. 16 and 12 steel. Price, $15.00

No. 8. Greatest width of tray, 40 in.; greatest length of tray, 45 in.; capacity, 450 lbs. of coal; 16 in. wheel; tray of Nos. 16 and 12 steel. Price, $20.00

No. 7. Greatest width of tray, 36 in.; greatest length of tray, 39 in.; capacity, 300 lbs. of coal; 16 in. wheel; tray of Nos. 16 and 12 steel. Price, $18.00

PRICES, FIG. 7084.

Our "A" barrows have sides of No. 12 and bottoms of No. 10 steel.

No. 4 A. Greatest width of tray, 29 in.; greatest length of tray, 32 in.; 16 in. wheel; tray of Nos. 12 and 10 steel; capacity, 3 cubic ft. Price, $14.00

No. 5 A. Greatest width of tray, 31½ in.; greatest length of tray, 36 in.; 16 in. wheel; tray of Nos. 12 and 10 steel; capacity, 4 cubic ft. Price, $15.00

No. 6 A. Greatest width of tray, 32 in.; greatest length of tray, 38 in.; 16 in. wheel; tray of Nos. 12 and 10 steel; capacity, 4½ cubic ft. Price, $16.50

No. 7 A. Greatest width of tray, 36 in.; greatest length of tray, 39 in.; 16 in. wheel; tray of Nos. 12 and 10 steel; capacity, 5½ cubic ft. Price, $20.00

No. 8 A. Greatest width of tray, 40 in.; greatest length of tray, 45 in.; 16 in. wheel; tray of Nos. 12 and 10 steel; capacity, 7½ cubic ft. Price, $22.00

Our "AA" barrows have sides of No. 12 and bottoms of No. 8 steel.

No. 4 AA. Same size as No. 4 A; tray of Nos. 12 and 8 steel. Price, $15.00

No. 5 AA. Same size as No. 5 A; tray of Nos. 12 and 8 steel. Price, $16.00

No. 6 AA. Same size as No. 6 A; tray of Nos. 12 and 8 steel. Price, $17.50

No. 7 AA. Size and capacity, same as No. 7 A; tray of Nos. 12 and 8 steel. Price, $21.00

No. 8 AA. Size and capacity, same as No. 8 A; tray of Nos. 12 and 8 steel. Price, $23.00

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WHEEL AND CHARGING BARROWS.

COAL BARROWS.



FIG. 7085.

Size A, with tray holding 325 lbs. of coal. Greatest width of tray, 30 in..Price, $26.00
Weight of barrow, 135 lbs.
Size B, with tray holding 400 lbs. of coal. Greatest width of tray, 36 in..Price, $29.00
Weight of barrow, 145 lbs.
Size C, with tray holding 260 lbs. of coal. Greatest width of tray, 25 in.; especially designed for use in coal bunkers.
Weight of barrow, 135 lbs. Price, $26.00
Size D, with tray holding 300 lbs. of coal.
Weight of barrow, 98 lbs. Price, $18.00
Size D, No. 2, with tray holding 350 lbs. of coal.....Price, $20.00
Weight of barrow, 120 lbs.
Size E, with tray holding four bushels of coke or charcoal.....Price, $28.00
Weight of barrow, 126 lbs.

COAL BARROWS.



FIG. 7086.

Size A, with tray holding 325 lbs. of coal. Greatest width of tray, 30 in...Price, $26.00
Size B, with tray holding 400 lbs. of coal. Greatest width of tray, 36 in..Price, $29.00
Size C, with tray holding 260 lbs. of coal. Greatest width of tray, 25 in.; especially adapted for use in steamship coal bunkers, Price, $26.00

LIGHT COAL BARROW.

Size D, with tray holding 300 lbs. of coal.....Price, $18.00

TWO-WHEELED COAL BARROW.



FIG. 7087.

Holding 500 lbs. **PRICE, $38.00.**

TWO-WHEELED COAL OR COKE BARROWS.



FIG. 7088.

PRICES, FIG. 7088.

No. 1.	8	cubic feet;	400	lbs. coal;	bottom,	No.	12;	sides,	No.	14.....	Prices,	$40.00
No. 2.	10	"	"	500	"	"	"	"	12	"	"	14.....	"	45.00
No. 3.	12	"	"	600	"	"	"	"	12	"	"	14.....	"	47.50
No. 4.	16	"	"	800	"	"	"	"	10	"	"	12.....	"	50.00
No. 5.	20	"	"	1,000	"	"	"	"	10	"	"	12.....	"	52.50

Wheels, 24 inches or 30 inches diameter.

CHARGING BARROWS.

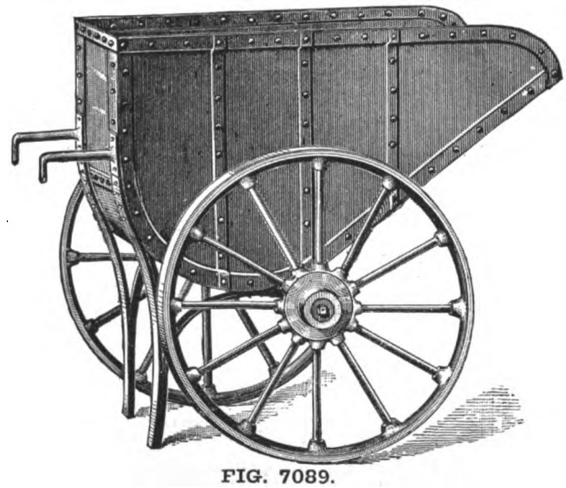


FIG. 7089.

PRICES, FIG. 7089.

Nos.	Cap., cubic.	Length of body.	Width body.	Depth body.	Out to out of axles.	Length with handles.	Height to top of body.	Weight.	Prices.
1	10 ft.	44½ in.	25½ in.	22 in.	35½ in.	53½ in.	39½ in.	575	$58.00
2	12 "	47 "	25½ "	24 "	35½ "	53½ "	40 "	600	62.00
3	14 "	50 "	26 "	26 "	36½ "	56 "	40½ "	650	65.00
4	16 "	52 "	26½ "	28 "	37 "	61 "	42 "	690	68.00
5	20 "	52 "	30½ "	30 "	40½ "	61 "	44½ "	725	72.00

BARROWS FOR CHARGING BLAST FURNACES OR GAS RETORTS.

PRICES, FIGS. 7090 AND 7091.

Nos.	Dimensions of body, in.			Capacity in cubic feet.	Prices, each.
	Width.	Depth.	Length.		
18	20	21½	54	10	$58.00
19	21	25	54	12	62.00
20	24	26	54	14	65.00
21	26	28	56	16	68.00
22	28	30	57	20	72.00

Charging barrows of other sizes can be made to order.

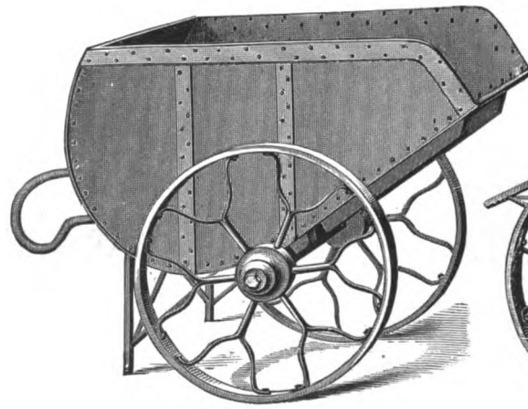


FIG. 7090.

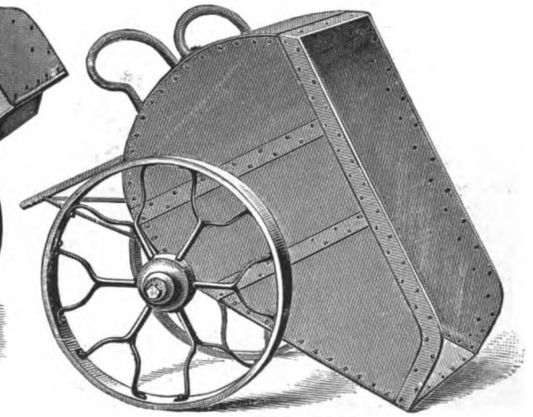


FIG. 7091.

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ASH BARROW.

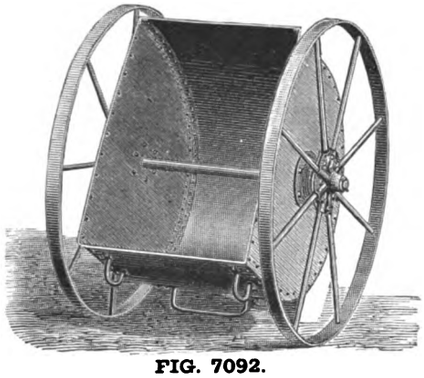


FIG. 7092.

PRICES, FIG. 7092.

For coal, ashes or waste material. Convenient for use on elevators, being self-contained. Inside measurements: 26 in. wide, 34 in. deep, 36½ in. long; greatest width, 48½ in. Outside diameter of wheels, 48⅝ in. Capacity, 16 cubic feet.

PRICE, $60.00.

STEEL COAL OR COKE WAGONS.

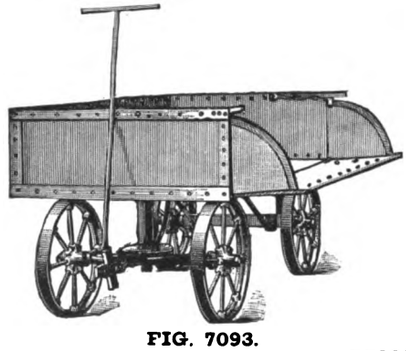


FIG. 7093.

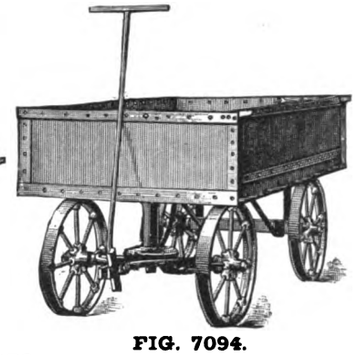


FIG. 7094.

PRICES.

Body, 34 x 60 x 13 ; capacity, 900 lbs. of coal, **$90.00.**

ASHBOX CARS.

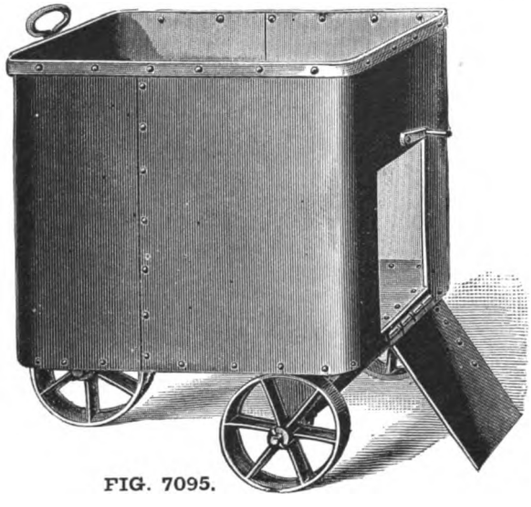


FIG. 7095.



FIG. 7096.

PRICES, FIGS. 7095 AND 7096.

For use in factories where steam boilers are employed, for either coal or ashes. Measurements: 36 in. long, 30 in. wide, 30 in. deep; diameter of wheels, 12 in.; capacity, 18 cubic feet, or 1,500 lbs. of coal.

PRICE, $60.00.

DROP SIDE COAL CARS FOR TRACK, OR WHEELS FOR GROUND.

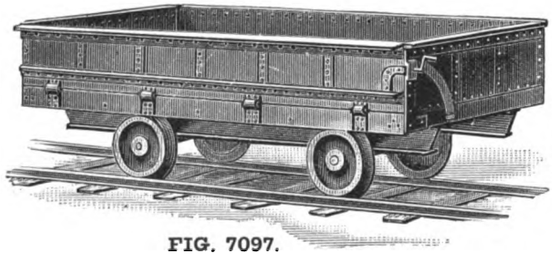


FIG. 7097.

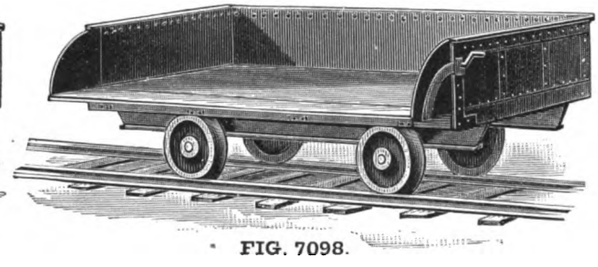


FIG. 7098.

PRICES, FIGS. 7097 AND 7098.

7 ft. 8 in. x 3 ft. 7 in. x 14 in. inside measurement; 28 in. from top of track to top of body; both sides to lower; for track of 36 in. gauge; capacity of 32 cubic feet or 2,500 lbs. of coal.

PRICES GIVEN ON APPLICATION.

SIDE DUMPING COAL CARS.

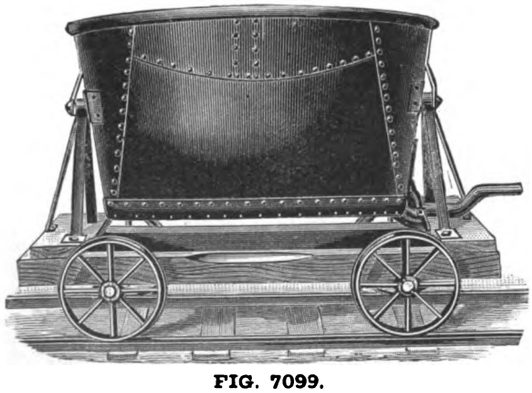


FIG. 7099.

For use in coal yards, brick works and large factories.

Dumping both sides of the track.



FIG. 7100.

Number.	Height from track.	Height, dumping.	Width on top.	Length over all.	Diameter of wheels.	Track gauge.	Distance C to C wheels.	Capacity.	Prices.
60	62 in.	72 in.	60 in.	90 in.	18 in.	30 in.	52 in.	1 ton.	$150.00
61	63 "	83 "	69 "	91 "	18 "	30 "	52 "	1½ "	175.00
62	68 "	93 "	80 "	112 "	23 "	36 "	52 "	2 "	225.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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STEEL MINING CARS.

No.	Length.	Width.	Depth.	Gauge.	Capacity.	Weight.	Prices.
1	48 in.	28 in.	18 in.	18 in.	14 ft.	750	$90.00
2	48 "	26 "	20 "	22 "	14 "	750	90.00
3	52 "	34 "	18 "	24 "	25 "	940	105.00
4	66 "	54 "	12 "	30 "	25 "	1,000	115.00
5	48 "	40 "	18 "	36 "	20 "	950	110.00
6	56 "	36 "	24 "	36 "	28 "	950	110.00
7	64 "	43 "	20 "	36 "	31 "	1,300	137.00
8	64 "	43 "	26 "	36 "	40 "	1,400	143.00

Wheels chilled, loose, self-oiling, 12 in. diam., 3 in. tread. Eye bolts for couplings. Coupling bars to order, but extra. Cars dump side and end. Cars to dump but one end, 6 per cent. from list. Brakes, if needed, $8.50 net, extra. Size and width of gauge as required. Self-oiling journals. Dumps at either side or end.

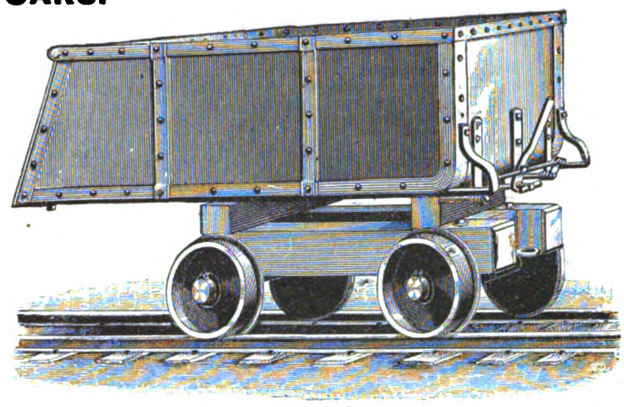


FIG. 7101.

DESCRIPTION, FIGS. 7102 AND 7103.

The swivel cars, as illustrated, are two feet gauge and 15 cubic feet capacity, equal to 1 ton quartz; the body or box is 39 x 41 inches, and stands 42 inches high on the track; total weight about 875 lbs. The side dumpers illustrated have the same capacity as the swivel, but stand only 38 inches high on the track, and weigh about 800 lbs. complete.

We still make to order any of our other styles of gate, side, end, or swivel, etc., etc.

PRICES ON APPLICATION.

SIDE DUMP CARS.

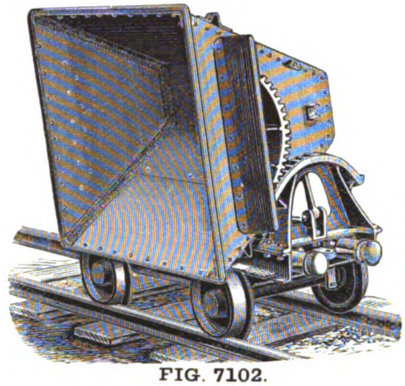


FIG. 7102.

SWIVEL DUMP CARS.

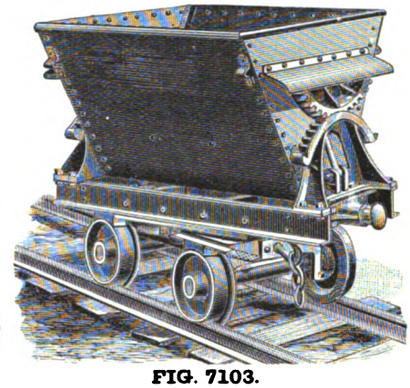


FIG. 7103.

COALING TUBS.



FIG. 7104.



FIG. 7105.

PRICES, IRON, FIGS. 7104 AND 7105.

Size No.	Capacity in coal.	Weight of tub.	Width, over all.	Prices, each.
24	250 lbs.	155 lbs.	28 in.	$30.00
25	335 "	170 "	30 "	32.50
26	400 "	195 "	32 "	35.00
27	500 "	230 "	35 "	40.00
28	500 "	250 "	35 "	45.00
29	600 "	275 "	38 "	65.00
30	700 "	370 "	42 "	75.00
31	1,120 "	480 "	45 "	90.00
32	2,240 "	600 "	55 "	150.00

PRICES, STEEL, 7104 AND 7105.

Size No.	Capacity in coal.	Weight of tub.	Width over all.	Prices, each.
33	250 lbs.	135 lbs.	28 in.	$30.00
34	335 "	150 "	30 "	32.50
35	400 "	160 "	32 "	35.00
36	500 "	190 "	35 "	40.00
37	500 "	210 "	35 "	45.00
38	600 "	223 "	38 "	65.00
39	700 "	290 "	42 "	75.00
40	1,120 "	390 "	45 "	90.00
41	2,240 "	550 "	55 "	150.00

SELF-OPENING COALING TUBS.



FIG. 7106.



FIG. 7107.

These tubs open from both sides, and close automatically.

PRICES, IRON, FIGS. 7106 AND 7107.

Size No.	Capacity in coal.	Prices, each.	Size No.	Capacity in coal.	Prices, each.
42	250 lbs.	$40.00	46	600 lbs.	$75.00
43	335 "	42.50	47	700 "	85.00
44	400 "	45.00	48	1,120 "	100.00
45	500 " Heavy pattern.	55.00	49	2,240 "	160.00

PRICES, STEEL, FIGS. 7106 AND 7107.

Size No.	Capacity in coal.	Prices, each.	Size No.	Capacity in coal.	Prices, each.
51	250 lbs.	$40.00	55	600 lbs.	$75.00
52	335 "	42.50	56	700 "	85.00
53	400 "	45.00	57	1,120 "	100.00
54	500 " Heavy pattern.	55.00	58	2,240 "	160.00

STEAM POWER COALING TUBS.

PRICES, FIG. 7108.

No. 5, holding 400 lbs., each.....$50.00
" 6, " 500 " " 55.00
" 7, " 600 " " 65.00
" 7, " 600 " " large wheels... 70.00
" 8, " 700 " " " " ... 75.00
" 9, " 800 " " " " ... 80.00
" 10, " 900 " " " " ... 85.00
" 11, " 1,000 " " " " ... 90.00
" 12, " 2,000 " " " " ...180.00



FIG. 7108.
With side or top lock.

HORSE POWER COALING TUBS.

PRICES, FIG. 7109.

No. 1, holding 1/8 of a ton, each.....$30.00
" 2, " 1/6 " " " 32.50
" 3, " 1/5 " " " 35.00
" 4, " 1/4 " " " 40.00
" 4, " 1/4 " " " heavy.... 45.00

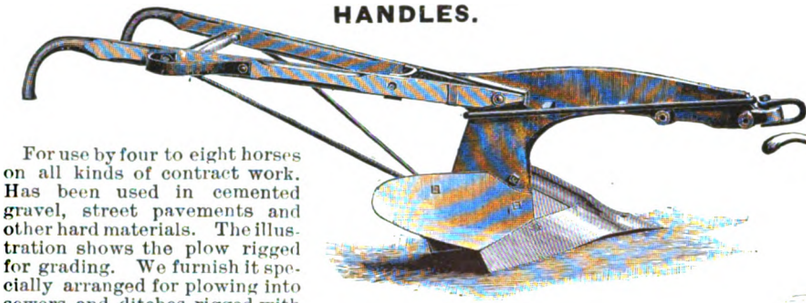


FIG. 7109.
With side or top lock.

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CONTRACTORS' AND ROAD PLOWS.

TRUSS BEAM, WROUGHT POINT AND YOKE FOR HANDLES.



For use by four to eight horses on all kinds of contract work. Has been used in cemented gravel, street pavements and other hard materials. The illustration shows the plow rigged for grading. We furnish it specially arranged for plowing into sewers and ditches rigged with a short mould-board, wheel and cutter when desired.

FIG. 7110.

A 4 SWIVEL ROAD PLOW.

Especially designed for rough road work, and extensively used for this purpose. We can iron the wood-work of these plows to order.

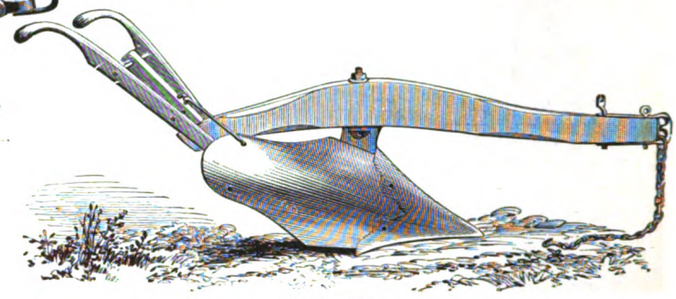


FIG. 7111.

NO. 8 COULTER ROAD PLOW.

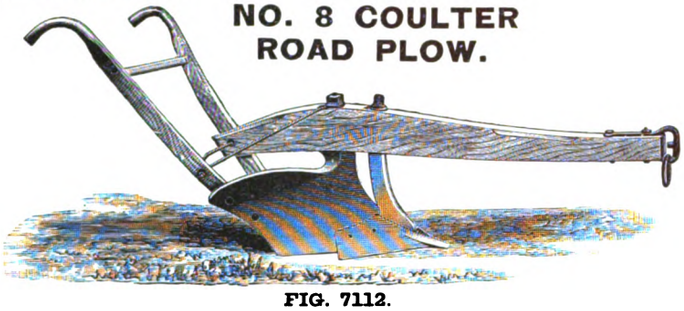


FIG. 7112.

We iron the wood-work of these plows when desired. Can rig them with a high plate iron mould-board for use in plowing snow out of gutters in city streets.

PRICES, FIGS. 7110 TO 7112.

	Plain.	Wheel.	Wheel and cutter.
Truss beam, heavy grading	$30.00	$32.50	
" " " ditching	30.00	32.50	$35.00
A 4 swivel, heavy road	14.50	16.00	
" " " extra ironed	19.00	20.50	
No. 8 Coulter, heavy road	17.50	19.00	
" 8 " " " extra ironed	22.00	23.50	
" 8 " " " with snow mould-board	23.50		

RIGHT OR LEFT R. R. GRADING PLOWS.

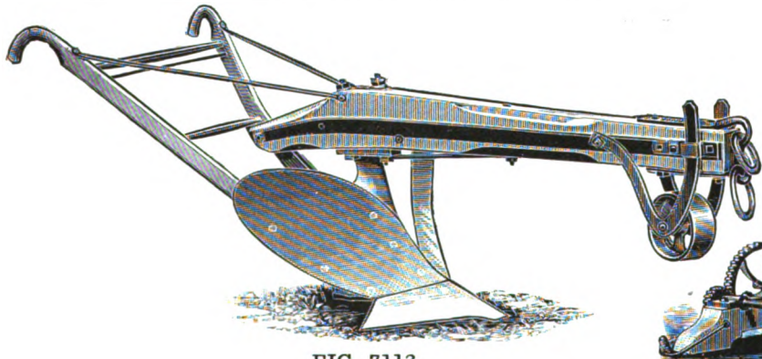


FIG. 7113.

PRICE, FIG. 7113.

The beam is the toughest butt cut white oak, carefully selected; length, 7 feet, and 3¼ x 7 inches at standard. It has an adjustable gauge wheel, 3 x 6½ inches. It does not turn the soil over, but loosens it, leaving the trash on top, so that it will not interfere with the scraper when filling.

WEIGHT, 200 LBS. PRICE, $30.00.

ONE HORSE LEVER POWER AND JACK.

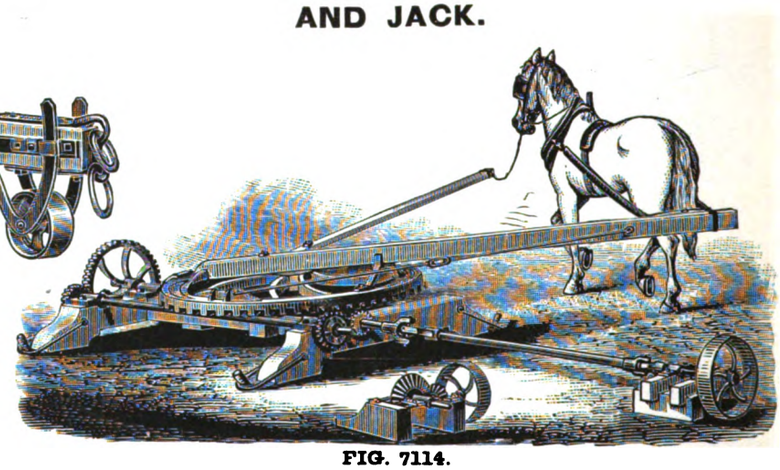


FIG. 7114.

Price, with pulley, 12 x 3½ inches, on end of tumbling shaft counter, giving 3 speeds, 22½, 96 and 205 revolutions per minute.

Price of power, with tumbling shaft and pulley $50.00
" " " " " " bevel geared jack and pulley 60.00
Total weight, 600 lbs.

Fig. 7115 illustrates a cheap and effective lever horse-power, applicable to various uses about a plantation. It can be run by either one, two, three or four horses or mules as required. This power has four different speeds—two on the power and two on the jack. The main shaft on power runs 26½ turns a minute. The countershaft on power runs 65 turns. The side attachment on the jack, 65 turns. The rear attachment on the jack runs the jack-pulley 225 turns a minute. This gives all the speed required for pumping water and running grindstones, corn-shellers, feed-cutters, churns, saw-benches and threshing machines.

PRICES, FIG. 7115.

Power with jack $100.00
Weight, 1,150 lbs.
Power, without jack 85.00

TWO OR FOUR HORSE LEVER POWER AND JACK.



FIG. 7115.

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HORSE POWER HOISTING MACHINES.

BELT POWER MACHINE.

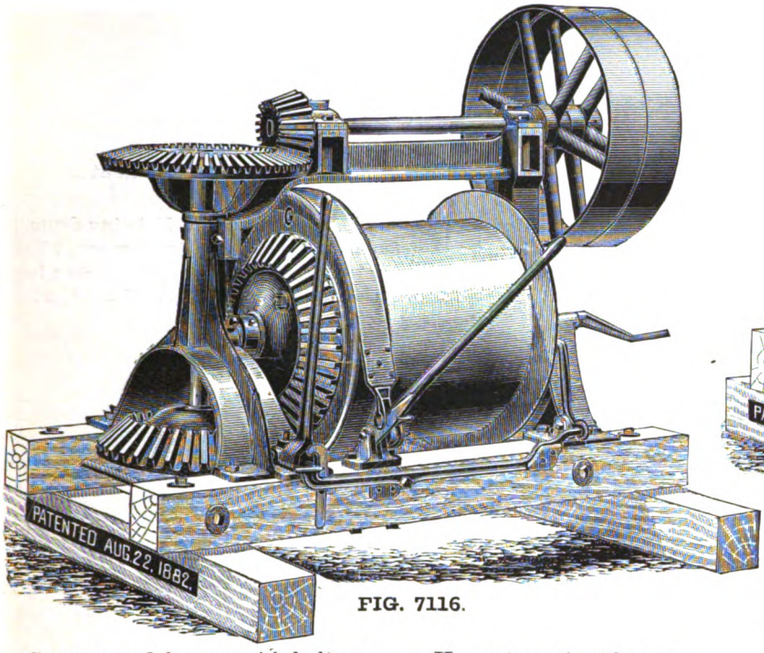


FIG. 7116.

Constructed for use with belt power. Has automatic safety attachment and brake for lowering. Driving shaft on power should run 25 revolutions per minute. Pulleys, tight and loose, 30 inches diameter, 4 inch face.

Belt apparatus can be removed and horse power attachment used if so desired.

WEIGHT, 1,700 LBS. PRICE, $150.00.

SINGLE DRUM HORSE POWERS.

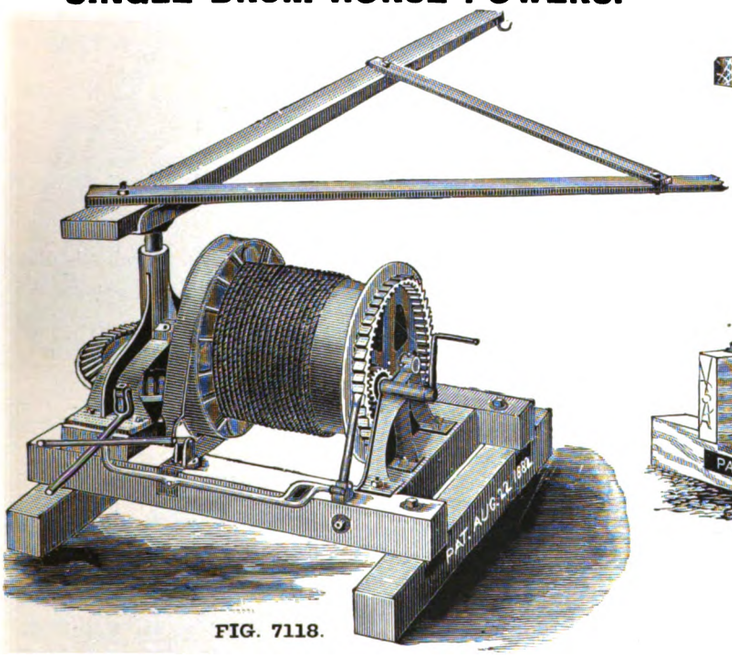


FIG. 7118.

No. 2½ is designed for light lifting, such as slate, coal, etc.

Single rope, 1,600 lbs. 33 feet per minute. Single block, 3,200 lbs. 17 feet per minute.

Gears, 39 and 26 teeth. Drum, 22 inches long by 20 inches diameter. Bed frame, 5 feet 3 inches by 3 feet wide. Height, 3 feet 6 inches.

WEIGHT, 1,300 LBS. PRICE, $100.00.

No. 3 is designed for light lifting at quick speed.

Single line, 960 lbs. 55 feet per minute. Single block, 1,920 lbs. 28 feet per minute.

Gears, 45 and 18 teeth. Drum, 21 inches long by 20 inches diameter. Bed frame, 5 feet 3 inches by 3 feet 3 inches wide. Height, 3 feet 6 inches.

WEIGHT, 1,200 LBS. PRICE, $100.00.

SINGLE DRUM HORSE POWERS.

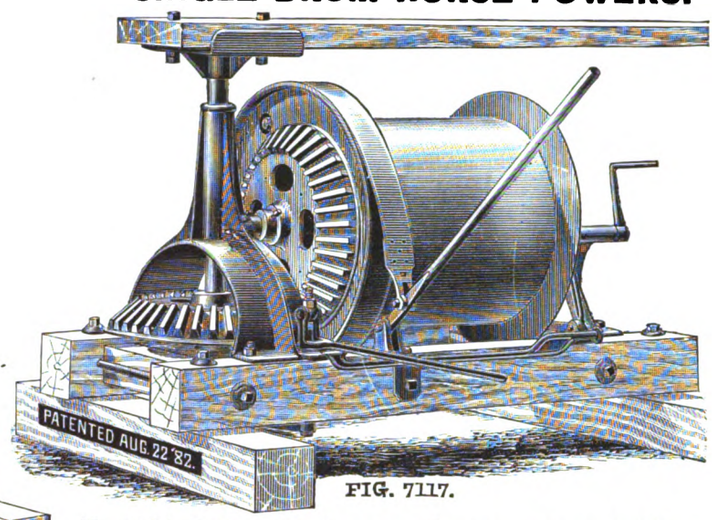


FIG. 7117.

No. 1½ is designed for heavy work—quarrying or building. Single rope, 4,800 lbs. 11 feet per minute. Single block, 9,600 lbs. 5½ feet per minute. Two single blocks, 14,400 lbs. Gears, 20 and 43 teeth. Drum, 22 inches long by 20 inches diameter. Bed frame, 5 feet 3 inches by 2 feet 9 inches wide.

WEIGHT, 1,400 LBS. PRICE, $120.00.

No. 2 is designed for the ordinary building of bridge foundations and approaches and quarrying.

Single rope, 2,400 lbs. 22 feet per minute. Single block, 4,800 lbs. 11 feet per minute. Two single blocks, 7,200 lbs.

Gears, 34 and 34 teeth. Drum, 22 inches long by 20 inches diameter. Bed frame, 5 feet 3 inches long by 2 feet 9 inches wide. Height, 3 feet 6 inches.

WEIGHT, 1,300 LBS. PRICE, $100.00.

SINGLE DRUM DOUBLE SPEED.

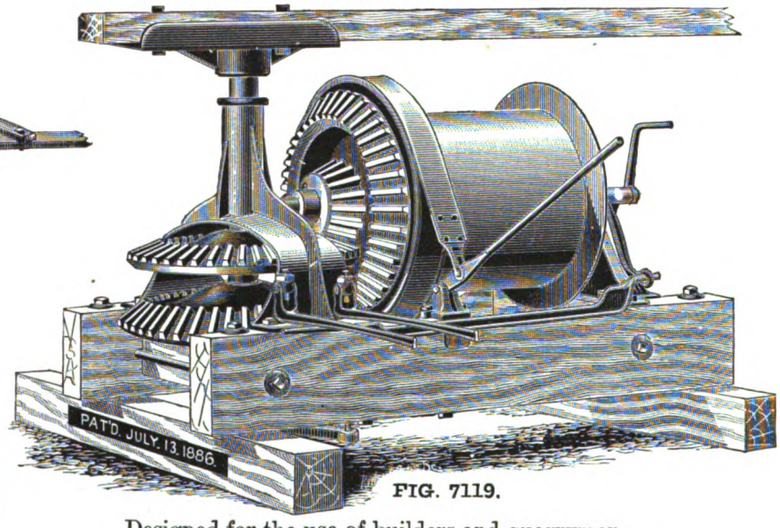


FIG. 7119.

Designed for the use of builders and quarrymen.

Fast speed.—Single rope, 960 lbs. 55 feet per minute.
" " Single block, 1,960 lbs. 28 feet per minute.

Slow speed.—Single rope, 2,400 lbs. 22 feet per minute.
" " Single block, 4,800 lbs. 11 feet per minute.
" " Two single blocks, 7,200 lbs.

Gears, 42 and 42, 45 and 18 teeth. Drum, 22 inches long by 20 inches diameter. Bed frame, 6 feet long by 3 feet 3 inches wide. Height, 4 feet.

WEIGHT, 2,000 LBS. PRICE, $150.00.

DIRECTIONS FOR FIGS. 7117, 7118 AND 7119.

To raise weight, start the horse and draw back gear lever. To lower, push forward gear lever and in the same instant apply brake and lower weight to place desired. To take up slack rope, use the crank on end of drum. To put wheels closer in gear, tighten two nuts connected with iron bridge tree, and adjust collar on outer end of drum.

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HORSE POWER HOISTING MACHINES.
DOUBLE DRUMS AND DOUBLE SPEED.

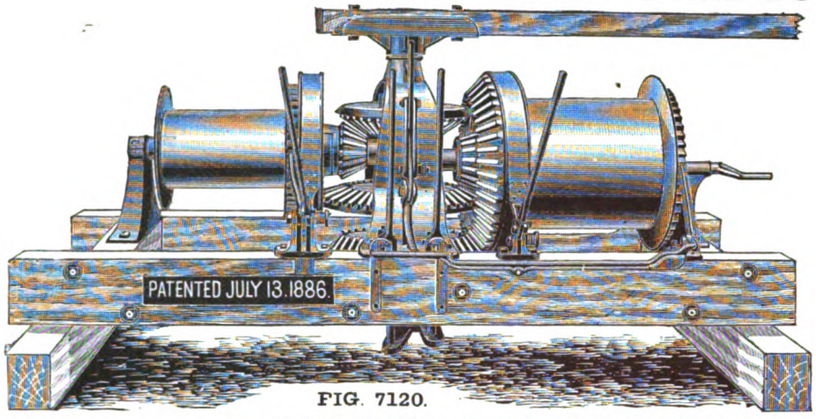
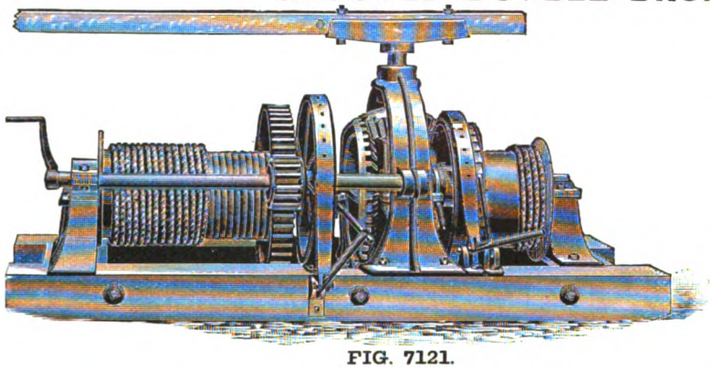


FIG. 7120.

Designed for the use of quarrymen and builders.
Fast speed.—Single rope, 960 lbs. 55 feet per minute.
" " Single block, 1,960 lbs. 28 feet per minute.
Slow speed.—Single rope, 2,400 lbs. 22 feet per minute.
" " Single block, 4,800 lbs. 11 feet per minute.
" " Two single blocks, 7,200 lbs.

Hoisting gears, 42 and 42, 45 and 18 teeth. Hoisting drum, 22 inches long by 20 inches diameter. Boom drum gears, 36 and 16 teeth. Boom drum, 12 inches diameter by 20 inches long. Bed frame, 8 feet 5 inches by 3 feet 3 inches. Height, 4 feet. Weight, 2,800 lbs. **PRICE, $200.00.**

GROOVED DOUBLE DRUMS AND DOUBLE SPEED.


FIG. 7121.

Designed to operate a derrick in quarrying or building.
Single rope, 2½ tons 10 feet in one minute. Single and double block, 10 tons. Corded drum, 28 inches long by 17 inches diameter. Drum for boom hoist, 12 inches long by 14 inches diameter. Bed frame, 8 feet long by 3 feet 8 inches wide. Height over all, 4 feet. Weight, 2,800 lbs.

PRICE, $225.00.

DIRECTIONS.

In raising a weight, put corded drum clutch in gear. Start the horse. When the weight is high enough, apply the brake, ease back the horse, throw out the clutch and lower the weight at any required speed. Care should be taken to keep the corded drum clutch out of gear when lowering the weight. The boom can be raised or lowered in the same manner and at the time the hoisting drum is in or out of gear. In no case apply the brake to stop the horse. Breeching strap on the horse should be fastened forward to the sweep-tie, so as to enable the horse to hold back when required.

NO. 3. LIGHT LIFTING AT QUICK SPEED.

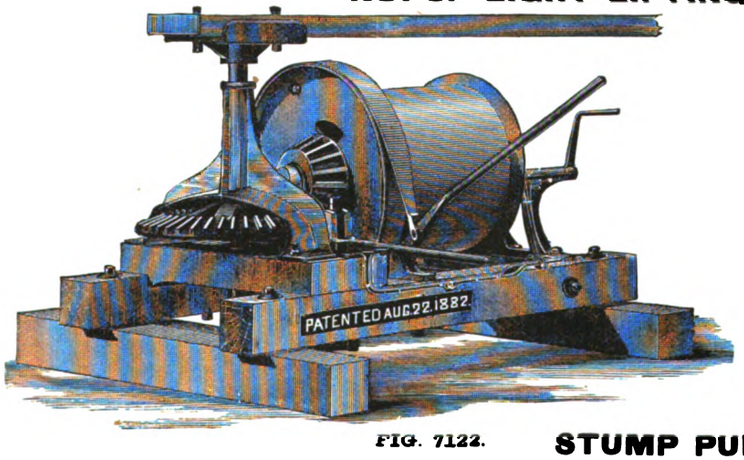


FIG. 7122.

SINGLE DRUMS.

Designed for light lifting, and at a quick speed.

CAPACITY.

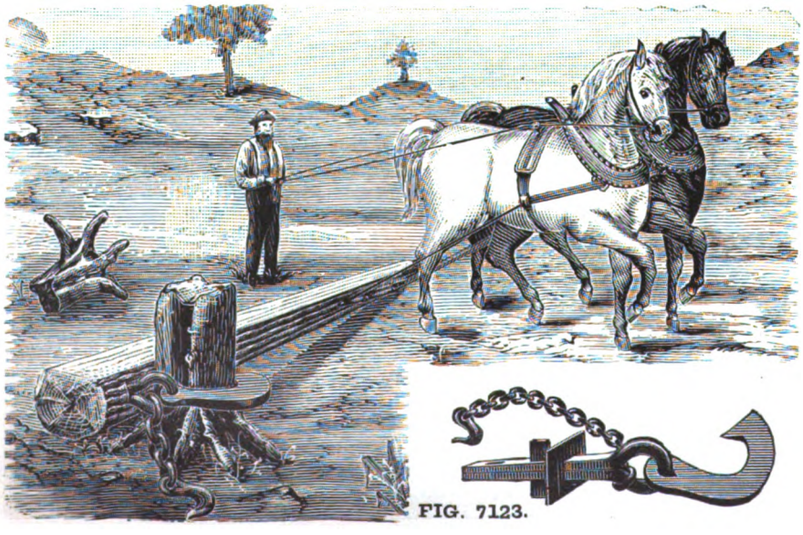
Single line, 960 lbs. 55 feet per minute. Single block, 1,920 lbs. 28 feet per minute.

DIMENSIONS.

Gears, 45 and 18 teeth. Drum, 21 inches long, 20 inches in diameter. Bed frame, 5 feet 3 inches long by 3 feet 3 inches wide. Height, 3 feet 6 inches. Weight, 1,200 lbs.

PRICE, $100.00.

STUMP PULLERS.


FIG. 7123.

PRICES, FIG. 7123.

No.	Size adjustable for stumps.	Dimensions of levers.			Prices.
		Large end.	Small end.	Length.	
1	Up to 24 in. dia.	8 x 10 in.	3 x 6 in.	20 feet.	$25.00
2	" 30 "	10 x 12 "	3½ x 8 "	25 "	35.00
3	" 40 "	14 x 18 "	6 x 12 "	30 "	50.00

DIRECTIONS.

Mortise a hole for the eye bolt through the thick end of the lever, about two feet from the large end. Put the eye bolt through with the point of the hook toward the little end. Put on the plate, and for largest sizes put the key in hole next to end of eye bolt; for medium put key in next hole. Attach the team to little end of lever, drag by the stump until hook is near the stump, place it around, attach the point to the stump, turn the team and when the lever presses the stump the hook will tighten; the team can then pull the stump. Use the chain when the stump is very small.

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STUMP PULLERS AND ROCK LIFTERS.

STUMP PULLERS.

The runners are 10 and 12 ft. long, 4 x 7, or 5 x 7, usually oak or hickory. The posts, 4¼ x 6, 5 x 6, 5 x 7, 12 and 14 ft. long, usually best of elm or maple, on account of being tough, yet light to handle. The lever is 10 or 12 feet long, best of second growth ash. The castings are made of the very best material.

PRICES are for complete machines. 12 ft. derrick, root chain, and in fact everything not mentioned as extras, but some of the extras are almost indispensable and should always be considered.

No. 0 Baby Giant, 9 in.	$15.00
No. 1 machine, 15 in. wheel, all complete	35.00
No. 2 machine, 8 in. wheel, all complete	40.00
No. 3 machine, 20 in. wheel, all complete	45.00
No. 4 machine, 23 in. wheel, all complete	50.00
No. 5 machine, 26 in. wheel, all complete	70.00

EXTRAS.

Grab hooks, iron, either size	$7.00
No. 5 " steel	10.00
No. 4 " "	9.00
Steel block chain, either size, in place of iron	5.00
14 ft. derrick either size, longer chain	2.00
2 good wagon whiffletrees	1.00
Root cutter	1.50
Crow bar	.50
Stone hooks (2)	5.00
A short, light root chain	2.00
12 ft. extra heavy lever, with iron complete, for No. 5	2.00

Irons complete, without wood work, $3.00 less.

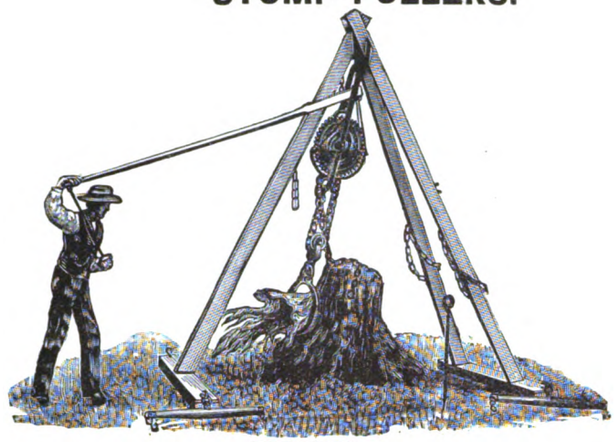


FIG. 7124.

The Nos. 1 and 2 machines are for light work only, plenty heavy for lifting ordinary stone or boulders, etc. The Nos. 3 and 4 are for medium to heavy work. No. 5 is extra heavy and strong, and especially adapted to heavy work.

ROCK LIFTERS.

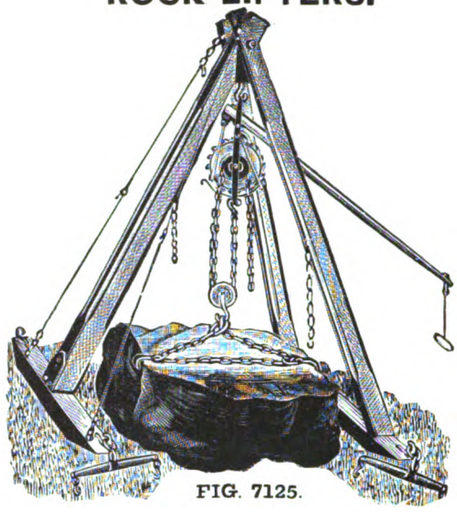


FIG. 7125.

HASLUP'S WHEEL SCRAPERS.

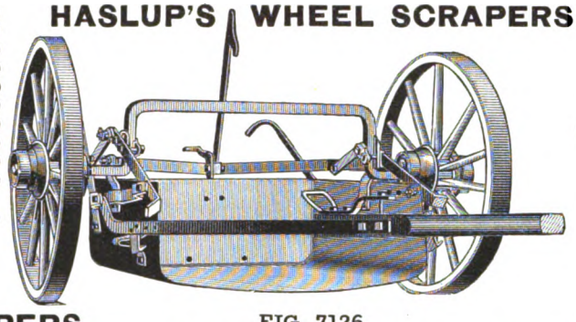


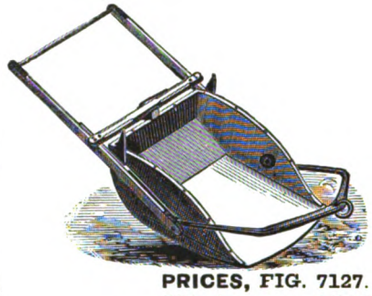
FIG. 7126.
SHOWING POSITION WHEN RAISED.

PRICES, FIG. 7126.

No. 2. Capacity, 13 cubic feet; weight, 500 lbs., $50.00.

No. 3. Capacity, 17 cubic feet; weight, 650 lbs., $55.00.

AUTOMATIC STEEL BOTTOM ROAD SCRAPER.



PRICES, FIG. 7127.

30 inch	$18.00
33 "	19.00
36 "	20.00

DRAC SCRAPERS, WITH RUNNERS.



FIG. 7128.

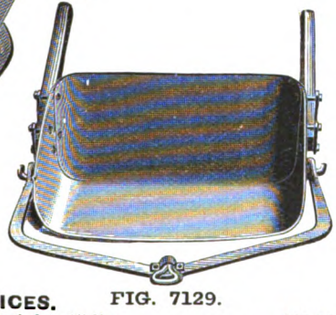


FIG. 7129.

PRICES.

No. 1.	Capacity, 7 cubic feet;		weight, 95 lbs.		$10.00
No. 2.	" 5 "	"	85 "		9.50
No. 3.	" 3½ "	"	80 "		9.25

PRESSED BOWL SCRAPERS. WITH SARVEN WOOD WHEELS.

PRICES, FIG. 7130.

No. 2. Capacity, 13 cubic feet; "Sarven Patent" wood wheels, 40 in. diam., and tire 3½ x ¼ in. Weight, complete, 595 lbs. Price, $55.00.

No. 3. Capacity, 17 cubic feet; "Sarven Patent" wood wheels, 46 inches diam., and tire, 3½ x ¼ in. Weight, complete, 705 lbs. Price, $60.00.

No. 3 has snatch rod for extra team when filling.



FIG. 7130.

PRICES, FIGS. 7131 AND 7132.

No. 1. Carries 7 feet of earth. Size of bowl: top of back to cutting edge, 33½ inches; width, 32 inches; depth, 11½ inches. Weight, 102 lbs. Price, $15.00.

No. 2. Carries 5 feet of earth. Size of bowl: top of back to cutting edge, 31½ inches; width, 29 inches; depth, 11½ inches. Weight, 94 lbs. Price, $14.00.

No. 3. Carries 3 feet of earth. Size of bowl: top of back to cutting edge, 28 inches; width, 29 inches; depth, 11½ inches. Weight, 90 lbs. Price, $13.00.

With runners, extra, per scraper, 25 cts.

With double bottoms, per scraper, extra, 50 cts.

COLUMBUS SOLID STEEL SCRAPERS, WITH AND WITHOUT RUNNERS.

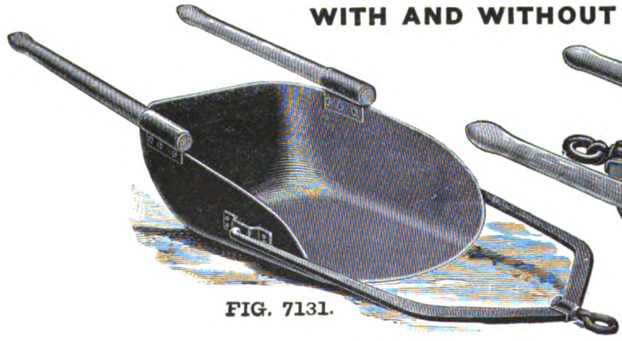


FIG. 7131.

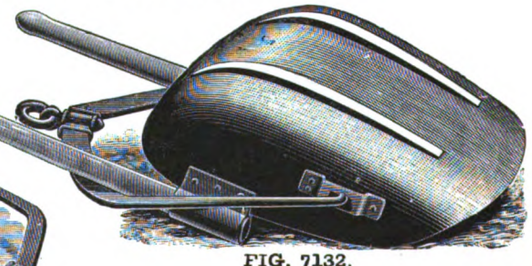
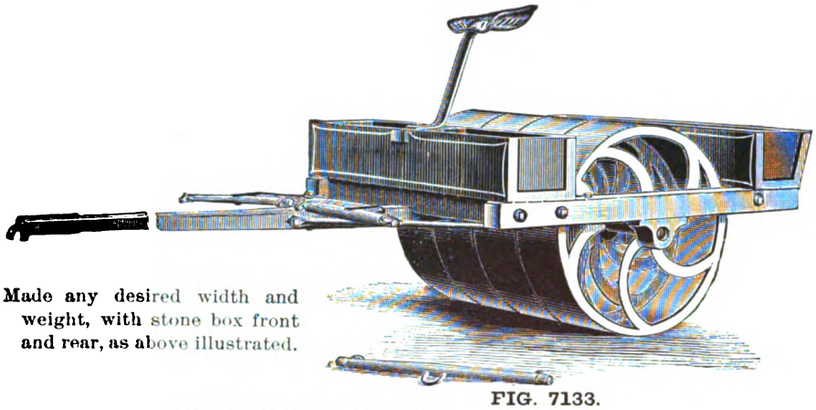


FIG. 7132.

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ROAD ROLLERS.



Made any desired width and weight, with stone box front and rear, as above illustrated.

FIG. 7133.

PRICES, FIG. 7133.

Sections.	Face. Ins.	Diam. Ins.	Weight. Lbs.	Prices.
4	12	36	2,500 to 3,500	$125.00 to $175.00
5	12	36	3,000 " 4,000	150.00 " 200.00
6	12	36	3,500 " 5,000	175.00 " 250.00
4	15	48	4,000 " 6,000	200.00 " 300.00
5	15	48	5,000 " 7,000	250.00 " 350.00
3	15	60	5,000 " 8,000	250.00 " 400.00
4	15	60	7,000 " 10,000	350.00 " 500.00
5	15	60	9,000 " 12,000	450.00 " 600.00

Scraper, $8.00 extra; seat, $5.00 extra; whiffletrees, $5.00 extra.

DESCRIPTION, FIG. 7134.

The roller has nineteen narrow sections, ten large ones 35 inches in diameter and nine smaller ones 32 inches in diameter, set alternately, for the purpose of bringing more weight on the crushed stone or earth and thus preparing a more evenly and compactly pressed road-bed than can be obtained with a wide flat section roller. The sections act independently on the axle, and are self-clearing. Width of roller on the ground, 5 feet. The bearings sustain weight of frame and driver only. Weight about 2½ tons.

Price, $265.00. Complete with neckyokes, spreader, chains and whiffletrees.

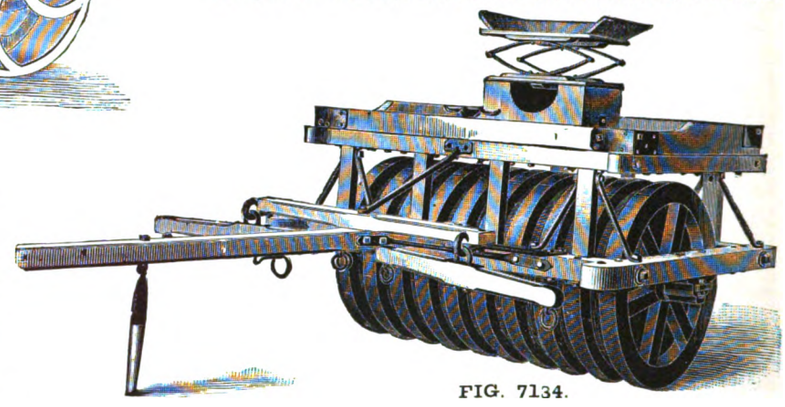


FIG. 7134.

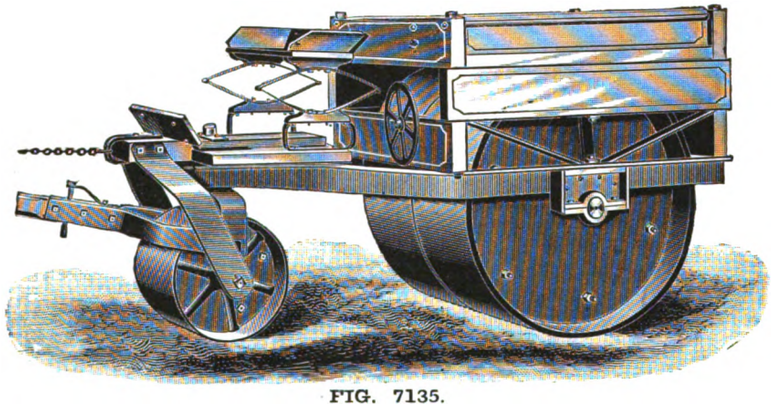


FIG. 7135.

4-TON ROAD ROLLER.

This roller is made in two sections, each section 26 inches wide and 50 inches diameter. The weight may be increased to 6 or 7 tons by loading the box over the main roll with any heavy material. The machine is made first-class in every respect. It is provided with a small front roll, which relieves the weight from the horses' necks, avoids any side switching of the tongue, and enables the tongue to be turned at full right angles, allowing the machine to be turned in the smallest possible space. The two sections of the main roll run independently of one another, and there is no injury done to the work by a short turn. The main frame is made of channel iron, scrapers are attached to the frame to clean main roll, and a brake is provided within easy reach of the driver, to enable him to control the machine on down grades.

PRICE ON APPLICATION.

STEAM ROAD ROLLERS.

Adapted in the construction of macadamized and concrete roads.

This machine is constructed as near as possible of wrought iron and steel. The main frame is made of heavy wrought iron channel beams, strongly braced with cross beams of the same material and shape, and held in place by tight fitting bolts and rivets. The small front rollers, as well as the large main rollers, are made of heavy wrought iron plates with cast iron centers.

It will adapt itself to an uneven surface, without straining the frame or injuring the engines. There is a universal joint at the front of the machine, in which the vertical pivot, corresponding to the king bolt in carriages, allows the axle to turn for the purpose of steering the machine, and in which the horizontal pivot enables the front axle to assume a position at any required angle with the rear axle, thus obviating all twisting strain hitherto met with in the construction and use of this class of machines. We use two high pressure reversible engines with link motion. The connecting rods are attached to a heavy double crank shaft, of the best hammered iron, which is held in place by suitable bearings, and on this shaft is keyed a steel bevel pinion. The large bevel wheel, constructed of steel segments, is firmly bolted to the wrought iron head of the large drum. This easy and true method of transmitting power at once meets the approval of practical engineers. In place of using a single engine, running at a high and ruinous speed, and numerous gear wheels, this machine has its first motor, viz., two steam engines of fair capacity and fully capable of giving motion to the roller with the ordinary piston speed, thus dispensing with unusual friction and with the expense of keeping in proper order a combination of gear wheels, with clutches, chains, and numerous connections. The boiler for supplying steam to the engines is well built, of the best materials, and stands in a vertical position; is of easy access for cleaning tubes, hauling fires, etc., and is furnished with the usual fixtures to make it complete. A reliable direct acting steam pump supplies the boiler with feed water from a large tank which is fastened on the frame work. A suitable coal bunker is arranged near the fire door of the boiler. Made in two sizes, 5 and 10 tons.

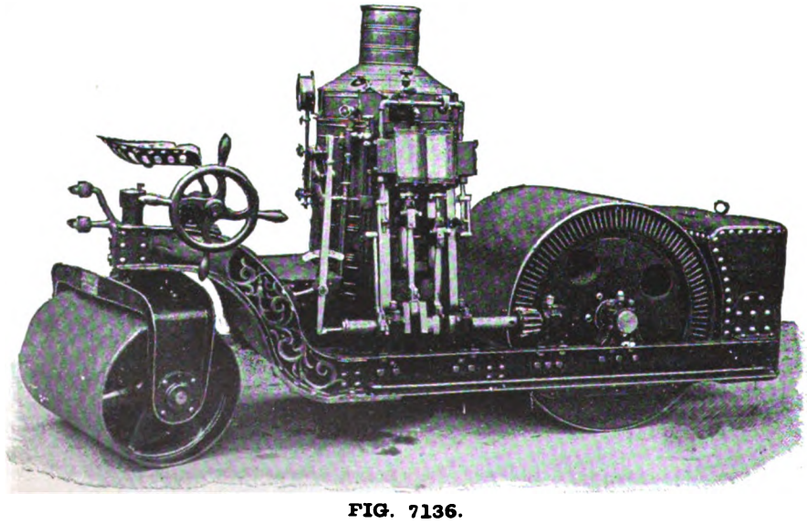


FIG. 7136.

PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ROCK DRILLS.

INCERSOLL-SARGEANT ROCK DRILLS.

PRICES, FIG. 7137.

Complete with tripod and weights.

A,	1¼ inches	$175.00
A,	2 "	200.00
B,	2½ "	275.00
C,	2¾ "	300.00
D,	3 "	325.00
E,	3⅛ " / 3¼ "	350.00
F,	3½ "	375.00
G,	4¼ "	430.00
H,	5 "	480.00

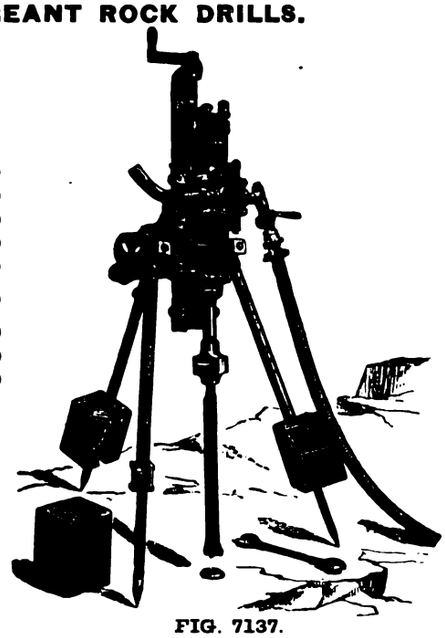


FIG. 7137.

HAND ROCK DRILL.

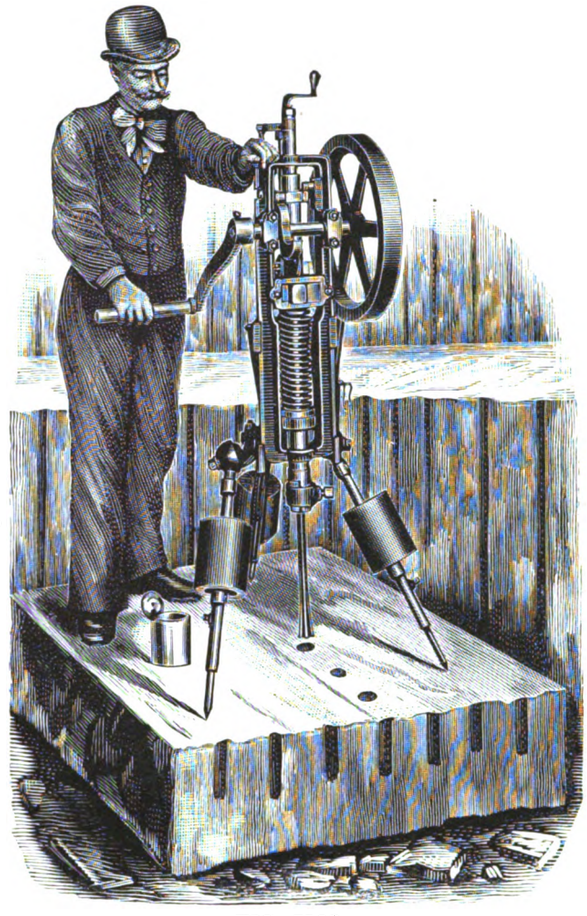


FIG. 7138.

PRICE, INCLUDING 1 SET DRILLS, WEIGHT 250 LBS., $200.00.

The drill bar passes through the cross-head; at the bottom is a collar to prevent it from dropping too low. This collar is cushioned on a rubber ring at the lower end on the cross-head. The rotating mechanism is enclosed in a box cast solid on the cross-head, which excludes the dirt and prevents the possibility of injury to the rotating gear; at the same time it acts as a tie to bind the parts firmly together, and as a seat for the top end of the spring. The spring seats at the bottom in a groove in the collar. Above the gear box is the shaft carrying the cams which lift the drill bar. After the cams have lifted the bar to the proper height, the anti-friction collars pass over the ends of the cams, and the reaction of the spring causes the bar and drill steel to descend and strike the rock with great force.

The automatic feed at the top of the drill feeds as the drill penetrates the rock, and no faster, thereby allowing the bar to have a full stroke without striking the buffer.

PISTON INLET COLD AIR COMPRESSOR.

CLASS "A" STRAIGHT LINE.

STEAM ACTUATED, WITH WATER JACKETED AIR CYLINDER AND HEADS.

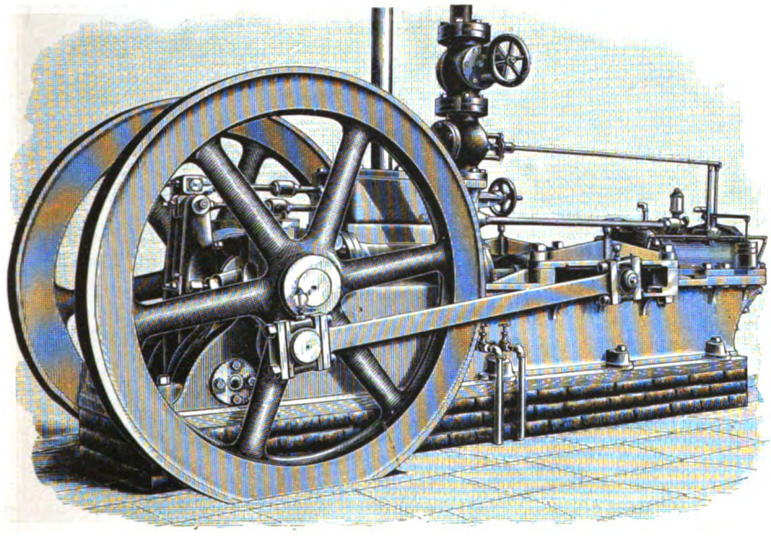


FIG. 7139.

This compressor is complete in itself, both the steam and air cylinder being situated on one solid bed. All strains are direct. Owing to the size and strength of the bed plate light foundations are sufficient, and whatever the foundation may be it is impossible for the compressor to get out of line.

SPECIFICATIONS.

Special descriptive symbol.	Diameter steam cylinder, inches.	Diameter of air cylinder, inches.	Length of stroke, inches.	No. of revolutions per minute.	Piston speed in feet per minute.	Cubic feet free air per minute.	No. of 3-in. drills or coal cutters compressor will run.	Weight of heaviest piece.	Weight of compressor complete, lbs.	Horse-power of boiler required.	Prices of compressor complete.
C L	10	10¼	12	160	320	183	2	957	5,500	30	$1,200
C M	12	12¼	14	155	361	295	3	1,650	7,400	40	1,500
C N	14	14¼	18	120	360	398	5	2,900	10,800	55	2,000
C O	16	16¼	18	120	360	518	7	2,900	12,000	70	2,500
C P	18	18¼	24	94	376	683	10	4,950	20,050	100	3,050
C R	20	20¼	24	94	376	840	12	4,950	21,400	130	3,400
C S	22	22¼	30	75	375	1,011	16	7,000	29,000	155	4,400
C T	24	24¼	30	75	375	1,202	20	7,000	34,500	200	5,000

Size "C N" and larger sizes are furnished with adjustable cut-off on steam engine.

Above prices include automatic speed and pressure regulator, with unloading device on sizes "C M" and larger. All sizes are furnished with automatic lubricators for steam and air cylinders, oil cups, foundation bolts and washers.

Foundation plans furnished with each compressor.

Special designs for any duty built to order, or sectionalized for mule-back transportation.

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SCOOPS, SHOVELS, SPADES, SPOONS, ETC.

357.—D HANDLE CAST STEEL BACK-STRAP SHOVEL.



FIG. 7140.

22.—PLAIN BACK SQUARE-POINT SHOVEL.

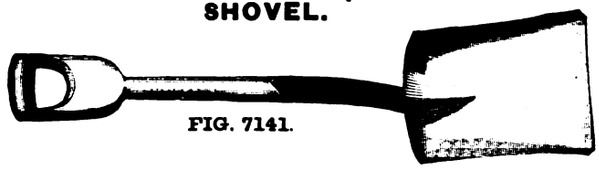


FIG. 7141.

228.—PATENT PLAIN BACK SHOVEL.

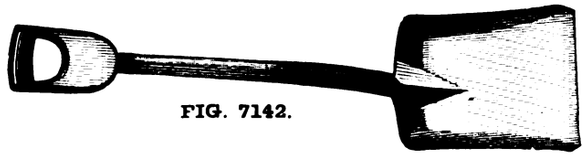


FIG. 7142.

343.—PATENT MOULDER'S SHOVEL.

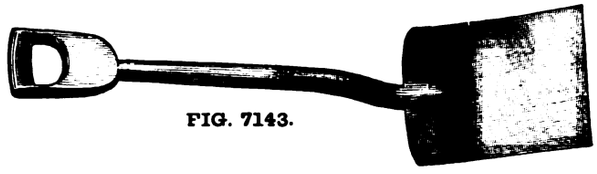


FIG. 7143.

365.—BACK STRAP D HANDLE ROUND-POINT SHOVEL.



FIG. 7144.

704.—CAST STEEL POLISHED SCOOP.



FIG. 7145.

707.—BACK VIEW NO. 6 SCOOP.



FIG. 7146.

703.—NO. 2 SCOOP.

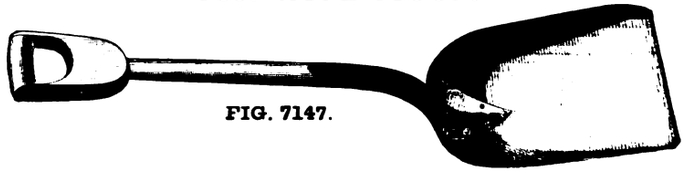


FIG. 7147.

709.—NO. 8 SCOOP.

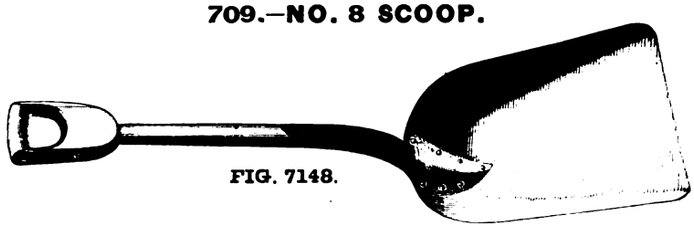


FIG. 7148.

81.—LONG HANDLE PLAIN BACK SPADE.



FIG. 7149.

53.—LONG HANDLE PLAIN BACK ROUND-POINT SHOVEL.



FIG. 7150.

374.—LONG HANDLE BACK-STRAP ROUND-POINT SHOVEL.

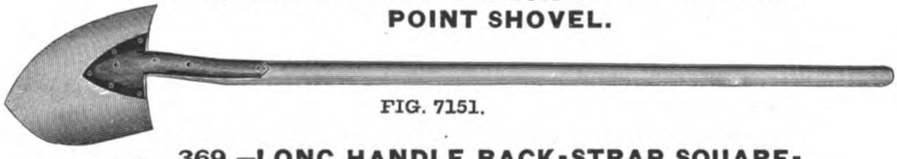


FIG. 7151.

369.—LONG HANDLE BACK-STRAP SQUARE-POINT SHOVEL.

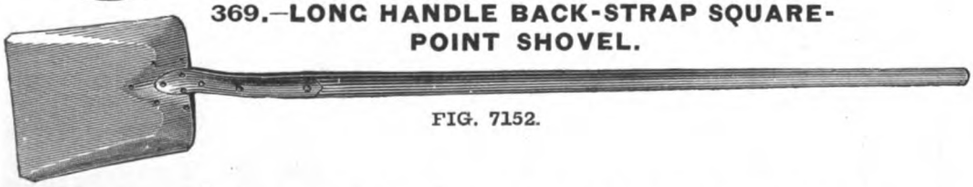


FIG. 7152.

TELEGRAPH AND POST HOLE SPOONS.



FIG. 7153.

TAMPING SHOVEL, WITH MALLEABLE IRON HEAD.



FIG. 7154.

MALLEABLE HEADS FOR SHOVELS.



FIG. 7155.

PRICE.
Trade number 837.
PER DOZEN, $3.00.

MALLEABLE D HEADS, WITH WOOD HANDLES.



FIG. 7156.

PRICE.
PER DOZEN, $1.50.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

No.	PRICES.	Per dozen.
823.	Spoon for digging out post holes; size, 10 x 8¼ in.; length of handle, 7 ft	$9.00
"	" " " " " " " 10 x 8¼ " " " " 8 "	10.00

No.	PRICES, FIG. 7154.	Per dozen.
836.	Cast steel edge plated, No. 2	$12.50
1031.	Patent solid cast steel, No. 2	13.25

FOR PRICES, SEE PAGES 895 AND 896.

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PRICES, O. AMES' SHOVELS AND SCOOPS, FIGS. 7140 TO 7152.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

CAST-STEEL EDGE PLATED SHOVELS.

BLACK.

No.		No.	Per doz.
20.	D. handle plain back square-point shovels	0.	$10.75
21.	" " " " "	1.	10.75
22.	" " " " "	2.	11.00
23.	" " " " "	3.	11.50
24.	" " " " "	4.	12.00
25.	" " " " "	5.	13.00
26.	" " " " "	6.	14.00
27.	" " " " "	7.	15.00
28.	" " " " "	8.	16.00
29.	" " " " "	9.	17.00
30.	" " " " "	10.	18.50
31.	" " " " "	11.	19.50
32.	" " " " "	12.	21.50
33.	" " " " "	13.	23.50
34.	" " " " "	14.	25.00
35.	" " " " charcoal "		27.00
36.	" " " " boys' "		7.00
37.	" " " " brick "		11.00
38.	" " " round-point "	1.	11.00
39.	" " " " "	2.	11.25
40.	" " " " "	3.	11.75
41.	" " " " "	4.	12.75
42.	" " " " "	5.	13.50
43.	" " " " "	6.	15.00
44.	" " " " "	7.	16.50
45.	Long handle plain back square-point shovels	0.	10.75
46.	" " " " "	1.	10.75
47.	" " " " "	2.	11.00
48.	" " " " "	3.	11.50
49.	" " " " "	4.	12.00
50.	" " " " "	5.	13.00
51.	" " round-point "	0.	10.75
52.	" " " " "	1.	10.75
53.	" " " " "	2.	11.00
54.	" " " " "	3.	11.50
55.	" " " " "	4.	12.00
56.	D. handle back strap square-point shovels	0.	10.00
57.	" " " " "	1.	10.00
58.	" " " " "	2.	11.00
59.	" " " " "	3.	11.50
60.	" " " " "	4.	12.50
61.	" " " " "	5.	13.25
62.	" " " " "	6.	14.25
63.	Socket plain back round-point shovels, without handles		9.50

POLISHED.

No.		No.	Per doz.
64.	D. handle plain back square-point shovels	1.	$11.50
65.	" " " " "	2.	11.75
66.	" " " " "	3.	12.25
67.	" " " round-point "	1.	11.75
68.	" " " " "	2.	12.00
69.	" " " " "	3.	12.50
70.	Long handle plain back square-point shovels	1.	11.50
71.	" " " " "	2.	11.75
72.	" " " " "	3.	12.25
73.	" " round "	1.	11.50
74.	" " " " "	2.	11.75
75.	" " " " "	3.	12.25

PATENT PLAIN BACK SOLID CAST-STEEL SHOVELS.

No.		No.	Per doz.
228.	D. handle square-point shovels, polished	2.	$12.50
229.	" " " " "	3.	13.00
230.	" " round-point " "	2.	13.00
231.	" " " " "	3.	13.50
232.	Long handle square-point " "	2.	12.50
233.	" " " " "	3.	13.00
234.	" round-point " "	2.	12.50
235.	" " " " "	3.	13.00
236.	D. handle square-point shovels, black	2.	11.75
237.	" " " " "	3.	12.50
238.	" " round-point " "	2.	12.50
239.	" " " " "	3.	13.00
240.	Long handle square-point " "	2.	11.75
241.	" " " " "	3.	12.50
242.	" round-point " "	2.	11.75
243.	" " " " "	3.	12.50
244.	D. handle spades, polished	1.	12.50
245.	" " " "	2.	12.50

POLISHED CAST-STEEL BACK-STRAP SHOVELS.

No.		No.	Per doz.
356.	D. handle square-point shovels	1.	$11.50
357.	" " " "	2.	11.50
358.	" " " "	3.	12.00
359.	" " " "	4.	12.75
360.	" " " "	5.	13.50
361.	" " " "	6.	14.25
362.	" " " "	7.	14.75
363.	" " " "	8.	15.50
364.	" " " "	9.	16.50
365.	" " round-point "	2.	12.00
366.	" " " "	3.	12.50
367.	" " " "	4.	13.50
368.	Long handle square-point "	1.	11.50
369.	" " " "	2.	11.50
370.	" " " "	3.	12.00
371.	" " " "	4.	12.75
372.	" " " "	5.	13.50
373.	" round-point "	1.	11.50
374.	" " "	2.	11.50
375.	" " "	3.	12.25
376.	" California round-point shovels	2.	11.50
377.	" round spring-point shovels	2.	11.50

SCOOPS.

No.		No.	Per doz.
703.	O. Ames cast steel, polished	2.	$13.50
704.	" " "	3.	13.75
705.	" " "	4.	14.25
706.	" " "	5.	14.50
707.	" " "	6.	15.00
708.	" " "	7.	15.50
709.	" " "	8.	16.00
710.	" " "	9.	16.75
711.	" " "	10.	17.50
712.	" " "	11.	18.00
713.	" " "	12.	19.00
714.	" " "	13.	20.00
715.	" " "	14.	21.00

Half polished cast-steel or steel scoops 25 cts. per dozen less than polished.

Unpolished cast-steel or steel scoops 50 cts. per dozen less than polished.

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PRICES, O. AMES' SPADES, ETC., FIG. 7141.

CAST-STEEL EDGE PLATED SPADES.

BLACK.

No.		No.	Per dozen.
76.	D. handle plain back spades	1.	$11.75
77.	" " " "	2.	12.00
78.	" " " "	3.	12.50
79.	" " " "	4.	13.50
80.	Long handle " "	1.	11.75
81.	" " " "	2.	12.00
82.	" " " "	3.	12.50
98.	" " " mining spades		11.00

POLISHED.

No.		No.	Per dozen.
104.	D. handle plain back spades	1.	$12.50
105.	" " " "	2.	12.50
106.	" " " "	3.	13.25
109.	Long handle " "	1.	12.50
110.	" " " "	2.	12.50
111.	" " " "	3.	13.25

PATENT PLAIN BACK SOLID CAST-STEEL SPADES.

No.		No.	Per dozen.
244.	D. handle spades, polished	1.	$12.50
245.	" " " "	2.	12.50
246.	" " " "	3.	13.25
247.	Long handle " "	1.	12.50
248.	" " " "	2.	12.50
249.	" " " "	3.	13.25
250.	D. handle mining spades, polished		11.50
253.	" " " black	1.	11.75
254.	" " " "	2.	11.75
255.	" " " "	3.	12.50
256.	Long handle " "	1.	11.75
257.	" " " "	2.	11.75
258.	" " " "	3.	12.50
259.	D. handle mining " "		10.75

POLISHED CAST-STEEL BACK STRAP SPADES.

No.		No.	Per dozen.
378.	D. handle spades	1.	$11.50
379.	" " "	2.	11.50
380.	" " "	3.	12.25
381.	" " "	4.	13.00
382.	" " long strap spades	2.	12.75
383.	" " " "	3.	13.50
384.	" " mining "		10.00
385.	Long handle "	1.	11.50
386.	" " "	2.	11.50
387.	" " "	3.	12.25
388.	" " long strap "	2.	12.75
389.	" " " "	3.	13.50

UNPOLISHED, 50 CENTS LESS PER DOZEN.

LIME SHOVELS.

No.		No.	Per dozen.
824.	Cast-steel back strap, long handle, double strap, black	5.	$14.50

CAS SHOVELS.

No.		No.	Per dozen.
825.	Cast-steel back strap, long handle, long strap, black	2.	$14.00

MOULDERS' SHOVELS.

PATENT PLAIN BACK SOLID CAST-STEEL MOULDERS' SHOVELS.

No.		No.	Per dozen.
343.	O. Ames' D. handle square-point shovels	2	$12.50

POLISHED CONCAVE OR POST SPADE.



FIG. 7159.

1020. O. Ames' cast steel, in. long, 14 16 18 20 22
Prices, per dozen $12.00 12.25 12.75 13.25 14.00

POLISHED FLAT DRAIN CLEANERS.

No. 818. Flat drain cleaner, to push. Size, 11¾ x 6½ x 5⅛ in.

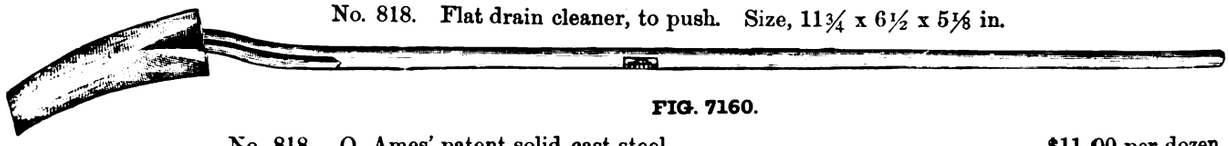


FIG. 7160.

No. 818. O. Ames' patent solid cast-steel ..... $11.00 per dozen.

EUREKA POST HOLE DIGGER.



FIG. 7157.



FIG. 7158.

DIRECTIONS FOR USE.

Throw the digger into the soil, as shown in Fig. 7157, and after the soil is well loosened, press the handles apart as shown in Fig. 7158, to hold the dirt in the digger while drawing from the hole.

POLISHED CONCAVE DRAIN CLEANERS.

No. 817. Concave drain cleaner. Tapers from 5¼ inches at shoulder to 3½ inches at point.

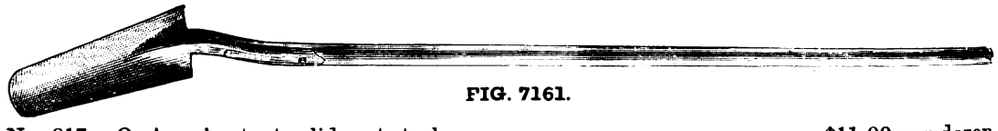


FIG. 7161.

No. 817. O. Ames' patent solid cast-steel ..... $11.00 per dozen.

HERCULES POST HOLE DIGGER.

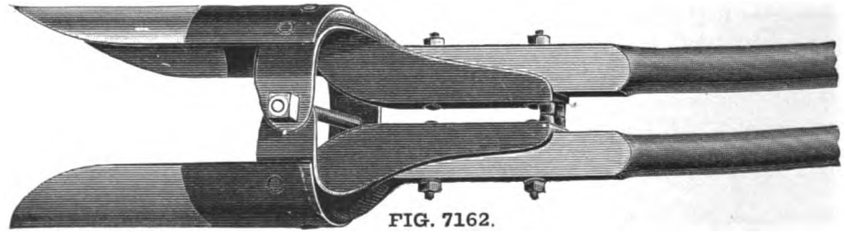


FIG. 7162.

PRICE, EACH, $2.50.

PRICES, FIG. 7157.

Digger complete ..... each,	$3.00	Cast steel blades ..... each,	$0.60
EXTRAS.		Hinge bolts ..... "	.20
Malleable iron heads ..... "	.60	Handles, per pair	.40

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COAL FORKS.

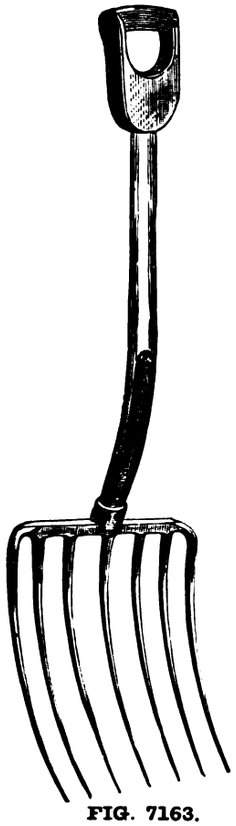


FIG. 7163.

BALLAST OR SPALL FORKS.



FIG. 7169.

D handle, strapped ferrule.

PRICES.

	Per doz.
Flat, 8 tines	$30.00
" 10 "	40.00
" 12 "	50.00

MALLEABLE SCREENING SCOOPS.



FIG. 7164.

These shovels are made of best malleable iron, are very strong and durable, and are used for coal, coke and ash screeners.

PRICE, PER DOZEN, $25.00.

SNOW SHOVELS.



FIG. 7165.

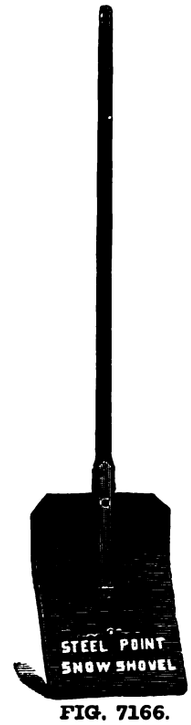


FIG. 7166.

ICE CHOPPERS.



FIG. 7167.



FIG. 7168.

PRICES.

BENT WOOD SNOW SHOVELS.

D handle	per dozen,	$3.50
L "	" "	3.25

ICE CHOPPERS AND SCRAPERS.

No. 1.	Small	per dozen,	$5.00
No. 2.	Medium	" "	6.00
No. 3.	Large	" "	7.50

PRICES, FIG. 7163.

		Per doz.
7	tines, strapped ferrule, half bright	$43.00
8	" " " " "	45.00
9	" " " " "	55.00
10	" " " " "	55.00
12	" " " " "	65.00
7	" " " black	38.00
8	" " " "	40.00
9	" " " "	50.00
10	" " " "	50.00
12	" " " "	60.00

PRICES, FIG. 7170.

						Per doz.
Diamond,	8	tines, D handle,	half bright,	strapped	ferrule	$42.00
"	10	" D "	" "	"	"	50.00
"	12	" D "	" "	"	"	60.00
"	14	" D "	" "	"	"	75.00
"	16	" D "	" "	"	"	100.00
"	18	" D "	" "	"	"	120.00
"	8	" D "	black,	"	"	41.00
"	10	" D "	"	"	"	48.00
"	12	" D "	"	"	"	57.00
"	14	" D "	"	"	"	70.00
"	16	" D "	"	"	"	92.00
"	18	" D "	"	"	"	110.00
Flat,	10	" D "	"	"	"	60.00
"	12	" D "	"	"	"	72.00

COKE FORKS.



FIG. 7170.

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PICKS.

RAILROAD OR CLAY.

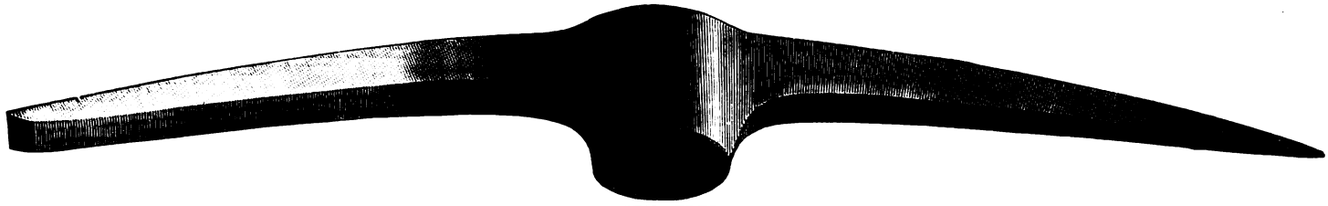


FIG. 7171.

V TAMPING.

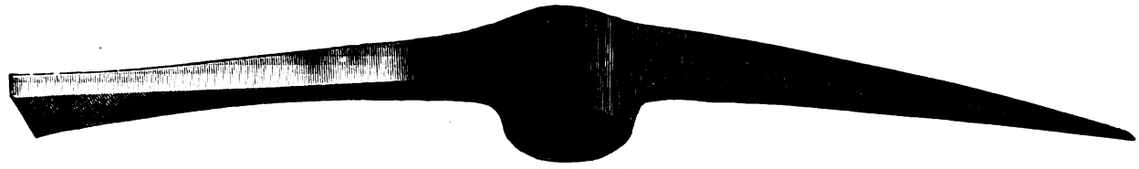


FIG. 7172.

T TAMPING.

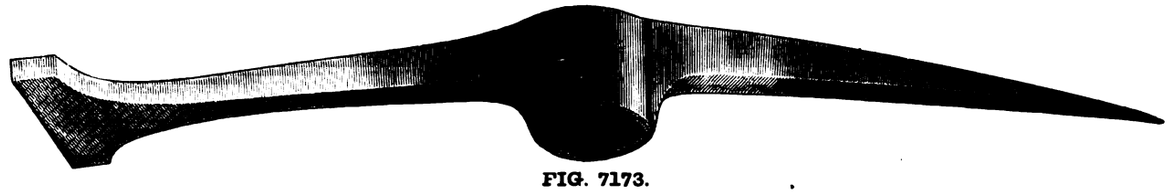


FIG. 7173.

CONTRACTORS'.



FIG. 7174.

MINERS' SURFACE.

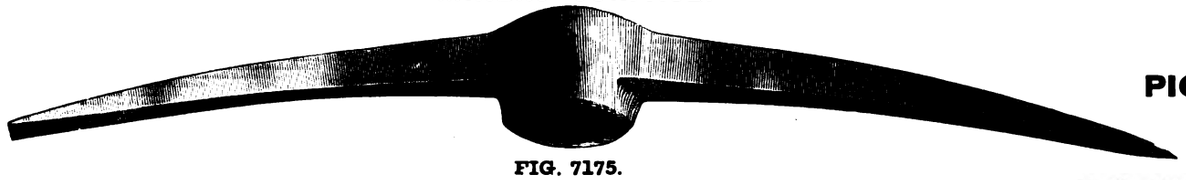


FIG. 7175.

MINERS' DRIFTING.

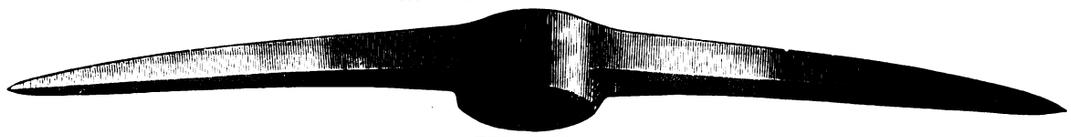


FIG. 7176.

POLL.

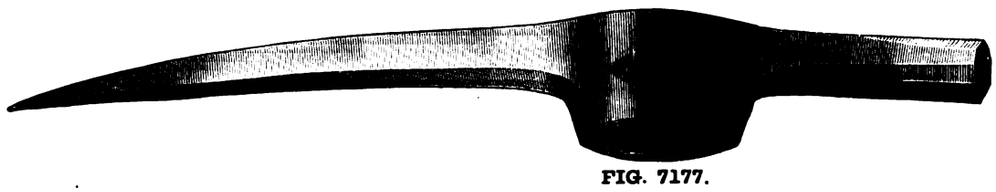


FIG. 7177.

ADZE EYE COAL.

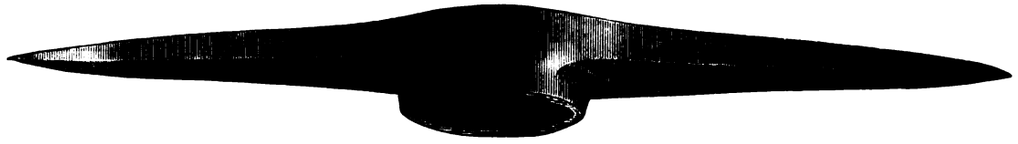


FIG. 7178.

COMMON EYE COAL.

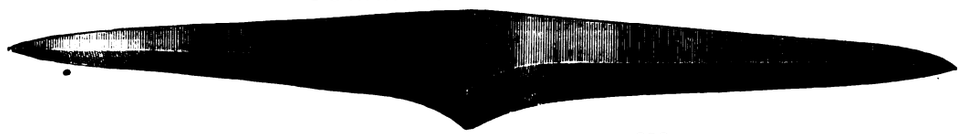


FIG. 7179.

PICKEYES.

SURFACE AND DRIFTING.

R. R. AND TAMPING.

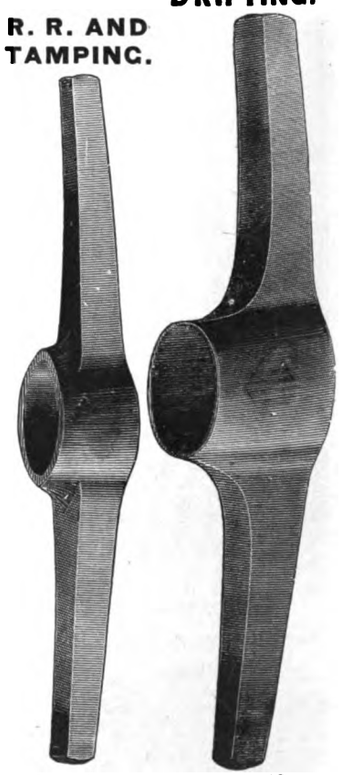


FIG. 7180. FIG. 7181.

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PRICES, PICKS.

PRICES, FIG. 7171.

Length.	Lbs.	Per doz.	Length.	Lbs.	Per doz.
21 in.	4	$10.50	26 in.	7	$13.50
22 "	4½	11.00	27 "	7½	14.00
23 "	5	11.50	27 "	8	15.00
24 "	5½	12.00	28 "	8½	16.00
25 "	6	12.50	28 "	9	17.00
25 "	6½	13.00	29 "	10	19.00

Assorted, 4-5 5-6 6-7 7-8 8-9 9-10 lbs.
$11.00 12.00 13.00 14.00 16.00 18.00 per doz.

Double pointed picks same as above.

PRICES, FIG. 7177.

Number.....	1	2	3	4	4½	5	6
Weight, lbs...	3½	4	4½	5	5½	6	7
Price, per doz.	$15.00	16.00	17.00	18.50	19.25	20.00	21.50

PRICES, FIGS. 7178 AND 7179.

Weight, lbs.,	2	2½	3	3½	4	4½	5	5½	6	6½
Price, doz.,	$8.50	9.00	9.50	10.00	10.50	11.00	11.50	12.00	12.50	13.00

PRICES, FIG. 7180.

Surface,	number.....	2	3	4	5	6
"	weight, lbs....	4½	5	5½	6	6½
"	price, per doz.	$9.00	9.50	10.00	10.50	11.00
Drifting,	number.....	1	2	3	4	5
"	weight, lbs....	3	4	4½	5	6
"	price, per doz.	$7.50	8.50	9.00	9.50	10.50

PRICES, FIG. 7181.

Railroad,	weight of pick, lbs.	4½	5	6	7	8
"	price, per doz....	$9.00	9.50	10.50	11.50	12.50
Tamping,	weight of pick, lbs.		6	7	8	
"	price, per doz....		$11.00	12.00	13.00	

PRICES, FIG. 7182.

No.	Average weight.	Size hoe.	Per doz.
0	3 lbs.	10½ x 3½ in.	$10.50
1	3½ "	10¾ x 3¾ "	11.00
2	4 "	11¼ x 4 "	11.50
3	4½ "	11½ x 4¼ "	12.00

PRICES, FIG. 7183.

Short cutter, 5 lbs..... .....$15.00 per doz.
" " 5½ " ..... 15.50 "
Long " 5 " ..... 15.00 "
" " 6 " ..... 16.00 "

PRICES, FIG. 7184.

Weight, 5 lbs..... .....$15.00 per doz.
" 6 "..... 16.00 "

PRICES, FIGS. 7172 AND 7173.

6	6½	7	7½	8	9	lbs.
$16.50	17.00	17.50	18.00	18.50	19.50	per doz.
	Assorted,	6–7	7–8	8–9	lbs.	
		$17.00	18.00	19.00	per doz.	

PRICES, FIG. 7174, OIL FINISH.

7	7½	8	8½	9	9½	10	lbs.
$18.00	18.50	19.00	20.00	21.00	22.00	23.00	per doz.

All picks packed two dozen in a case.

PRICES, FIG. 7175, OIL FINISH.

Number....	2–0	0	1	2	3	4	5	6	7
Weight, lbs..	3	3½	4	4½	5	5½	6	6½	7
Price, per dz..	$12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00

PRICES, FIG. 7176, OIL FINISH.

Number.....	1	2	3	4	5
Weight, lbs.....	3	4	4½	5	6
Price, per doz.....	$12.50	14.00	15.00	16.00	17.50

MATTOCKS.

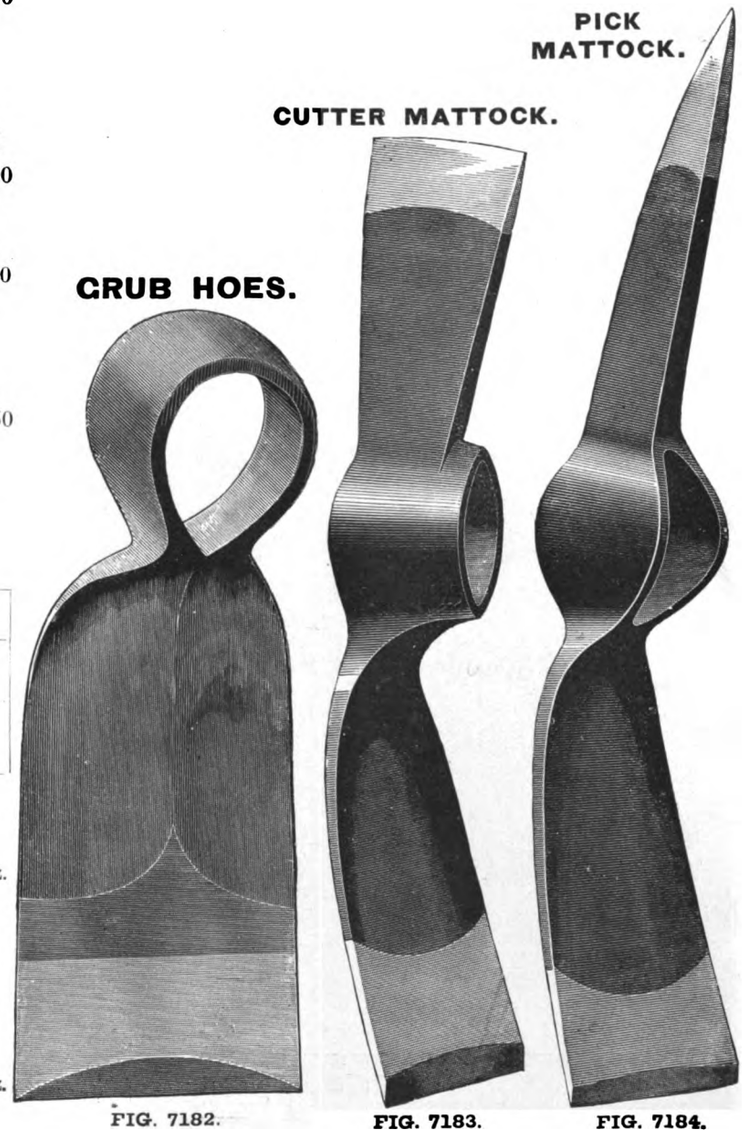


FIG. 7182. FIG. 7183. FIG. 7184.

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BUSH HOOKS AND ADZES.

AXE HANDLE BUSH HOOK.

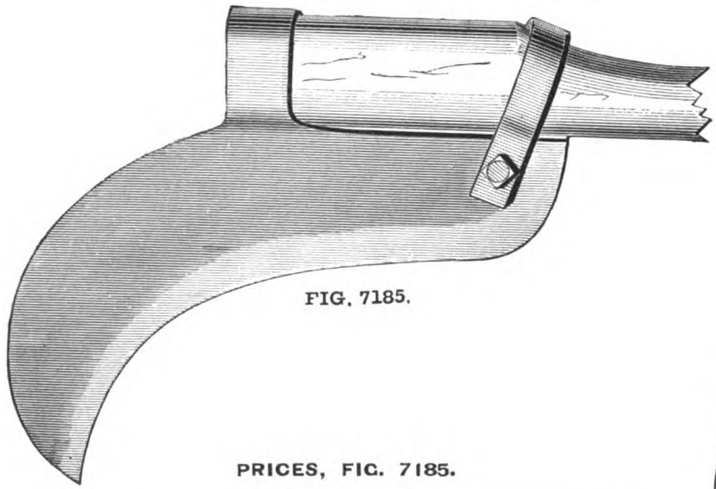


FIG. 7185.

PRICES, FIG. 7185.

Material.	No.	Weight.	Per doz.
Bronze finish, cast steel..	790	Light.	$14.50
" " ..	791	Medium.	15.00
" " ..	792	Extra heavy.	17.00

TWO RING BUSH HOOK.

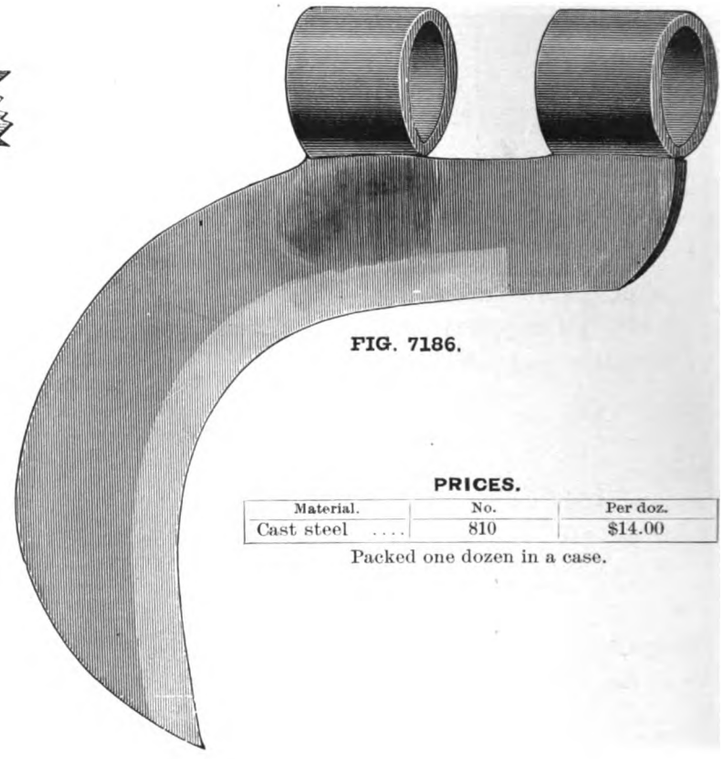


FIG. 7186.

PRICES.

Material.	No.	Per doz.
Cast steel	810	$14.00

Packed one dozen in a case.

SHIP CARPENTERS' ADZES, WITH SPUR HEADS AND STEEL POLES.

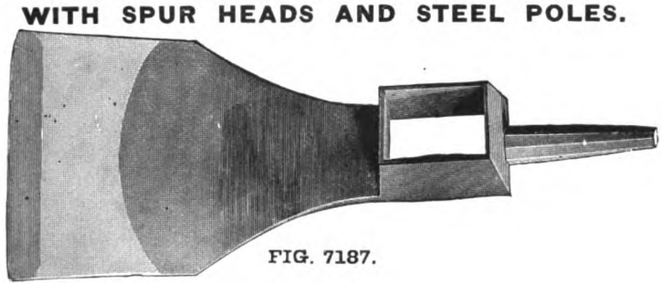


FIG. 7187.

PRICES, FIG. 7187.

Finish.	No.	Width of cut.	Per doz.	Per doz., with lip.
Gold bronze..	780	4 to 4½ in.	$25.00	.....
" ..	781	4 to 4½ in.	.....	$30.00

Packed one dozen in a case.

CARPENTERS' ADZES.

HALF HEAD.

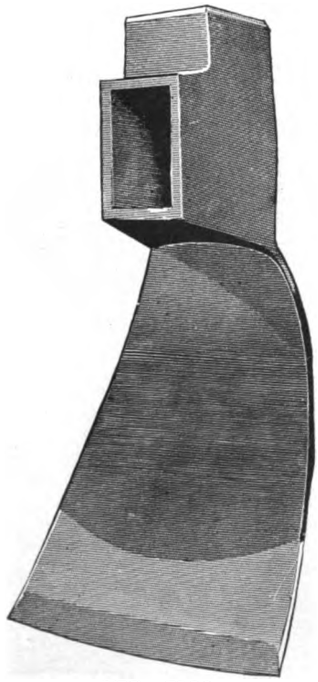


FIG. 7188.

FULL HEAD.

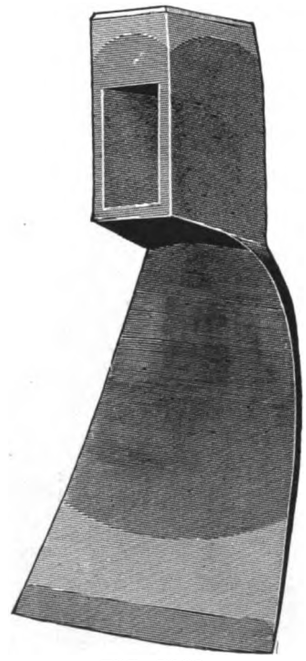


FIG. 7189.

RAILROAD ADZES.

HALF HEAD.

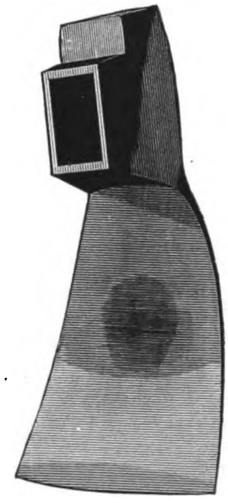


FIG. 7190.

FULL HEAD.

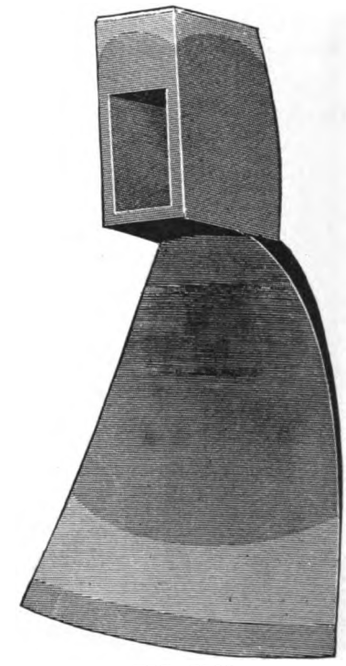


FIG. 7191.

PRICES, WITH STEEL POLES.

Finish.	Fig.	Width of cut.	Per doz.	Finish.	Fig.	Width of cut.	Per doz.	Finish.	Fig.	Width of cut.	Per doz.
Gold bronze.	7188	3½ to 4½ in.	$24.00	Gold bronze.	7190	5 to 5⅛ in.	$26.00	Gold bronze.	7191	5 to 5⅛ in.	$26.00
"	7189	3½ to 4½ in.	24.00	"	7190	5¾ to 6 in.	27.00	"	7191	5¾ to 6 in.	27.00

Packed one dozen in a case.

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BROAD AXES.

OHIO PATTERN.

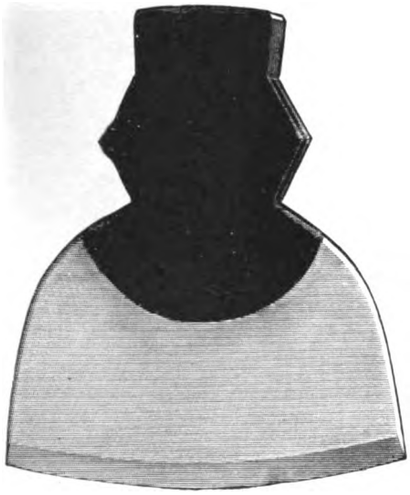


FIG. 7192.

PENNA. OR PITTSBURG PATTERN.

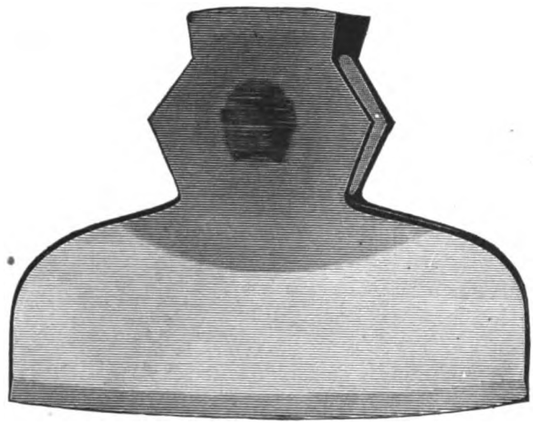


FIG. 7193.

WESTERN PATTERN.

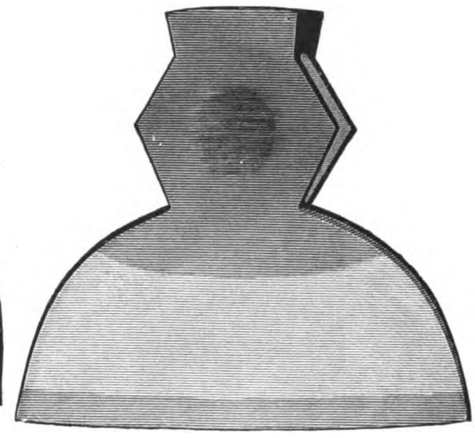


FIG. 7194.

PRICES, FIGS. 7192 TO 7195.

Material.	Fig. 7192. Ohio. No.	Fig. 7193. Penna. No.	Fig. 7914. Western. No.	Fig. 7195. New Orleans. No.	Assorted.	Per dozen.
Bronze finish, cast steel,	680	690	700	710	5 to 6½ lb.	$32.00
" "	681	691	701	711	6 " 7 "	32.00
" "	682	692	702	712	6½ " 7½ "	32.00
" "	683	693	703	713	7 " 8 "	35.00
" "	684	694	704	714	7½ " 8½ "	35.00
" "	685	695	705	715	7 " 9 "	35.00
" "	686	696	706	716	8 " 9 "	38.00
" "	687	697	707	717	8½ " 9½ "	38.00
" "	688	698	708	718	8 " 10 "	38.00

Packed half-dozen in a case. Weights assorted as wanted.

NEW ORLEANS PATTERN.

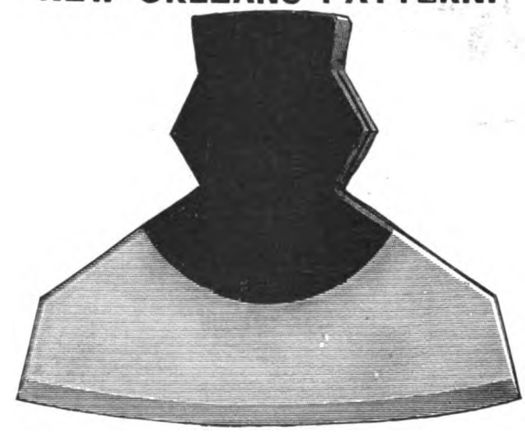


FIG. 7195.

CANADA PATTERN.

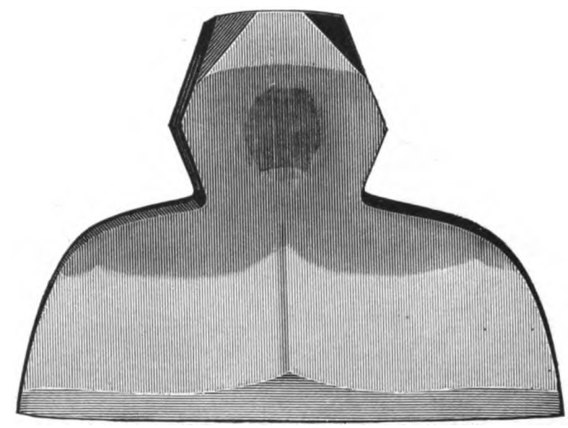


FIG. 7196.

PRICES, FIG. 7196.

Material.	No.	Assorted.	Per dozen.
Bronze finish, cast steel.....	720	5 to 7 lb.	$38.00
" "	721	7 " 9 "	42.00
" "	722	9 " 11 "	46.00

PRICES, FIG. 7197.

Bronze finish, cast steel.....	730	5 to 5½ lb.	$30.00

Packed half-dozen in a case.

COOPERS' ADZES.

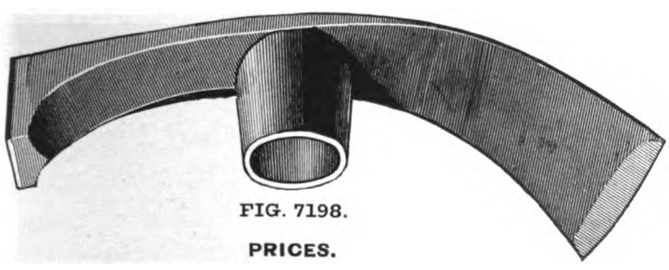


FIG. 7198.

PRICES.

Handled	$26.00
Handled and bolted.....	28.00

SHIP PATTERN.

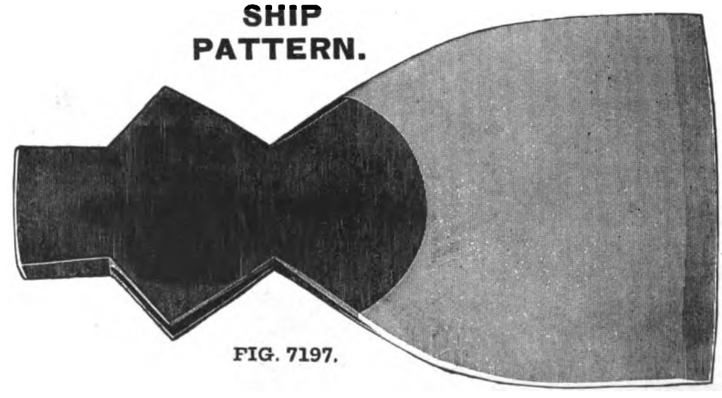


FIG. 7197.

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HATCHETS.

SHINGLING.

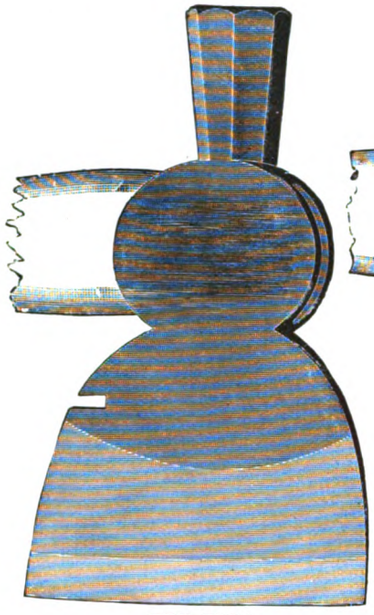


FIG. 7199.

LATHING.

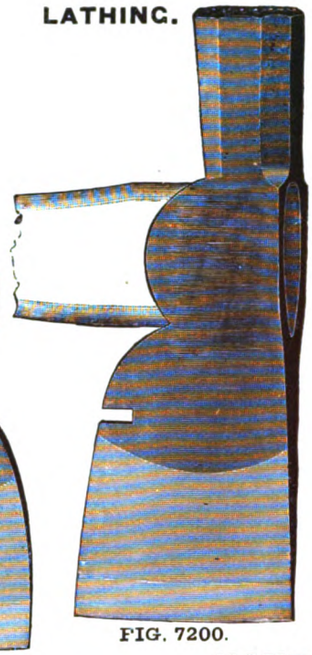


FIG. 7200.

HALF.

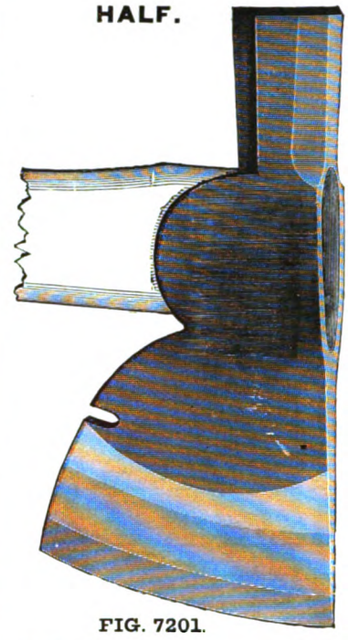


FIG. 7201.

CLAW.

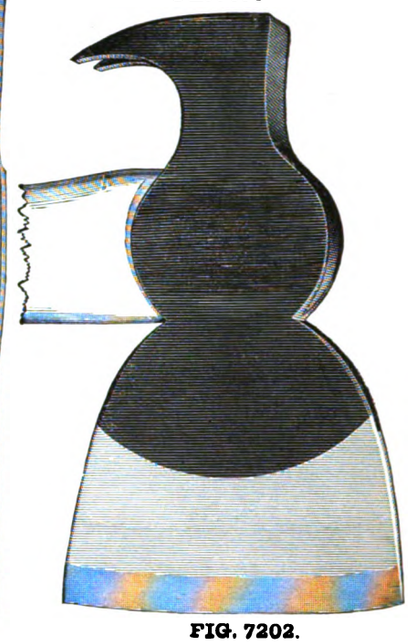


FIG. 7202.

HANDLED AXES.

BRONZE FINISH, CAST STEEL.

PRICES, FIG. 7199.

No.	Size.	Weight.	Width of bit.	Per doz.
590	0	13 oz.	3¼ in.	$7.50
591	1	1 lb. 1 oz.	3½ "	8.00
592	2	1 " 7 "	4 "	8.50
593	3	1 " 13 "	4½ "	9.00
594	4	2 " 3 "	4¾ "	9.50

PRICES, FIG. 7200.

No.	Size.	Weight.	Width of bit.	Per doz.
620	0	10 oz.	2 in.	$7.50
621	1	14 "	2¼ "	8.00
622	2	1 lb. 1 oz.	2½ "	8.50
623	3	1 " 4 "	2¾ "	9.00

PRICES, FIG. 7201.

No.	Size.	Weight.	Width of bit.	Per doz.
600	1	15 oz.	3¼ in.	$8.50
601	2	1 lb. 5 oz.	3⅝ "	9.00
602	3	1 " 11 "	4 "	9.50

PRICES, FIG. 7202.

No.	Size.	Weight.	Width of bit.	Per doz.
610	1	1 lb. 3 oz.	3½ in.	$9.00
611	2	1 " 9 "	4 "	9.50
612	3	1 " 15 "	4½ "	10.00

DOUBLE BITTED AXE.



FIG. 7203.

Price, per doz.....$24.00



FIG. 7204.

PRICE, PER DOZ., $12.00.

PRICES, FIGS. 7205 AND 7206.

Handled.

3¼ to 4½ lbs., per doz., $	.....
4¼ to 5¼ " "	.....
4½ to 5½ " "	.....
4½ to 6 " "	.....
5 to 7 " "	.....
6 to 7 " "	.....

Not handled, $.....per doz. less than above.

FULL POLISHED, SOLID CAST STEEL.

PRICES, FIG. 7199.

No.	Size.	Weight.	Width of bit.	Per doz.
480	1	1 lb. 1 oz.	3½ in.	$11.50
481	2	1 " 7 "	4 "	12.00
482	3	1 " 12 "	4½ "	12.50

PRICES, FIG. 7201.

No.	Size.	Weight.	Width of bit.	Per doz.
490	1	15 oz.	3¼ in.	$12.00
491	2	1 lb. 5 oz.	3⅝ "	12.50
492	3	1 " 11 "	4 "	13.00

PRICES, FIG. 7202.

No.	Size.	Weight.	Width of bit.	Per doz.
510	1	1 lb. 3 oz.	3½ in.	$12.50
511	2	1 " 9 "	4 "	13.00
512	3	1 " 15 "	4½ "	13.50

All hatchets are packed half dozen in a paper box. Weights do not include handles.

HANDLED AXES.

YANKEE.



FIG. 7205.

WESTERN.



FIG. 7206.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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CARPENTERS' TOOL CHESTS.

Every tool in assortments Nos. 80, 65, 60, 50 and 45 is fully warranted.

OUTSIDE MEASUREMENT OF CHESTS.

No. 80. 2 ft. 5 in. long, 1 ft. 3 in. wide, 11½ in. deep. Made of extra quality and heavy hardwoods, nicely finished in oil and varnished, dovetailed corners, extra heavy and ornamental base, with two large inside sliding drawers, and partitions and saw rack, with extra strong folding handles and tumbler chest lock.

No. 60. Size of chest, 27 in. long, 12 in. wide, 10 in. deep. Made of hardwood; finished with a neat moulding and patent-locked corners; complete, with lock and key, and forty-two good quality tools, in addition to one hollow handle containing ten bradawls and tools.

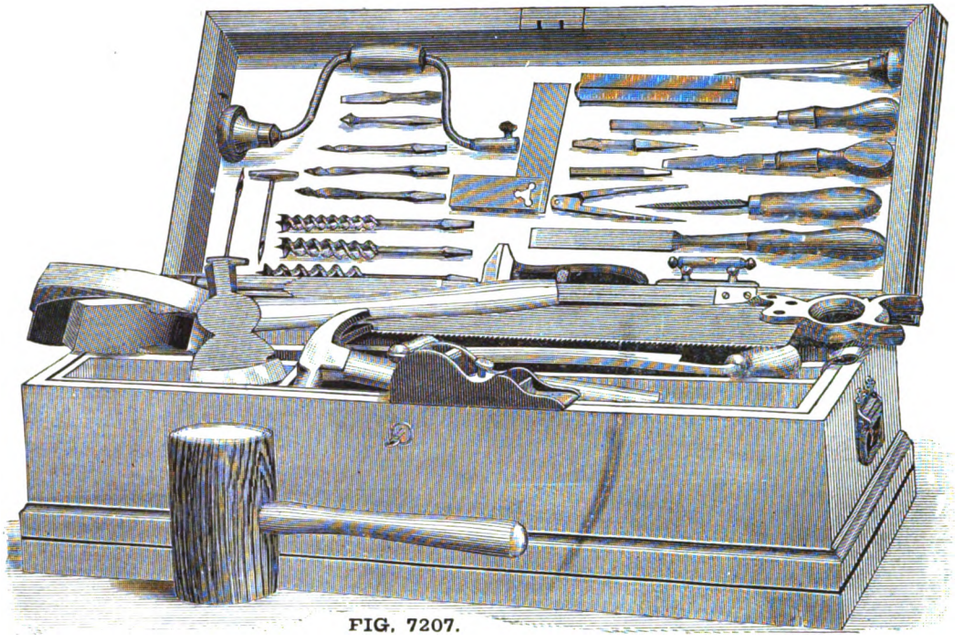


FIG. 7207.

CONTENTS OF TOOL CHEST, NO. 80.

1 iron block plane, with best steel irons.
1 iron smooth plane, with best steel irons.
1 iron jack plane, with best steel irons.
1 iron jointer plane, with best steel irons.
1 steel hatchet.
1 mallet.
1 wrench.
1 spirit level.
1 bit brace, with automatic jaws, for carpenters' use.
1 cast steel hammer.
12 C. E. Jennings & Co.'s cast steel Firmer chisels, handled.
2 cast steel gouges.
1 cast steel drawing knife.
1 mill file.
1 taper file.
1 wing divider.
1 nail set.
1 reamer.
1 try square.
1 T bevel.
1 pair cutting nippers.
1 glue pot, complete with brush and glue.
1 bracket saw frame.
12 cast steel bracket saws.
1 cast steel panel saw.
1 cast steel hack saw, with 13 blades.
13 auger bits and dowell bits, assorted sizes.
12 double cut bits, assorted sizes.
12 German pattern bits, "
1 screw-driver bit.
2 cast steel gimlets.
1 boxwood rule.
1 zinc oiler.
1 oil stone.
4 steel screw drivers, assorted sizes.
1 auger, with ring and handle.
1 pair gas plyers.
1 pair flat nose plyers
1 brick trowel.
1 can opener.
1 patent saw set.
1 saddler's spring punch, assorted tubes.
1 saddler's belt punch.
1 washer cutter.
1 tack claw.
1 patent handle, containing 5 cast steel useful tools.
12 handled bradawls.
1 steel box opener.
1 Handy vise.

PRICE, COMPLETE, $60.00 EACH.

CONTENTS OF TOOL CHEST, NO. 60.

1 steel hatchet.
1 smooth plane.
1 hickory mallet.
1 block plane.
1 wrench.
1 steel prick punch.
1 adjustable level.
1 bit brace.
1 cast steel nail hammer.
2 cast steel socket Firmer chisels.
1 cast steel drawing knife.
1 cast steel three-corner file.
1 cast steel mill file.
1 compass.
1 steel nail set.
1 steel square reamer.
1 steel try square.
1 steel T bevel.
1 steel auger bit, $\frac{8}{16}$ inch.
1 steel auger bit, $\frac{10}{16}$ inch.
1 steel auger bit, $\frac{12}{16}$ inch.
3 steel German bits, assorted.
1 steel metal countersink.
1 steel screw-driver bit.
2 steel gimlets.
1 boxwood rule.
2 steel countersinks.
1 zinc oiler.
2 cast steel screw drivers.
1 steel corkscrew.
1 steel panel saw.
1 steel double cut gimlet bit.
1 cast steel auger, with ring.
1 flat nose plyer.
1 cast steel brick trowel.
1 steel can opener.

1 handle, with 10 awls and tools of extra quality.

Price, for No. 60 chest, complete.....$24.00 each.
" " " 65 " " with same tools for mechanics' use..... 40.00 "

Tool chests made to order with any assortment of tools required.

DIMENSIONS, CHESTS, NOS. 50 AND 45.

Size of chest, 24 in. long, 10 in. wide and 8 in. deep; contains 22 useful tools, in addition to one hollow tool handle, containing 10 small tools.

CONTENTS OF TOOL CHEST, NO. 50.

1 steel panel saw.
1 wire cutter.
1 pair gas plyers.
1 pair flat nose wire plyers.
1 family glue pot, with glue.
1 brick trowel.
1 garden trowel.
1 hickory mallet.
1 smooth plane.
1 boxwood rule.
1 steel spike gimlet.
1 steel nail gimlet.
1 bit brace.
1 wrench.
1 steel screw driver.
1 cast steel chisel, 1 inch.
1 steel nail set.
1 steel auger bit, $\frac{4}{16}$ inch.
1 steel auger bit, $\frac{8}{16}$ inch.
1 try square.
1 steel taper file.
1 steel hatchet.
1 steel nail hammer.
2 steel gimlet bits.
1 steel countersink.
1 steel corkscrew.
1 compass.
1 oil can.

1 tool handle containing 10 tools.

No. 50, complete with tools, each.....$15.00

CONTENTS OF TOOL CHEST, NO. 45.

1 steel panel saw.
1 plane.
1 boxwood rule.
1 spike gimlet.
1 nail gimlet.
1 bit brace.
1 wrench.
1 steel screw driver.
1 cast steel chisel.
1 steel nail set.
1 steel auger bit, $\frac{8}{16}$ inch.
1 steel auger bit, $\frac{12}{16}$ inch.
1 try square.
1 steel file, with handle.
1 steel hatchet.
1 cast steel hammer.
1 steel German bit.
1 steel gimlet bit.
1 steel countersink.
1 steel corkscrew.
1 compass, 5 inch.
1 oil can.

1 handle, containing 10 small tools.

No. 45. Tool chest, complete with tools, each.....$10.00

EMPTY CHESTS, FOR MACHINISTS OR CARPENTERS.

PRICES, FIG. 7208.

Made from hardwood and fitted with tumbler lock. Made with drawer at bottom and two inside sliding tills.

Chest, 22 x 13 x 12 inches, outside measure, $12.00 each.

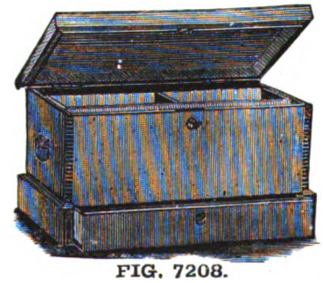


FIG. 7208.

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CARPENTERS' TOOL CHESTS.

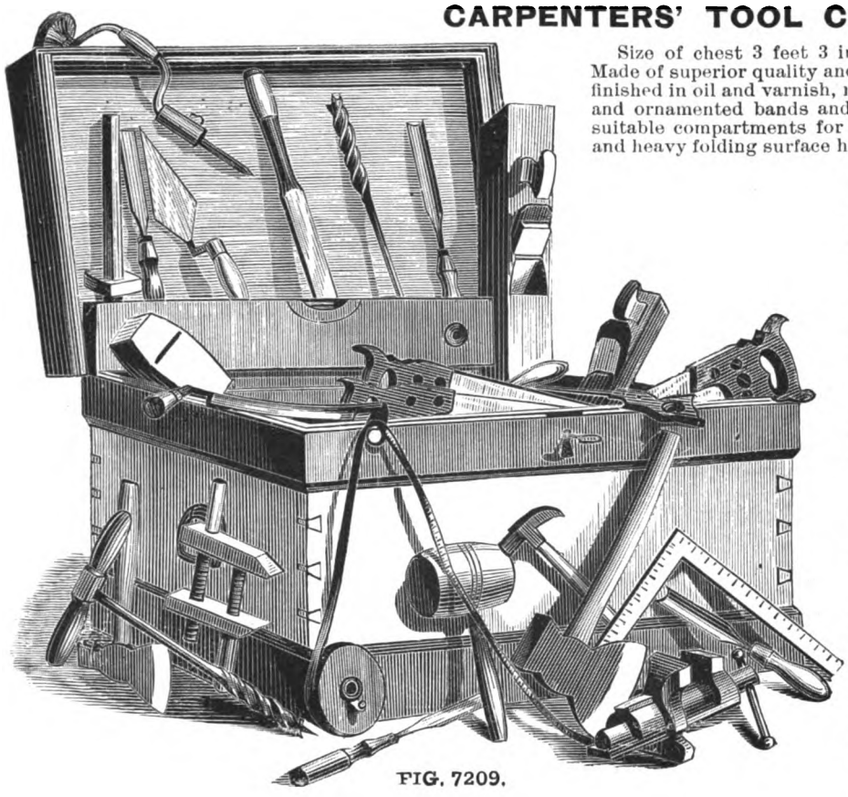


FIG. 7209.

Size of chest 3 feet 3 inches long, 1 foot 10½ inches wide, 1 foot 7¼ inches deep. Made of superior quality and extra heavy chestnut and black walnut woods, beautifully finished in oil and varnish, neatly and extra strong hand dovetailed corners, extra heavy and ornamented bands and bases, with two inside extra large sliding drawers, and suitable compartments for small tools, extra large plane, saw rack, and extra strong and heavy folding surface handles and hinges, and double link spring tumbler chest lock.

CONTENTS.

1 smooth plane, c. s. double iron.
1 cabinet plane, c. s. double iron.
1 jack plane, c. s. double iron.
1 fore plane, c. s. double iron.
1 c. s. shingling hatchet.
1 cast steel broad hatchet.
1 improved screw wrench.
1 rosewood and brass thumb screw mortise gauge.
1 beechwood marking gauge.
1 beechwood cutting gauge.
1 Washita oil slip.
1 hack saw frame and saw, for iron.
12 c. s. nail gimlets, assorted sizes.
1 pair cast steel cutting nippers.
1 improved saw set.
6 cast steel spike gimlets, assorted sizes.
1 set of 12 extra quality Firmer chisels, with polished hickory handles, assorted sizes, ⅛ to 2 inches.
1 set of 9 extra quality Firmer gouges with polished hickory handles, assorted sizes, ¼ to 1½ inches.
5 cast steel nut augers, assorted sizes, 4-4, 5-4, 6-4, 7-4, 8-4.
2 pat. adjustable auger handles.
1 cast steel drawing knife.
1 pair cast steel compasses.
1 improved bench stop.
1 Washita oil stone.
1 oil can.
12 carpenter's lead pencils.
1 cast steel nail punch.
1 pair nail pincers.
1 mahogany plumb and level.
1 plumb bob.
1 iron bench screw.
1 folding handle tape line and box.
1 glue pot.
1 cast steel pruning knife.
1 c. s. wood file and handle.
1 c. s. wood rasp and handle.
1 two-feet boxwood rule.
1 ball brace.
1 cast steel combination hand vise.
1 spokeshave, cast steel iron.
1 saw pad.
1 key hole saw.
1 angular boring implement.
1 hand screw.
1 two-feet steel square.
1 cast steel cold chisel.
1 cast steel punch for iron.
1 chalk line and reel.
1 c. s. panel saw, 18 inch.
1 c. s. panel saw, 26 inch.
1 c. s. rip saw, 28 inch.
1 c. s. blue back saw, 10 inch.
1 c. s. blue back saw, 14 inch.
1 c. s. compass saw, 12 inch.
1 hickory mallet.
1 c. s. adze eye nail hammer.
1 iron nut wrench.
1 appletree bradawl set, containing 20 assorted cast steel tools and wrench.
1 pair cast steel dividers.
1 rosewood stock thumb screw sliding bevel.
3 rosewood stock trying squares, assorted sizes.
1 cast steel brick trowel.
6 cast steel bradawls, handled, assorted sizes.
1 pair round nose plyers.
1 steel face bench vise.
1 patent improved carpenter's brace bit stock.
1 set of 9 cast steel auger bits, assorted sizes.
25 cast steel brace bits, assorted.
2 c. s. screw drivers, assorted sizes.
1 pair flat nose plyers.
3 cast steel flat bastard files, with handles, assorted sizes.
3 cast steel half round bastard files, with handles, assorted sizes.
7 cast steel saw files, with handles, assorted sizes.

PRICE, CHEST, CONTAINING 194 TOOLS, $147.50.

SMALLER SET.

Size of chest 3 feet long, 1 foot 7¼ inches wide, 1 foot 3½ inches deep. Made of superior quality and extra heavy chestnut and black walnut woods, elegantly finished in oil and varnish, neatly and securely hand dovetailed corners, extra heavy and ornamental bands and bases, with two inside extra large sliding drawers and suitable compartments for small tools, large saw rack, with extra strong and heavy folding surface handles and hinges, and double link spring tumbler chest lock, containing 105 extra quality assorted tools.

1 smooth plane, c. s. double iron.
1 jack plane, c. s. double iron.
1 carpenter's improved brace bit stock.
4 cast steel auger bits, assorted, 4-16, 8-16, 10-16, 12-16.
12 cast steel brace bits, assorted.
1 cast steel panel saw, 26 inch.
1 cast steel rip saw, 28 inch.
1 cast steel blue back saw, 12 inch.
1 cast steel compass saw, 12 inch.
6 cast steel Firmer chisels, with polished hickory handles, assorted sizes.
4 c. s. Firmer gouges, with polished hickory handles, assorted sizes.
1 cast steel a. e. nail hammer.
1 cast steel bench hatchet.
1 appletree bradawl set, containing 20 assorted cast steel tools and wrench.
1 spokeshave, c. s. iron.
1 cast steel drawing knife.
1 cast steel cold chisel.
1 cast steel nail set.
1 hickory mallet.
1 two-feet boxwood rule.
1 pair nail pincers.
1 pair flat nose plyers.
1 pair of compasses.
3 c. s. nut augers, ass'd, 3-4, 4-4, 6-4.
2 patent adjustable auger handles.
1 Washita oil stone.
1 oil can.
1 rosewood stock trying square.
3 carpenter's pencils.
1 chalk line and reel.
1 beechwood marking gauge.
6 c. s. bradawls, handled, assorted sizes.
1 c. s. flat bastard file and handle.
2 c. s. saw files, handled.
1 c. s. shingling hatchet.
1 beechwood cutting gauge.
1 iron bench screw.
1 c. s. half round bastard file and handle.
6 c. s. nail gimlets, assorted sizes.
1 two feet steel square.
1 hand screw.
2 c. s. screw drivers, assorted sizes.
1 c. s. regulator.
1 mahogany plumb and level.
1 screw wrench.

PRICE, $60.00.

STAR GIMLETS, WOOD HEAD.



FIG. 7210.

PRICE.

Assorted, 4 to 7-32 inch.....per dozen, $1.00
Quarter gross in a box.

WOOD HEAD DOUBLE CUT GIMLETS.

BEST CAST STEEL AND FULLY WARRANTED.



FIG. 7211.

PRICES.

Nos. 1	2	3	4	assorted 1 to 4
$9.50	$11.00	$12.50	$14.50	$12.00 per gross.

Boxes of one-fourth gross.

POD GIMLETS.

ALL STEEL, NICKEL-PLATED.

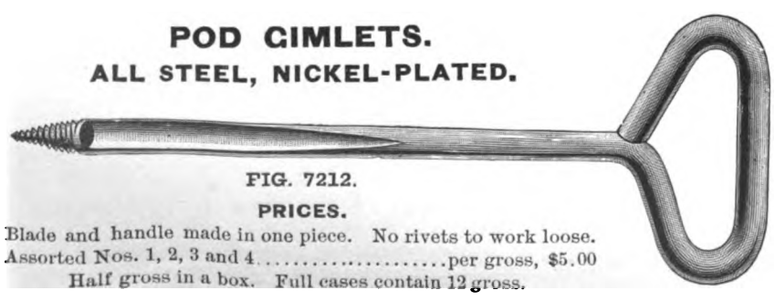


FIG. 7212.

PRICES.

Blade and handle made in one piece. No rivets to work loose.
Assorted Nos. 1, 2, 3 and 4.....per gross, $5.00
Half gross in a box. Full cases contain 12 gross.

WHEELER'S COUNTERSINK. FOR WOOD.

This countersink works equally well for every variety of screw. The countersink cuts rapidly, and is easily sharpened by drawing a thin file lengthwise inside of the cutter. By fastening the gauge at a given point, any number of screws may be driven so as to leave the heads flush with the surface, or at a uniform depth below it.

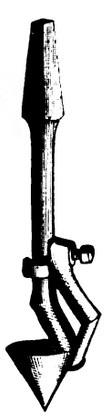


FIG. 7213.

No.	PRICES, FIG. 7213.	Per doz.
18.	Countersinks, ½ dozen in a box,	$3.00
20.	Countersinks, with gauge, ½ dozen in a box.....	4.50

DOWEL SHARPENER.

This tool is the reverse of the countersink, and can be sharpened with equal ease. By its use dowel pins can be sharpened rapidly and uniformly.

No.	PRICE, FIG. 7214.	Per doz.
22.	Dowel sharpener, ½ dozen in a box.....	$3.00



FIG. 7214.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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COUNTERSINKS.

FOR WOOD. FOR METAL.

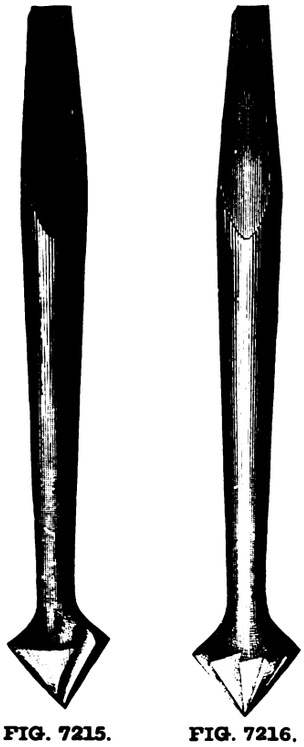


FIG. 7215. FIG. 7216.

PRICES, EITHER, PER DOZ.

Standard quality.....$1.00
Extra " 2.00

L'HOMMEDIEU'S SHIP AUGERS.

WITH SCREWS.



FIG. 7217.

WITHOUT SCREWS.



FIG. 7218.

PRICES, EITHER.

Sizes ½ inch and under	per dozen,	$7.50	Sizes 29 and 30-16 inch	per dozen,	$27.00
" 9 and 10-16 inch	"	9.00	" 31 " 32-16 "	"	31.50
" 11 " 12-16 "	"	10 50	" 33 " 34-16 "	"	48.00
" 13 " 14-16 "	"	12.00	" 35 " 36-16 "	"	60.00
" 15 " 16-16 "	"	13.50	" 37 " 38-16 "	"	72.00
" 17 " 18-16 "	"	15.00	" 39 " 40-16 "	"	84.00
" 19 " 20-16 "	"	16.50	" 41 " 42-16 "	"	96.00
" 21 " 22-16 "	"	18.00	" 43 " 44-16 "	"	108.00
" 23 " 24-16 "	"	21.00	" 45 " 46-16 "	"	120.00
" 25 " 26-16 "	"	24.00	" 47 " 48-16 "	"	132 00
" 27 " 28-16 "	"	25.50	" 59 " 60-16 "	"	204.00

The usual twist for ship augers from 6 to 8-16 inch is from 7½ to 9½ inches. Sizes from 9 to 17-16 inch, the twist will run about 12 inches. Sizes from 18 to 30-16 inch will average about 15 inch twist. Boxes of one-half dozen.

SHIP AUGERS.

WITH RINGS.



FIG. 7219.

Sizes ½ inch and under	per dozen,	$8.25	Sizes 29 and 30-16 inch	per dozen,	$29.70
" 9 and 10-16 inch	"	9.90	" 31 " 32-16 "	"	34.65
" 11 " 12-16 "	"	11.55	" 33 " 34-16 "	"	52.80
" 13 " 14-16 "	"	13.20	" 35 " 36-16 "	"	66.00
" 15 " 16-16 "	"	14.85	" 37 " 38-16 "	"	79.20
" 17 " 18-16 "	"	16.50	" 39 " 40-16 "	"	92.40
" 19 " 20-16 "	"	18.15	" 41 " 42-16 "	"	105.60
" 21 " 22-16 "	"	19.80	" 43 " 44-16 "	"	118.80
" 23 " 24-16 "	"	23.10	" 45 " 46-16 "	"	132.00
" 25 " 26-16 "	"	26.40	" 47 " 48-16 "	"	145.20
" 27 " 28-16 "	"	28.05	" 59 " 60-16 "	"	224.40

Sizes 71 and 72-16 inch, per dozen, $303.60.

In sets, 29½ quarters, 1 each, 12, 14, 16, 20, 24, 32-16ths, six augers, $9.75 per set.

CAST STEEL LONG EYE AUGERS.

Polished in the twist.

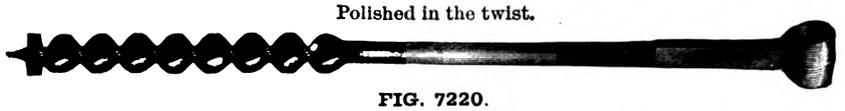


FIG. 7220.

⅜	½	⅝	¾	⅞	1	1⅛	1¼	inch.
$6.50	$6.50	$7.50	$9.00	$9.50	$10.50	$11.50	$12.50	per dozen.
1½	1¾	2	2¼	2½	3	3½	4	inch.
$15.00	$19.00	$22.00	$27.50	$33.00	$45.00	$55.00	$75.00	per dozen.

In sets, 8 augers, ½, ¾, ⅞, 1. 1¼, 1½, 1¾, 2 inch, $8.75 per set.

CAST STEEL CARPENTERS' NUT AUGERS.

Square lipped pattern, extra quality.



FIG. 7221.

½	⅝	¾	⅞	1	1⅛	1¼	1½	1¾	inch.
$5.50	$6.50	$8.00	$8.50	$9.50	$10.50	$11.50	$14.00	$17.00	per dozen.
2	2¼	2½	2¾	3	3¼	3½	3¾	4	inch.
$20.00	$24.00	$30.00	$35.00	$40.00	$45.00	$50.00	$60.00	$70.00	per dozen.

In sets, 6 augers, ¾, 1, 1¼, 1½, 1¾, 2 inch, $6.75 per set.

MILLWRIGHT AUGERS.

Best cast steel, 30 to 36 in. long, full polish.

Twist, 12 to 14 in.

These are made with or without nuts, as may be required.

PRICES, FIG. 7222.

⅜	½	9/16	inch.
$12.00	$12.00	$15.00	per dozen.
⅝	11/16	¾	inch.
$15.00	$18.00	$18.00	per dozen.
13/16	⅞	15/16	inch.
$21.00	$21.00	$24.00	per dozen.
1	1⅛	1¼	inch.
$24.00	$26.00	$30.00	per dozen.
1⅜	1½	1¾	inch.
$36.00	$38.50	$42.00	per dozen.
1⅞		2	inch.
$45.00		$48.00	per dozen.
	28	41	qrs.
In sets.....	$18.00	$24.00	

Packages of one-half dozen.



FIG. 7222.

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AUGERS AND BITS.

SOLID CAST STEEL AUGER BITS.

EXTRA DOUBLE SPUR. FULL POLISHED.



FIG. 7223.

PRICES.

Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.
3/16 in.	$3.50	10/16 in.	$4.50	16 in.	$8.00
4/16 "	3.00	11/16 "	5.00	17/16 "	9.00
4/16 "	3.00	12/16 "	5.50	18/16 "	10.00
5/16 "	3.25	13/16 "	6.00	20/16 "	11.00
6/16 "	3.25	14/16 "	6.50	22/16 "	12.00
7/16 "	3.50	15/16 "	7.25	24/16 "	14.00
8/16 "	4.00				
9/16 "					

	18	21	24	32½ qrs.
In sets,	$3.25	$3.50	$4.00	$5.50

EXTENSION LIP AUGER BITS.



FIG. 7225.

PRICES.

Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.
3/16 in.	$3.40	9/16 in.	$5.20	15/16 in.	$8.40
4/16 "	3.00	10/16 "	5.60	16/16 "	9.00
5/16 "	3.40	11/16 "	6.10	17/16 "	9.60
6/16 "	3.80	12/16 "	6.60	18/16 "	10.20
7/16 "	4.40	13/16 "	7.20	19/16 "	10.80
8/16 "	4.80	14/16 "	7.80	20/16 "	11.40

	18	24	32½ qrs.
In sets,	$3.60	$4.75	$6.25

CLARK'S OR STEER'S EXPANSIVE BITS.

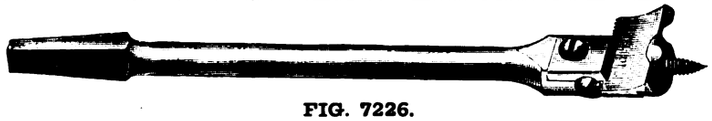


FIG. 7226.

BIT, WITH CUTTERS OFF.

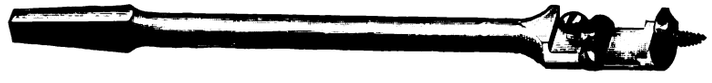




FIG. 7227.

PRICES, FIG. 7226 OR 7227.

Per doz.

No. 1. With two cutters, cutting from 7/8 to 3 inches.....$26.00
No. 2. " " " " 5/8 to 1¾ " 18.00

PRICES, FIG. 7228.

Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.
2/16 to 8/16 in.	$6.00	13 and 14/16 in.	$10.50	17 and 18/16 in.	$13.50
9/16 and 10/16 "	7.50	15/16 " 16/16 "	12.00	19/16 " 20/16 "	15.00
11/16 " 12/16 "	9.00				
14/16 "					

In sets, 32½ quarters, 1 each, from 4/16 to 12ths (13 bits) ....per set, $9.00
Sizes from 2/16 to 8/16 are packed in boxes of one dozen; larger sizes one-half dozen.

PRICES, FIG. 7229. SINGLE SPUR.

Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.
4/16 in.	$8.00	13/16 in.	$12.50	22/16 in.	$19.00
5/16 "	8.50	14/16 "	13.00	23/16 "	21.50
6/16 "	9.00	15/16 "	14.00	24/16 "	22.00
7/16 "	9.50	16/16 "	14.50	25/16 "	25.00
8/16 "	10.00	17/16 "	15.50	26/16 "	25.50
9/16 "	10.50	18/16 "	16.00	27/16 "	26.00
10/16 "	11.00	19/16 "	17.00	28/16 "	26.50
11/16 "	11.50	20/16 "	17.50	29/16 "	27.50
12/16 "	12.00	21/16 "	18.50	30/16 "	28.00

In sets, 32½ quarters, 1 each, from 4/16 to 12ths (13 bits).....per set, $12.00
Designed especially for hard wood and rough boring.

FORSTNER IMPROVED AUGER BITS.



FIG. 7224.

PRICES.

Sizes.	Prices, each.	Sizes.	Prices, each.	Sizes.	Prices, each.
1/4 in.	$0.50	11/16 in.	$0.80	8/8 in.	$1.05
5/16 "	.60	8/8 "	.80	10/8 "	1.15
3/8 "	.45	13/16 "	.92	1 "	1.25
7/16 "	.55	7/8 "	.92	1⅛ "	5.00
8/16 "	.55	15/16 "	1.00	1¼ "	7.00
9/16 "	.68	8/8 "	1.00	2 "	9.00
10/16 "	.68	17/16 "	1.05		
5/8 "					

L'HOMMEDIEU AUGER BITS,

WITH AND WITHOUT SCREWS.

SHIP. CAR, 12 IN. TWIST. LIP CAR.

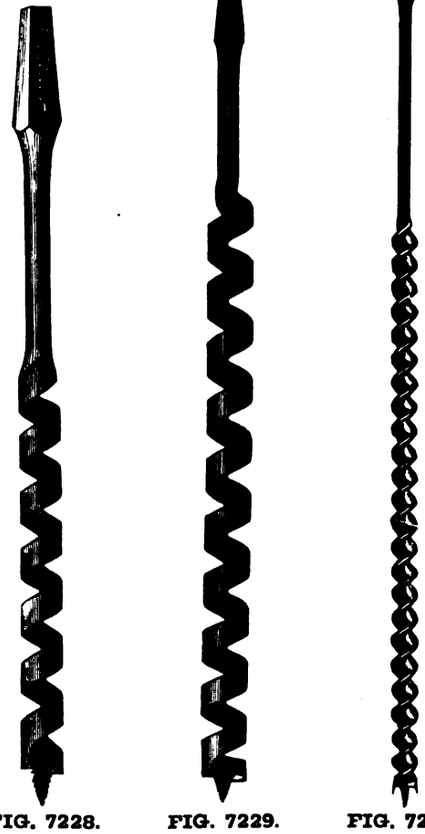


FIG. 7228. FIG. 7229. FIG. 7230.

PRICES, FIG. 7230, SOLID CAST STEEL.

EXTENSION LIP PATTERN CAR BITS.

12 INCH TWIST.

Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.
4/16 in.	$6.00	9/16 in.	$10.40	14/16 in.	$15.60
5/16 "	6.80	10/16 "	11.20	15/16 "	16.80
6/16 "	7.60	11/16 "	12.20	16/16 "	18.00
7/16 "	8.80	12/16 "	13.20	17/16 "	19.20
8/16 "	9.60	13/16 "	14.40	18/16 "	20.40

	24	32½ qrs.
In sets,	$9.50	$12.50

PRICES, FIG. 7230.

DOUBLE SPUR PATTERN CAR BITS.

Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.	Sizes.	Prices, per dozen.
4/16 in.	$6.50	9/16 in.	$11.25	14/16 in.	$17.75
5/16 "	6.50	10/16 "	12.75	15/16 "	18.75
6/16 "	7.50	11/16 "	13.20	16/16 "	20.50
7/16 "	9.00	12/16 "	15.50	17/16 "	24.00
8/16 "	10.25	13/16 "	16.50	18/16 "	27.00

	21	24	32½ qrs.
In sets,	$9.50	$10.50	$14.00

We make to order 6 inch twist car bits at 30 cts. per quarter inch; 9 inch twist for 35 cts. per quarter inch; also 16 inch twist at 45 cts. per quarter inch. Boxes of one-half dozen.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BORING MACHINES.

WOOD FRAMES, GRADUATED WAYS.

NOS. 3, 4 & 5. NOS. 1 & 2.

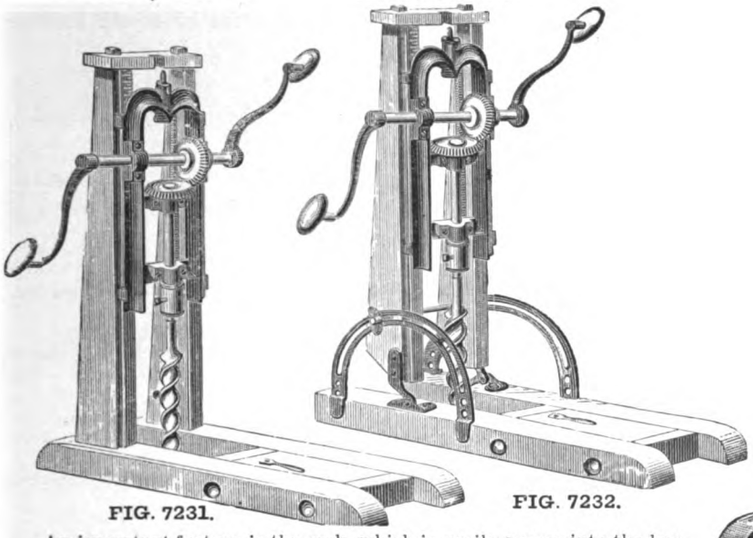


FIG. 7231. FIG. 7232.

An important feature is the rack, which is easily swung into the beveled gear, and by turning the handles in the same direction as in boring, the auger is withdrawn. A reverse motion of the handles throws the rack out of gear. Two in a case.

	PRICES, WITHOUT AUGERS.	Each.
No. 1.	Angular, polished gear	$10.00
No. 2.	"	6.75
No. 3.	Upright, polished gear	8.50
No. 4.	"	7.50
No. 5.	"	5.50

IRON FRAMES, GRADUATED WAYS.

ANGULAR. UPRIGHT.

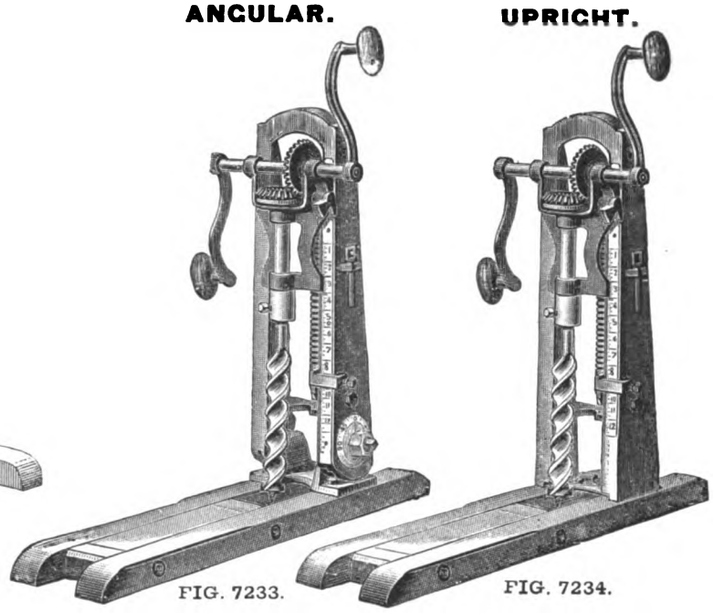


FIG. 7233. FIG. 7234.

PRICES.

Angular, painted standard, without augers	each,	$10.75
Upright, " " "	"	8.50

Two in a case.

AJAX WOOD BORER.

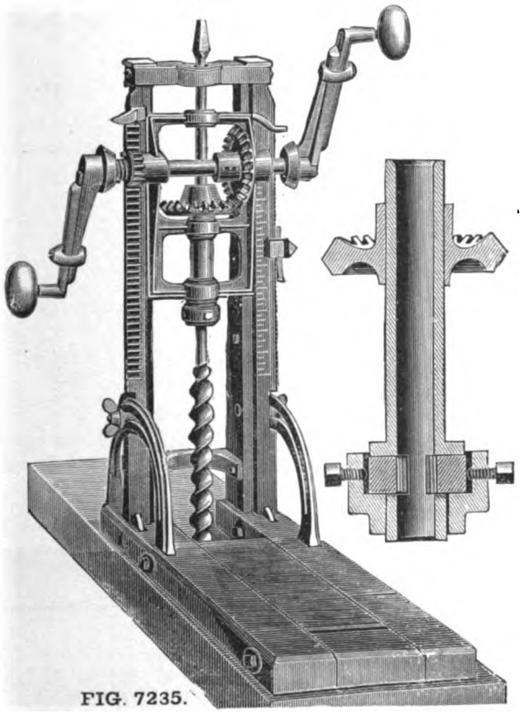


FIG. 7235.

It is self with drawing, and will hold in its chuck any shaped auger bit, round or square, or bit brace ends.

It can be set to bore any depth of hole, and when the required depth is reached withdraws quickly by the same motion, automatically, without stopping.

It folds compactly, requiring but little space in a carpenter's chest. It has extension arms.

PRICE, without augers.....**$6.50.**

BORING MACHINE AUGERS, IN SETS.

	PRICES.	Per set.
Cast steel, 18 quarters	(1, 1¼, 2)	$4.50
" " 23 "	(1, 1¼, 1½, 2)	5.50
" " 28 "	(½, ¾, 1, 1¼, 1½, 2)	7.00
" " 41 "	(½, ⅝, ¾, ⅞, 1, 1¼, 1½, 1¾, 2)	10.25
Cooks, 18 quarters	(1, 1½, 2)	5.50
" 23 "	(1, 1¼, 1½, 2)	7.00
" 41 "	(½, ⅝, ¾, ⅞, 1, 1¼, 1½, 1¾, 2)	12.50
No. 7, cast steel, 18 quarters	(1, 1½, 2)	4.50
" " " 23 "	(1, 1¼, 1½, 2)	5.50
" " " 28 "	(½, ¾, 1, 1¼, 1½, 2)	7.00
" " " 41 "	(½, ⅝, ¾, ⅞, 1, 1¼, 1½, 2)	10.25

One set in a package.

SOCKET FRAMING CHISELS, EXTRA QUALITY.

Best cast steel. Sharpened ready for use.



FIG. 7236.

PRICES.

8 to 8½ inch blade.

¼	5/16	⅜	7/16	½	⅝	¾	inch.
$12.00	$12.00	$12.00	$12.00	$12.00	$13.00	$14.00	per dozen.
⅞	1	1⅛	1¼	1½	1¾	2	inch.
$15.00	$16.00	$18.00	$18.00	$20.00	$22.00	$24.00	per dozen.

Assorted in sets.

¼ to 2 inches (12 in a set)	per set,	$18.00
¼ to 2 " (9 ")	"	14.00
¼ to 2 " (6 ")	"	10.00

CARPENTERS' SLICKS.

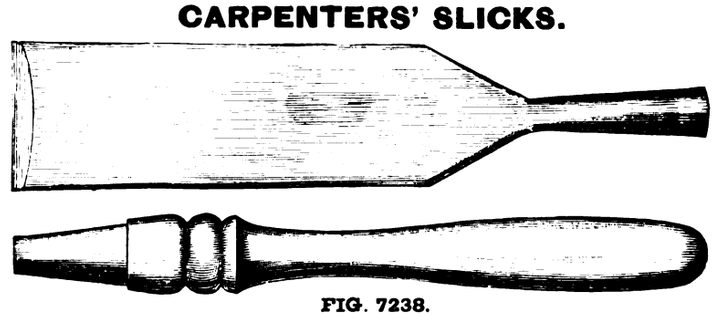


FIG. 7238.

PRICES.

¾	⅞	1	1⅛	1¼	1½	inch.	2½	3	3½	4	inch.
$28.00	$30.00	$32.00	$34.00	$36.00	$40.00	per dozen.	$40.00	$44.00	$52.00	$60.00	per dozen.

CORNER CHISELS.



PRICES, FIG. 7237.

¾	⅞	1	1⅛	1¼	1½	inch.
$28.00	$30.00	$32.00	$34.00	$36.00	$40.00	per dozen.

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SOLID CAST STEEL CHISELS AND GOUGES.

BEVEL EDGE SOCKET FIRMER, 6 IN. BLADE.



FIG. 7239.

These chisels are made from the finest tool steel, tempered by an improved process, ground sharp and honed ready for use, and put up with patent improved leather tipped handles.

PRICES.

1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2 inch.
$5.37	$5.37	$5.37	$6.00	$6.75	$7.38	$7.38	$8.00	$8.75	$9.38	$10.00	$10.75 per dozen.

EXTRA SOCKET FIRMER, 6 IN. BLADE.



FIG. 7240. SHARPENED READY FOR USE.

PRICES, FIG. 7240. ASSORTED IN SETS.

1/8 to 2 inch (12 in a set).....$11.25
1/8 to 1 1/2 " (9 ").....7.75
1/4 to 2 " (8 ").....8.25

PRICES, FIG. 7240.

1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2 inch.
$8.00	8.00	8.00	9.00	10.00	11.00	11.00	12.00	13.00	14.00	15.00	16.00 per doz.

SOCKET FIRMER GOUGES, 6 IN. BLADE.



FIG. 7241.

PRICES, FIG. 7241. ASSORTED IN SETS.

1/8 to 2 inch (12), 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4, 2..per set, $9.00
1/4 to 2 " (8), 1/4, 1/2, 3/4, 1, 1 1/4, 1 1/2, 1 3/4, 2..... " 6.50

PRICES, FIG. 7241.

1/8	1/4	3/8	1/2	5/8	3/4	7/8 inch.
$5.00	$5.75	$6.00	$7.00	$8.00	$8.50	$9.00 per dozen.
1	1 1/4	1 1/2	1 3/4	2	2 1/2	3 inch.
$9.50	$10.50	$11.50	$12.00	$13.00	$20.00	$26.00 per dozen.

EXTRA TANGED FIRMER CHISELS.



FIG. 7242.

PRICES, FIG. 7242. ASSORTED IN SETS.

1/8 to 2 inch, 12 chisels (1 each, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4, 2).....per set, $4.25
For handling, add to the list per dozen or set..... 1.25

PRICES, FIG. 7242.

1/8	3/16	1/4	5/16	3/8	1/2	5/8	5/8 inch.
$2.00	$2.00	$2.00	$2.00	$2.13	$2.25	$2.60	$2.60 per dozen.
3/4	7/8	1	1 1/4	1 1/2	1 3/4	2 inch.	
$2.75	$3.00	$3.50	$4.50	$5.00	$6.00	$7.50	$9.00 per dozen.

EXTRA TANGED FIRMER GOUGES.



FIG. 7243.

PRICES, FIG. 7243. ASSORTED IN SETS.

1/8 to 2 inch, 12 gouges (1 each, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4, 2).....per set, $6.00
For handling, add to the list per dozen or set..... 1.25

FIGS. 7242 AND 7243.

For sharpening add 25 cents net per dozen.
Packed one dozen in a box. Handled, half a dozen in a box.

PRICES, FIG. 7243.

1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2 inch.
$2.25	$2.50	$2.63	$2.88	$3.00	$3.25	$3.50	$4.50	$6.00	$7.50	$10.00	$12.00 per dozen.

EXTRA MILLWRIGHTS' FIRMER GOUGES.
INSIDE BEVEL.



FIG. 7244.

PRICES. 7 1-2 INCH BLADES.

Inches	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2
Per dozen	$6.25	$6.25	$6.75	$7.25	$8.25	$9.25	$10.25	$11.25	$14.75	$17.25	$20.25	$23.75	$29.25	$36.25

Half-dozen in a wooden box.

ASSORTED IN SETS.

Inches, 1/8 to 2 (12)—1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4, 2.....Per set, $13.75
Inches, 1/4 to 2 (8)—1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, 2..... " 11.25
Without handles, $1.25 per dozen less on list prices. One set in a wooden box.

EXTRA TURNING CHISELS.



FIG. 7245.

PRICES. 7 INCH BLADES.

Inches	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1
Per dozen.	$2.50	$2.75	$3.12 1/2	$3.37 1/2	$3.75	$4 25	$5.00	$5.50
Inches....	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2	2 1/4	2 1/2
Per dozen.	$7.00	$7.00	$8.75	$8.75	$10.25	$12.50	$16.50	$21.50

Half-dozen in a wooden box.

ASSORTED IN SETS.

Inches, 1/8 to 2 (12)—1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4, 2, per set, $6.50
Inches, 1/4 to 1 1/2 (9)—1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2..... " 5.00
Handled, $1.25 per dozen extra on list prices.

EXTRA TURNING GOUGES.



FIG. 7246.

PRICES. 7 INCH BLADES.

Inches	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1
Per dozen.	$3.00	$3.00	$3.50	$4.00	$4.50	$5.50	$6.00	$7.00
Inches....	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2	2 1/4	2 1/2
Per dozen.	$8.50	$8.50	$12.75	$12.75	$14.00	$18.00	$21.00	$25.00

Half-dozen in a wooden box.

ASSORTED IN SETS.

Inches, 1/8 to 2 (12)—1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4, 2, per set, $8.50
Inches, 1/4 to 1 1/2 (9)—1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2..... " 6.50
Handled, $1.25 per dozen extra on list prices.

WOOD TURNERS' PARTING TOOLS.

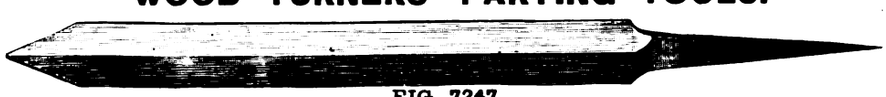


FIG. 7247.

The 1/2 inch wide measures 8 1/2 inches over all. Length 8 1/2 to 9 1/2 inches over all.
1/2 inch, $4.50; 5/8 inch, $5.00; 3/4 inch, $5.50 per dozen.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PIT AND CROSS-CUT SAWS.

WARRANTED PATENT OIL TEMPERED AND PATENT GROUND.

BOXES FOR PIT SAWS.

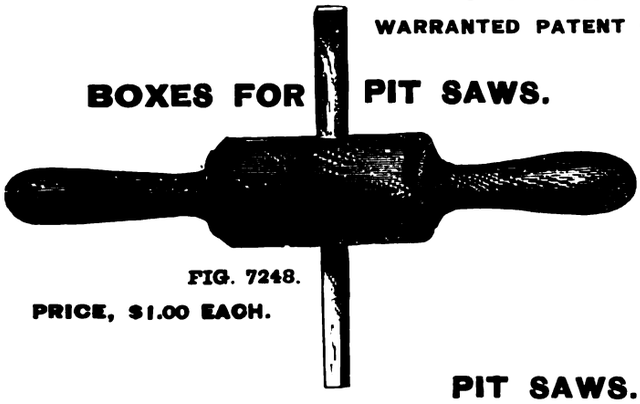


FIG. 7248.

PRICE, $1.00 EACH.

TILLERS FOR PIT SAWS.

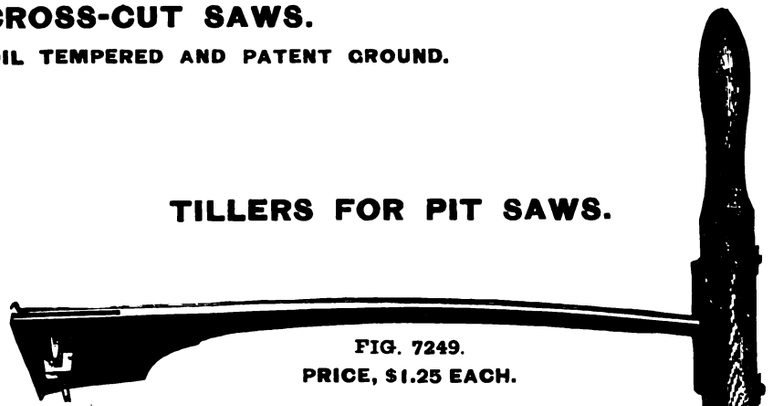
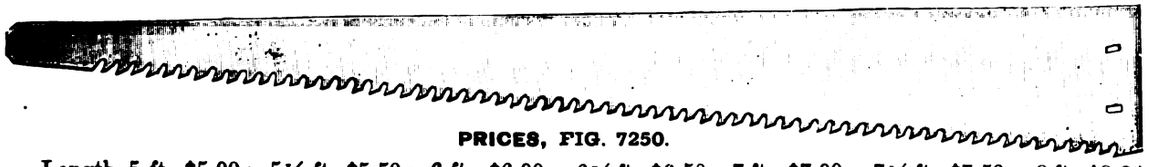


FIG. 7249.

PRICE, $1.25 EACH.

PIT SAWS. HANDLES EXTRA.



PRICES, FIG. 7250.

Prices. . .....Length, 5 ft., $5.00; 5½ ft., $5.50; 6 ft., $6.00; 6½ ft., $6.50; 7 ft., $7.00; 7½ ft., $7.50; 8 ft., $8.00.

CROSS-CUT SAWS. HANDLES EXTRA.

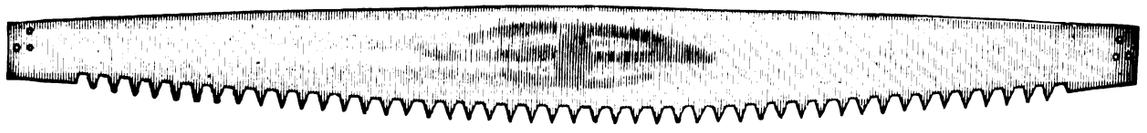


FIG. 7251. REPRESENTS PLAIN TOOTH SAWS NO. 1.

PRICES, PER FOOT.

No. 1 tooth, 68 cents; No. 2 tooth, 60 cents; No. 3 tooth, 52 cents; No. 4 tooth, 45 cents.

PRICES.

	4 feet.	4½ feet.	5 feet.	5½ feet.	6 feet.	6½ feet.	7 feet.	7½ feet.	8 feet.	
Plain tooth, No. 1. Four gauges thinner on back than on teeth,	$2.32	$2.61	$2.90	$3.19	$3.48	$3.77	$4.06	$4.35	$4.64	each.
" " " 2. Two " " " " " " "	2.16	2.43	2.70	2.97	3.24	3.51	3.78	4.05	4.32	"

CHAMPION TOOTH CROSS-CUT SAWS. HANDLES EXTRA.

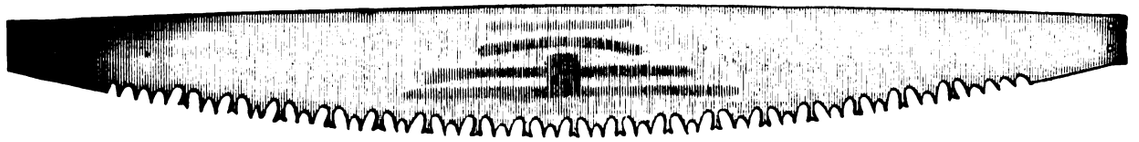


FIG. 7252. REPRESENTS NO. 1 TOOTH.

PRICES.

	4 feet.	4½ feet.	5 feet.	5½ feet.	6 feet.	6½ feet.	7 feet.	7½ feet.	8 feet.	
Champion tooth, No. 1. Four gauges thinner on back than on teeth,	$2.32	$2.61	$2.90	$3.19	$3.48	$3.77	$4.06	$4.35	$4.64	each.
" " " 2. Two " " " " " " "	2.16	2.43	2.70	2.97	3.24	3.51	3.78	4.05	4.32	"

HOLLOW BACK OR NARROW CROSS-CUT SAWS, WITHOUT HANDLES.

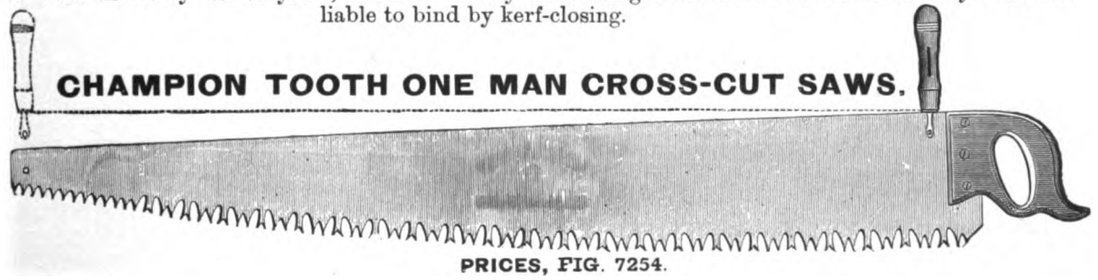


PRICES, FIG. 7253.

	4 feet.	4½ feet.	5 feet.	5½ feet.	6 feet.	6½ feet.	7 feet.	7½ feet.	8 feet.	
Champion teeth.....	$1.44	$1.62	$1.80	$1.98	$2.16	$2.34	$2.52	$2.70	$2.88	each.

These saws have been made by us for years, and their utility for cutting down trees can best be told by their use. They are not so liable to bind by kerf-closing.

CHAMPION TOOTH ONE MAN CROSS-CUT SAWS.



PRICES, FIG. 7254.

Prices, set and sharpened .....Length, 3 ft., $2.25; 3½ ft., $2.60; 4 ft., $3.00; 4½ ft., $3.35; 5 ft., $3.70; 5½ ft., $4.10; 6 ft., $4.45.

One man cross-cut, common tooth, same price as above.

LIGHTNING TOOTH AND PATENT HANDLE ONE MAN CROSS-CUT.

Prices..... .....Length, 3 ft., $2.55; 3½ ft., $2.75; 4 ft., $3.25; 4½ ft., $3.65; 5 ft. $4.10; 5½ ft., $4.55; 6 ft., $5.00.

AMERICAN TOOTH ONE MAN CROSS-CUT SAWS.

3 ft., $2.55 each; 3½ ft., $2.75 each; 4 ft., $3.25 each; 4½ ft., $3.65 each; 5 ft., $4.10 each; 5½ ft., $4.55 each; 6 ft., $5.00 each.

This saw will be found to be as fast cutting saw as there is in the market. HANDLES EXTRA. SEE NEXT PAGE.

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CROSS-CUT SAW HANDLES AND HAND SAWS.

ADJUSTABLE CROSS-CUT SAW HANDLES.



FIG. 7255.

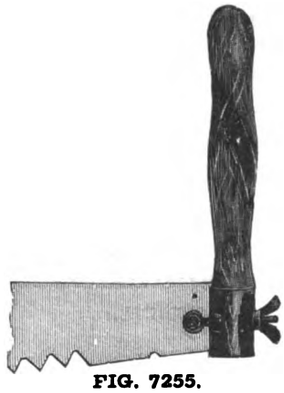


FIG. 7255.

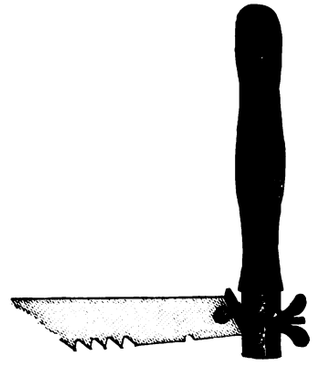


FIG. 7255.

DESCRIPTION, FIG. 7255.

It is the only cross-cut saw handle whereby the saw can be turned from a cross-cut into an ice saw. It can be used as a one man saw, and can be adjusted or used on any cross-cut saw made.

PRICE, PER PAIR, 30 CENTS.

PRICE, FIG. 7256.

LOOP, PER PAIR, 28 CENTS.

LOOP HANDLES.

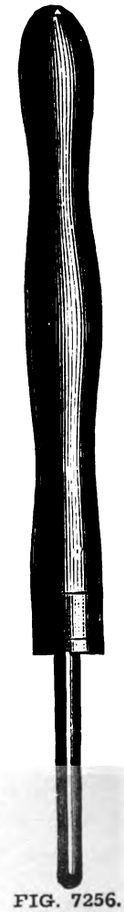


FIG. 7256.

EARLE'S HAND PANEL AND RIP SAWS.

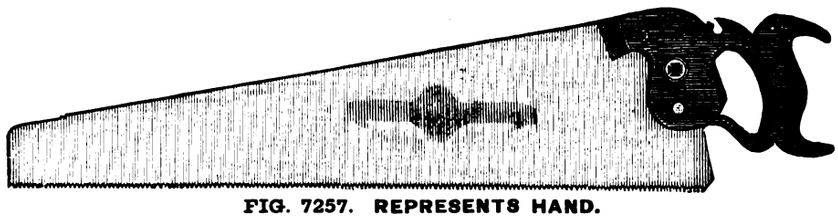


FIG. 7257. REPRESENTS HAND.

Warranted cast steel; patent ground and tempered; beech handled; polished edges; three brass screws, one embossed and etched.

PRICES, FIG. 7257.

RIP.

28 inch, per doz.	$9.00
30 inch, "	10.50

HAND.

26 inch, per doz.	$8.00

SHORT PANEL OR PONY.

Length, inches	12	14	16	18
Prices, per doz.	$4.50	$5.00	$5.50	$6.00
Length, inches	20	22	24	
Prices, per doz.	$6.50	$7.00	$7.50	

All one-third dozen in box.

PRICES, FIG. 7258.

RIP.

Length, inches	28	30	32
Prices, per doz.	$23.50	$27.00	$30.50
Length, inches	34	36	
Prices, per doz.	$34.50	$39.00	

HAND.

26 in., per doz.	$20.00

SHORT PANEL OR PONY.

Length, inches,	14	16	18
Prices, per doz.	$12.00	$13.00	$14.00
Length, inches,	20	22	24
Prices, per doz.	$16.00	$18.00	$19.00

All one-third dozen in box.

RICHARDSON'S NO. 7 STANDARD RIP AND HAND AND PANEL SAWS.

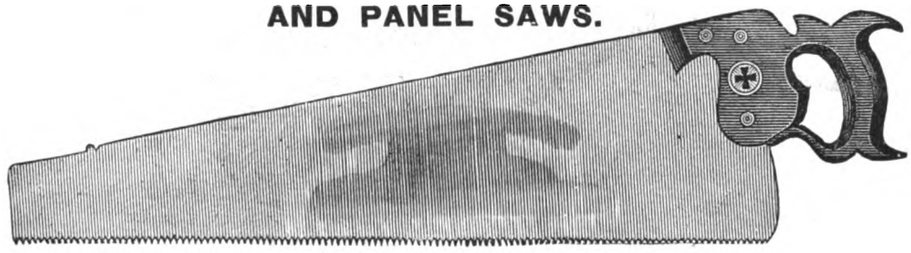


FIG. 7258. REPRESENTS RIP.

Warranted cast steel; patent ground and tempered; beech handle; polished edges; four improved brass screws, one embossed; fine rubbed blade. Warranted fully equal to any American or English saw in the market. Etched and warranted.

IMPROVED MITER BOX.

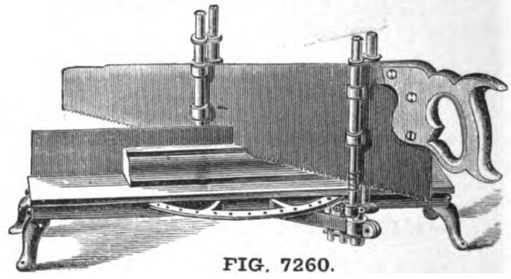


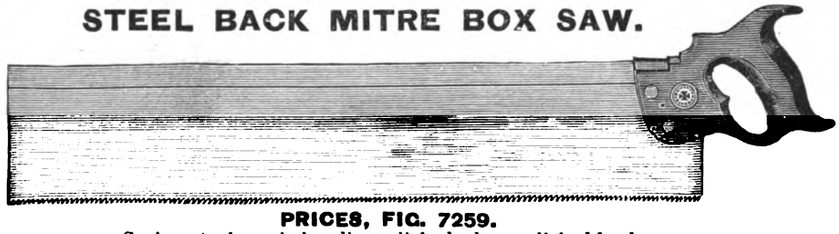
FIG. 7260.

This miter box can be used with a back saw or a panel saw equally well. If a back saw is used, both links which connect the rollers, or guides, are left in the upper grooves, and the back of the saw is passed through under the links.

If a panel saw is used, the link which connects the rollers on the back spindle is changed to the lower groove; and then the blade of the saw will be stiffly supported by both sets of rollers, and work like a back saw.

Miter box, 20 in.	each, $7.00
Miter box, 30 inch, with 20 inch Disston's back saw	each, 10.00

STEEL BACK MITRE BOX SAW.



PRICES, FIG. 7259.

Spring steel, apple handle, polished edge, polished back.

FOUR INCHES UNDER BACK.

Length, inches	20	22	24	26	28	30
Prices, per doz.	$24.00	$26.00	$28.00	$30.00	$32.00	$34.00

FIVE INCHES UNDER BACK.

Length, inches	20	22	24	26	28	30
Prices, per doz.	$26.00	$28.00	$30.00	$32.00	$34.00	$36.00

SIX INCHES UNDER BACK.

Length, inches	20	22	24	26	28	30
Prices, per doz.	$28.00	$30.00	$32.00	$34.00	$36.00	$38.00

One-third dozen in box.

EXTRA FINE COMPASS SAWS.

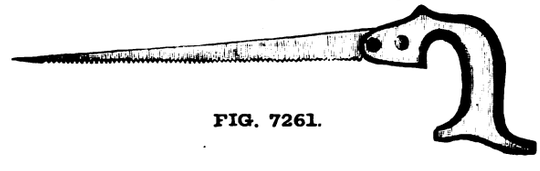


FIG. 7261.

DESCRIPTION, FIG. 7261.

Warranted extra spring steel, patent ground and tempered.

QUALITY NO. 88. BEECH HANDLE.

Plain screws. Set and filed. Heavy blades. Thick on tooth and thin at back.

Length, inches	8	10	12	14	16	18
Prices, per doz.	$4.00	$4.25	$4.50	$4.75	$5.00	$5.25

Compass saw blades, 2 cents per inch.

QUALITY NO. 77. APPLE HANDLE.

Embossed screws. Set and filed. Heavy blades. Thick on tooth and thin at back.

Length, inches	8	10	12	14	16	18
Prices, per doz.	$4.00	$4.25	$4.50	$4.75	$5.00	$5.25

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SAWS, SAW SETS AND DRAWING KNIVES.

IMPROVED BACK SAWS.



FIG. 7262.

Extra spring steel, steel polished back, improved handle, apple, polished edges, improved brass screws.

PRICES.

Length, inches	8	10	12	14	16	18
Price, per dozen	$14.00	$15.00	$17.00	$19.00	$21.00	$23.00

To run without set—otherwise same as above. For fine cabinet work, sawing miters and in all instances where rapid and smooth cutting is required, this saw is especially adapted.

Length, inches	8	10	12	14	16	18
Price, per dozen	$18.00	$18.00	$22.50	$25.50	$29.00	$32.00

All one-third dozen in box.

ADJUSTABLE SAWS.

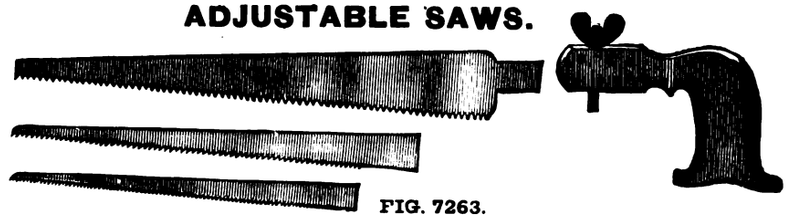


FIG. 7263.

No holes—no slots. Patent adjustable saws, nest including one each, key-hole, compass, and table or pruning saw.

PRICES.

Handles and loop, per dozen		$2.50
Key-hole blades,	"	1.50
Compass blades,	"	3.00
Pruning blades,	"	5.00
Two sets in a box.		$12.00

TAINTOR'S SAW SETS.



FIG. 7264. THREE-FOURTHS FULL SIZE.

PRICE.

Per dozen $18.00

CROSS-CUT SAW SETS.

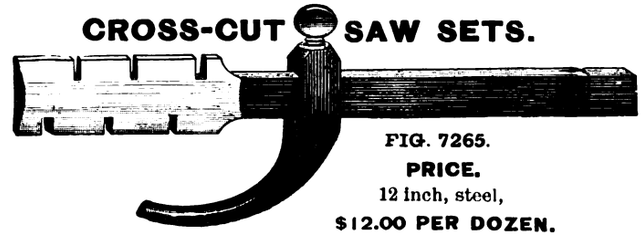


FIG. 7265.

PRICE.

12 inch, steel,

$12.00 PER DOZEN.

SPRING HAMMER SAW SETS.

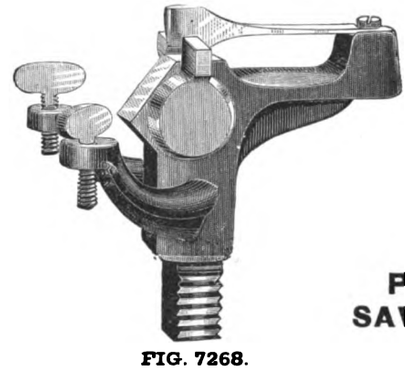


FIG. 7268.

PRICE,

$10.00 PER DOZEN.

NEW PATTERN LEVER SAW SETS, WITH GAUGE.



FIG. 7266.

PRICE,

$8.25 PER DOZEN.

NEW PATTERN HAMMER SAW SETS.

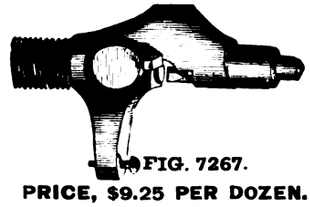


FIG. 7267.

PRICE, $9.25 PER DOZEN.

PLATE SAW SETS.



FIG. 7270.

PRICE.

6 inch, steel,

$3.75 PER DOZEN.

RAZOR BLADE DRAWING KNIVES.



FIG. 7271.

Extra quality cast steel. Sharpened, ready for use. Boxes of half dozen.

PRICES.

Inches	6	7	8	9	10
Per dozen	$17.00	$18.00	$19.00	$20.00	$21.00
Inches	11	12	13	14	16
Per dozen	$22.00	$23.00	$25.00	$26.00	$29.00

LEVER SAW SETS.



FIG. 7269.

PRICE, $10.00 PER DOZEN.

BEECHWOOD, PLAIN SPOKESHAVES, NO. 30.



FIG. 7273.

PRICES.

Inches	2½	3	3½	4
Per dozen	$3.25	$3.75	$4.25	$4.75

ADJUSTABLE HANDLE DRAWING KNIVES.



FIG. 7272.

Blades, 1¼ inches wide.

PRICES.

Inches	6	7	8	9
Per dozen	$9.00	$10.50	$12.00	$13.50
Inches	10	11	12	
Per dozen	$15.00	$16.50	$18.00	

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SPOKESHAVES AND SCREW DRIVERS.

BAILEY'S SPOKESHAVES.



FIG. 7274.
Represents raised handle.

PRICES.

Double iron, raised handle, 10 inch, 2⅛ inch cutter.....$3.50 per doz.
Double iron, straight handle, 10 inch, 2⅛ inch cutter.....$3.50 per doz.

STRAIGHT HANDLES.



FIG. 7275.

PRICES.

Adjustable, raised handle, 10 inch, 2⅛ inch cutter.....$4.50 per doz.
Adjustable, straight handle, 10 inch, 2⅛ inch cutter.....$4.50 per doz.

ROUND BLADE. FLAT BLADE.

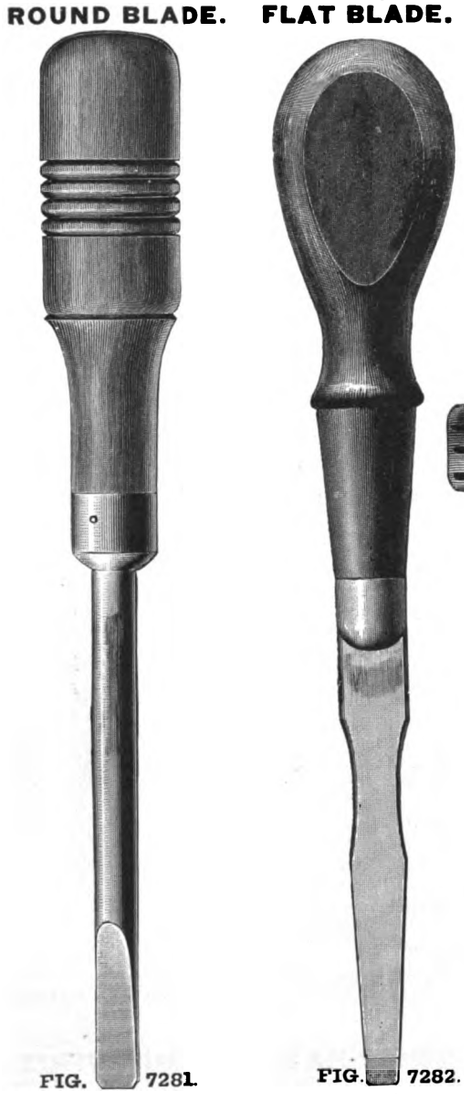


FIG. 7281. FIG. 7282.

GUN AND MACHINE MAKERS' SCREW DRIVERS.



FIG. 7283.

Drop-forged, from best tool steel, spring tempered, with fancy wood handles.

PRICES.

No. 1. ⅛ x 3 inches.....$4.00 per doz.
No. 2. ¼ x 3 inches..... 4.00 "
No. 3. ⅜ x 3 inches..... 4.50 "
No. 4. ⅜ x 3 inches..... 4.50 "
No. 5. ½ x 6 inches..... 6.00 "

BIT BRACE, EXTRA QUALITY CAST STEEL.



FIG. 7276. FULL SIZE, NO. 200.

PRICES.

Nos. 100, 200 and 300, all per dozen.....$2.75
No. 450, assorted, " 2.75

HERCULES SCREW DRIVER.

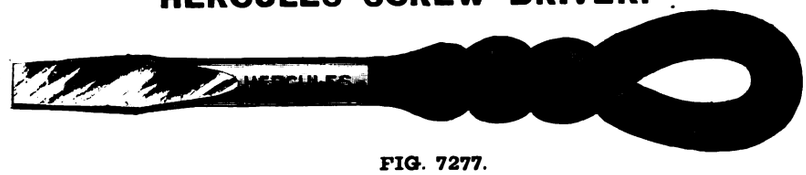


FIG. 7277.

PRICES.

Length of blade, inches,	2	3	4	5	6	7	8	10	12
Prices, per dozen.....	$2.00	$2.50	$3.00	$3.50	$4.00	$5.00	$5.50	$8.50	$9.50

Bicycle or sewing machine screw drivers, 4½ inches long over all, per dozen, $3.00.

CHAMPION SCREW DRIVER.



FIG. 7278.

With special ferrule and bolster. The handles are apple wood and fluted, to give best possible grip. Every blade tested.

PRICES.

2½ in.....$3.00 per doz.	6 in.....$6.00 per doz.	10 in.....$10.00 per doz.
3 " ..... 3.50 "	7 " ..... 7.00 "	12 " ..... 12.00 "
4 " ..... 4.25 "	8 " ..... 8.00 "	
5 " ..... 5.00 "	9 " ..... 9.00 "	

THE CHAMPION MACHINISTS' SCREW DRIVER.

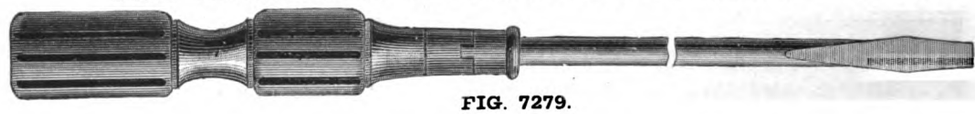


FIG. 7279.

Same style as above but with double handle, extra strong, and extra lengths for special work, millwrights, machinists, etc.

$14.00	$16.00	$18.00	$24.00	$30.00	per dozen.
12	15	18	24	30	inch.

RATCHET SCREW DRIVER.

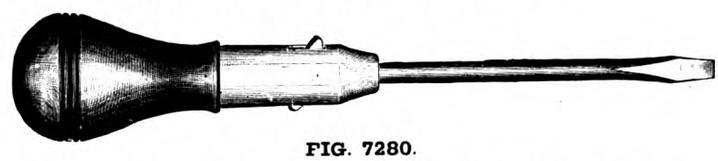


FIG. 7280.

Reversible, to turn right or left, in or out, by a single motion of the finger on the projecting pawl, without removing the blade from the screw or changing the position of the hand on the tool.

PRICES.

No. 1, blade, 1¼ in., pocket.....$6.00 per doz.	No. 6, blade, 6 in.....$9.00 per doz.
No. 4, " 4 " ..... 7.00 "	No. 7, " 7 " .....10.00 "
No. 5, " 5 " ..... 8.00 "	No. 8, " 8 " .....11.00 "

One dozen in a box.

PRICES, FIG. 7281.

Blades forged from best cast steel, round top, wrought iron seamless ferrule, nickel-plated. Handles ebony finish and superior quality.

2	3	4	5	6	inch.
$2.00	$2.50	$3.00	$3.50	$4.00	per dozen.
7	8	9	10	12	inch.
$5.00	$5.50	$6.00	$6.50	$9.00	per dozen.

Boxes of one-half dozen.

PRICES, FIG. 7282.

2	3	4	5	6	inch.
$2.00	$2.50	$3.00	$3.50	$4.00	per dozen.
7	8	9	10	12	inch.
$5.00	$5.50	$6.00	$6.50	$9.00	per dozen.

Boxes of one-half dozen.

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SOLID CAST STEEL NAIL HAMMERS.



FIG. 7284.

PRICES.

No.	Size.	Weight.	Per doz.
70	0	1 lb. 12 oz.	$12.50
71	1	1 lb. 4 oz.	9.00
72	1½	1 lb.	8.50
73	2	13 oz.	8.00
74	3	7 oz.	7.50

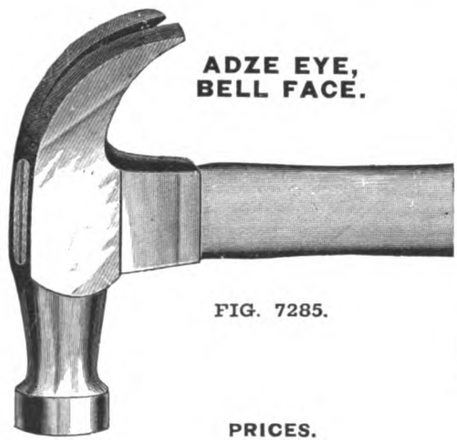


FIG. 7285.

PRICES.

No.	Size.	Weight.	Per doz.
80	1	1 lb. 4 oz.	$9.00
81	1½	1 lb.	8.50
82	2	13 oz.	8.00
83	3	7 oz.	7.50

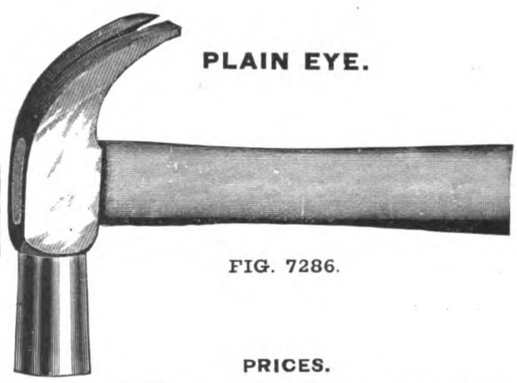


FIG. 7286.

PRICES.

No.	Size.	Weight.	Per doz.
90	0	7 oz.	$6.25
91	1	12 oz.	6.50
92	2	15 oz.	6.75
93	3	1 lb. 2 oz.	7.00
94	4	1 lb. 8 oz.	8.00

DOUBLE AND SINGLE IRON BENCH PLANES.

PRICES, FIG. 7287.

SINGLE IRONS.

No. 10. Smooth.....each, $0.60
No. 11. Jack..... " .75
No. 12. Fore..... " 1.00
No. 13. Jointer, 26 in.. " 1.10

DOUBLE IRONS.

No. 14. Smooth.....each, $0.90
No. 15. Jack..... " 1.00
No. 16. Fore..... " 1.40
No. 17. Jointer, 26 in.. " 1.50
No. 18. " 28 in.. " 1.60



FIG. 7287.

BAILEY'S ADJUSTABLE EXCELSIOR BLOCK PLANES.

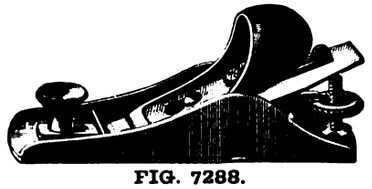


FIG. 7288.

No. 9½. Plane, 6 inches length, 1¾ inch cutter....each $1.50
No. 15. " 7 " " 1¾ " " .... " 1.60

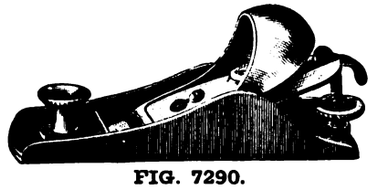


FIG. 7290.

No. 16. Plane, 6 inches length, 1¾ inch cutter, with Stanley's lateral adjustment, nickel-plated trimmings, $1.65
No. 17. Plane, 7 inches length, 1¾ inch cutter, with Stanley's lateral adjustment, nickel-plated trimmings, 1.75

BAILEY'S ADJUSTABLE WOOD PLANES.

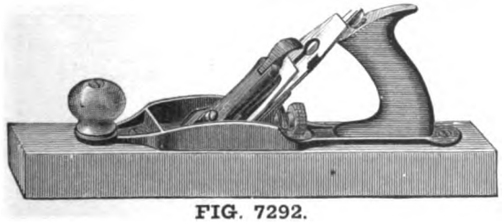


FIG. 7292.

No. 26.	Jack plane,	15	inches in length,	2	inch cutter,	$2.25
No. 27.	" "	15	" "	2⅛	" "	2.50
No. 28.	Fore "	18	" "	2⅜	" "	2.75
No. 29.	" "	20	" "	2⅜	" "	2.75
No. 30.	Jointer plane,	22	" "	2⅜	" "	3.00
No. 31.	" "	24	" "	2⅜	" "	3.00
No. 32.	" "	26	" "	2⅝	" "	3.25
No. 33.	" "	28	" "	2⅝	" "	3.25
No. 34.	" "	30	" "	2⅝	" "	3.50



FIG. 7289.

No. 9¾. Plane, rosewood handle, 6 inches in length, 1¾ inch cutter..... $1.75
No. 15½. Plane, rosewood handle, 7 inches in length, 1¾ inch cutter..... 1.85

KNUCKLE JOINT BLOCK PLANES.

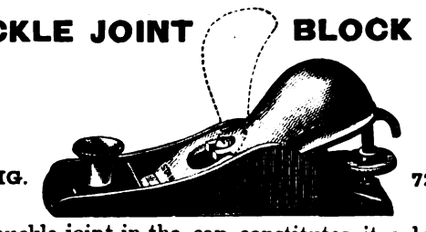


FIG. 7291.

The knuckle-joint in the cap constitutes it a lever also; and the single movement of putting the cap in position clamps the cutter firmly in its seat.

No. 18. Plane, 6 inches length, 1¾ inch cutter, Stanley's lateral adjustment, nickel-plated trimmings.... $1.75
No. 19. Plane, 7 inches length, 1¾ inch cutter, Stanley's lateral adjustment, nickel-plated trimmings ... 1.85
Cutters for above block planes, warranted cast steel, per doz., 2.40

BAILEY'S ADJUSTABLE WOOD PLANES.

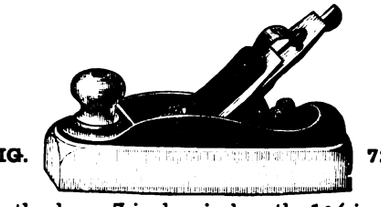


FIG. 7293.

No. 21.	Smooth plane,	7	inches in length,	1¾	inch cutter,	$2.00
No. 22.	" "	8	" "	1¾	" "	2.00
No. 23.	" "	9	" "	1¾	" "	2.00
No. 24.	" "	8	" "	2	" "	2.00
No. 25.	Block "	9½	" "	1¾	" "	2.00

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PLANES AND BENCH HOOKS.

BAILEY'S ADJUSTABLE WOOD PLANES.

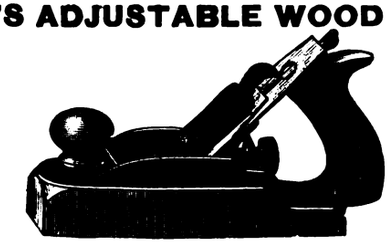


FIG. 7294.

No. 35. Handle smooth, 9 inches in length, 2 inch cutter.....$2.50
No. 36. " " 10 " " 2⅜ " 2.75
No. 37. Jenny " 13 " " 2⅝ " 3.00

IRON PLANES.



FIG. 7296.

No. 5. Jack plane, 14 inches in length, 2 inch cutter..... .....$3.75
No. 6. Fore " 18 " " 2⅜ " 4.75
No. 7. Jointer " 22 " " 2⅜ " 5.50
No. 8. " " 24 " " 2⅝ " 6.50

ADJUSTABLE CIRCULAR PLANE.

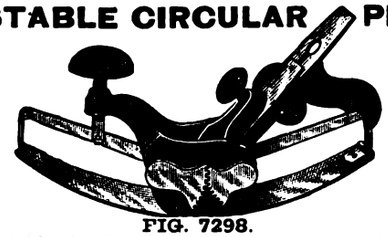


FIG. 7298.

No. 113. Adjustable circular plane, 1¾ inch cutter, each.....$4.00

This plane has a flexible steel face, which can be easily shaped to any required arc, either concave or convex, by turning the knob on the front of the plane.

COMBINATION PLOW AND DADO PLANES.

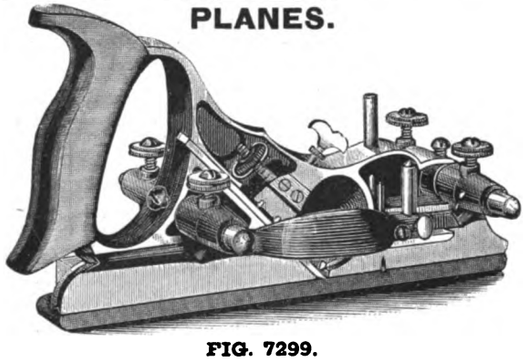


FIG. 7299.

Nickel-plated, and including the following size bits: 3/16, ¼, 5/16, ⅜, 7/16, ½, 5/8, ¾, ⅞ match bits.....} $8.00
Also including the following sizes bead plane bits: 3/16, ¼, 5/16, ⅜, 7/16, ½ }
Single bits, 25c. each; cluster bead bits, 2 cluster, 30c.; 3 cluster, 35c.; 4 cluster, 40c. Sash moulding cutter, working from 1¼ to 1½ in., 50c.

IRON PLANES.

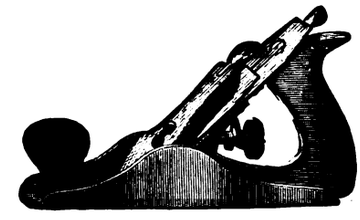


FIG. 7295.

No. 3. Smooth plane, 8 inches in length, 1¾ inch cutter, each.....$3.00
No. 4. " 9 " " 2 " " 3.25
No. 4½. " 10 " " 2⅜ " " 3.75

TONGUING AND GROOVING PLANES.

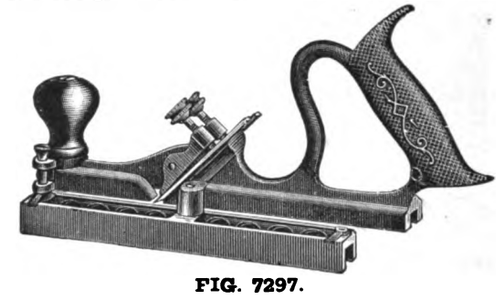


FIG. 7297.

This fence is hung on a pivot, and can be swung around, end for end. This movement covers one of the cutters, and also furnishes a guide for grooving an exact match for the tongue.

PRICES.

No. 48. Iron stock and fence, for ¾ to 1¼ inch boards, each.....$2.50
No. 49. " " ⅜ to ¾ " " 2.50

DUPLEX RABBET PLANES AND FILLETSTER.



FIG. 7300.

The construction of the stock is such that the plane will lie perfectly flat on either side, and can be used with right or left hand equally well, while planing into corners or up against perpendicular surfaces.

The arm to which the fence is secured can be screwed into either side of the stock, thus making a superior right or left hand filletster, with adjustable spur and depth gauge.

PRICE.

Iron stock and fence, 8½ inches in length, 1½ inch cutter, each.....$1.50

BENCH HOOKS.

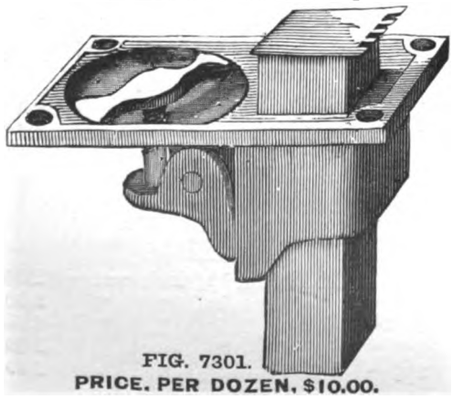


FIG. 7301.

PRICE, PER DOZEN, $10.00.

BENCH HOOKS.

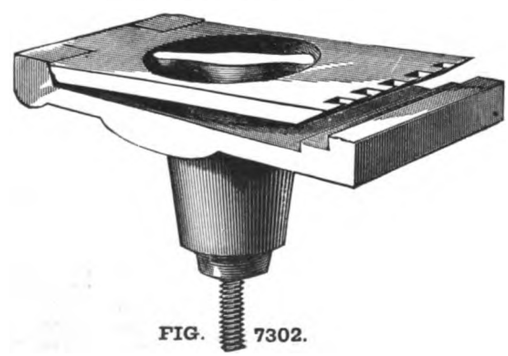


FIG. 7302.

PRICE, PER DOZEN, $9.00.

BENCH HOOKS.

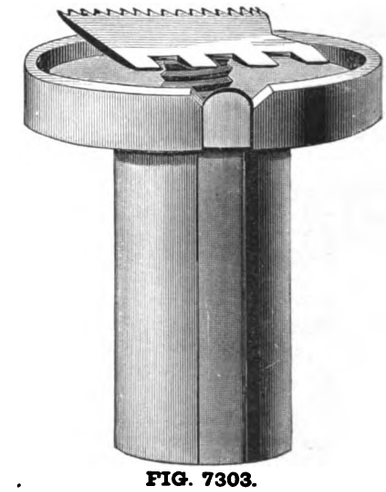


FIG. 7303.

Hook has 4 jaws.

PRICE, PER DOZEN, $4.50.

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IRON, STEEL AND NICKELED SQUARES.

Note 0100 nickeled has no $\frac{1}{32}$ division. The 05 nickeled has $\frac{1}{16}$ and not $\frac{1}{8}$.

IRON SQUARES.

PRICES.

Nos.	Width.	Per doz.
1	1½ in.	$10.00
2	1¾ "	12.00
4	2 "	16.00

Divisions are marked:
No. 1, ⅛, ¼, on one side.
No. 2, ⅛, ¼, on both sides.
No. 4, ⅛, ¼, on both sides.

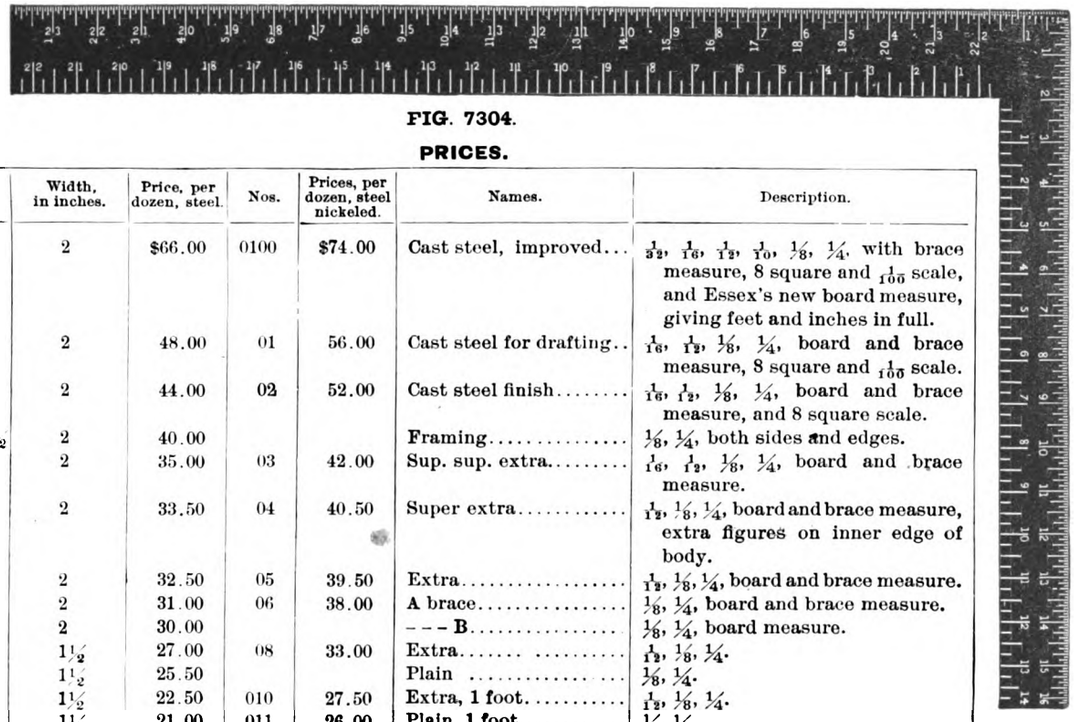


FIG. 7304.

PRICES.

Nos.	Width, in inches.	Price, per dozen, steel.	Nos.	Prices, per dozen, steel nickeled.	Names.	Description.
100	2	$66.00	0100	$74.00	Cast steel, improved...	$\frac{1}{32}$, $\frac{1}{16}$, $\frac{1}{12}$, $\frac{1}{10}$, ⅛, ¼, with brace measure, 8 square and $\frac{1}{100}$ scale, and Essex's new board measure, giving feet and inches in full.
1	2	48.00	01	56.00	Cast steel for drafting..	$\frac{1}{16}$, $\frac{1}{12}$, ⅛, ¼, board and brace measure, 8 square and $\frac{1}{100}$ scale.
2	2	44.00	02	52.00	Cast steel finish.....	$\frac{1}{16}$, $\frac{1}{12}$, ⅛, ¼, board and brace measure, and 8 square scale.
2½	2	40.00			Framing.....	⅛, ¼, both sides and edges.
3	2	35.00	03	42.00	Sup. sup. extra.....	$\frac{1}{16}$, $\frac{1}{12}$, ⅛, ¼, board and brace measure.
4	2	33.50	04	40.50	Super extra.....	$\frac{1}{12}$, ⅛, ¼, board and brace measure, extra figures on inner edge of body.
5	2	32.50	05	39.50	Extra.....	$\frac{1}{12}$, ⅛, ¼, board and brace measure.
6	2	31.00	06	38.00	A brace.....	⅛, ¼, board and brace measure.
7	2	30.00			- - - B.....	⅛, ¼, board measure.
8	1½	27.00	08	33.00	Extra.....	$\frac{1}{12}$, ⅛, ¼.
9	1½	25.50			Plain	⅛, ¼.
10	1½	22.50	010	27.50	Extra, 1 foot.....	$\frac{1}{12}$, ⅛, ¼.
11	1½	21.00	011	26.00	Plain, 1 foot.....	⅛, ¼.
12	1½	30.00	012	35.00	Cast steel, 1 foot.....	$\frac{1}{16}$, $\frac{1}{12}$, ⅛, ¼, and $\frac{1}{100}$ scale.
15	3	180.00			Bridge builders'.....	$\frac{1}{16}$, $\frac{1}{12}$, ⅛; 1 in. slot in center.
31	1½	12.00			Flat steel, not tapered..	⅛ on one side.
32	1½	16.00			" " " ..	⅛ on both sides.
34	2	22.00			" " " ..	⅛ on both sides.
	1		20	13.50	Machinists', 6 inch.....	$\frac{1}{16}$, $\frac{1}{12}$, ⅛, ¼, extra finish.

Packed in paper boxes ¼ dozen each.

TRY SQUARES.

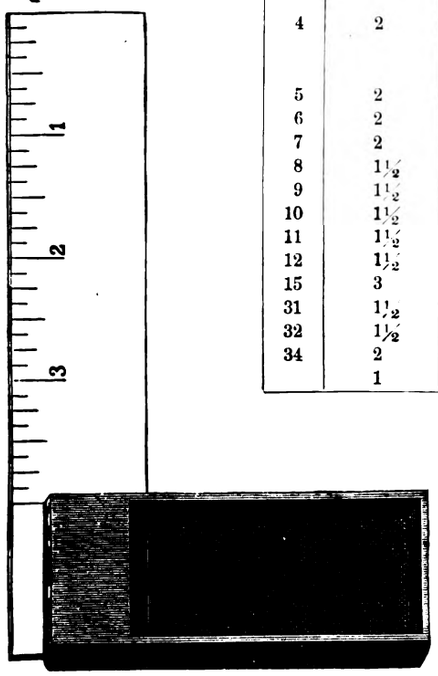


FIG. 7305.

Iron handle, graduated steel blade, square inside and out.

PRICES.

Inches.....	2	4	6	8	10	12
Per doz.....	$2.25	$2.75	$3.50	$4.50	$5.50	$7.00

One-half dozen in a box.

TRY AND MITER SQUARES.

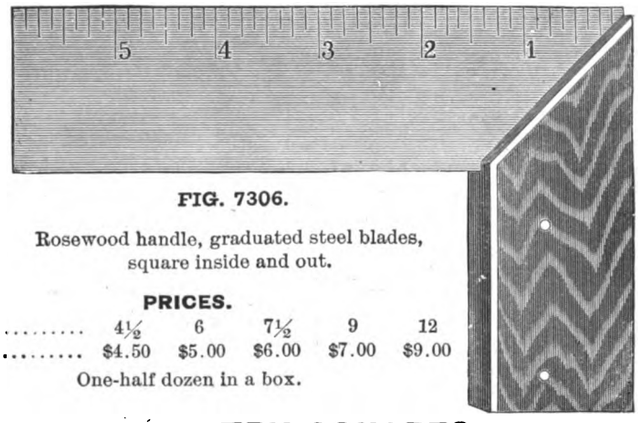


FIG. 7306.

Rosewood handle, graduated steel blades, square inside and out.

PRICES.

Inches.....	4½	6	7½	9	12
Per doz.....	$4.50	$5.00	$6.00	$7.00	$9.00

One-half dozen in a box.

TRY SQUARES.

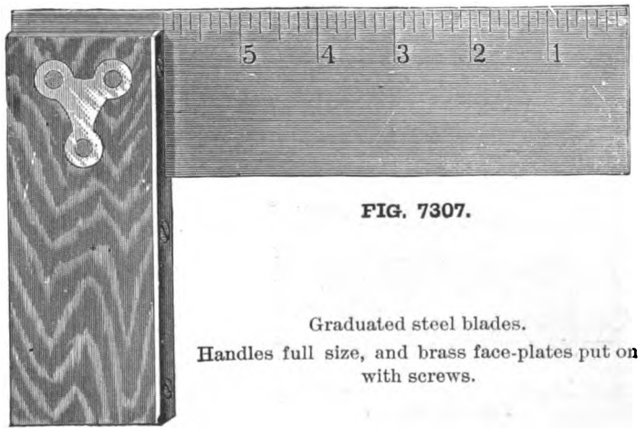


FIG. 7307.

Graduated steel blades.
Handles full size, and brass face-plates put on with screws.

PRICES, FIG. 7307.

		Per doz.
Rosewood, 1 dozen in a box	3 inch,	$3.00
" ½ " "	4½ "	3.75
" ½ " "	6 "	5.00
" ½ " "	7½ "	5.75
" ½ " "	9 "	6.50
" ½ " "	10 "	7.25
" ½ " "	12 "	8.50
" with rest, ½ dozen in a box	15 "	12.50
" " " ½ " "	18 "	15.50

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SLIDING T BEVELS.

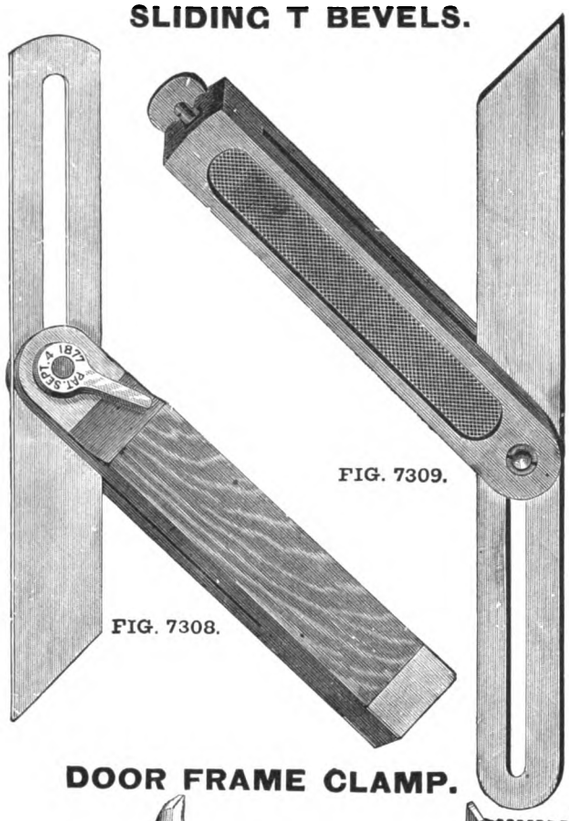


FIG. 7309.

FIG. 7308.

PRICES, FIG. 7308.

The bevel blade can be made fast or loose by moving the lever with the thumb of the hand which grasps the handle, thus leaving the other hand of the workman free.

Bevels with thumb screws will be furnished if so ordered.

ROSEWOOD HANDLE, WITH BRASS LEVER, FLUSH.

6 inch	per doz.,	$5.50
8 "	"	6.00
10 "	"	6.50
12 "	"	7.00
14 "	"	7.50

One-half dozen in a box.

PRICES, FIG. 7309.

FLUSH BLADES, IRON HANDLE, WITH PARALLEL EDGES.

The blade is easily secured at any angle by turning the thumb screw at the lower end of the handle.

6 inch	per doz.,	$6.00
8 "	"	6.50
10 "	"	7.50

One-half dozen in a box.

HAND SCREWS.

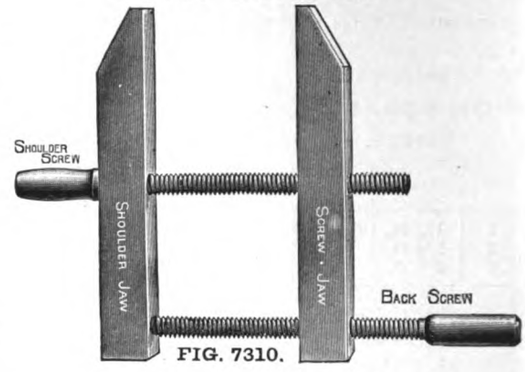


FIG. 7310.

PRICES.

No.	Diameter of screws.	Length of screws.	Length of jaws.	Size of jaws.	Open.	Prices, per doz.
0	1¼ in.	28 in.	21 in.	3 x 3 in.	17 in.	$9.25
1	1¼ "	26 "	20 "	2¾ " 3¼ "	14½ "	8.75
2	1¼ "	24 "	20 "	2¾ " 3 "	13 "	8.00
3	1¼ "	22 "	20 "	2½ " 2¾ "	11 "	7.75
4	1⅛ "	22 "	18 "	2½ " 2½ "	12½ "	7.50
5	1⅛ "	20 "	18 "	2½ " 2½ "	10½ "	7.00
6	1 "	20 "	16 "	2⅜ " 2½ "	10¾ "	6.75
7	1 "	18 "	16 "	2⅜ " 2⅜ "	9 "	6.25
8	⅞ "	20 "	14 "	2 " 2¼ "	11¾ "	6.25
9	⅞ "	18 "	14 "	2 " 2 "	10 "	5.50
10	⅞ "	16 "	14 "	2 " 1⅞ "	8 "	5.00
11	¾ "	14 "	12 "	1⅝ " 1⅞ "	6¾ "	4.00
12	¾ "	12 "	10 "	1½ " 1¾ "	5¼ "	3.50
13	⅝ "	10 "	8½ "	1⅜ " 1⅜ "	4¼ "	2.50
14	⅝ "	9 "	7 "	1⅛ " 1⅛ "	4 "	2.25
15	⅜ "	5 "	4 "	¾ " ⅞ "	2¼ "	1.75
15½	⅜ "	Th'mb screws	4 "	¾ " ⅞ "	2¼ "	2.00

DOOR FRAME CLAMP.

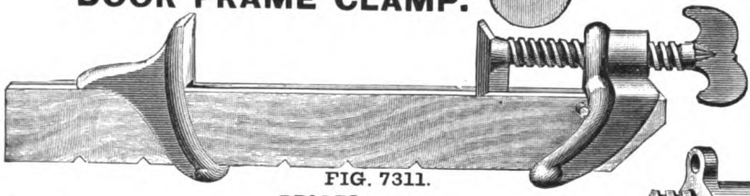


FIG. 7311.

PRICES.

3 feet long	per dozen, $8.00
4 " "	" " 9.00

WROUGHT IRON BENCH SCREWS.

MOVABLE COLLAR, DOUBLE THREAD, WOOD HANDLE.



FIG. 7313.

CARPENTERS' CLAMPS.

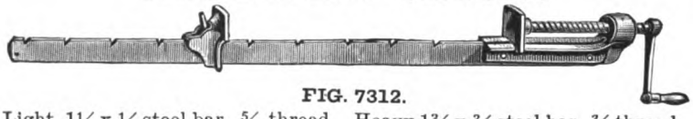


FIG. 7312.

Light, 1½ x ¼ steel bar, ⅝ thread wrought screw and malleable crank.

Heavy 1¾ x ⅜ steel bar, ¾ thread wrought screw.

PRICES, PER PAIR.

LIGHT.

Opening 2½ feet	$3.75
" 3 "	4.00
" 4 "	4.50
" 5 "	5.00

HEAVY.

Opens 5 feet	$7.50
" 6 "	8.50
" 7 "	9.50
" 8 "	11.00
" 9 "	12.50
" 10 "	14.00

IMPROVED RIGGER SCREWS.



FIG. 7316.

For rope and wire rigging.

PRICES.

No.	Size of screw	Prices
0	1½ in.	$8.00
1	1¼ "	4.50
2	1⅛ "	3.75
3	1 "	2.75
4	⅞ "	2.50

PRICES.

1 inch, 16 inches long, per doz.	$10.80
1⅛ " 16 " "	12.50
1¼ " 17 " "	15.00
1½ " 19 " "	27.00

One doz. in a case.

WROUGHT IRON RIGGER SCREWS.

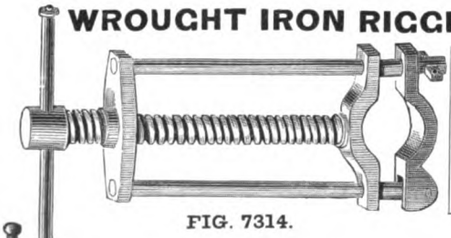


FIG. 7314.

Size.	Prices, each.
⅞ in.	$2.75
1 "	3.50
1⅛ "	4.75
1¼ "	6.25
1½ "	8.00

HEAVY WOOD BENCH SCREWS.



FIG. 7318.

PRICES.

HICKORY SCREWS.

No. 16, 2¾ in. hickory screws, per doz.	$8.00
" 17, 2⅜ " " " "	6.00
" 18, 2 " " " "	5.00
" 19, 1¾ " " " "	4.50
" 20, 1½ " " " "	4.00
" 21, 1¼ " " " "	3.00

MAPLE BENCH SCREWS.

No. 22, 2¾ inch maple screw, per doz.	$5.25
" 123, 2½ " " " "	3.00
" 124, 2 " " " "	2.50

RIGGER SCREWS.

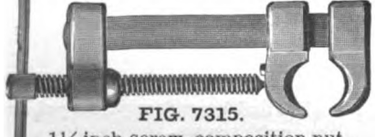


FIG. 7315.

1⅛ inch screw, composition nut.

PRICE, $9.00.

LOBSTER CLAW RIGGERS SCREWS.

PRICES, FIG. 7317.



FIG. 7317.

No.	Size of screw.	Prices.
1	1⅛ in.	$3 25
2	1 "	3.00
3	⅞ "	2.75

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CLAMPS.

ADJUSTABLE.

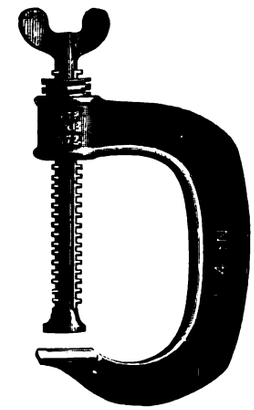


FIG. 7319.

HEAVY PATTERN.

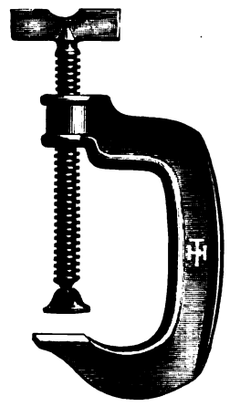


FIG. 7320.

DESCRIPTION, FIG. 7319.

By turning the bolt one-quarter turn to the left, it can be moved its full length out or in; when turning it to the right it operates like any other screw.

PRICES, FIG. 7319.

3 inch, per dozen	.....	$4.50
4 " "	.....	6.50
5 " "	.....	7 50
6 " "	.....	9.00
8 " "	.....	11.50

PRICES, FIG. 7320.

2 inch, per dozen	.....	$2.25
3 " "	.....	4.00
4 " "	.....	6.00
5 " "	.....	7.00
6 " "	.....	8.75
8 " "	.....	11.00

MALLEABLE CLAMPS, WITH WROUGHT SCREWS.



FIG. 7322.

These clamps are by far the heaviest of any yet placed upon the market, and are so proportioned, by actual experiment, as to give the greatest amount of strength possible, for the weight or amount of material used. A special quality is the wrought-iron screws, which are much stronger than malleable.

PRICES.

Price, 3 inch, per doz.	$ 7.00	Price, 7 inch, per doz.	$20.00
" 4 " "	10.00	" 8 " "	25.00
" 5 " "	12.00	" 9 " "	27.50
" 6 " "	16.00	" 10 " "	30.00

Packed, 3, 4, 5, 6 inch, one-half dozen in a box.
7, 8, 9, 10 inch, not packed.

IMPROVED PATENT CORNER CLAMP.

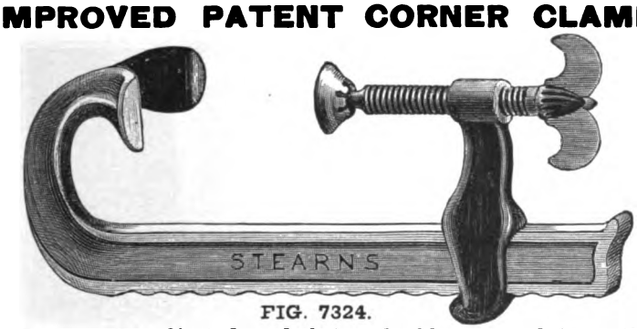


FIG. 7324.

It is easily adjusted, and, being double pronged, is particularly adapted for holding corners. Can be used on straight work equally as well. Malleable. Adjustable washer.

PRICES.

Price, 6 inch, per doz. . . $8.00 Price, 9 inch, per doz. . . $12.00
Packed one-half dozen in a box.

ADJUSTABLE BALL.

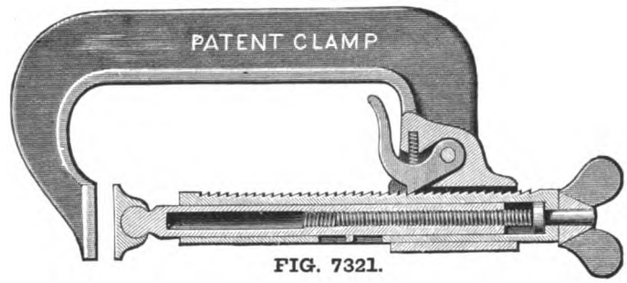


FIG. 7321.

The new clamp represented in the above cut combines the qualities of quick adjustment and durability. It has the especial advantage over all others in clamping the work without displacement, being so constructed that in operating the plunger or screw it does not turn as in all other clamps, but is forced directly on the work by the thumb-screw.

These clamps are made of the best malleable iron.

PRICES.

No. 1	Opens 3 inches, per dozen	$7.50
No. 2.	" 5 " "	8.50
No. 3.	" 7 " "	12.00
No. 4.	" 10 " "	16.00
No. 5.	" 12 " "	20.00

STEARNS' MALLEABLE IRON CABINET CLAMPS.

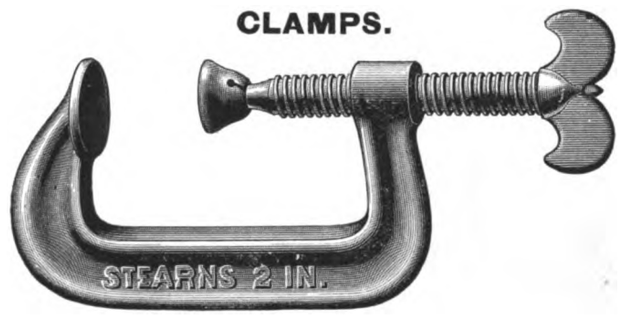


FIG. 7323.

A most convenient clamp for light purposes; for gluing, scroll sawing uses, in the trimming shop, etc., and in fact in all places where the ordinary quilt clamp is not sufficiently strong. The adjustable washer works upon a perfect ball at the end of screw, thereby conforming to a beveled surface.

PRICES.

Price, 2 inch, per dozen. $2.00 Price, 3 inch, per dozen. $3.00
Packed one dozen in a box.

STEARNS' ADJUSTABLE SCREW CLAMPS.

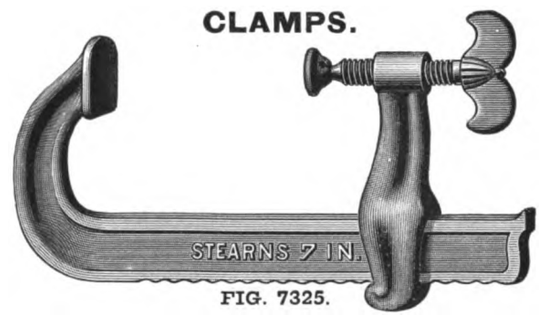


FIG. 7325.

Made of the best refined malleable iron, and so proportioned as to give the greatest strength for the amount of weight. The shape of the thread on the thumb-screw is of the strongest make, and so fine that the utmost power in clamping is secured without the use of a wrench. They cannot slip, and will conform to a beveled surface.

PRICES.

Price, 3 inch, per dozen.	$4.00	Price, 9 inch, per dozen.	$10.50
" 5 " "	6.50	" 12 " "	15.00
" 7 " "	9.00	" 16 " "	20.00

Packed one-half dozen in a box.

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BARBER'S IMPROVED BIT BRACE, FORCED STEEL JAWS.

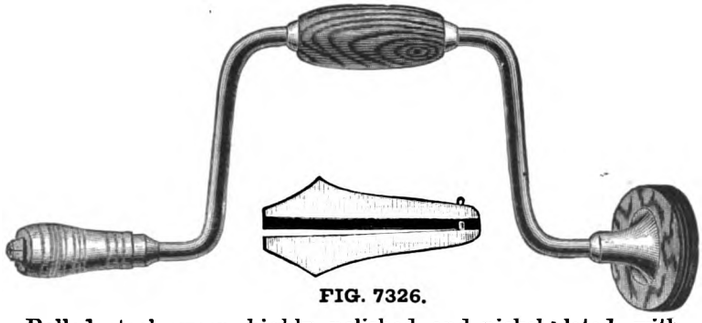


FIG. 7326.

Rolled steel sweep, highly polished and nickel-plated, with rosewood handle and lignum-vitæ head, with steel anti-friction collar.

PRICES.

	Per doz.
No. 10, 14 inch sweep	$33.00
No. 11, 12 " "	30.00
No. 12, 10 " "	27.00
No. 13, 8 " "	24.00
No. 14, 6 " "	21.00
No. 15, 4 " "	20.00

BARBER RATCHET BRACE.

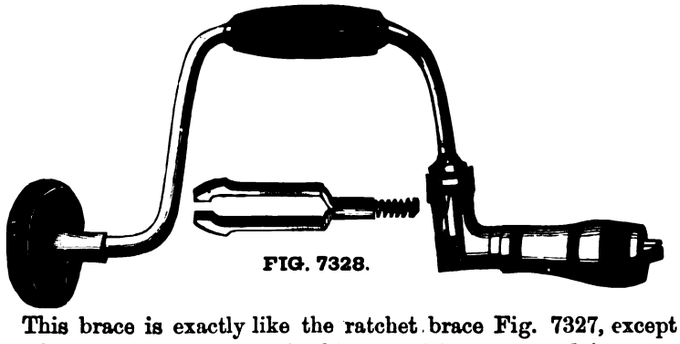


FIG. 7328.

This brace is exactly like the ratchet brace Fig. 7327, except the jaws, which are as seen in this cut. The sweep and jaws are steel, the nickel-plating and trimmings all first-class. Steel anti-friction collar.

PRICES.

	Per doz.
No. 61, 12 inch sweep	$39.00
No. 62, 10 " "	36.00
No. 63, 8 " "	33.00

BARBER'S IMPROVED PATENT BRACE.

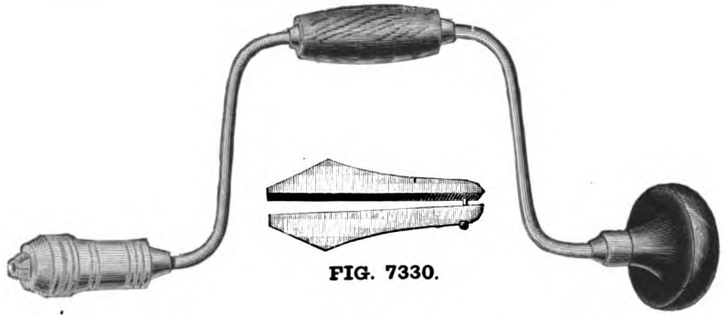


FIG. 7330.

This brace has the same style of jaws as our best steel braces. The sweep is made of steel, tumbled and not polished; the head and revolving handle are of hard maple.

PRICES.

	Per doz.
No. 71, 12 inch sweep	$8.00
No. 72, 10 " "	7.50
No. 73, 8 " "	7.00
No. 82, 10 " " ratchet	14.00
No. 83, 8 " " "	13.50

BARBER'S IMPROVED RATCHET BRACE.



FIG. 7327.

Steel brace, nickel-plated, with steel anti-friction collar.

This has a regular Barber chuck, with forged steel jaws, and also Dolan's patent ratchet attachment, to be used in places where there is not room to revolve the sweep. A slight back-and-forth motion will drive the bit in or out. All the working parts are made of steel.

PRICES.

	Per doz.		Per doz.
No. 30, 14 inch sweep	$42.00	No. 32, 10 inch sweep	$36.00
No. 31, 12 " "	39.00	No. 33, 8 " "	33.00

BARBER BRACE.

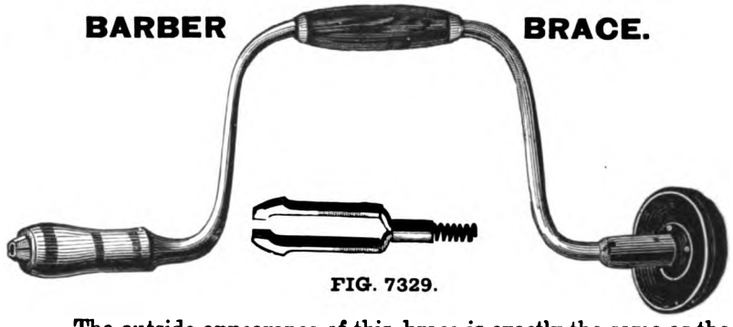


FIG. 7329.

The outside appearance of this brace is exactly the same as the Barber improved brace, Fig. 7326, but the jaws are as seen in this cut. The jaws are forged steel, the sweep of rolled steel, heavily nickel-plated. The head lignum-vitæ, and the handle of rosewood. Steel anti-friction collar.

PRICES.

	Per doz.		Per doz.
No. 40, 14 inch sweep	$33.00	No. 43, 8 inch sweep	$24.00
No. 41, 12 " "	30.00	No. 44, 6 " "	21.00
No. 42, 10 " "	27.00		

STEEL DRILL BRACE, WITH ANTI-FRICTION COLLAR.

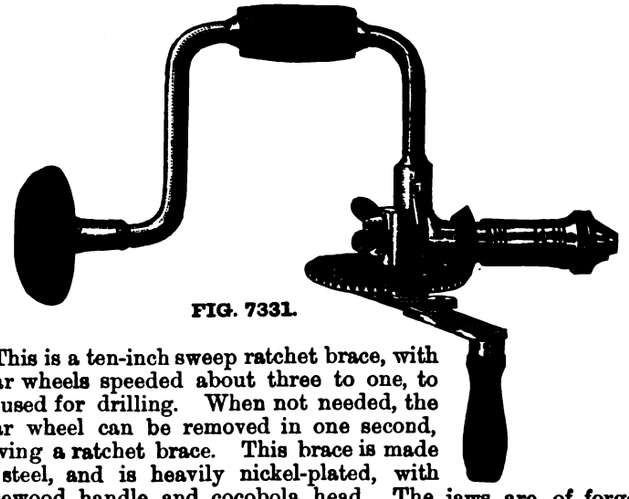


FIG. 7331.

This is a ten-inch sweep ratchet brace, with gear wheels speeded about three to one, to be used for drilling. When not needed, the gear wheel can be removed in one second, leaving a ratchet brace. This brace is made of steel, and is heavily nickel-plated, with rosewood handle and cocobola head. The jaws are of forged steel, and will center and hold firmly round twist drills from $\frac{1}{8}$ to $\frac{7}{16}$ of an inch diameter. Also square shank bits and drills of all sizes. Also square and flat screw-driver bits. In fact, it will hold perfectly tool shanks of any size or shape.

With each drill brace we send an extra set of forged steel jaws, mainly to be used for holding round twist drills less than one-eighth of an inch in diameter. As will be noticed in the cut, the large gear wheel has an extension handle to give it more power when needed.

Price of drill brace, complete ..... per doz., $36.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BIT BRACES AND FIXTURES.

BARBER'S EXTENSION BIT HOLDERS.



FIG. 7332.

PRICES, in lengths of 12, 15, 18 or 24 inches.....**PER DOZ., $15.00.**

CENTRAL GRIP EXTENSION BIT HOLDERS.

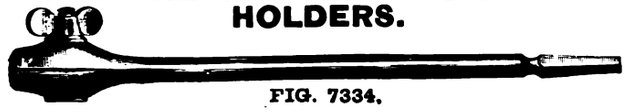


FIG. 7334.

PRICES, in lengths of 12, 16 or 20 inches.....**PER DOZ., $18.00.**

SLEEVE EXTENSION BIT HOLDERS.

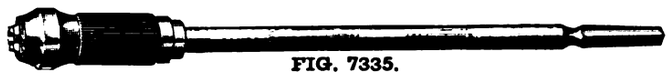


FIG. 7335.

PRICES, in lengths of 12, 16 or 20 inches.....**PER DOZ., $18.00.**

BALL BRACES, WITH SCREW.



FIG. 7336.

PRICES.

8 inch sweep.....per doz., $3.75
10 " " ..... " 4.20

ADJUSTABLE BRACES, WITH RATCHET ATTACHMENT.

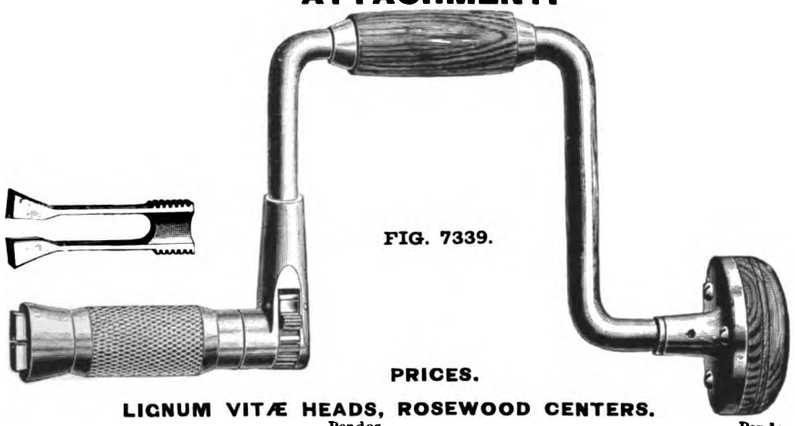


FIG. 7339.

PRICES.

LIGNUM VITÆ HEADS, ROSEWOOD CENTERS.

	Per doz.		Per doz.
6 inch sweep, nickel-plated.....	$37.00	12 inch sweep, nickel-plated.....	$46.00
8 " " "	39.50	14 " " "	53.00
10 " " "	42.75		

CENTRAL GRIP BRACES.

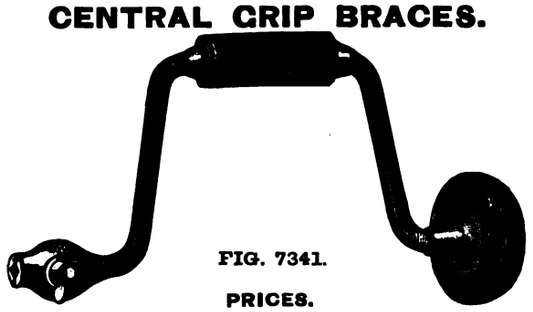


FIG. 7341.

PRICES.

6 inch sweep.....per doz.,	$21.00	12 inch sweep.....per doz.,	$30.00
8 " ..... "	24.00	14 " ..... "	33.00
10 " ..... "	27.00		

PRICES, FIG. 7342.

6 inch sweep.....per doz.,	$21.00	12 inch sweep.....per doz.,	$30.00
8 " ..... "	24.00	14 " ..... "	33.00
10 " ..... "	27.00		

PRICES, FIG. 7343.

6 inch sweep.....per doz.,	$30.00	10 inch sweep.....per doz.,	$36.00
8 " ..... "	33.00	12 " ..... "	39.00

DOUBLE EXTENSION, WITH SCREW DRIVER.

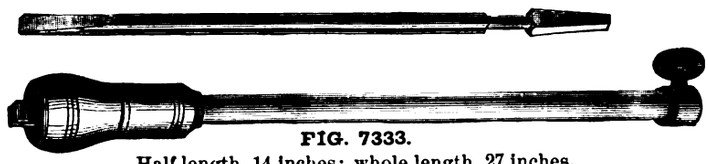


FIG. 7333.

Half length, 14 inches; whole length, 27 inches.
Nickel-plated.....per doz., $24.00

CORNER BRACES.

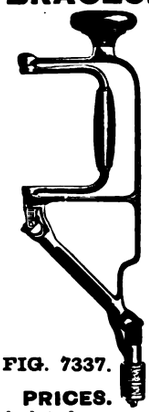


FIG. 7337.

PRICES. Per doz.
Nickel-plated.....$36.00
Black enameled, with nickeled trimmings.. 33.00

UNIVERSAL ANGULAR BIT STOCKS.



FIG. 7338.

PRICE.

Per doz..... $24.00

DOUBLE CRANK OR WIMBLE,

NICKEL-PLATED, REVOLVING COCOBOLO HEAD AND HANDLE.

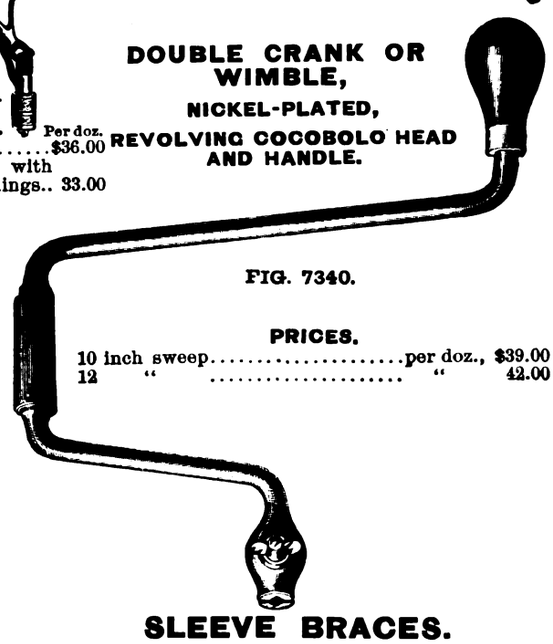


FIG. 7340.

PRICES.

10 inch sweep.....per doz., $39.00
12 " ..... " 42.00

SLEEVE BRACES.

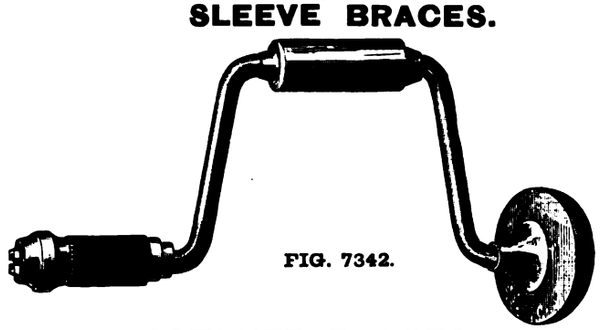


FIG. 7342.

RATCHET BRACES.

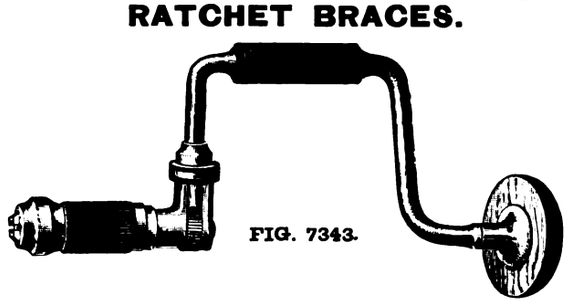


FIG. 7343.

Figs. 7342 and 7343 are nickel-plated, with revolving cocobolo handles and lignum vitæ heads, and the jaws are made of steel.

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PLUMBS AND LEVELS.

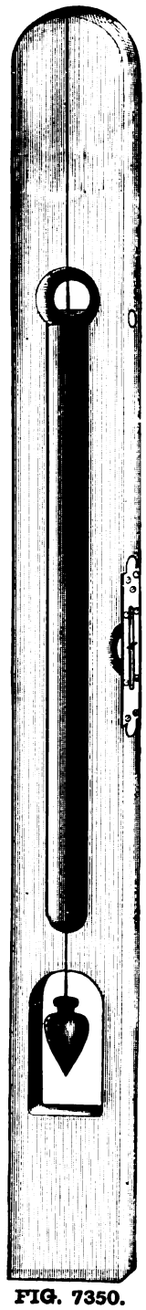


FIG. 7350.

HAND-Y PLUMB AND LEVEL.



FIG. 7344.

DESCRIPTION, FIG. 7344.

This level can be used in horizontal position, or can be brought to perpendicular for ascertaining a plumb, with remarkable ease, as the shallow grooves along the two sides afford an excellent grip on the tool.

PRICES.

No. 16. Patent adjustable Hand-y plumb and level, cherry, arch top plate, two side views, polished, tipped, assorted, 24 to 30 inches, per dozen, $15.00.

HAND-Y PLUMB AND LEVEL.

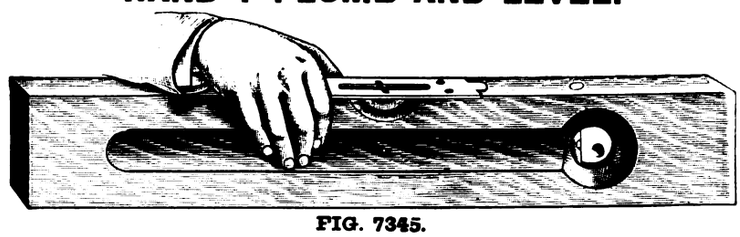


FIG. 7345.

PRICES, FIG. 7345.

No. 20. Hand-y plumb and level, arch top plate, two side views, polished, assorted, 24 to 30 inch, per dozen, $9.00.

DUPLEX PLUMBS AND LEVELS.

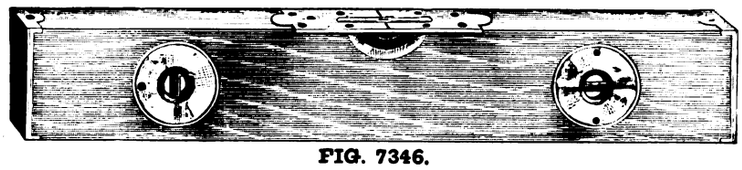


FIG. 7346.

PRICES, FIG. 7346.

No. 25. Patent adjustable plumb and level, mahogany, arch top plate, improved duplex side views polished, tipped, assorted, 24 to 30 inches, per dozen, $24.00.

No. 30. Patent adjustable plumb and level, cherry, arch top plate, improved duplex side views, polished, tipped, assorted, 24 to 30 inches, per dozen, $18.00.

No. 50. Patent adjustable plumb and level, cherry, triple stock, arch top plate, improved duplex side views, polished and tipped, assorted, 24 to 30 inches, per dozen, $24.00.

These levels have the ordinary form of leveling glass, set in the top surface of the stock. For any uses where an observation of the glass, sidewise, may be found convenient, an additional leveling glass is set in the side, at the opposite end from the plumb. Both glasses are protected by brass disks, can be seen from either side, and are inserted in the level with the least possible removal of wood from the stock.

PLAIN PLUMBS AND LEVELS.



FIG. 7347.

ADJUSTABLE PLUMBS AND LEVELS.



FIG. 7348.

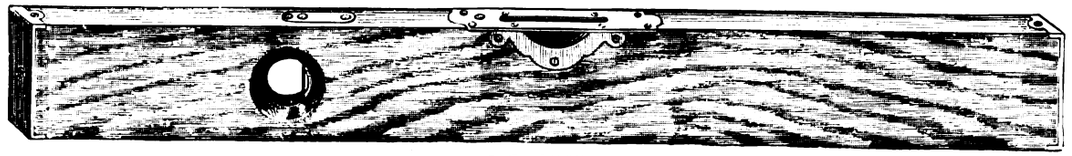


FIG. 7349.

PRICES, FIG. 7347.

No. 104. Plumb and level, arch top plate, two side views, polished, assorted, 12 to 18 inches, per dozen.....$14.00

No. 00. Plumb and level, arch top plate, two side views, polished, assorted, 18 to 24 inches, per dozen..... 16.00

No. 0. Plumb and level, arch top plate, two side views, polished, assorted, 24 to 30 inches, per dozen..... 18.00

PRICES, FIG. 7348.

No. 3. Patent adjustable plumb and level, arch top plate, two side views, polished and tipped, assorted, 24 to 30 inches, per dozen..$30.00

NOTE.—No. 3 plumb and level we also keep in stock, assorted, 18 to 24 inches, ½ dozen in a box. The regular assortment, 24 to 30 inches, will always be sent, unless otherwise ordered.

No. 5. Patent adjustable plumb and level, triple stock, arch top plate, two ornamental brass lipped side views, polished and tipped, assorted, 24 to 30 inches, per dozen.....$48.00

PRICES, FIG. 7349.

No. 0. Patent adjustable mahogany plumb and level, triple stock, two ornamental brass lipped side views, arch top plate, polished and tipped, assorted, 24 to 30 inches, per dozen.....$60.00

DESCRIPTION, FIG. 7350.

Masons will fully appreciate the special features of the Hand-y level, as their occupation is mostly out-of-doors. From frequent exposure to cold, and with the constant handling of brick or stone, the fingers become stiff and the skin hardened.

The level now offered for their use will meet all the peculiar requirements of masons.

No. 36. Patent adjustable Hand-y mason's plumb and level; adapted also for plumb and bob line, 42 inches, per dozen.....$18.00

The Hand-y plumbs and levels are packed in wooden cases, ½ dozen in a case, same as all of our regular plumbs and levels.

PRICES, FIG. 7351.

No. 35. Patent adjustable mason's plumb and level, adapted also for plumb bob and line, 42 inches, per dozen.....$40.00

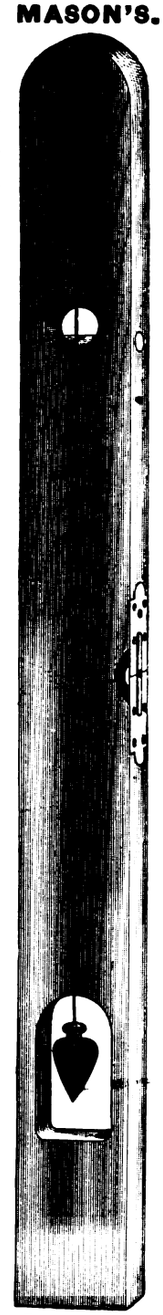


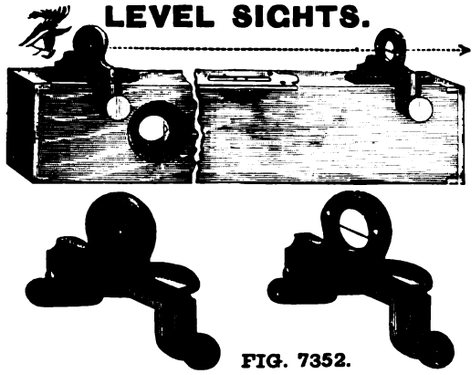
FIG. 7351.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PLUMBS, LEVELS AND INCLINOMETERS.

LEVEL SIGHTS.



By the use of these ingenious devices, which can be attached to any level, the owner has a convenient and accurate means for leveling, from one given point to another, at a long distance away. When not in use the level sights are easily detached, and can be packed away in a small space for future use.

PRICES.

Per pair, in a box...$0.75

FIG. 7352.

LEVEL GLASSES.



FIG. 7354.

	Per gross.		Per gross.
1 doz. in a box.....1¾ inch,	$9.50	1 doz. in a box....3½ inch,	$13.00
1 " " .... 2 "	10.00	1 " " ....4 "	14.50
1 " " ....2½ "	10.50	1 " " ....4½ "	16.00
1 " " ....3 "	11.50		

Assorted, 1¾, 3 and 3½ inch, 1 dozen in a box 12.00

METALLIC PLUMBS AND LEVELS.



FIG. 7356.

No. 13.	14 inches long.....per doz.,	$18.00
No. 14.	20 " " ..... "	21.00
No. 15.	24 " " ..... "	27.00

MACHINISTS' ADJUSTABLE IRON LEVEL AND INCLINOMETER.

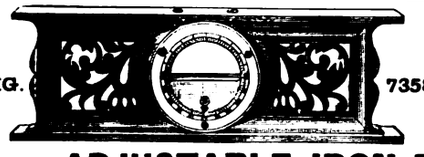


FIG. 7358.

PRICES, FIG. 7358.

6	inches	long,	per	doz.,	$24.00
12	"	"	"	"	30.00
18	"	"	"	"	36.00
24	"	"	"	"	42.00

ADJUSTABLE IRON PLUMB, LEVEL AND INCLINOMETER COMBINED.

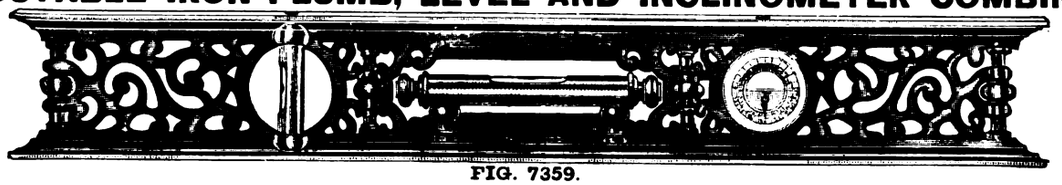


FIG. 7359.

24 inch, per doz....$72.00.

With surveyor's ground glasses, each....$7.00 net.

ADJUSTABLE IRON DOUBLE PLUMB AND LEVEL.

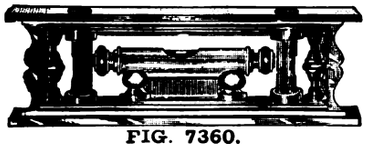


FIG. 7360.

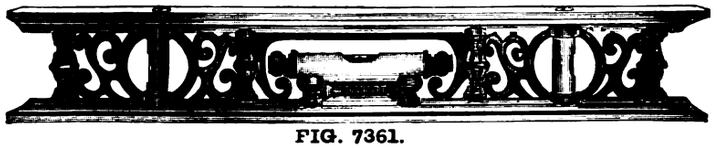


FIG. 7361.

Prices, Fig. 7360.	6 inches long, per doz			$24.00
" " 7361.	12 " " "			27.00
	With surveyor's ground glasses			3.00 net.
" " 7361.	18 inches long			30.00
	With surveyor's ground glasses			3.50 "
" " 7361.	24 inches long			36.00
	With surveyor's ground glasses			4.00 "
" " 7362.	4 inches long, per doz			6.00
" " 7362.	6 " " "			9.00
" " 7363.	4 " " "			8.00

BIT AND SQUARE LEVEL.

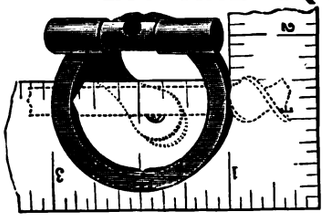




FIG. 7353.

The frame of this level has three pairs of V slots on its back edges. The shank to a bit will lie in these slots, either parallel with the bubble-glass, at an exact angle to it, or at an angle of 45 degrees.

A thumb-screw secures the level to the bit, in either position; and boring can be done with perfect accuracy as to perpendicular, horizontal or angle of 45 degrees, by observing the bubble-glass while turning the bit.

The frame can also be attached to a carpenter's square. Two shoulders rest on the top of the horizontal leg to the square, thus making it an accurate spirit-level. The upright leg of the square will indicate an exact plumb-line.

Bit and square level, brass frame, in a box, each.....$0.30

POCKET LEVELS.

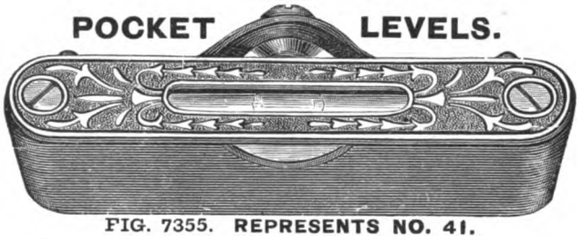


FIG. 7355. REPRESENTS NO. 41.

No. 40.	Iron, iron top plate, japanned, 1 doz. in a box.....per doz.,		$2.50
No. 41.	" brass top plate, 1 doz. in a box.....	"	3.00
No. 42.	Brass, brass top plate, 1 doz. in a box.....	"	8.00

MACHINISTS' LEVELS.



FIG. 7357.

No. 46.	Iron, brass top plate, a superior article $3.50	
No. 38.	Iron level, brass top plate.....4 inch,	3.50
No. 39.	" " " " " .....6 "	4.50

MACHINISTS' ADJUSTABLE IRON BENCH LEVEL.



FIG. 7362.

FOR SQUARES OR STRAIGHT EDGES.

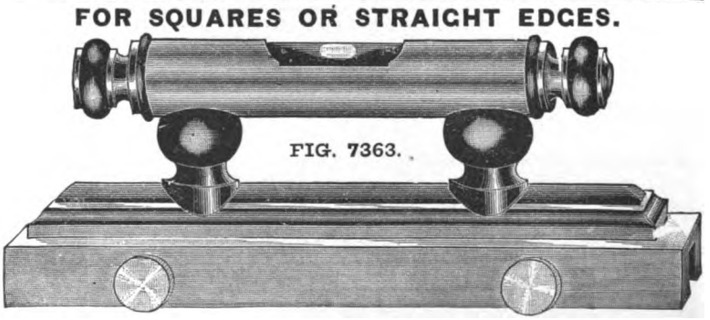


FIG. 7363.

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LEVELS, PLUMB BOBS, ETC.

IRON BENCH LEVELS.



FIG. 7364. REPRESENTS NO. 4.

PRICES, FIG. 7364.

No. 1.	Bench level, 2½ inch.	$0.25
No. 2.	" " 3½ "	.30
No. 3.	" " 4 "	.65
No. 4.	" " 6 "	.75

IRON LEVELS, WITH DOUBLE PLUMBS.



FIG. 7366. REPRESENTS NO. 6.

PRICES, FIG. 7366.

No. 5.	Bench level, double plumb, 6 in	$1.50
No. 6.	" " " " 9 in	1.65
No. 7.	" " " " 12 in	1.75
No. 9.	" " " " 18 in	2.00
No. 10.	" " " " 24 in	2.25
No. 11.	Pocket, " nickel-plated, 2½ in.	.60
No. 12.	" " " " 3½ in.	.75

ADJUSTABLE BENCH LEVELS.

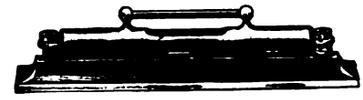


FIG. 7365.

With ground and graduated vials; very sensitive and accurate.

PRICES.

4 in., with ground vial	$2.25
6 in., " " " and handle	3.50
8 in., " " " " "	4.00
4 in., with plain vial	1.00
6 in., " " "	1.25
8 in., " " "	1.50

With nickel-plated base, 15 cents extra.

MECHANICS' PLUMB BOBS.



FIG. 7367.

ENGINEERS' PLUMB BOBS.



FIG. 7368.

ADJUSTABLE PLUMB BOBS.



FIG. 7369.

These plumb bobs are constructed with a reel at the upper end, upon which the line may be kept; and by dropping the bob with a slight jerk, while the ring is held in the hand, any desired length of line may be reeled off. A spring, which has its bearing on the reel, will check and hold the bob firmly at any point on the line. The pressure of the spring may be increased or decreased.

PRICES, FIG. 7369.

No. 1.	Small, bronze metal, with steel point	each, $1.50
No. 2.	Large, " " " " "	" 1.75
No. 3.	" iron " " " "	" 1.00

Each plumb is packed in an air-tight wooden box, neatly labeled.

No.	Weight.	Prices. Each.
1	1 ounce.	$0.85
2	2⅛ "	.95
3	4¼ "	1.10
4	6 "	1.25
5	8 "	1.50
6	15 "	2.50
7	1 3/16 lbs.	3.00
8	2½ "	3.50

No.	Weight.	Prices. Each.
9	9 ounces.	$2.00
10	12 "	2.50

COOK'S EXTENSION BEAM TRAMMELS.

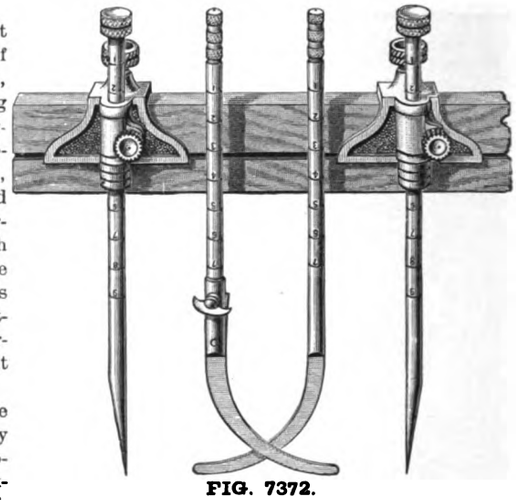


FIG. 7372.

The above cut represents a pair of trammel heads, with an opening through the underside to accommodate the extension, giving width and stiffness in proportion to the length required for large work, while it is equally well adapted to receive a narrow beam for light work.

The points are eccentric, and may be loosened and rotated in their sockets, to make fine adjustments. Either point may be removed and a common pencil inserted.

One of the caliper legs is provided with a joint, worked by an eccentric thumb piece for fine adjustments.

The marks on legs enable them to be adjusted in proper relation to each other.

Price, complete .....$3.25 Price, without caliper legs....$2.50

Sent complete unless otherwise ordered.

CHALK-LINE REELS, ETC.

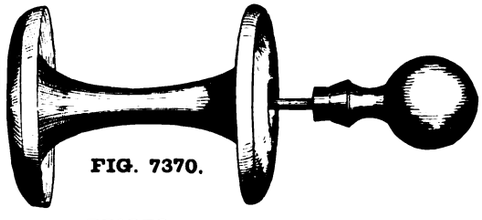


FIG. 7370.

PRICES.

		Per doz.
No. 12.	Chalk-line reels, 3 dozen in a box	$0.36
No. 13.	Chalk-line reels, with 60 feet best quality chalk-line, 1 dozen in a box	1.75
No. 14.	Chalk-line reels, with steel scratch awls, 1 dozen in a box	.95
No. 15.	Chalk-line reels, with steel scratch awls, and 60 feet best quality chalk line, 1 dozen in a box	2.25

HANDLED SCRATCH AWLS.



FIG. 7371.

PRICES.

		Per gross.
No. 1.	Handled, steel scratch awls, 1 dozen in a box	$7.00
No. 2.	Handled, steel scratch awls, large, 1 dozen in a box	8.50

COOK'S IMPROVED TRAMMEL POINTS.

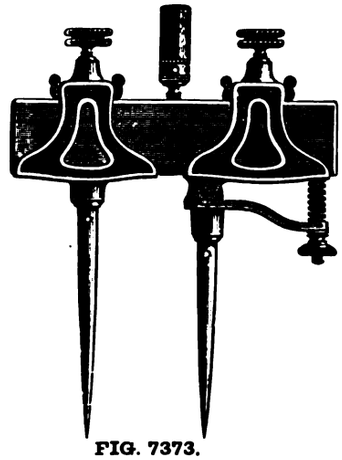


FIG. 7373.

Made of bronze metal, with forged steel points, hardened.

Either point can be removed, and the pencil socket, accompanying each pair, put in its place.

Adjustable like spring dividers. Light and durable.

PRICES.

With 3 inch points, adjustable	$2.50
With 3 inch points, not adjustable	1.50
Extra long points, 5 inch, per set	.35

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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TRAMMEL POINTS, GAUGES AND TAPES.

BRONZE METAL TRAMMEL POINTS.

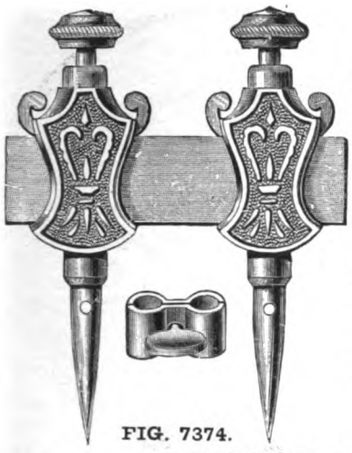


FIG. 7374.

They have steel points, on either of which a pencil socket, which accompanies each pair, can be firmly clamped close up to the main stock. The pencil will thus be secured at a point nearer the work than is possible by any other method.

PRICES.

No. 1. Small, bronze metal, steel points, per pair, $1.00.
No. 2. Medium, bronze metal, steel points, per pair, $1.25.
No. 3. Large, bronze metal, steel points, per pair, $1.75.

MORTISE GAUGE.

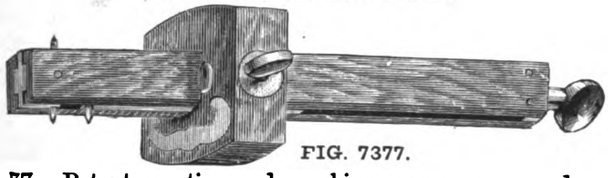


FIG. 7377.

No. 77. Patent mortise and marking gauge, rosewood, plated head, improved screw slide, brass thumb screw and shoe, oval bar, marked, steel points, ½ doz. in a box, per dozen.....$10.00

STEEL MEASURING TAPES.



FIG. 7379.

Tapes, ⅜ inch wide.

The above tapes are marked on the back with links and poles. When links are not wanted, they will be supplied marked at every foot instead, at same price.

Tapes marked in meters, at same price as corresponding lengths in feet.

Each of above tapes packed in a very handsome, round leatherette box.

They are used by surveyors, engineers, bridge builders and all who want a compact, accurate tape measure.

Hard leather cases, flush folding handles, nickel-plated trimmings.

Marked feet and 12ths.	Marked feet and 10ths.	Length.	Diameter of case.	Prices, each.
No. 200	No. 200 D	25 ft.	2½ in.	$4.50
" 201	" 201 D	33 "	2½ "	5.20
" 202	" 202 D	40 "	3 "	6.00
" 203	" 203 D	50 "	3 "	7.20
" 204	" 204 D	66 "	3½ "	9.20
" 205	" 205 D	75 "	3½ "	10.40
" 206	" 206 D	100 "	4 "	12.80

SCRATCH GAUGE.



FIG. 7375.

PRICES.

No. 61. Marking gauge, beechwood, boxwood thumb screw, oval bar, marked, steel point, 1 dozen in a box.....$1.00

MARKING GAUGE.

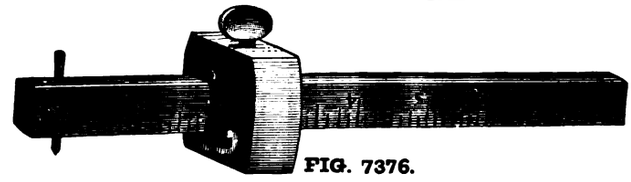


FIG. 7376.

No. 64. Patent marking gauge, polished, plated head, boxwood thumb screw, oval bar, marked, adjusting steel point, 1 dozen in a box.....$2.75
No. 65. Patent marking gauge, boxwood, polished, plated head, brass thumb screw and shoe, oval bar, marked, adjusting steel point, ½ dozen in a box..... ..... 5.00

DOUBLE GAUGES.

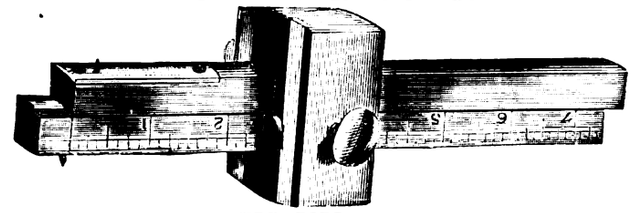


FIG. 7378.

No. 72. Patent double gauge—marking and mortise gauge combined—beechwood, polished, boxwood thumb screws, oval bars, marked, steel points, ½ dozen in box.$4.00

POCKET STEEL TAPES.

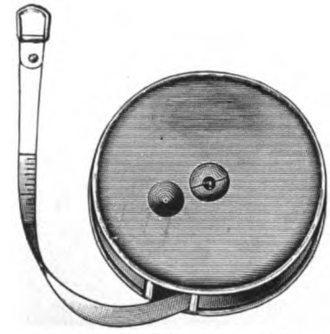


FIG. 7380. REPRESENTS FULL SIZE OF NO. 153.

German silver cases, spring wind, with stop, steel tape, ¼ in. wide.

		Per dozen.
	PRICES.	
No. 153.	3 ft., marked one side inches and 16ths	$14.00
No. 154.	4 " " " "	16.00
No. 155.	5 " " " "	18.00
No. 156.	6 " " " "	20.00
No. 158.	8 " feet and inches	23.00
No. 153 M.	3 ft., 1 meter, marked inches and 16ths one side, millimeters other side	15.00
No. 155 M.	5 ft., 1½ meters, marked inches and 16ths one side, millimeters other side	20.00
No. 156 M.	6 ft., 2 meters, marked inches and 16ths one side, millimeters other side	22.00

Packed one-half dozen in a box.

TAPES ONLY, WITHOUT CASES.

PRICES.

⅜ inch wide.

Length, ft.,	25	33	40	50	66	75	100
Each,	$2.90	$3.60	$4.40	$5.40	$7.20	$8.00	$10.80

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CHESTERMAN'S STEEL MEASURING TAPES.

FLUSH HANDLE NO. 38 L.



FIG. 7381.

PRICES.

Tape 3/8 inch wide, divided either in 10ths or 12ths.

Length..	25	33	40	50 ft.
Each....	$4.50	$5.20	$6.00	$7.20
Length....	66	75	100 ft.	
Each.....	$9.20	$10.40	$12.80	

PRICES, FIG. 7382.

PRICES, NO. 34 L. FOLDING HANDLES.

Tape 5/8 inch wide, divided either in 10ths or 12ths.

Length,	25	33	40	50	66	75	100 ft.
Each,	$1.80	$2.10	$2.30	$2.60	$3.00	$3.30	$4.20

PRICES, NO. 34 F. H. FLUSH HANDLES.

Tape 5/8 inch wide, divided either in 10ths or 12ths.

Length,	25	33	40	50	66	75	100 ft.
Each,	$2.00	$2.30	$2.50	$2.80	$3.30	$3.60	$4.60

PRICES, NO. 126.

Without cases.

Suitable to fit 34 L. and 34 F. H. cases.

Marked on both sides.

Tape 5/8 inch wide, divided either in 10ths or 12ths.

Length,	25	33	40	50	66	75	100 ft.
Each,	$0.90	$1.10	$1.30	$1.50	$1.80	$2.00	$2.90

METALLIC TAPES.

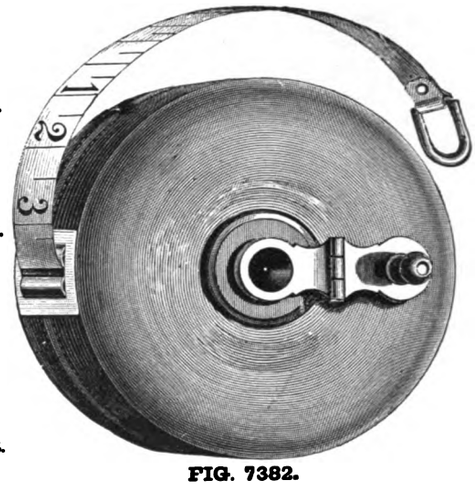


FIG. 7382.

SPRING MEASURES.

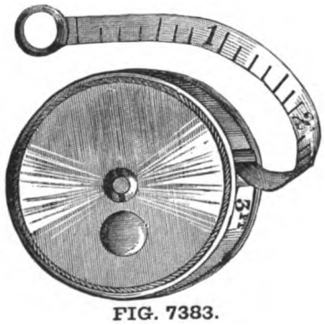


FIG. 7383.

Steel tape, 1/4 inch wide.

PRICES, FIG. 7383.

No. 36 S. S. German silver case, with spring stop, marked on one side in inches, and on other in meters.

Length.....	3	5	6	9	12 ft.
Each.....	$1.20	$1.60	$1.80	$2.40	$2.94

No. 215 S. S. Same as 36 S. S., but with tape 3/8 inch wide and much stronger.

Length.....	3	6	9	12 ft.
Each.....	$1.47	$2.14	$2.54	$3.14

No. 218. German silver case, steel tape, spring stop, width specially adapted for architects and engineers.

These tapes are 6 feet or 2 meters long, and are marked with two measurements on one side, and on the other side with a dozen different 12-inch scales. Thus for a mechanical draughtsman it would have 27 English inches and 2 French meters on one side, and on the other side 12 fully divided 12-inch scales, ranging from 1/16 to 3 inches, or for an architect, 8 fully divided duodecimal scales and 4 chain scales, 10 to 40.

No. 1, draughtsman's, each, $2.20 No. 2, architect, each, $2.20

No. 219. German silver case, milled edge steel tape 5/32 inch wide, 3 feet long, marked on one side in inches.

Per doz. $6.60

No. 220. German silver case, smooth edge steel tape 5/32 inch wide, marked on one side in inches.

Per doz., 6 foot long $8.40

PAINE'S STANDARD STEEL TAPES.

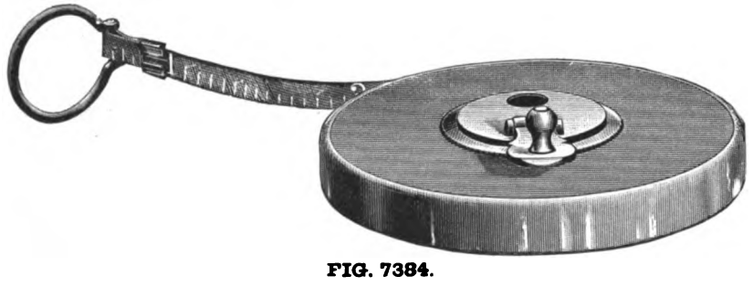


FIG. 7384.

In iron cases, brass bound, morocco covered, improved handle.

All orders for steel tapes will be filled marked in 12ths unless otherwise directed. These tapes are not marked in links unless specially ordered.

PRICES.

No.....	204	205	206	207	208	209
Feet.....	25	33	50	66	75	100
Price, each.....	$3.50	$4.50	$6.00	$8.00	$10.00	$12.00

These tapes are graduated in 10ths and 12ths, and are detachable from the case, and are furnished with detachable rings to avoid breakage.

STEEL STANDARD TAPES.

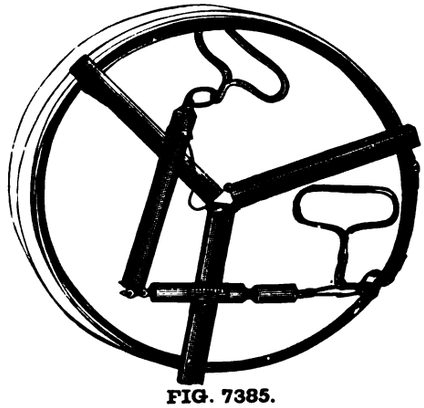


FIG. 7385.

Made of heavy steel 3/16 inch wide, with brass graduations, and used only for rough work.

PRICES.

For each 100 feet of tape.....	$1.00
For each graduation.....	.15
Pair of clamping handles.....	3.00
Wooden reel.....	3.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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MEASURING TAPES.

CHESTERMAN'S LINEN TAPES.

Brown leather cases with folding handles, linen tapes, $\frac{9}{16}$ inch wide, divided in 10ths or 12ths, as desired.

PRICES, NO. 1533.

Length.....feet,	25	33	40	50	66	75	100
Each.....$	0.97	$1.07	$1.20	$1.40	$1.60	$1.74	$2.20

33 L.

Tape, $\frac{5}{8}$ inch wide.

Length.....feet,	25	33	40	50	66	75	100
Each.....$	1.40	$1.60	$1.80	$2.10	$2.40	$2.60	$3.20

PRICES, 216, S. S.

Tape, $\frac{3}{8}$ inch wide. German silver case with spring top.

Length.....feet,	3	5	6	9	12
Each.....$	1.07	$1.27	$1.40	$1.74	$2.14

ASSES' SKIN, BRASS BOUND CASES.

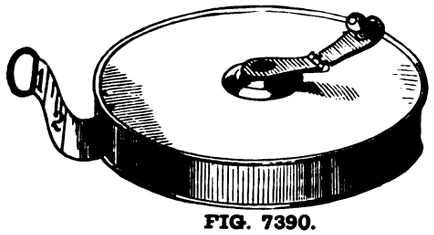


FIG. 7390.

DESCRIPTION, FIGS. 7390 AND 7391.

These tapes are the cheapest made, and, although sold in large quantities, are only adapted to the most ordinary work; although printed from a standard they are liable to variations in use.

Folding handles; common cotton tapes, ½ inch wide.

PRICES.

No.....	30	31	32	33	34	35	36	37
Feet.....	25	30	40	50	66	75	80	100
Per doz....$	3.75	$4.00	$4.50	$5.00	$6.00	$7.50	$8.00	$9.00

BEST COTTON TAPE, HALF INCH WIDE.

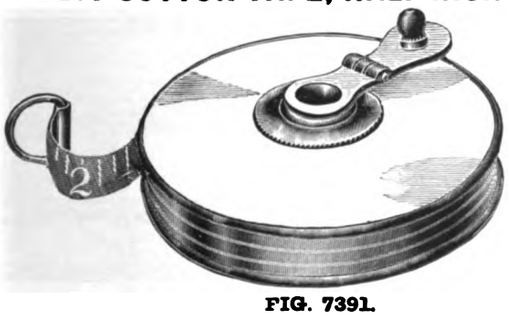


FIG. 7391.

PRICES.

A better cotton tape with heavier warp.

No.....	90	91	92	93	94	95	96	97
Feet.....	25	30	40	50	66	75	80	100
Per doz..$	4.75	$5.00	$5.75	$6.25	$7 25	$8.75	$9.25	$10.75

PRICES, FIG. 7391.

HOLLAND TAPE, HALF INCH WIDE.

A heavier tape with linen warp.

No.....	80	81	82	83	84	85	86	87
Feet.....	25	30	40	50	66	75	80	100
Per doz. $	5.00	$5.50	$7.00	$8.00	$9.00	$10.00	$10.50	$12.50

PRICES, FIG. 7393.

COMMON PATENT LEATHER CASE.

Best cotton tape, ½ inch wide.

No.....	40	41	42	43	44	45	46	47	48
Feet.....	25	30	40	50	60	66	75	80	100
Per doz.....$	4.75	$5.00	$5.75	$6.25	$6.75	$7.25	$8.75	$9.25	$10.75

MEDIUM QUALITY PATENT LEATHER CASE.

Holland tape, ½ inch wide.

No.....	50	51	52	53	54	55	56	57	58
Feet.....	25	30	40	50	60	66	75	80	100
Per doz.....$	5.00	$5.50	$7.00	$8.00	$8.50	$9.00	$10.00	$10.50	$12.50

SPRING MEASURING TAPES.

LACQUERED BRASS CASES.



FIG. 7388.

			Prices, per doz.
No. 20.	3 feet	without stop, linen tape	$3.75
No. 21.	5 "	" " " "	4.00
No. 22.	3 "	with " " "	5.00
No. 23.	5 "	" " " "	5.25
No. 23½.	6 "	" " " "	5.50

Tapes, ¼ inch wide.

NICKEL-PLATED CASES.

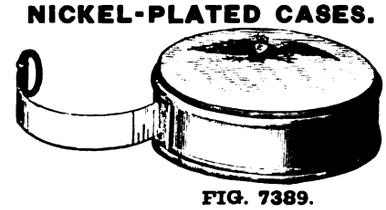


FIG. 7389.

PRICES.

			Prices, per doz.
No. 320.	3 feet,	with stop, linen tape, ⅜ inch wide	$9.00
No. 322.	5 "	" " " " " " "	10.00
No. 323.	6 "	" " " " " " "	11.00
No. 324.	7 "	" " " " " " "	11.50
No. 329.	8 "	" " " " " " "	12.00
No. 330.	12 "	" " " " " " "	15.00
No. 331.	15 "	" " " " " " "	18.00

ASSES' SKIN, BRASS BOUND CASES.

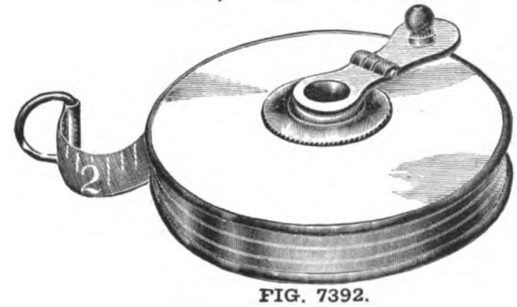


FIG. 7392.

PRICES.

Folding handles; corded linen tapes, ½ inch wide. An all linen tape with cords to prevent stretching.

No.....	100	101	102	103	104	105
Feet.....	33	40	50	66	75	100
Per doz.....$	7.00	$8.25	$10.00	$12.00	$13.00	$15.00

PRICES, SUPER CORDED LINEN TAPE, 9-16 INCH WIDE.

No.....	106	107	108	109
Feet.....	50	66	75	100
Per doz.....$	13.00	$14.00	$15.00	$17.00

SURVEYORS' EXTRA.

PRICES, SUPER HEAVY HOLLAND TAPE, 5-8 INCH WIDE.

No.....	110	111	112	113
Feet.....	50	66	75	100
Per doz.....$	14.00	$15.00	$16.00	$18.00

PATENT LEATHER CASES. FOLDING HANDLES.

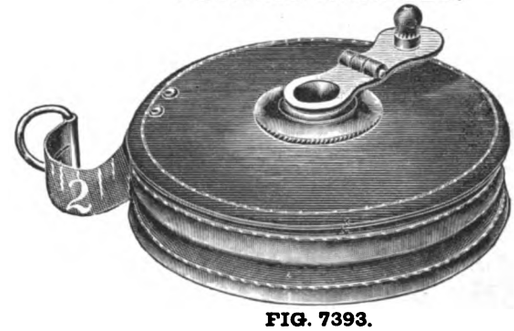


FIG. 7393.

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MEASURING TAPES.

PRESSED LEATHER CASES, FOLDING HANDLES.

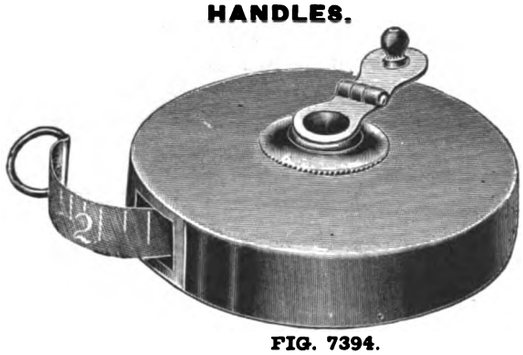


FIG. 7394.

PRICES, 1-2 INCH HOLLAND TAPE.

No.	250	251	252	253	255	256	258
Feet	25	30	40	50	66	75	100
Per dozen	$5.00	$5.50	$7.00	$8.00	$9.00	$10.00	$12.50

PRICES, 1-2 INCH SUPER CORDED LINEN TAPE.

No.	260	261	262	263	264	265
Feet	33	40	50	66	75	100
Per dozen	$7.00	$8.25	$10.00	$12.00	$13.00	$15.00

PRESSED LEATHER, RED JAPANNED CASES.

PRICES, 9-16 INCH SUPER CORDED ALL LINEN TAPE.

No	266	267	268	269
Feet	50	66	75	100
Per dozen	$13.00	$14.00	$15.00	$17.00

PRICES, 5-8 INCH SUPER HEAVY HOLLAND TAPE.

No.	270	271	272	273
Feet	50	66	75	100
Per dozen	$14.00	$15.00	$16.00	$18.00

PRICES, 5-8 INCH SUPER CORDED LINEN TAPE.

No.	230	231	232	233
Feet	50	66	75	100
Per dozen	$18.00	$20.00	$22.00	$24.00

BENT LEATHER CASES, RED OR RUSSET.

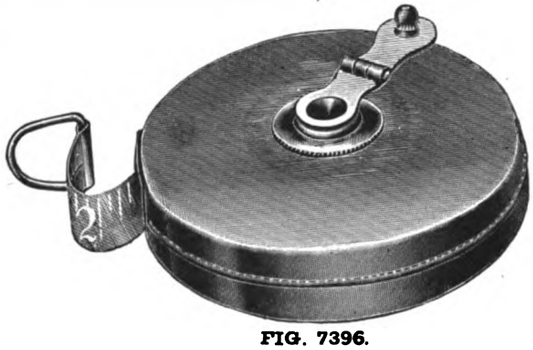


FIG. 7396.

HEAVY HOLLAND TAPE, 5-8 INCH WIDE.

PRICES.

No.	120	121	122	123
Feet	50	66	75	100
Per dozen	$16.00	$17.00	$18.00	$20.00

THE ENAMELED LINEN TAPES

are made of corded linen tape, ⅝ inch wide, and are coated with a durable enamel, making them as nearly waterproof as possible, and are preferred by many to the metallic warp tape.

ENAMELED LINEN TAPE, 5-8 INCH WIDE.

No.	124	125	126	127
Feet	50	66	75	100
Per dozen	$24.00	$26.00	$28.00	$30.00

METALLIC WARP TAPES.

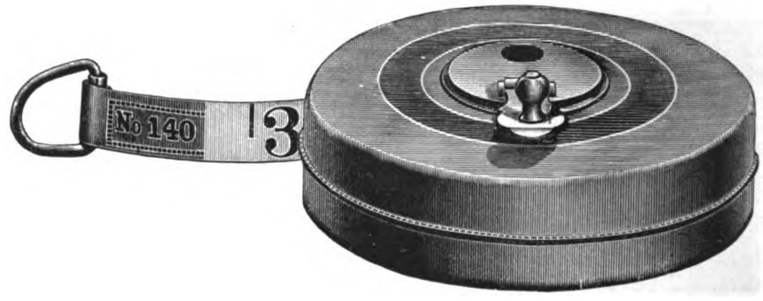


FIG. 7395.

These tapes are made of the best linen tape with wire threads to prevent stretching, and by our process of making are always soft and pliable. The ends are re-enforced with leather to prevent wearing, and all the cases have our new improved flush handle.

PRICES, METALLIC TAPE, 5-8 INCH WIDE.

PRICES.

No.	137	138	139	140	141	142	143
Feet	25	33	40	50	66	75	100
Per doz.	$21.00	$24.00	$27.00	$30.00	$36.00	$42.00	$48.00

CARPENTERS' PINCERS.

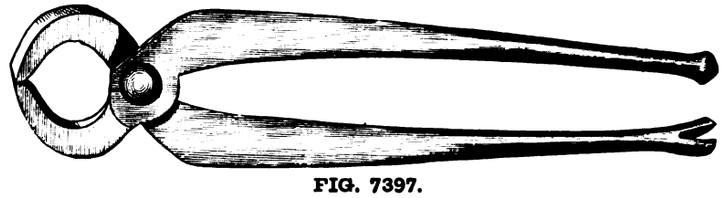


FIG. 7397.

PRICES, PER DOZEN.

No.	Inch	6	7	8	9	10	11	12
100.	Bright jaw	$1.35	$1.70	$2.15	$3.10	$3.90	$5.50	$6.50
101A.	" steel jaw	1.50	1.90	2.35	3.35	4.10	5.80	6.70
102.	Polished " "	1.75	2.10	2.65	3.60	4.50	6.25	7.15
104.	Stubs' quality	2.50	3.20	4.35	5.40	6.50	7.75	9.00

Packed in half-dozen boxes, excepting No. 100.

BLACKSMITHS' PINCERS.

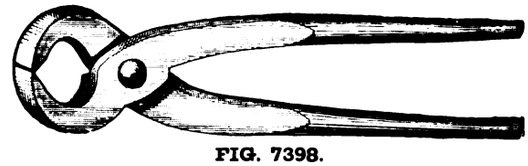


FIG. 7398.

PRICES.

Inch	10	12	14
Per dozen	$5.00	$8.00	$11.50

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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END CUTTING PINCERS AND NIPPERS.

HOOF NAIL PINCERS, EXTRA QUALITY.



FIG. 7399.

PRICES, solid steel jaws, 14½ inch, **PER DOZEN, $16.00.**

CAREW'S WIRE CUTTERS, ADJUSTABLE JAWS.

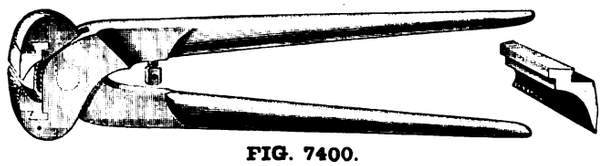


FIG. 7400.

PRICES.

6 inch	each,	$1.75	Extra jaws, per pair,				$0.50
8 "	"	2.00	"	"	"	"	.55
10 "	"	2.25	"	"	"	"	.60
12 "	"	2.60	"	"	"	"	.65
14 "	"	3.00	"	"	"	"	.70

TODD'S NIPPERS.

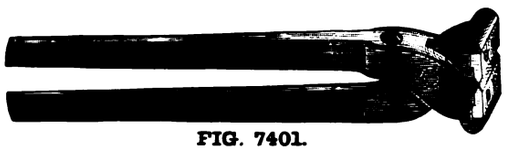


FIG. 7401.

PRICES, EACH.

No. 0, 15 inch	$3.00	No. 3, 10 inch	$1.75
" 1, 12 "	2.25	" 4, 8 "	1.50
" 2, 11 "	2.00	" 4½, 8 "	1.50
No. 5, 5 inch	$1.25		

EXTRA CUTTERS FOR FIG. 7401.

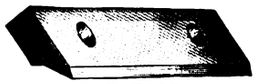


FIG. 7402.

PRICES.

No. 0, per pair		$0.60
" 1, "		.40
" 2, "		.40
" 3, "		.40
" 4, "		.35
" 5, "		.35

STAR NIPPERS.

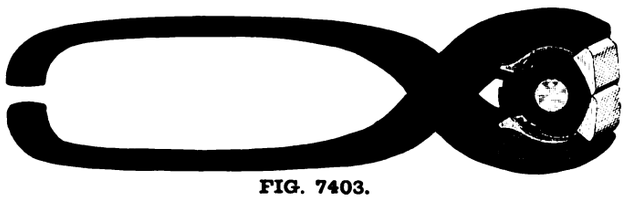


FIG. 7403.

PRICES.

No. 1, 7 inch.	each,	$1.25
" 2, 9 "	"	1.75
" 3, 12 "	"	2.50

P. S. STUBS AND STUBS PATTERN.

PINCERS.



FIG. 7404.

NIPPERS.

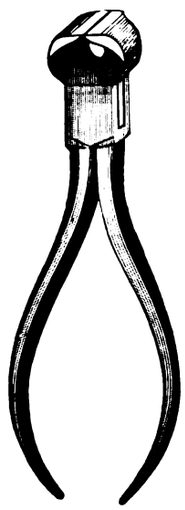


FIG. 7405.

LINDSEY'S NIPPERS.



FIG. 7406.

PRICES, P. S. STUBS GOODS, FIG. 7404.

No. 285 A, length	5	6	7	8	9	10	12 in.
Per dozen	$7.50	$9.00	$10.50	$12.00	$15.75	$17.50	$27.00

PRICES, STUBS PATTERN, FIG. 7404.

Length, in inches	5	5½	6	7	8
Prices	$5.25	$5.75	$6.50	$8.40	$11.00

PRICES, P. S. STUBS GOODS, FIG. 7405.

No. 154, length, in., 5 and under	5½	6	6½	7	8
Prices	$10.50	$11.50	$14.00	$16.50	$19.00	$25.00

PRICES, STUBS PATTERN.

Inches	4	4½	5	5½	6	7	8
Cast steel, per doz.,	$3.40	$3.70	$4.00	$4.60	$5.30	$7.40	$10.80
" " extra quality. "	6.00	6.00	6.00	6.75	7.60	10.75	14.25
" " straw colored "	7.00	7.00	7.00	7.80	8.60	11.00	14.40

PRICES, FIG. 7406.

7 inch long, will cut ⅜ wire	per dozen,	$21.00
5 " " " " 3/32 "	"	13.50

PRICES, FIG. 7407.

5 inch long, will cut 3/32 wire ..... per dozen, $9.00

LINDSEY'S NIPPERS.

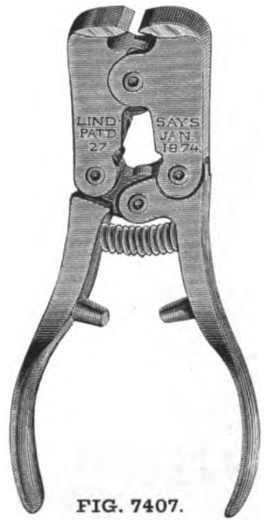


FIG. 7407.

HALL'S NIPPERS.



FIG. 7408.

PRICES, FIG. 7408.

						Plain.	Nickel-plated.
No. 1.	4 inch, cuts	1/16	inch wire		per dozen,	$12.00	$15.50
" 2.	5 "	"	3/32	"	"	13.50	17.50
" 4.	7 "	"	1/8	"	"	21.00	27.00
" 6.	8 "	"	3/16	"	"	30.00	39.00

PRICES, EXTRAS FOR FIG. 7408.

		Jaws, plain.	Jaws, nickel-plated.	Handles, plain.	Handles, nickel-plated.	Screws.
For No. 1	per dozen,	$3.35	$4.50	$3.35	$4.50	$0.80
" " 2	"	3.35	4.50	3.35	4.50	.80
" " 4	"	5.00	6.50	5.00	6.50	.80
" " 6	"	6.50	8.25	6.50	8.25	2.00

KING VISE CUTTING TOOLS.

DESCRIPTION, FIG. 7409.

Extreme length, 3⅛ inches.
Extreme width, 1⅝ inches.
Width of cutting blades, ¾ inch.

PRICES.

	Per dozen.
Finished bright	$9.00
" nickeled	12.00
Cutter blades	2.00

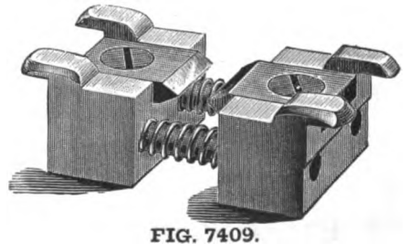


FIG. 7409.

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SIDE CUTTING PLYERS.

LINDSAY'S 6 AND 8 INCH PLYERS.

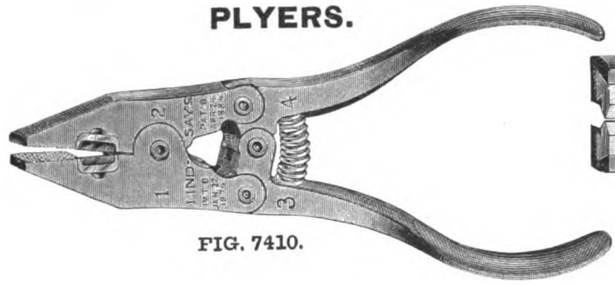


FIG. 7410.

LINDSAY'S 18 INCH, FOR 5-16 CARRIAGE BOLTS.



FIG. 7411.

PRICES, Fig. 7410, 6 inches long, cuts No. 9 wire.....per doz., $12.00
" " 7410, 8 " " " No. 6 telegraph wire..... " 21.00
" " 7411, 18 " " " 5/16 rods..... each, 6.00

HALL'S CENTER CUTTING.

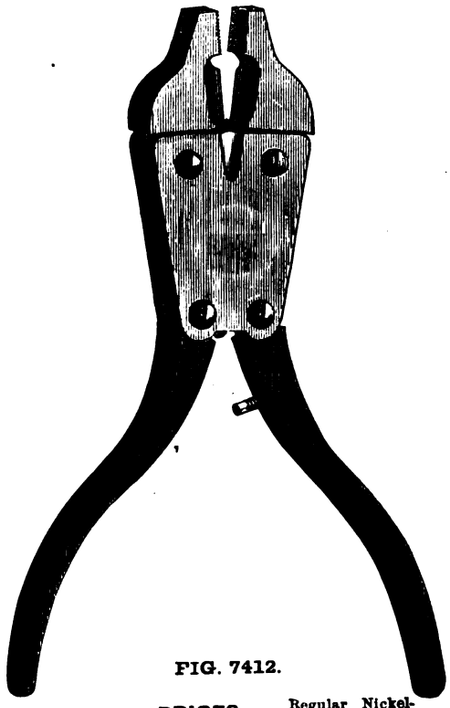


FIG. 7412.

PRICES.	Regular finish.	Nickel-plated.
No. 3, size 6 inch.....per doz.,	$17.50	$22.00
" 5, " 8 " ..... "	25.00	31.00

PRICES, JAWS.

No. 3.....per doz.,	$5.00	$6.50
" 5 ..... "	6.50	8.25

HALL'S TELEGRAPH.

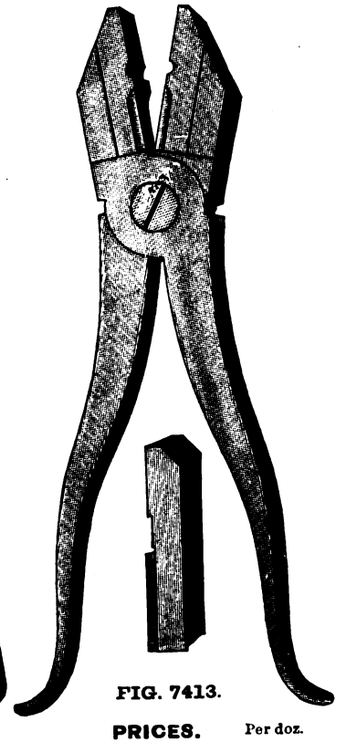


FIG. 7413.

PRICES.	Per doz.
8 inch.....$25.00	
Extra jaws.....	6.00

AMERICAN ALL STEEL.

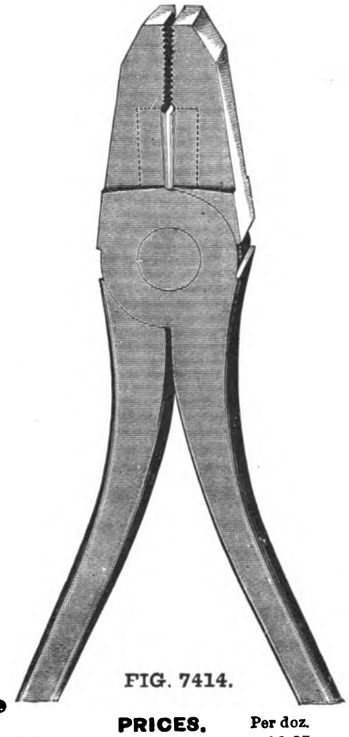


FIG. 7414.

PRICES.	Per doz.
4 inch.....$6.25	
4½ " 6.25	
5 " 6.50	
5½ " 7.00	
6 " 7.75	
7 " 10 00	
8 " 12.00	

HALL'S TELEPHONE.

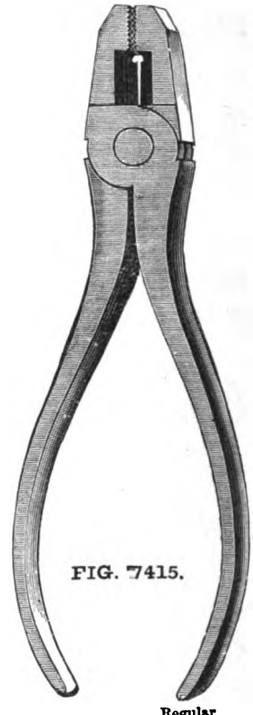


FIG. 7415.

		Regular black finish.	Nickel-plated.
4 inch....per doz.,		$6.25	$8.50
4½ "	"	6.25	8.50
5 "	"	6.50	9.00
5½ "	"	7.00	10.00
6 "	"	7.75	11.00
7 "	"	10.00	14.00
8 "	"	12.00	17.00

When warranted to cut piano wire 20 per cent. added to list.

WIRE CUTTING PLYERS.

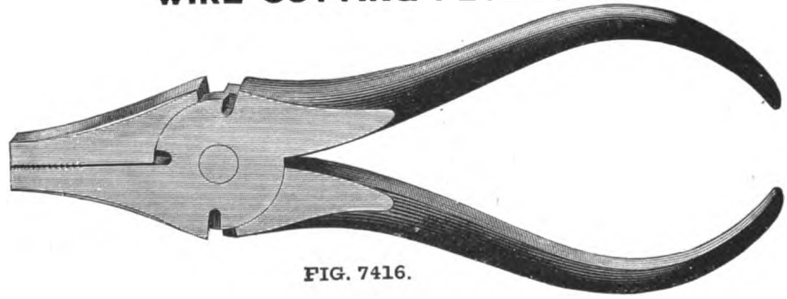


FIG. 7416.

PRICES, FIG. 7416.

CAST STEEL, BEST QUALITY.

Inch.....	4½	6	8	10
Per dozen.....	$6.00	$7.00	$9.00	$12.00

PRICES, FIG. 7417. P. S. STUBS.

Inch.....5½ & under.	6	6½	7	8
Per dozen.....	$10.00	$11.00	$14.00	$18.00	$24.00

PRICES, FIG. 7417.

EXTRA HEAVY CAST STEEL, BEST QUALITY.

Stubs' pattern.

Inch.....	7	8
Per dozen.....	$12.00	$15.25

P. S. STUBS' AND STUBS' PATTERN TELEGRAPH.



FIG. 7417.

EXTRA HEAVY, CAST STEEL, BEST QUALITY.

BELL HANGERS' PLYERS.

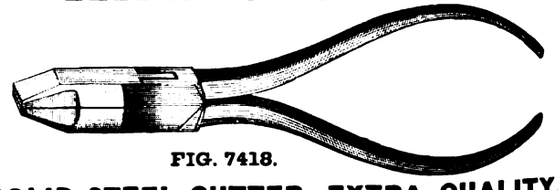


FIG. 7418.

SOLID STEEL CUTTER, EXTRA QUALITY.

Inch.....	4½	5	5½	6	7	8
PRICES, per doz..	$7.00	$7.25	$8.00	$9.00	$11.00	$13.75

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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SIDE CUTTING NIPPERS AND PLAIN PLYERS.

ANGLE CUTTER. FLAT CUTTER. RAISED CUTTER.

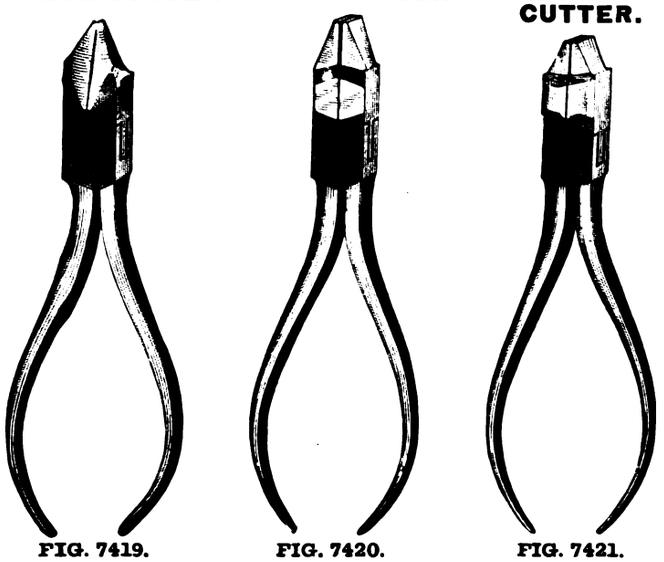


FIG. 7419. FIG. 7420. FIG. 7421.

NO. 149 P. S. STUBS ANGLE CUTTER, FIG. 7419.

Length, in inches	5 and under,	5½	6
Prices, per dozen	$10.50	$11.50	$14.00

STUBS PATTERN, FIG. 7419.

Length, in inches	4 to 5	5½	6
Prices, per dozen	$7.30	$8.15	$9.25

PRICES, FIG. 7420.

Inches	4 and 4½	5	5½	6	6½	7	8
per dozen,	$5.50	$5.50	$6.00	$6.75	$7.50	$8.50	$10.50
Straw colored.. "	6.25	6.25	6.75	7.50	....	9.50	11.50

PRICES, FIG. 7421.

Inches	4 and 4½	5	5½	6	6½	7	8
per dozen,	$5.75	$5.75	$6.30	$7.20	....	$9 00	$11.00
Straw colored. "	6.25	6.25	6.75	7.50	....	9.50	11.50

PRICES, EITHER FIG. 7423 OR 7424.

P. S. STUBS GOODS.

NO. 161 FLAT NOSE, NO. 162 ROUND NOSE.

Flat pendulum, stockinger, round. half round and snipe nose.

3 to 4½ inch	per doz.,	$5.50
5 inch	"	6.00
5½ "	"	7.00
6 "	"	9.00
6½ "	"	12.00
7 "	"	14.00
8 "	"	20.00

FLAT NOSE PLYER.

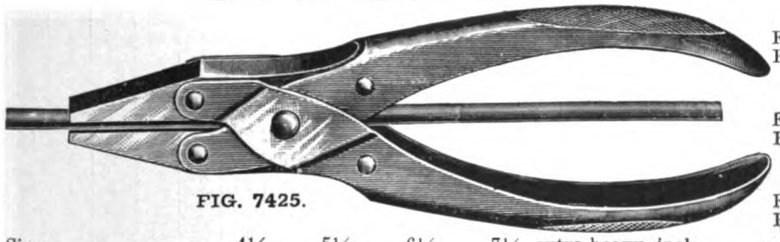


FIG. 7425.

Size	4½	5½	6½	7½, extra heavy, inch.
Prices	$6.00	$8.00	$10.50	$15.00 per dozen.

WIRE CUTTER, GAS AND FLAT NOSE PLYER.

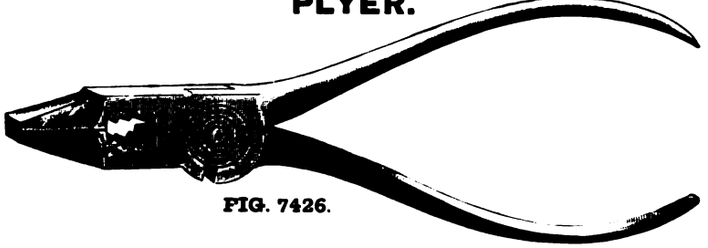


FIG. 7426.

Price, 5½ inches.....per dozen, $5.50

HALL'S FLAT NOSE PLYERS, WITH AND WITHOUT SPRINGS.

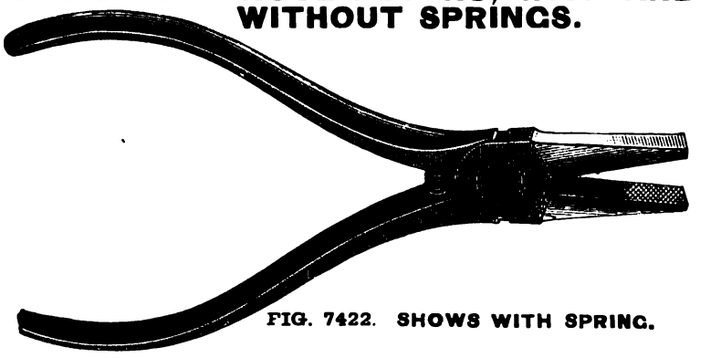


FIG. 7422. SHOWS WITH SPRING.

Size.	Prices, with springs.		Prices, no springs.	
	Regular finish. Per dozen.	Nickel-plated. Per dozen.	Regular finish. Per dozen.	Nickel-plated. Per dozen.
3 inch.	$5.25	$7.50	$4.50	$6.75
3½ "	5.25	7.50	4 50	6.75
4 "	5.25	7.50	4.50	6.75
4½ "	5.25	7.50	4 50	6.75
5 "	5.75	8.25	5.00	7.50
5½ "	6.75	9.25	6.00	8.50
6 "	7.75	10.75	7.00	10.00
7 "	10.00	14.00	8.50	12.00
8 "	12.00	16.00	10.00	15.00

P. S. STUBS AND STUBS PATTERN FLAT NOSE PLYERS.

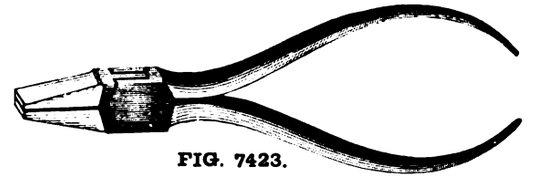


FIG. 7423.

P. S. STUBS AND STUBS PATTERN ROUND NOSE PLYERS.

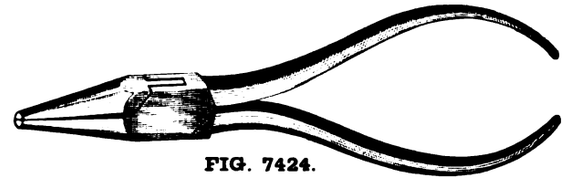


FIG. 7424.

PRICES, PER DOZEN.

Inches....	3 to 4	4½	5	5½	6	6½	7	8
COMMON, BRIGHT JAWS.								
Flat nose, Round "	$1.00	$1.15	$1.25	$1.45	$1.60	....	....	....
BEST WROUGHT, BRIGHT JAWS.								
Flat nose, Round "	$1.35	$1.40	$1.70	$1.95	$2.30	$2.60	$2.90	$4.00
STEELED, POLISHED JAWS.								
Flat nose, Round "	$2.00	$2.00	$2.10	$2.20	$2.60	$2.90	$3.50	$4.25
STEELED, POLISHED JAWS.—OUR STANDARD PLYER.								
Flat nose, Round "	$2.30	$2.30	$2.40	$2.80	$3.20	$3.80	$4.50	$5.50
FINE CAST STEEL, POLISHED JAWS.								
Flat nose, Round "	$3.15	$3.15	$3.60	$4.10	$4.50	$5.50	$6.15	$7.50
FINE CAST STEEL, STRAW COLORED JAWS.								
Flat nose, Round "	$4.10	$4.10	$4.50	$5.20	$5.80	$6.75	$7.75	$11.20
EXTRA QUALITY CAST STEEL.								
Flat nose, Round "	$4.00	$4.00	$4.40	$5.20	$6.00	$7.00	$8.10	$10.90

N. B.—For all bright plyers, advance the list price 50 cents per dozen.

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NAIL PULLERS, SCRAPERS AND NAILS.

GIANT NAIL PULLERS.

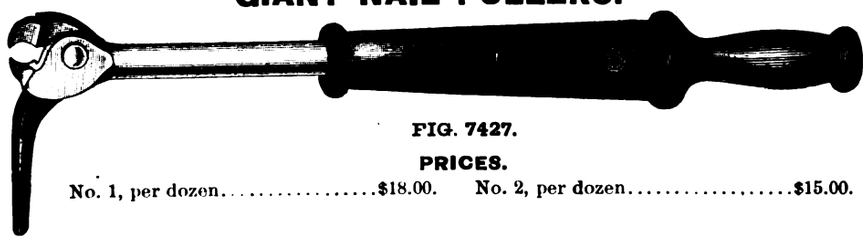


FIG. 7427.

PRICES.

No. 1, per dozen.....$18.00. No. 2, per dozen.....$15.00.

CAST STEEL NAIL SETS.



FIG. 7428.

PRICES.

Large, per dozen	$1.25
Small, "	1.12
Round, "	1.12
Assorted, "	1.12

ADJUSTABLE BOX SCRAPER.



FIG. 7429.

PRICES.

Malleable iron, 2 inch steel cutter	$6.00
Cast steel cutters	1.50

SHIP SCRAPERS.

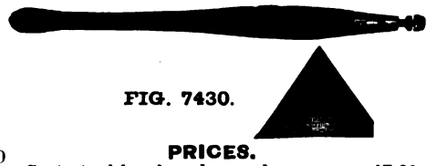


FIG. 7430.

PRICES.

Cast steel hardened, per doz.....$7.00

DESCRIPTION, FIG. 7432.

These scrapers are made from cast steel. The tang runs through the handle and is riveted.

PRICE, per dozen, **$12.00.**

SHIP SCRAPERS.



FIG. 7431.

PRICES.

WOOD HANDLES, TRIANGULAR BLADES, SOLID IRON SOCKETS.

No.		Per doz.
1.	Blades, ¼ in. thick, iron and steel welded,	$7.50
1½.	" ¼ " steel, extra finish	12.00
2.	" from No. 14 best cast steel	5.50
3.	" " " 14 steel, black sockets	3.50
5.	" " " 14 " 5 foot handles	9.00

BOX SCRAPERS.

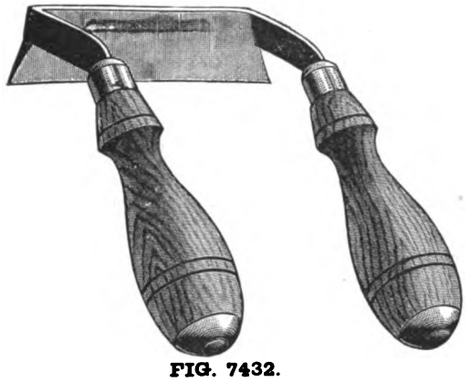


FIG. 7432.

STANDARD STEEL WIRE NAILS.

COMMON FLAT HEAD NAILS.

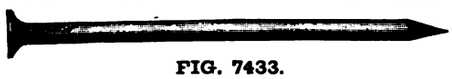


FIG. 7433.
Full size cut of 8d common nail.

FLOORING BRADS.

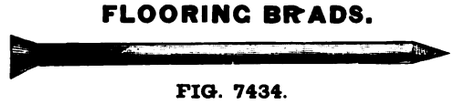


FIG. 7434.
Full size cut of 8d flooring brad.

COMMON BRAD HEADS.



FIG. 7435.

FINISHING NAILS.

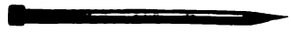


FIG. 7436.

PRICES, FIGS. 7433 TO 7436.

STANDARD STEEL WIRE NAILS IN KEGS.

SCHEDULE OF EXTRAS.

COMMON, FENCE, SHINGLE, FLOORING & COMMON BRADS.

Advance.		Advance.	
60d	base.	8d and 9d	$0.60
50d	$0.10	6d and 7d	.75
30d and 40d	.25	4d and 5d	.90
20d	.35	3d	1.20
12d and 16d	.45	2d	1.60
10d	.50		

All barbed nails 15 cents advance over same size, smooth.

CASING & SMOOTH BOX.

Advance.		Advance.	
30d and 40d	$0.40	6d and 7d	$0.90
20d	.50	5d	1.10
12d and 16d	.60	4d	1.25
10d	.65	3d	1.50
8d and 9d	.75	2d	1.75

SMOOTH FINISHING NAILS.

Advance.		Advance.	
20d	$0 60	5d	$1.25
12d and 16d	.65	4d	1.45
10d	.75	3d	1.65
8d and 9d	.90	2d	1.90
6d and 7d	1.10		

FINE NAILS.

	Advance.
2d	$1.90
3d	1.60
4d	1.25

LINING NAILS.

	Advance.
¾ in	$2.50
⅞ in	2.20
1 in	1.90

BARREL.

Advance.		Advance.	
¾ in	$2.00	1¼ in	$1.20
⅞ in	1.75	1⅜ in	1.00
1 in	1.50	1½ in	.90
1⅛ in	1.40		

SLATING.

Advance.		Advance.	
2d	$1.40	5d	$0.90
3d	1 20	6d	.80
4d	1.00		

BARBED ROOFING.

Advance.		Advance.	
¾ in	$2.00	1¼ in	$1.25
⅞ in	1.75	1⅛ in	1.10
1 in	1.50	1¼ in	1.05
1⅛ in	1.40	2 in	.90

CLINCH NAILS.

Advance.		Advance.	
2d	$1.80	8d and 9d	$0.80
3d	1.40	10d	.70
4d and 5d	1.00	12 and 16d	.60
6d and 7d	.90	20d	.50

WIRE SPIKES.

	Advance.
3 in. to 9 in	$0.50

HINGE NAILS.

Advance.		Advance.	
4d	$1.50	10d	$0.90
6d	1.25	12d to 16d	.85
8d	1.00	20d	.80

Nails packed in 25 or 50 lb. boxes 25c. per 100 lbs. extra.

PRICES, WIRE NAILS.

In 1, 5 and 10 lb. packages.

WIRE GAUGE.

Ins.	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Ins.
¼														60	80	90	¼
⅜													45	50	60	70	⅜
½									40	40	40	40	40	45	50		½
⅝							33	33	33	33	33	33	35	40	45		⅝
¾					28	28	28	28	28	28	30	32	32	35			¾
⅞			26	26	26	26	26	26	26	27	27	30	30				⅞
1		24	24	24	24	24	24	24	24	24	26	27	28				1
1⅛		24	24	24	24	24	24	24	24	24	26	27	28				1⅛
1¼	21	21	21	21	21	21	21	21	22	23	24	25					1¼
1⅜	21	21	21	21	21	21	21	21	22	23	24	25					1⅜
1½	20	20	20	20	20	20	20	20	22	23	24	25					1½
1¾	19	19	19	19	19	19	19	20	22	23							1¾
2	18	18	18	18	18	18	19	20	22								2
2¼	18	18	18	18	18	18	19	20	22								2¼
2½	17	17	17	17	18	18	19	20									2½
2¾	17	17	17	17	18	18	19	20									2¾
3	16	16	16	17	18	18	20										3
3¼	16	16	16	17	18	18	20										3¼
3½	16	16	16	17	18	18											3½
4	16	16	16	17	18	18											4

For tinned nails, add 50 per cent. to list prices.
For nails packed in ½ lb. papers, add 2 cents to list.
For nails packed in ¼ lb. papers, add 4 cents to list.
Add 1 cent to list, for either barbing, annealing, oval head or special point.
Nails combining several specialties, add 1 cent for each specialty.
Nails in 25 or 50 lb. boxes or 100 lb. kegs, bulk, deduct 1 cent from this list only.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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CUT NAILS AND BRADS.

PRICES, STEEL OR IRON CUT NAILS AND EXTRAS.

60d, 50d, common.....Base price on application.

40d, common	$0.05 per keg above base.
30d, common	.10 " " " "
20d, 16d, 12d, common and fence and sheathing	.15 " " " "
10d, common and fence and sheathing	.20 " " " "
8d 9d, fence and sheathing, and all sizes cut spikes	.25 " " " "
6d and 7d, common and fence	.40 " " " "
4d and 5d, common	.60 " " " "
3d, common	1.00 " " " "
3d, fine, and 2d	1.50 " " " "
2d, fine	2.00 " " " "

	3d.	4d & 5d.	6d & 7d.	8d.	10d.	12d, 16d & 20d.	
Slating	$1.25	$0.85	$0.65				
Coopers', tobacco, casing, flooring & box	1.50	1.10	.90	$0.75	$0.60	$0.50	Per keg above base.
Finishing		1.35	1.15	1.00	.85	.75	
Fine finishing		1.50	1.30	1.15	1.00	.90	

	¾ in.	⅞ in.	1 in.	1⅛ & 1¼ in.	1⅜ & 1½ in.	
Barrel and roofing	$2.25	$1.75	$1.50	$1.00	$0.60	"

	1½ & 1¾ in.	2 & 2¼ in.	2½ & 2¾ in.	3 in.	3½ to 4½ in.	
Clinch	$1.35	$1.15	$1.00	$0.85	$0.75	"
" in ½ kegs	1.55	1.35	1.20	1.05	.95	per 100 lbs.

PATENT AND COMMON BRADS.

IN LB. PAPERS OR BULK.

2-8	in.	125 cts.	per lb.
2½-8	"	100 "	" "
3-8	"	80 "	" "
4-8	"	58 "	" "
5-8	"	48 "	" "
6-8	"	36 "	" "
7-8	"	30 "	" "
1	"	26 "	" "
1⅛	"	25 "	" "
1¼	"	24 "	" "
1½	"	22 "	" "
1¾	"	20 "	" "
2	"	18 "	" "

FINISHING NAILS.

IN LB. PAPERS OR BULK.

3-8	in.	48 cts.	per lb.
4-8	"	32 "	" "
5-8	"	26 "	" "
6-8	"	22 "	" "
7-8	"	20 "	" "
1	"	19 "	" "
1⅛	"		
1¼	"		
1½	"		
1¾	"		
2	"		
2¼	"		

CLOUT NAILS.

IN LB. PAPERS OR BULK.

3-8	in.	48 cts.	per lb.
4-8	"	32 "	" "
5-8	"	26 "	" "
6-8	"	22 "	" "
7-8	"	20 "	" "
1	"	19 "	" "
1⅛	"		
1¼	"		
1½	"		
1¾	"		
2	"		
2¼	"		

NAILS IN PAPER PACKAGES.

FULL WEIGHT.

PATENT AND COMMON BRADS.

2-8	inch	100 cts.	per doz.
3-8	"	120 "	" "
4-8	"	130 "	" "
5-8	"	144 "	" "
6-8	"	160 "	" "
7-8	"	180 "	" "
1	"	200 "	" "
1⅛	"	224 "	" "
1¼	"	252 "	" "
1½	"	364 "	" "
1¾	"	450 "	" "
2	"	486 "	" "

HALF WEIGHT.

PATENT AND COMMON BRADS.

2-8	inch	50 cts.	per doz.
3-8	"	60 "	" "
4-8	"	65 "	" "
5-8	"	72 "	" "
6-8	"	80 "	" "
7-8	"	90 "	" "
1	"	100 "	" "
1⅛	"	112 "	" "
1¼	"	126 "	" "
1½	"	182 "	" "
1¾	"	225 "	" "
2	"	243 "	" "

WOOD SCREWS, IRON OR BRASS.

FLAT HEAD.



FIG. 7440.

ROUND HEAD.

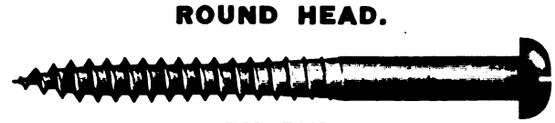


FIG. 7441.

The following varieties of iron screws are invoiced from this list at varying discounts:—Flat, round, piano, fillister and oval head screws, dowel and felloe screws, bright, blued, bronzed, japanned, lacquered and tinned.

IRON WOOD SCREWS.

PRICES, PER GROSS.

¼ in.		⅜ in.		½ in.		⅝ in.		¾ in.		⅞ in.		1 in.	
No.		No.		No.		No.		No.		No.		No.	
0	$0.40	0	$0.40	1	$0.40	1	$0.40	2	$0.40	2	$0 41	3	$0.51
1	.40	1	.40	2	.40	2	.40	3	.41	3	.44	4	.55
2	.40	2	.40	3	.40	3	.40	4	.41	4	.48	5	.59
3	.40	3	.40	4	.40	4	.40	5	.46	5	.52	6	.66
4	.40	4	.40	5	.41	5	.43	6	.53	6	.59	7	.73
		5	.40	6	.45	6	.49	7	.60	7	.66	8	.80
		6	.41	7	.52	7	.56	8	.67	8	.73	9	.87
		7	.48	8	.59	8	.63	9	.74	9	.80	10	.94
		8	.55	9	.66	9	.70	10	.81	10	.87	11	1.00
		9	.62	10	.73	10	.77	11	.88	11	.94	12	1.10
				11	.80	11	.84	12	.95	12	1.00	13	1.25
				12	.87	12	.91	13	1.05	13	1.15	14	1.40
						13	.98	14	1.20	14	1.30	15	1.60
						14	1.10	15	1.35	15	1.50	16	1.80
								16	1.55	16	1.70	17	2.00
												18	2.20
												20	2.70

1¼ in.		1⅜ in.		1½ in.		2 in.		2¼ in.		2½ in.		2¾ in.	
No.		No.		No.		No.		No.		No.		No.	
4	$0.62	4	$0.70	6	$0.92	6	$1.05	8	$1.30	8	$1.55	10	$2.05
5	.68	5	.76	7	.98	7	1.10	9	1.35	9	1.60	11	2.10
6	.74	6	.82	8	1.05	8	1.20	10	1.45	10	1.70	12	2.15
7	.80	7	.88	9	1.10	9	1.25	11	1.50	11	1.75	13	2.25
8	.87	8	.94	10	1.20	10	1.30	12	1.70	12	1.85	14	2.45
9	.94	9	1.00	11	1.30	11	1.40	13	1.90	13	2.05	15	2.70
10	1.00	10	1.10	12	1.45	12	1.55	14	2.10	14	2.25	16	2.95
11	1.10	11	1.20	13	1.55	13	1.80	15	2.35	15	2.55	17	3.25
12	1.20	12	1.30	14	1.85	14	2.00	16	2.60	16	2.75	18	3.60
13	1.35	13	1.50	15	2.05	15	2.20	17	2.80	17	3.00	20	4.25
14	1.55	14	1.70	16	2.25	16	2.40	18	3.05	18	3.30	22	5.00
15	1.75	15	1.90	17	2.45	17	2.60	20	3.60	20	3.85	24	5.60
16	1.95	16	2.10	18	2.70	18	2.90	22	4.20	22	4.50		
17	2.15	17	2.30	20	3.20	20	3.40	24	4.80	24	5.10		
18	2.35	18	2.50	22	3.75	22	4.00						
20	2.85	20	3.00	24	4.35	24	4.55						
22	3.35	22	3.50										
24	3.95	24	4.15										

3 in.		3½ in.		4 in.		4½ in.		5 in.		6 in.	
No.		No.		No.		No.		No.		No.	
10	$2.35	10	$3.30	12	$4.50	16	$6.40	18	$8.20	20	$11.75
11	2.40	11	3.40	14	4.60	18	6.60	20	8.60	22	12.50
12	2.45	12	3.50	16	4.75	20	7.40	22	9.75	24	13.50
13	2.55	13	3.60	18	5.60	22	8.45	24	11.05	26	16.00
14	2.65	14	3.70	20	6.40	24	9.70	26	12.60	28	18.05
15	2.95	15	3.80	22	7.30	26	11.05	28	14.25	30	20.10
16	3.20	16	3.90	24	8 40						
17	3.65	17	4.30	26	9.70						
18	4.05	18	4.75								
20	4.80	20	5.55								
22	5.55	22	6.35								
24	6.40	24	7.30								
26	7 50	26	8.50								

BRASS WOOD SCREWS.

¼ in.		⅜ in.		½ in.		⅝ in.		¾ in.	
No.		No.		No.		No.		No.	
0	$0.80	0	$0.80	1	$0.86	2	$0.91	2	$1.06
1	.80	1	.82	2	.89	3	.99	3	1.10
2	.84	2	.86	3	.93	4	1.06	4	1.15
3	.87	3	.89	4	1.03	5	1.20	5	1.30
4	.91	4	.95	5	1.10	6	1.30	6	1.45
		5	1.03	6	1.20	7	1.50	7	1.60
		6	1.10	7	1.30	8	1.70	8	1.90
		7	1.20	8	1.50	9	1.90	9	2.15
				9	1.70	10	2.15	10	2.40
				10	1.90	11	2.40	11	2.65
						12	2.65	12	3.00
								13	3.35
								14	3.70
								15	4.10
								16	4.50

⅞ in.		1 in.		1¼ in.		1⅜ in.		1½ in.	
No.		No.		No.		No.		No.	
2	$1.35	3	$1.55	3	$2.05	4	$2.85	6	$3.75
3	1.40	4	1.60	4	2.10	5	2.90	7	3.80
4	1.45	5	1.65	5	2.15	6	2.95	8	3.85
5	1.50	6	1.70	6	2.20	7	3.00	9	3.90
6	1.55	7	1.95	7	2.25	8	3.05	10	4 45
7	1.80	8	2.30	8	2.65	9	3.45	11	5.05
8	2 05	9	2.60	9	3.00	10	3.95	12	5.70
9	2.35	10	2 95	10	3.25	11	4.45	13	6.35
10	2.65	11	3.30	11	3.85	12	5.00	14	7.10
11	2.95	12	3.65	12	4.35	13	5.60	15	7.90
12	3 25	13	4.10	13	4.85	14	6.25	16	8.65
13	3.70	14	4.55	14	5.35	15	6 90	17	9.50
14	4.10	15	5.00	15	5.95	16	7.60	18	10.45
15	4.55	16	5.55	16	6 55	17	8.35	20	12.40
16	5.05	17	6.65	17	7.20	18	9.15	22	14.50
				18	7.85	20	10.85	24	16.85
				20	9.35				

2 in.		2¼ in.		2½ in.		3 in.	
No.		No.		No.		No.	
6	$4.80	8	$6.85	10	$9.50	10	$13.70
7	4.85	9	6.90	11	9.55	11	13.75
8	4.90	10	6.95	12	9.60	12	13.80
9	4.95	11	7.00	13	9.65	13	13.85
10	5.00	12	7.05	14	9.70	14	13.90
11	5.65	13	7.90	15	10.75	15	13.95
12	6.40	14	8.80	16	11.85	16	14.00
13	7.15	15	9.80	17	13.00	18	16.80
14	7.95	16	10.75	18	14.30	20	19.95
15	8.80	17	11.90	20	16.95	22	23.40
16	9.75	18	13.00	22	19.85	24	27.10
17	10.70	20	15.40	24	23.00	26	31.15
18	11.70	22	18.05				
20	13.90						
22	16.30						
24	18.90						

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SPIKES, MALLETS AND AXE HANDLES.

DOCK OR WHARF SPIKES.

NAIL HEAD, RAGGED.

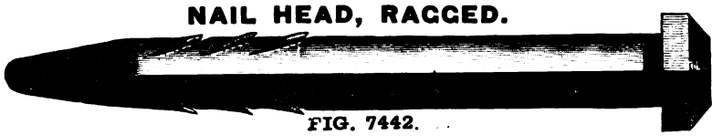


FIG. 7442.

OVAL HEAD.

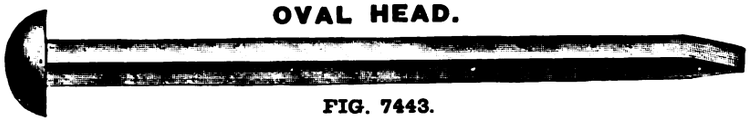


FIG. 7443.

COUNTERSUNK HEAD.

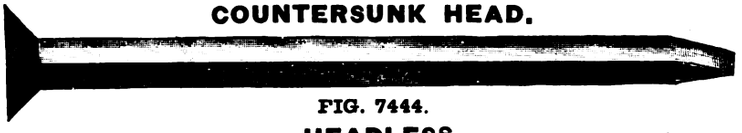


FIG. 7444.

HEADLESS.



FIG. 7445.

PRICES QUOTED ON APPLICATION.

Points made wedge-shape or conical, as preferred.

The illustrations show the ordinary styles; shapes of heads are varied according to requirement of specifications.

SQUARE MALLETS.

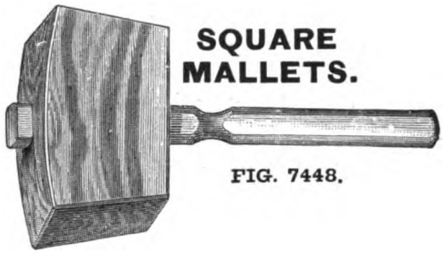


FIG. 7448.

No.		Per doz.
8.	Hickory, mortised, 6 in. long, 2½ x 3½ in.	$2.00
9.	" " 6½ " " 2¾ x 3¾ "	2.50
10.	" " 7 " " 3 x 4 "	3.00
11.	Lignumvitæ, " 6 " " 2½ x 3½ "	3.75
12.	" " 6½ " " 2¾ x 3¾ "	4.75
13.	" " 7 " " 3 x 4 "	5.75

TINNERS' ROUND.

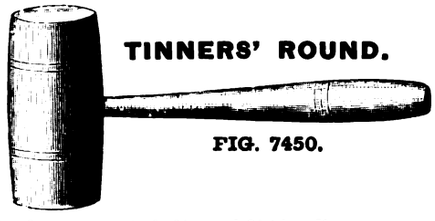


FIG. 7450.

No.		Per doz.
4.	Hickory, 5½ in. long, assorted, 2¼ and 2½ in. diam.	$1.00

MARKET OR NORTHERN N. Y. AXE HANDLE.



FIG. 7452.

OVAL, HAND-SHAVED AXE HANDLE.



FIG. 7453.

LUMBERMAN'S OR STRAIGHT AXE HANDLE.

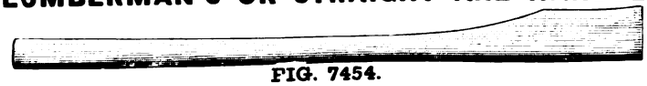


FIG. 7454.

OCTAGON, HAND-SHAVED, DOUBLE-BITTED AXE HANDLE.

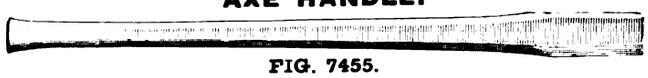


FIG. 7455.

TURNED, DOUBLE-BITTED, FLAT PATTERN AXE HANDLE.

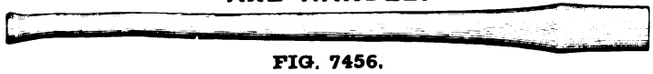


FIG. 7456.

MORTISED MALLETS.

ROUND.

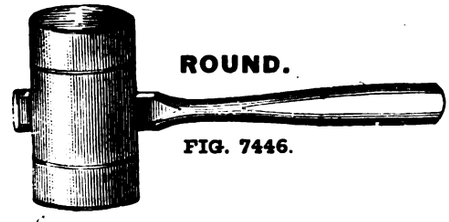


FIG. 7446.

No.		Per doz.
1.	Hickory, mortised, 5 in. long, 3 in. diam	$1.50
2.	" " 5½ " " 3½ " "	2.00
3.	" " 6 " " 4 " "	2.50
5.	Lignumvitæ, " 5 " " 3 " "	3.00
6.	" " 5½ " " 3½ " "	4.00
7.	" " 6 " " 4 " "	5.00

ROUND, IRON RINGS.



FIG. 7447.

No.		Per doz.
14.	Mallet, mortised, iron rings, 6 in. long, 4 in. diam.	$5.50
14½.	" " " " 5½ " " 3½ " "	4.00

ROUND, IRON.

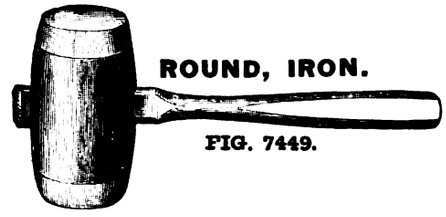


FIG. 7449.

No.		Per doz.
15.	Mortised, hickory ends, 2½ in. diam.	$4.00

ROUND, MALLEABLE.

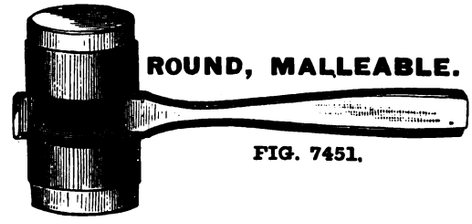


FIG. 7451.

No.		Per doz.
16.	Mallet, heavy malleable iron socket, mortised, hickory ends, 3 in. diam.	$7.50

PRICES, FIGS. 7452 TO 7456.

TURNED HICKORY AXE HANDLES.

Market, N. N. Y. and straight patterns.	Extra.	Exclr.	No. 1.	No. 2.	No. 3.
36 and 34 in. ..... per doz.	$3.20	$2.50	$2.00	$1.50	$1.30
32 and 30 in. ..... "	2.85	2.20	1.70	1.40	1.10
Boys' 28 and 26 in. ..... "	2.00	1.80	1.50	1.20	....
38 in. ..... "	3.50	2.70	2.00	1.50	1.30
40 in. ..... "	3.70	3.00	2.00	1.50	1.30
42 in. ..... "	4.20	3.20	2.00	1.50	1.30
44 in. ..... "	5.00	3.50	2.00	1.50	1.30
Double-bitted, 36 and 34 in. "	3.20	2.50	2.00	1.50	1.30

HAND-SHAVED HICKORY AXE HANDLES.

Octagon and oval, hand-shaved.	XXX	XX	X
36, 34 and 32 in., plain end. ..... per doz.	$3.50	$3.00	$2.20
38, 34 and 32 in. ..... "	3.75	3.00	2.20
40, 34 and 32 in. ..... "	4.00	3.50	2.30
36 and 34 in., scroll end. ..... "	4.00	3.50	2.50
36 in., straight lumberman's. ..... "	3.50	3.00	2.20
38 " " " ..... "	3.75	3.00	2.20

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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HICKORY ADZE, PICK AND TOOL HANDLES.

SHIP OR BROAD AXE.



FIG. 7457.

PRICES.

Either 32 or 36 inches long.....per dozen, $3.00

RAILROAD OR SURFACE PICK.

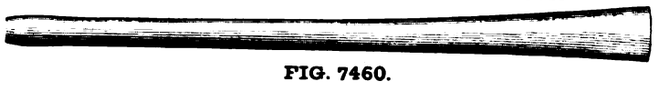


FIG. 7460.

POLL PICK.



FIG. 7462.

PRICES, PER DOZEN, FIGS. 7460 TO 7463.

Surface of railroad mattock, and miners'.	Extra.	Exclr.	No. 1.	No. 2.	No. A.
Surface or railroad, 36 inch.....	$4 50	$3.50	$2.50	$1.70	$1.30
Drifting, 32, 34 and 36 inch.....	3.50	3.00	2.00		
Poll, 32, 34 and 36 inch.....	3.50	3.00	2.00		
Coal miners', small eye, 3 x 5/8, 34..	2.00	1.60	1.40		
" " medium eye, 3 x 3/4, 34..	2.00	1.60	1.40		
" " large eye, 3 1/8 x 7/8, 34..	2.00	1.60	1.40		

PRICES, PER DOZEN, FIGS. 7464 TO 7467.

Sledge, tool or maul. Length.	24 and 26 inch.	28 and 30 inch.	32 in.	34 and 36 inch.	38 in.	40 in.
Extra.....	$1.25	$1.60	$1.75	$2.00	$2.25	$2.50
No. 1.....	1.00	1.25	1.40	1.60	1.70	2.00
" 2.....	.75	1.00	1.10	1.20	1.35	1.60

Hand shaved sledge, add 40 cents per dozen to above prices.

MACHINIST'S HAMMER.

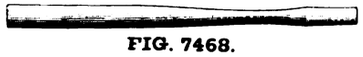


FIG. 7468.
Length, 12 to 24 inches.

BLACKSMITH HAMMER.

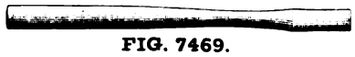


FIG. 7469.
Length, 12 to 24 inches.

RIVETING HAMMER.

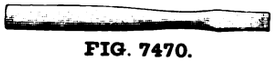


FIG. 7470.
Length, 11 to 16 inches.

STONE OR DRILLING HAMMER.

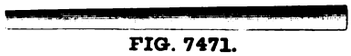


FIG. 7471.
Straight taper pattern. Length, 14 to 20 inches.

ROUND EYE HAMMER.

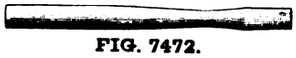


FIG. 7472.
Length, 12 to 15 inches.

PRICES, PER DOZEN, FIGS. 7468 TO 7474.

Length.....Inches,	11	12	13	14	15	16	17	18	19	20	22	24
Machinist's hammer....	60	60	60	60	60	65	70	80	85	90	95	1.05
Blacksmith's "	60	60	60	60	60	65	70	80	85	90	95	1.05
Riveting "	60	60	60	60	60	65	70	80	85	90	95	1.05
Hammer, A. & R. E ...	...	60	60	60	60							
Hatchet, broad or bench	...	...	...	...	...	65	75	85	1.00	1.00		
" shingle.....	...	60	60	60	60							

SCYTHE STONES.

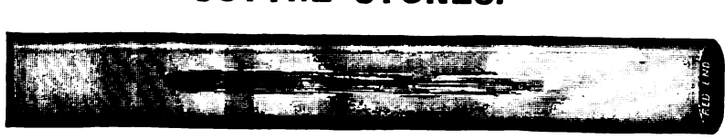


FIG. 7475.

PRICES.

Extra.....per gross, $7.50 No. 1.....per gross, $7.00
Packed in 1/4 and 1/2 gross boxes, as ordered.

RAILROAD OR SHIP CARPENTER'S ADZE.

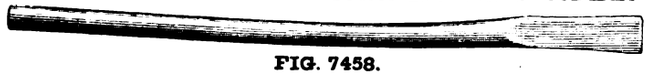


FIG. 7458.

HOUSE CARPENTER'S ADZE.



FIG. 7459.

PRICES.

	Extra.	Exclr.	No. 1.
Either style, 34 and 32 inches.....per doz.,	$4.00	$3.50	$2.00

DRIFTING PICK.

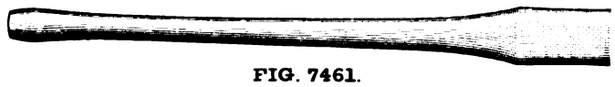


FIG. 7461.

COAL MINER'S PICK.



FIG. 7463.

NAPPING OR STRIKING HAMMER.



FIG. 7464.
Length, 28 to 36 inches.

SLEDGE HAMMER.



FIG. 7465.
Length, 24 to 42 inches.

STRAIGHT TAPER SLEDGE OR TOOL.

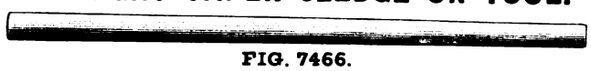


FIG. 7466.
Length, 30 to 38 inches.

SPIKE MAUL HAMMER.



FIG. 7467.
Length, 30 to 38 inches.

ADZE EYE HAMMER.



FIG. 7473.
Length, 12 to 15 inches.

BENCH OR BROAD HATCHET.



FIG. 7474.
Length, 16 to 20 inches.

ARKANSAS OIL STONES.

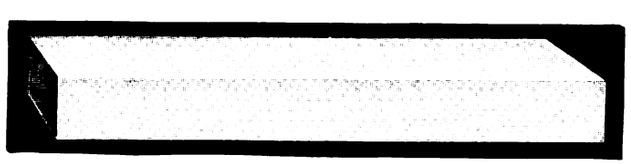


FIG. 7476.

The Arkansas stone is, as far as known, the hardest and finest whet stone in the world. It is composed of nearly pure silica in the form of minute crystals interpenetrating each other. It differs from "Washita" only in the minuteness of the crystals and more compact arrangement of the same, and is consequently very much harder.

PRICES.

Assortment.	Quality.	Length.	Width.	Thickness.	Per lb.
"A"	No. 1	3 1/2 to 6	x 1 3/4 to 2	x 5/8 to 1 1/4	$2.80
"B"	" 1	6 " 8	x 1 3/4 " 2	x 5/8 " 1 1/4	3.50
"C"	" 1	8 " 12	x 1 3/4 " 2 1/2	x 5/8 " 1 1/4	4.00
"D"	" 2	3 " 5 1/2	x 1 3/4 " 2	x 5/8 " 1 1/4	1.00
"E"	" 2	5 " 8	x 1 3/4 " 2	x 5/8 " 1 1/4	1.50
"F"	" 2	3 1/2 " 10	x 1 3/4 " 2	x 5/8 " 1 1/4	1.25
Jeweler's,	" 1	4 1/2 " 6	x 1 1/2 " 2	x 1/8 " 5/8	3.40

Packed in 14 to 25 lb. boxes.

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OIL STONES AND RUBBER HOSE.

ROUND EDGE SLIPS.

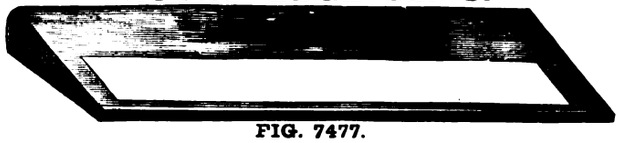


FIG. 7477.

OIL STONES, VARIOUS GRADES, WASHITA.

Extra lily white ..... 60 cents per lb.
Rosy red ..... 60 " "
Extra Washita, green paper wrapper ..... 50 " "
No. 1 " ..... 40 " "
No. 2 " ..... 24 " "

Packed in 14 or 25 lb. boxes; 100 or 112 lbs. to a case. Furnished in five assortments, as follows:

"G" 4 to 8 x 2 x ¾ to 1⅛ "K" 8 x 2 x ¾ to 1⅛
"H" 6 to 8 x 2 x ¾ to 1⅛ "L" 9 x 2 to 2½ x ¾ to 1½
"M" 8 x 2 x 1⅛

Washita flat files, 4 to 6 x ¼ x ½ ..... $2.00 per doz.
" square " 4 to 6 x ⅛ x ½ ..... 2.00 "
Other Washita files to order.

MOUNTED OIL STONES.

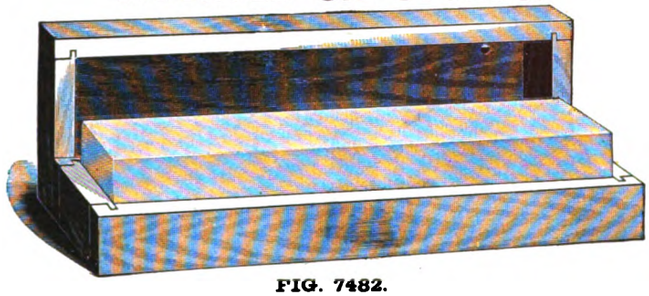


FIG. 7482.

MOUNTED ON MAHOGANY HANDLES.



FIG. 7483.

Prices, 4½ x 1 ..... $4.00 per doz.

Special sizes not quoted in list can be supplied, but it takes time to make them and we must charge for the extra expense.

PRICES, FIG. 7477. ARKANSAS.

No. 1 reg., 3 to 5½ x 1⅜ to 2 x ⅜ to ⅝ back x ⅛ to ⅜ edge... $4.00 per lb.
No. 1 small, 3 to 4½ x 1 to 1½ x ¼ to ⅝ back x ⅛ to sharp edge, 7.00 "
No. 2, assorted sizes ..... 2.50 "

Packed in 5 lb. slide cover boxes.

Rosy red, 3 to 5 x 1½ to 2 x ⅜ to ¾ at back x ¼ to ⅓ at edge, .80 "
Lily white, " " " " " " .90 "
Extra, " " " " " " .80 "
No. 1, " " " " " " .60 "
No. 2, " " " " " " .40 "

Special sizes, extra price.

Plain slips, 3 to 5 1¾ to 2 x ⅜ to ⅝ ..... .70 "
Pen knife pieces, 3 to 5 x 1 to 1¼ x ¼ to ⅝ ..... .70 "

Packed in 5 or 10 lb. slide cover boxes.

Wheels, 1½ to 5 diam. x ½ to ¾ in. thick ..... $0.80 per in.
Needle pieces, 1 to 2 x ¾ to 1 x ⅛ to ⅝, 100 in box ..... 8.00 per 100
Shoemakers' high round, 6 to 8 x 1¾ to 2 x ¾ to 1⅛ ..... .60 per lb.
Shoemakers' half-round ..... .80 "

PRICES, FIG. 7482. ARKANSAS.

In polished mahogany or cherry boxes.

8 x 2 ..... $40.00 per doz.
7 x 2 ..... 36.00 "
6 x 2 ..... 30.00 "
5 x 2 ..... 24.00 "
4 x ½ ..... 14.00 "
3½ x 1 ..... 9.00 "
4 x 1, on mahogany handles ..... 7.00 "

PRICES, FIG. 7483. WASHITA.

In mahogany or polished cherry boxes.

9 x 2 ..... $14.00 per doz.
8 x 2 ..... 12.00 "
7 x 2 ..... 11.00 "
6 x 2 ..... 10.00 "
5 x 2 ..... 9.00 "
4 x 1½ ..... 7.00 "
3½ x 1 ..... 5.50 "

In handsome vulcanized rubber boxes.

3½ x 1 ..... 7.00 "

RUBBER HOSE.

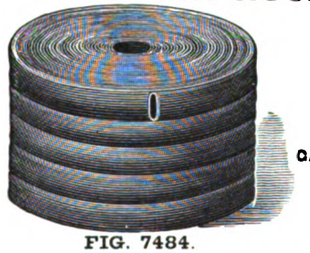


FIG. 7484.

FOR FIRE ENGINE, WATER AND GARDENERS' USE.

PRICES, FIG. 7484.

Int. diam.	Conducting hose. 2-ply. Per foot.	Hydrant hose. 3-ply. Per foot.	Engine hose. 4-ply. Per foot.	Engine hose. 5-ply. Per foot.
½ in.	$0.20	$0.25	$0.30	$0.37
¾ "	.25	.30	.37	.46
1 "	.33	.40	.50	.62
1¼ "	.42	.50	.62	.77
1½ "	.50	.60	.75	.93
1¾ "	.58	.70	.87	1.08
2 "	.66	.80	1.00	1.25
2¼ "	.75	.90	1.12	1.40
2½ "	.83	1.00	1.25	1.56
2¾ "	.92	1.10	1.37	1.71
3 "	.99	1.20	1.50	1.87
4 "	1.32	1.60	2.00	2.50
5 "	1.65	.....	.....	.....
6 "	1.98	.....	.....	.....
7 "	2.31	.....	.....	.....
8 "	2.64	.....	.....	.....
9 "	2.97	.....	.....	.....
10 "	3.33	.....	.....	.....

Tank hose for reels.

All intermediate sizes will be charged at the list price of the next larger size. Thus ⅞ inch will be charged at 1 inch price, etc.

Five and six-ply hose made at an advance of 25 and 50 per cent., respectively, on four-ply prices.

WIRE BOUND HOSE.

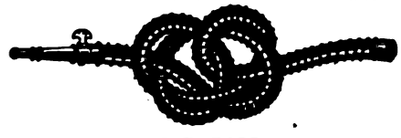


FIG. 7485.

PRICES, SAME AS FOR FIG. 7484.

STEAM, BREWERS', HYDRAULIC, OIL AND TANNERS' HOSE.

PRICES.

Int. diam.	3-ply. For 20 lbs. steam, or less. Per foot.	4-ply. For 35 lbs. steam, or less. Per foot.	5-ply. For 50 lbs. steam, or less. Per foot.	6-ply. For 75 lbs. steam, or less. Per foot.
½ in.	$0.43	$0.51	$0.63	$0.76
¾ "	.51	.67	.83	1.00
1 "	.67	.83	1.03	1.24
1¼ "	.85	1.04	1.30	1.56
1½ "	1.02	1.25	1.56	1.87
1¾ "	1.18	1.45	1.81	2.17
2 "	1.34	1.66	2.07	2.49
2¼ "	1.50	1.87	2.33	2.80
2½ "	1.66	2.08	2.60	3.12
3 "	2.00	2.80	3.50	4.20

Steam hose, served with marline, at 10 per cent. advance on price list.

Canvas wrapping outside, charged as one-ply.

SUCTION HOSE.

ON SPIRAL BRASS WIRE.

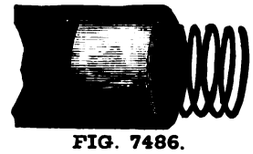


FIG. 7486.

PRICES.

Int. diam.	Per foot.	Int. diam.	Per foot.
¾ inch	$0.77	1½ inch	$1.65
1 "	1.00	2 "	2.50
1¼ "	1.25	2½ "	3.35

ON TINNED IRON WIRE.

PRICES.

Int. diam.	Per foot.	Int. diam.	Per foot.
¾ inch	$0.70	1½ inch	$1.50
1 "	.90	2 "	2.30
1¼ "	1.15	2½ "	3.10

"SMOOTH-BORE" SUCTION HOSE.

PRICES.

Int. diam.	Per foot.	Int. diam.	Per foot.
2 inch	$2.60	6 inch	$10.50
2½ "	3.50	6½ "	12.00
3 "	4.50	7 "	13.50
3½ "	5.50	7½ "	15.00
4 "	6.50	8 "	16.50
4½ "	7.50	9 "	19.50
5 "	8.50	10 "	22.50
5½ "	9.50	12 "	27.50

"Smooth-bore" suction hose made to order, in any lengths required, at about one week's notice.

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RUBBER HOSE.

HARD RUBBER, 4-PLY.

PRICES.

Int. diam.	Per foot.
¾ inch	$0.65
1 "	.75
1¼ "	.93
1½ "	1.13
1¾ "	1.31
2 "	1.50
2¼ "	1.69
2½ "	1.88

SUCTION HOSE, ON SPIRAL FLAT GALVANIZED IRON.



FIG. 7488.

PRICES, FIG. 7488.

Int. diam.	Per foot.	Int. diam.	Per foot.	Int. diam.	Per foot.
2½ inches	$3.10	5 inches	$7.60	7½ inches	$13.50
3 "	4.00	5½ "	8 50	8 "	15.00
3½ "	4.90	6 "	9.50	9 "	17.50
4 "	5 80	6½ "	10.50	10 "	20.00
4½ "	6.70	7 "	12.00	12 "	25.00

CORRUGATED STEAM HOSE, FOR CAR HEATING AND AIR BRAKES.

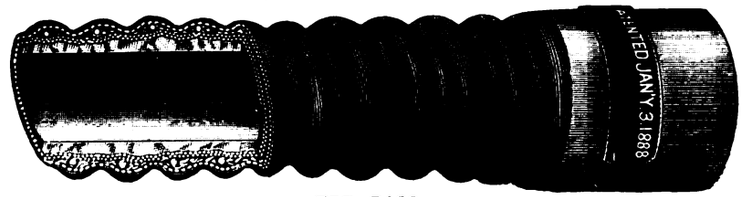


FIG. 7489.

PRICES.

Int. diam.	Per foot.	Int. diam.	Per foot.
¾ inch	$1.00	1¾ inch	$2.17
1 "	1.24	2 "	2.49
1¼ "	1.56	2½ "	3.12
1½ "	1 87	3 "	4.20

ACID HOSE.

PRICES.

	⅛ tube.	3-16 tube.	¼ tube.
¾ in. 4-ply,	$0.75 per ft.	$0.90 per ft.	$1.10 per ft.
1 " 4 "	1.00 "	1.15 "	1.35 "
1½ " 4 "	1.30 "	1.55 "	1.80 "
2 " 4 "	1.75 "	1.85 "	2.25 "
2½ " 4 "	1.85 "	2.30 "	2 75 "
3 " 4 "	2.25 "	2.75 "	3.25 "
4 " 4 "	3.25 "	3.75 "	4.25 "

Capped ends.

AIR DRILL HOSE, CANVAS WRAPPED.

PRICES, PER FOOT.

	4-ply. 3-ply inside and 1-ply outside.	5-ply. 4-ply inside and 1-ply outside.	6-ply. 5-ply inside and 1-ply outside.
¾ inch	$0.67	$0.83	$1.00
1 "	.83	1.03	1.24
1¼ "	1.04	1.30	1.56
1½ "	1.25	1.56	1.87
2 "	1.66	2.07	2.49
3 "			4.20

This hose will stand from 1,000 to 1,500 lbs. air pressure to the square inch, and being made of tough, durable rubber, and strong, closely-woven duck, will resist wear and tear for a long time.

PURE TUBING.

Heavy, medium, and light.

PRICES.

Int. diam.	Per foot.	Int. diam.	Per foot.
⅛ inch	$0.08	½ inch	$0.25
3/16 "	.12	5/8 "	.30
¼ "	.16	¾ "	.35
5/16 "	.18	1 "	.45
⅜ "	.20		

All sizes, made in either 12 or 50 ft. lengths.

ELECTRIC LIGHT TUBING.

White, pure.

Heavy, medium, and light, in 50 ft. lengths.

PRICES, SAME AS ABOVE.

CLOTH INSERTION.

Manufactured in lengths of 12 feet.

PRICES.

Int. diam.	Per foot.	Int. diam.	Per foot.
⅛ inch	$0.10	½ inch	$0.28
3/16 "	.14	5/8 "	.33
¼ "	.18	¾ "	.38
5/16 "	.20	1 "	.50
⅜ "	.23		

ELECTRIC LIGHT TUBING.

Black, hard.

Heavy, medium, and light, in 3 ft. lengths.

PRICES ON APPLICATION.

"FLEXITE."

This is a hard tubing which can be bent into any shape.

Made in 3 and 12 ft. lengths.

PRICES ON APPLICATION.

CAR HEATING HOSE.

PRICES.

Int. diam.	Per foot.
¾ inch	$1.17
1 "	1.45
1¼ "	1.82
1½ "	2.18
2 "	2.90

It is specially adapted for connections between the engine and baggage car, to transmit power to dynamos. When wanted for this purpose specify on the order, "for dynamos."

CARDEN HOSE.

RUBBER LINED.

PRICES.

Int. diam.	Per foot.
½ inch	$0.25
¾ "	.30

INSURANCE HOSE.

RUBBER LINED.

PRICES.

Int. diam.	Per foot.
1 inch	$0.40
1¼ "	.45
1½ "	.50
2 "	.60
2¼ "	.65
2½ "	.70

The mill fire hose is light, strong and pliable, and reels closely, and will not sweat or leak.

LINEN HOSE.

UNLINED.

In lengths of 100 feet.

PRICES.

Int. diam.	Per foot.	Int. diam.	Per foot.
¾ inch	$0.13	2 inch	$0.23
1 "	.14	2¼ "	.25
1¼ "	.16	2½ "	.26
1½ "	.18		

RUBBER LINED.

In lengths of 50 feet only.

PRICES.

Int. diam.	Per foot.	Int. diam.	Per foot.
1 inch	$0.35	2 inch	$0.55
1¼ "	.40	2¼ "	.60
1½ "	.45	2½ "	.65

This hose is circular-woven and seamless.

"NAVY" LINEN HOSE.

PRICES.

UNLINED.		LINED.	
Int. diam.	Per foot.	Int. diam.	Per foot.
¾ inch	$0.13	1 inch	$0.35
1 "	.14	1¼ "	.40
1¼ "	.16	1½ "	.45
1½ "	.18	2 "	.55
2 "	.23	2¼ "	.60
2¼ "	.25	2½ "	.65
2½ "	.26	3 "	.75
3 "	.33		

AIR BRAKE AND AUTOMATIC SIGNAL HOSE.

4-PLY.

PRICES.

1 in. internal diameter, 1⅝ in. external diameter.....per foot, $0.83
1¼ in. internal diameter..... " 1.04

Made in 50 foot lengths, or in short lengths with capped ends.

INSURANCE, FIRE JACKETED AND CARDEN HOSE.

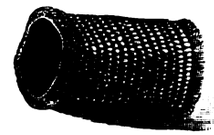


FIG. 7495.

FIRE HOSE, RUBBER LINED.

PRICES.

		Per foot.
Climax,	2½ inch int. diam.	$1.00
Eclipse,	2 " " "	.80
"	2½ " " "	1.00
Double or jacket,	2 " " "	.80
" "	2½ " " "	1.00
Mill fire hose,	1 "	.40
" "	1¼ "	.45
" "	1½ "	.50
" "	2 "	.60
" "	2¼ "	.65
" "	2½ "	.70

MILDEW PROOF COTTON HOSE.

SEAMLESS WOVEN AND RUBBER LINED.

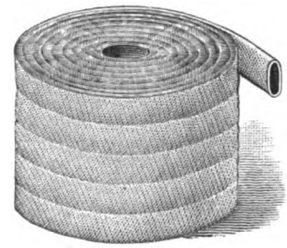


FIG. 7507.

PRICES.

Per foot.		Per foot.
1¼ inch int. diam.	$0.45	2¼ inch int. diam. $0.65
1½ " " "	.50	2½ " " " .70
2 " " "	.60	

In 50 foot lengths.

LEATHER FIRE HOSE.

We are prepared to furnish the very best quality of oak tanned, copper riveted, leather fire hose, with or without couplings, at bottom prices. **PRICES ON APPLICATION.**

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HOSE PIPES AND PLAY PIPES.

SCREW TIP AND COCK.

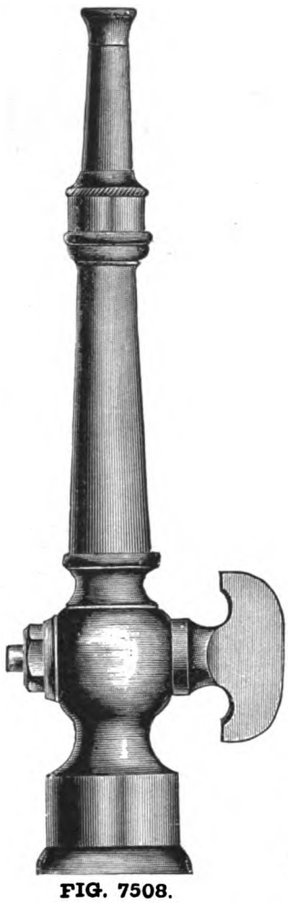


FIG. 7508.

PLAIN SCREW TIP.

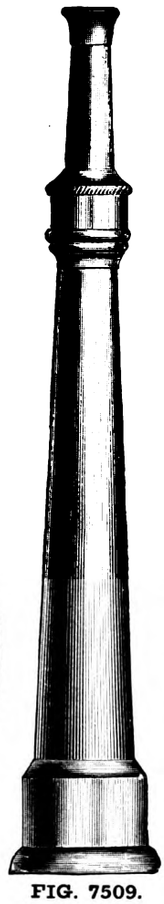


FIG. 7509.

PRICES, FIG. 7508.

Size ....inches,	¾	¾	¾	1	1	1¼	1¼	1¼
Length.....	6	8	12	8	12	12	15	20
Per dozen	$11.00	13.00	18.00	15.00	20.00	40.00	45.00	55.00
Size.....inches,	1½	1½	½	2	2	2½	2½	
Length.....	12	15	20	12	20	15	24	
Per dozen	$55.00	60.00	80.00	80.00	110.00	150.00	200.00	

PRICES, FIG. 7509.

Size.....inches,	¾	¾	¾	1	1	1¼	1¼	1¼
Length	6	8	12	8	12	12	15	20
Per dozen.....	$7.00	8.00	10.00	10.00	12.00	20.00	24.00	30.00
Size .....inches,	1½	1½	1½	2	2	2½	2½	
Length	12	15	20	12	20	15	24	
Per dozen.....	$25.00	30.00	36.00	38.00	50.00	75.00	100.00	

PRICES, FIG. 7510.

Size.....inches,	¾	1
Length.....	4½	4½
Per dozen.....	$3.50	4.00

PRICES, FIG. 7511.

Size.....inches,	2½
Length..... "	24
Per dozen.....	$100.00

NOZZLE TO TIE ON.

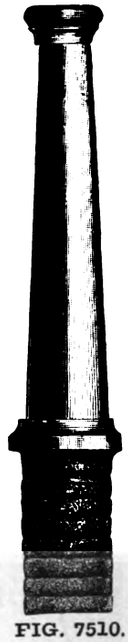


FIG. 7510.

PRICES, FIG. 7512.

Finished brass for ¾ inch hose, per dozen..$10.00
" " 1 " " .. 12.00

LARGE PATTERN.

Finished brass for ¾ inch hose, per dozen.. 21.00
" " 1 " " .. 23.50

The gems are easily adjusted, are free from leakage, and they can be graduated to throw either solid stream or spray, or shut off entirely.

GEM NOZZLE STREAM AND SPRAY.

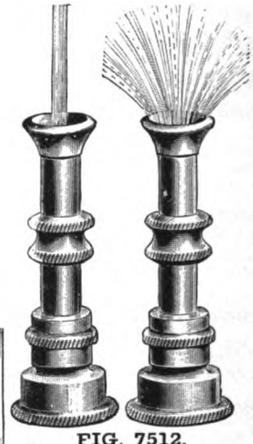


FIG. 7512.

LONG HOSE PIPES FOR FIRE ENGINES.

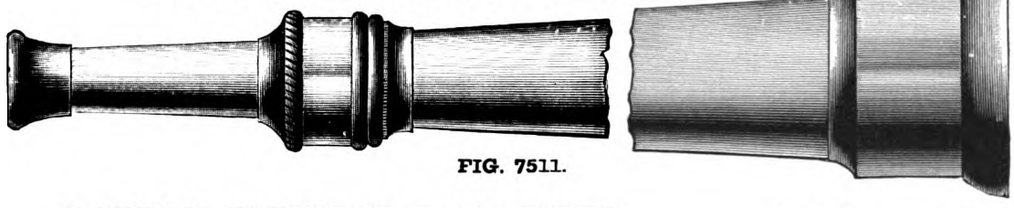


FIG. 7511.

REGULAR HEAVY BRASS SERVICE PIPE.



FIG. 7515.

These pipes are substantially made, and are for fire department or mill service, with or without handles, and have screw nozzles. 30 inches long. **PRICE, $10.00 EACH.**

COTTON FLEXIBLE PLAY PIPES.

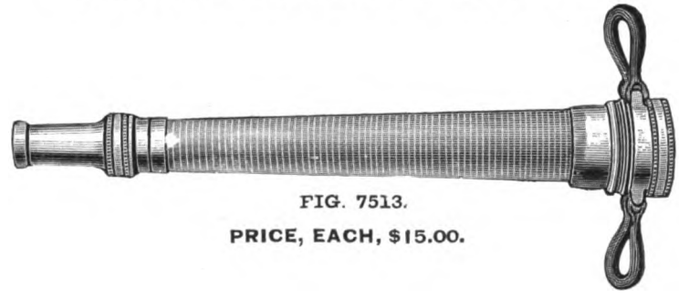


FIG. 7513.

PRICE, EACH, $15.00.

HOSE SPRINKLER.



FIG. 7516.

HOSE CLAMPS.



FIG. 7517.

PRICES, FIG. 7516.

Diameter.....inches,	1½	2	2½
Per dozen.....	$3.50	4.50	6.00

PRICES, FIG. 7517.

Size... .....inches,	½	¾	1	1¼	1½	2	2½
Per dozen.....	$1.50	1.50	2.00	2.50	3.00	4.00	7.00

HEAVY RUBBER PIPE, WITH PATENT METAL MOUNTINGS.

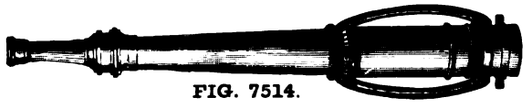


FIG. 7514.

For heavy service in fire departments.
2½ inch butt, leather or metal swivel handles, 30 inches long.
PRICE, $15.00 EACH.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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COUPLINGS, 1 1-4 TO 2 1-2 INCHES.

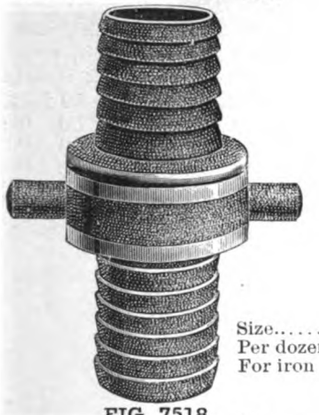


FIG. 7518.

STEAM HOSE COUPLINGS.

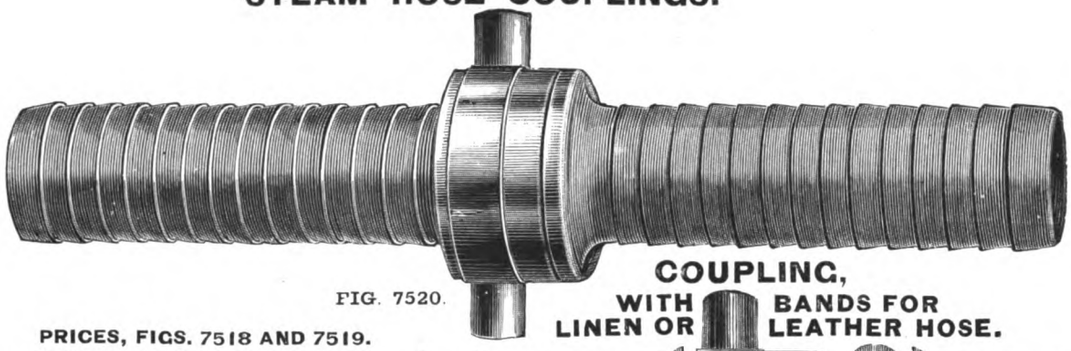


FIG. 7520.

PRICES, FIGS. 7518 AND 7519.

Size.....inches,	½	¾	1	1¼	1½	2	2½
Per dozen	$2.40	$2.40	$4.40	$10.00	$14.00	$24.00	$48.00
For iron pipe..per doz.	2.65	2.65	4.65	10.50	15.00	26.00	50.00

PRICES, FIG. 7520.

Size.....inches,	½	¾	1	1¼	1½	2	2½
Per dozen	$16.00	$16.00	$18.00	$25.00	$33.00	$42.00	$75.00

PRICES, FIG. 7521.

Size .....inches,	1¼	1½	2	2¼	2½	3
Per dozen	$24.00	$30.00	$42.00	$51.00	$51.00	$96.00

COUPLINGS, 1-2, 3-4 AND 1 INCHES.



FIG. 7519.

HOSE MENDERS.

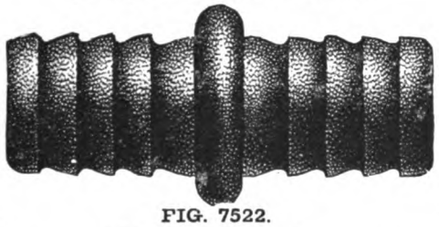


FIG. 7522.

PRICES, FIG. 7522.

Size.....inches,	½	¾	1
Brass..... ...per dozen,	$1.20	$1.20	$2.00
Iron, bronzed, "	.40	.50	1.00

HOSE CAPS.



FIG. 7523.

COUPLING, WITH BANDS FOR LINEN OR LEATHER HOSE.

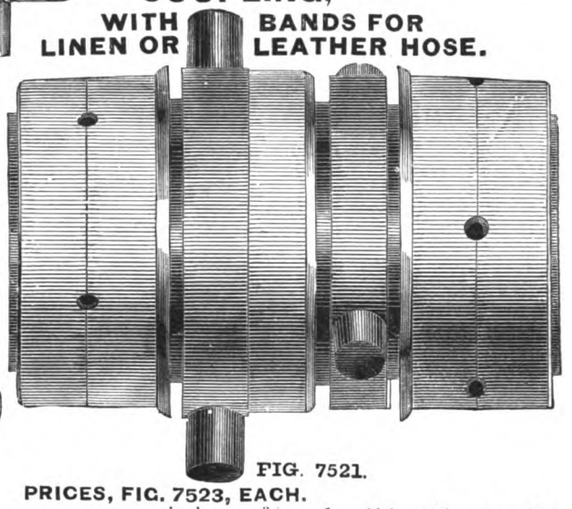


FIG. 7521.

PRICES, FIG. 7523, EACH.

Size.....inches,	¾	1	1¼	1½	2	2½
Finished..	$1.00	$1.25	$1.75	$2.25	$3.00	$3.50
Rough, without chain or swivel.....	.60	.75	1.15	1.50	2.00	2.50

COLWELL HOSE STRAPS.

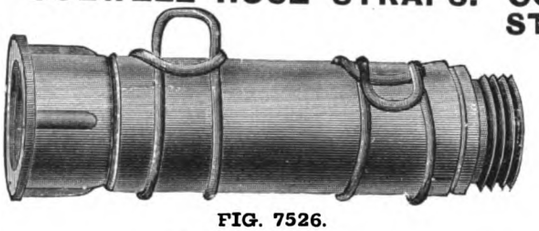


FIG. 7526.

PRICES, FIG. 7526.

Size.....inches,	½	¾	1	1¼	1½	2	2½
Per dozen.....	$0.40	$0.60	$0.80	$1.00	$1.20	$1.60	$2 00

PRICES, FIG. 7527.

Size.... .inches,	½	¾	1	1¼	1½	2	2½
Price	$0.50	$0.50	$0.50	$0.75	$0.75	$0.75	$0.75

COLWELL'S HOSE STRAP FASTENER.



FIG. 7527.

HOSE AND IRON PIPE NIPPLES.

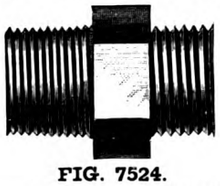


FIG. 7524.

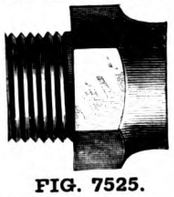


FIG. 7525.

PRICES, FIGS. 7524 AND 7525.

Size....inches,	½	¾	1	1¼	1½	2	2½	3
Per dozen	$3.50	3.50	5.00	9.00	10.00	14.00	28.00	40.00

HOSE REDUCERS.

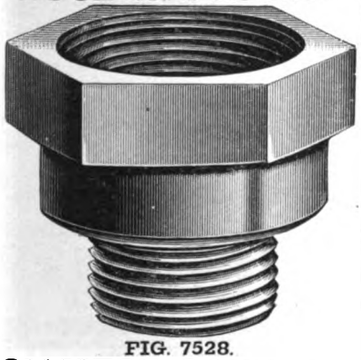


FIG. 7528.

PRICES, FIG. 7528.

Size ..... inches,	1 x ¾	1¼ x 1	1½ x 1¼	2 x 1½	2½ x 2
Prices..... .per doz.	$6.50	$10.00	$12.00	$18.00	$30.00

HOSE COUPLINGS WITH EXPANSION RINGS.

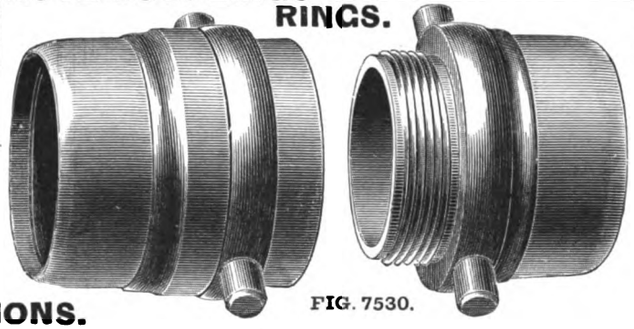


FIG. 7530.

PRICES, FIG. 7530.

1½ inch...	per pair,	$2.00
2 "	"	2.25
2½ " light.....	"	2.00
2½ " medium.....	"	2.25
2½ " heavy....	"	2.50

DESCRIPTION, FIG. 7531.

When additional sizes are ordered, not enumerated above, the price will be the same as nearest size larger; and for spiral wire wound suction hose, give outside diameter and we will send nearest of the above sizes.

Made to suit different ply hose. In ordering, state for how many ply hose desired.

HOSE BAND CLAMPS.

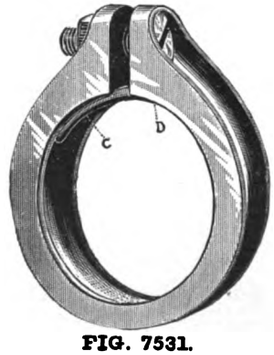


FIG. 7531.

PRICES, FIG. 7531.

Sizes, inches	½	¾	1	1¼	1½	2	2¼	2½	3
Hydrant hose, per doz.....$1.50	$1.50	$2.00	$2.50	$3.00	$4.00	$5.50	$7.00	$10.00	
Steam hose, " 1.50	2.00	2.50	3.00	3.50	5.50	7.00	8.50	13.00	

SIAMESE CONNECTIONS.



FIG. 7529.

PRICES, FIG. 7529.

FOR COMBINING STREAMS.

Size, 2½ in., each, $12.50

FOR DIVIDING ONE STREAM.

Size, 2½ in., each, $15.00

With closing cap on one of the male butts.

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HOSE RACKS, REELS AND CARTS.

SWINGING RACKS, WITH WALL PLATES.

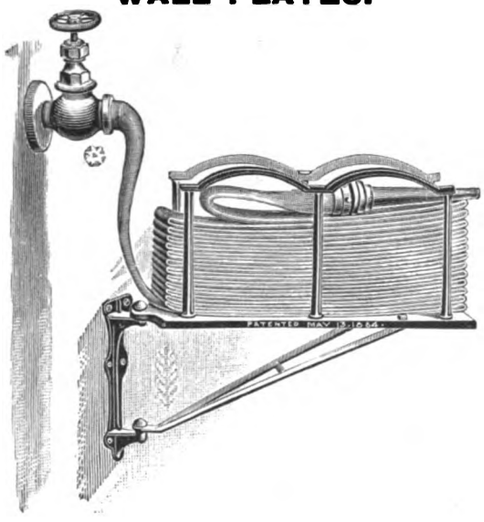


FIG. 7532.

CAPACITY OF RACKS AND SIZE NUMBER.

FOR "UNLINED LINEN" HOSE.

	Size of hose.	Full capacity.
* No. 0,	for 2 inch.....	50 feet.
No. 00,	" 2½ "	50 "
* No. 1,	" 2 "	100 "
No. 2,	" 2½ "	100 "
* No. 3,	" 2 "	150 "
No. 4,	" 2½ "	150 "

FOR "RUBBER LINED LINEN" OR "MILL" HOSE.

	Size of hose.	Full capacity.
* No. 3,	for 2 inch.....	50 feet.
No. 4,	" 2½ "	50 "
* No. 5,	" 2 "	100 "
No. 6,	" 2½ "	100 "

*For 1¼ and 1½ inch hose, when specified, we will furnish a narrow bed plate. Nos. 5 and 6 will carry heavy hose of almost any make in 50 foot lengths.

To avoid mistakes and to get the proper "rack" when you order, give size, kind and length of hose.

All racks japanned "red" unless otherwise ordered.

PRICES, FIG. 7532.

Style of finish.	Nos. 0 and 00	Nos. 1 and 2	Nos. 3 and 4	No. 5.	No. 6.
Japanned "red".....each,	$5.00	$6.00	$7.00	$7.50	$8.00
" "gold". ..... "	5.50	6.75	7.75	8.75	8.75
" white with gold stripe "	5.50	6.75	7.75	8.75	8.75
Bronzed in gold..... "	5.00	6.00	7.00	7.50	8.00
Nickel-plated, polished..... "	8.00	9.50	11.00	13.00	13.50
Brass " " ..... "	8.00	9.50	11.00	13.00	13.50
Solid Brass, " ..... "	13.00	16.00	19.00	24.00	24.00

Racks can be japanned or painted in other colors, and prices will be submitted upon application.

THE "STAR" SWINGING HOSE REEL.

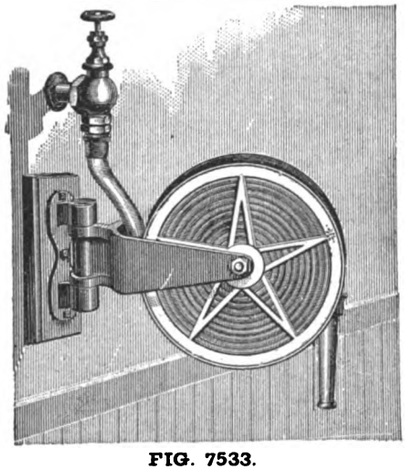


FIG. 7533.

With wall plates or pipe clamps. All reels japanned red unless otherwise ordered.

PRICES.

Style of finish.	Sizes.					
	1, 2, 3	4, 5, 6	7, 8, 9	10, 11, 12	13, 14	15
Japanned red, each.....	$7.00	8.40	9.80	9.80	10.50	11.20
Nickel-plated and polished, each.	11.20	13.30	15.40	15.40	18.20	18.90
Brass " " " .	11.20	13.30	15.40	15.40	18.20	18.90
Solid brass, polished, each....	18.20	22.40	26.60	26.60	33 40	33.40

Specify whether for wall or pipe.

CAPACITY OF REELS AND SIZES FOR PLAIN LINEN HOSE.

No. reel.	Size of hose, inches.	Cap. of reel, ft.	No. reel.	Size of hose, inches.	Cap. of reel, ft.
1	1¼ or 1½	50	7	1¼ or 1½	150
2	2	50	8	2	150
3	2½	50	9	2½	150
4	1¼ or 1½	100	13	1¼ or 1½	200
5	2	100	14	2	200
6	2½	100	15	2½	200

FOR RUBBER LINED LINEN OR MILL HOSE.

No. reel.	Size of hose, inches.	Cap. of reel, ft.	No. reel.	Size of hose, inches.	Cap. of reel, ft.
10	1¼ or 1½	50	13	1¼ or 1½	100
11	2	50	14	2	100
12	2½	50	15	2½	100

PORTABLE HOSE REELS.

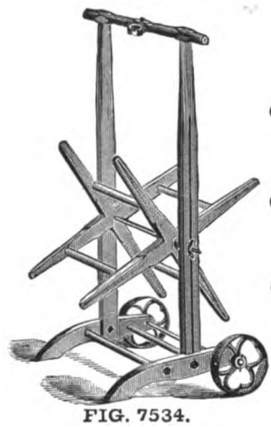


FIG. 7534.

PRICES, FIG. 7534.

Capacity No. 1, 50 to 75 ft. of ¾ in. rubber hose, each, $1.00.

Capacity No. 2, 100 to 150 ft. of ¾ in. rubber hose, each, $2.00.

Capacity No. B, 200 to 250 ft. of ¾ in. rubber hose, each, $3.00.

PORTABLE HOSE REELS.

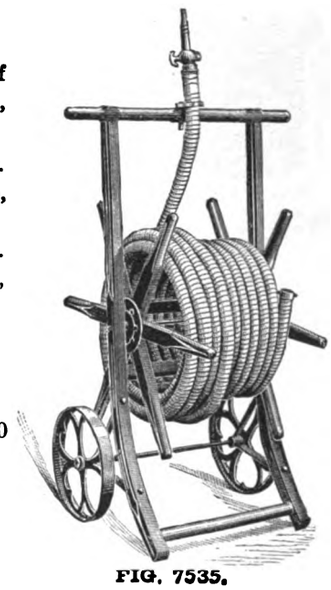


FIG. 7535.

PRICES, FIG. 7535.

No. 2. Reel carries either 100 or 200 ft. ¾ in. hose, each, $5.00.

HOSE CARTS.

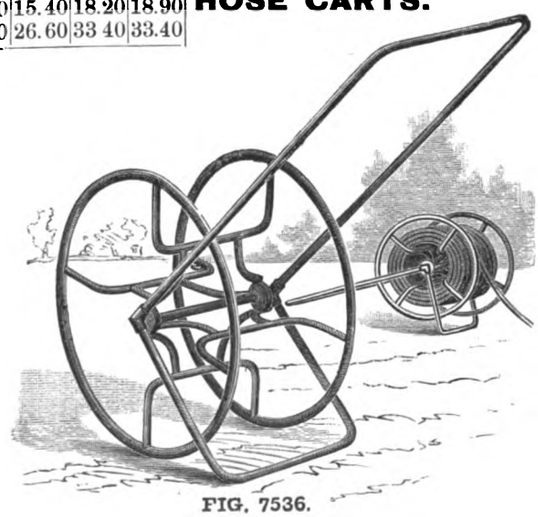


FIG. 7536.

DESCRIPTION, FIG. 7536.

Capacity, 100 to 500 feet of hose.

Two of these reels form a bundle and require no crating.

PRICES.

Small cut represents position of reel when rolling up hose.

No.	Height of wheel, inches.	Weight, pounds	Capacity ¾ hose, feet.	Prices.
10	21	18	100	$3.50
20	24	22	150	4.00
30	30	32	500	6.50

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HOSE CARTS.

MILL HOSE CARTS.

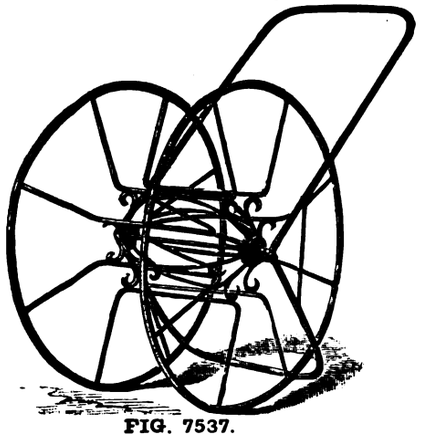


FIG. 7537.

PRICES.

No.	Height of wheel.	Weight.	Capacity, 2½ in. rubber fire hose.	Prices.
40	35 inches.	70 lbs.	100 feet.	$25.00
50	40 "	110 "	200 "	32.50
60	45 "	150 "	300 "	40.00

FACTORY HOSE REEL.

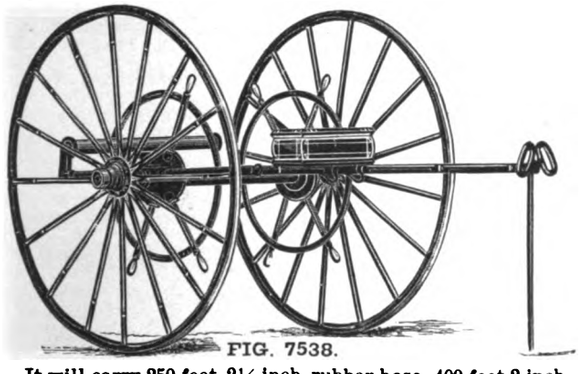


FIG. 7538.

It will carry 250 feet 2½ inch rubber hose, 400 feet 2 inch rubber hose, 800 feet 2 inch linen hose, 1,000 feet 1½ inch linen hose. It is strong, symmetrical and handsomely painted. Weight, about 130 pounds. Wheels, four feet diameter. **PRICE, $40.00.**

FOLDING LADDERS.

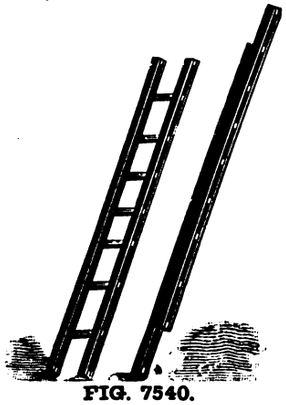


FIG. 7540.

Sizes, 8 to 16 feet.

PRICE, 20 CENTS PER FT.

PRICES, FIG. 7542.

	Each.		Each.
8 feet.	$1.60	16 feet.	$3.50
9 "	1.80	18 "	4.00
10 "	2.00	20 "	4.50
12 "	2.50	22 "	5.00
14 "	3.00	24 "	6.00

PRICES, FIG. 7543.

	Each.		Each.
22 feet.	$8.00	36 feet.	$14.00
26 "	10.00	42 "	17.00
28 "	10.50	46 "	20.00
32 "	12.00	50 "	23.00

PRICES, FIG. 7544.

	Each.		Each.
22 feet.	$7.50	36 feet.	$12.50
26 "	9.00	42 "	16.00
28 "	9.50	46 "	18.00
32 "	11.00	50 "	21.00

BALANCED HOSE CARTS.

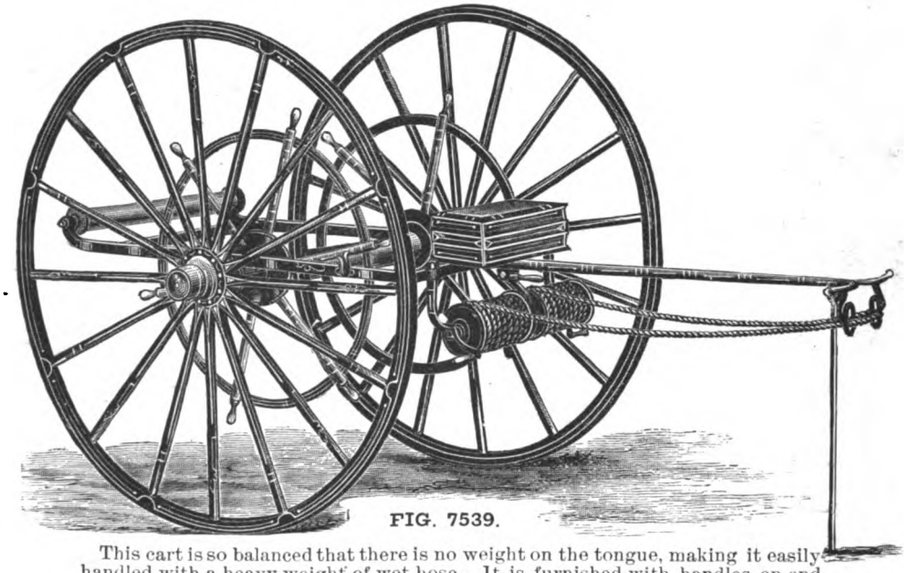


FIG. 7539.

This cart is so balanced that there is no weight on the tongue, making it easily handled with a heavy weight of wet hose. It is furnished with handles on end of reel spokes for reeling. With each cart goes drag rope, reel, axe, crowbar and tool box. It is painted with handsome designs.

No. 1. 5½ feet "A" wheels, **PRICE**.....$150.00

Will carry hose in quantity as follows:

1½ in. cotton, rubber-lined mill hose	1,500 feet.
2 " " " " "	1,200 "
2½ " " " " "	800 "
1½ " rubber hose	900 "
2 " " "	800 "
2½ " " "	700 "

No. 3. 5 feet "A" wheels. **PRICE**.....$100.00

1½ in. cotton, rubber-lined mill hose	1,000 feet.
2 " " " " "	800 "
2½ " " " " "	500 "
1½ " rubber hose	600 "
2 " " "	450 "
2½ " " "	400 "

LADDERS.

UNIVERSAL.



FIG. 7541.

Fig. 7543 has automatic hooks, pulleys and rope, and can be operated from the ground, catching on any rung desired, when raising or lowering the upper section.

In ordering extension ladders an allowance of about 3 feet should be made for lap. A ladder 22 feet long will reach 19 feet, etc.

LONG.

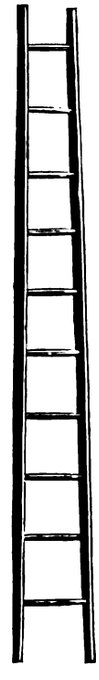


FIG. 7542.

PULLEY EXTENSION.

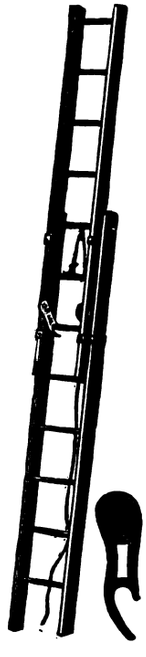


FIG. 7543.

EXTENSION.



FIG. 7544.

All these ladders are made of clear Norway pine. Hickory rungs pass two-thirds of the way through sides of the ladder and are secured by large screws.

Safety cross-bars of wrought iron.

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FIRE EXTINGUISHERS.

BABCOCK.



FIG. 7545.

PRICES, FIG. 7545.

Capacity.	In red Japan.	Nickeled.
6 gal.	$60.00	$65.00
3 "	40.00	43.00
1½ "		20.00

Above prices include charges.

6 gal., 6 charges.
3 " 4 "
1½ " 2 "

PRICES, EXTRA CHEMICAL CHARGES.

Box of 6 for 6 gallon extinguisher.....$5.00
Box of 6 for 3 gallon extinguisher..... 3.50
Box of 6 for 1½ gallon extinguisher..... 2.00

HAND GRENADES.



FIG. 7546.

The Hayward hand grenade is a glass globe about four inches in diameter, filled with a chemical fluid which generates enormous volumes of fire extinguishing gas when brought in contact with flame.

As the bottle is hermetically sealed, and the fluid itself is not susceptible to the influence of the atmosphere, no fermentation or evaporation can take place, and hence the grenade can always be relied upon to thoroughly do its work under any circumstances. It is, in fact a cheap, simple, durable and reliable fire extinguisher, which will not freeze, will not burst, and can be used by man, woman or child.

PRICE, $10.00 PER DOZEN.

PRICES, FIG. 7548.

Is made of cold rolled copper with lining. Weight, 18 lbs. when charged ready for use, and throws a stream 50 feet.

Plain, No. 1 holds 2 gallons.....$14.00
" " 2 " 4 " 24.00
Nickeled, No. 1 holds 2 gallons..... 15.00
" " 2 " 4 " 25.00

Cost of recharging, 25 cents each.

GRENADE BASKETS.



FIG. 7547.

Holding three grenades, 30 cents each.

EXCELSIOR.



FIG. 7548.

DIRECT STEAM RADIATORS.

THREE ROW STANDARD.

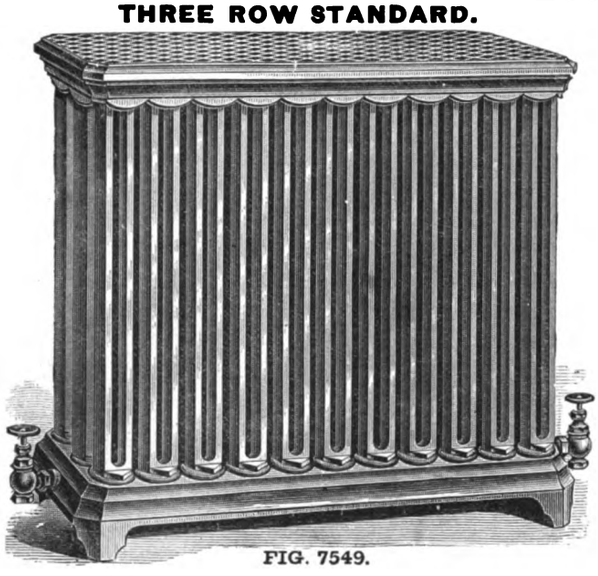


FIG. 7549.

CIRCULAR.

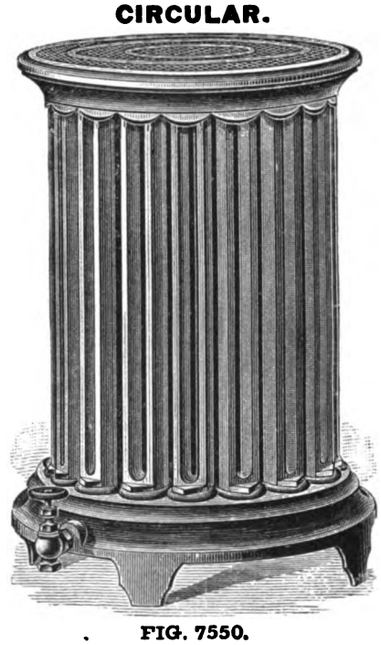


FIG. 7550.

COLUMN.

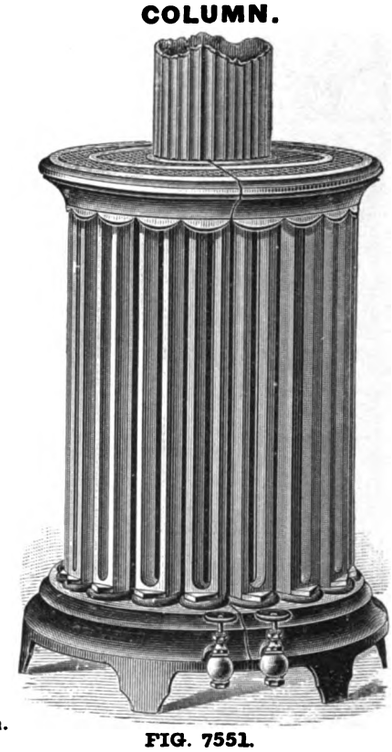


FIG. 7551.

CORNER.

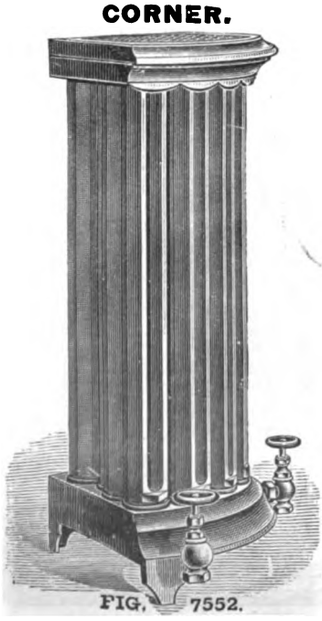


FIG. 7552.

PRICES, FIG. 7549.

One and two row, 3 to 26 loops long,
Three " 3 " 15 " "
Four " 4 " 24 " "
} Made 42 in., 36 in., 30 in., 24 in. high.

Amount in square feet of heating surface in loops, and prices per square foot.

Height,	42 in.	36 in.	30 in.	24 in.
Standard	3½ feet, $0.70	3 feet, $0.75	2½ feet, $0.85	2 feet, $1.00 sq. ft.
Enlarged	4¼ " .67½	3½ " .72½	3 " .82½	2⅓ " .97½ "
Extended	4¼ " .65	3½ " .70	3 " .80	2⅓ " .95 "

The enlarged and extended patterns are quite similar to the standard pattern, except having loops enlarged or extended, thereby giving more heating surface.

PRICES, FIGS. 7550, 7551 AND 7552.

Amount in square feet of heating surface in loops, and prices per square foot.

	CIRCULAR OR CORNER.		COLUMN.	
Height,	42 in.	36 in.	42 in.	36 in.
Standard	3½ feet, $0.75	3 feet, $0.80	3½ feet, $0.80	3 feet, $0.85
Enlarged	4¼ " .72½	3½ " .77½	4¼ " .77½	3½ " .82½
Extended	4¼ " .70	3½ " .75	4¼ " .75	3½ " .80

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WATER METERS.

ROTARY PISTON METER.

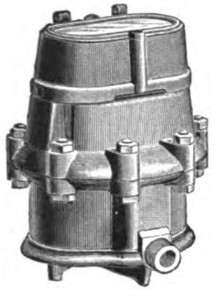


FIG. 7553.

PRICES, FIG. 7553.

Size.	Meters. Bronze.	Coupling for setting the meters.	Boxing.
$\frac{5}{8}$ inch.	$12.00	$0.50	$0.25
$\frac{3}{4}$ "	18.00	.75	.25
1 "	25.00	1.50	.50
$1\frac{1}{2}$ "	40.00	Iron unions. 1.25	.75
2 "	60.00	" 2.00	1.00
3 "	Iron body. 100.00	Spigots. 4.00	2.50
4 "	200.00	" 5.50	3.50
6 "	450.00	" 10.00	6.00
8 "	750.00	" 15.00	8.00
10 "	1,000.00	" 17.00	8.00

We also make these meters for extra heavy pressure, say over 125 lbs., for which the following is added to the regular price list:

EXTRA HEAVY ROTARY PISTON METERS.

1 inch	$3.00 extra.	3 inch	$10.00 extra.
$1\frac{1}{2}$ "	4.00 "	4 "	20.00 "
2 "	5.00 "	6 "	50.00 "

PRICES AND DESCRIPTION, FIG. 7555.

Size.	Greatest proper quantity per minute.	Prices.	Connections.	Boxing.	Dimensions and weight. Length.	Height over all.	Width.	Weight complete.	Weight boxed.
$\frac{3}{8}$ in.	1 cubic foot or $7\frac{1}{2}$ gals.	$11.10	$0.42	$0.13	6 in.	$5\frac{7}{8}$ in.	5 in.	10 lbs.	11 lbs.
$\frac{1}{2}$ "	2 " " 15 "	15.00	.55	.25	$7\frac{1}{4}$ "	$7\frac{1}{2}$ "	$6\frac{5}{8}$ "	18 "	24 "
$\frac{3}{4}$ "	4 " " 30 "	25.00	.83	.25	9 "	$9\frac{1}{2}$ "	$8\frac{1}{8}$ "	26 "	38 "
1 "	8 " " 60 "	33.33	1.67	.50	$10\frac{7}{8}$ "	$10\frac{1}{4}$ "	$9\frac{1}{2}$ "	40 "	53 "
$1\frac{1}{2}$ "	12 " " 90 "	61.11		.50	$12\frac{5}{8}$ "	12 "	11 "	56 "	73 "
2 "	20 " " 150 "	83.33		1.00	$15\frac{1}{4}$ "	$14\frac{1}{8}$ "	$12\frac{1}{2}$ "	98 "	128 "
3 "	36 " " 270 "	166.66		1.50	24 "	16 "	$15\frac{3}{4}$ "	200 "	244 "
4 "	72 " " 540 "	333.33		2.00	29 "	$21\frac{1}{2}$ "	$20\frac{1}{2}$ "	400 "	430 "
6 "	120 " " 900 "	666.66		4.00	$36\frac{1}{2}$ "	$28\frac{1}{2}$ "	$28\frac{1}{2}$ "	925 "	960 "

Connections are made only for the $\frac{3}{8}$ inch, $\frac{1}{2}$ inch, $\frac{3}{4}$ inch and 1 inch meters, as quoted above, and always are sent with these sizes, unless we are otherwise instructed. The sizes just mentioned are made with male threads, while the $1\frac{1}{2}$ inch and 2 inch have female threads. All threads are cut to fit standard pipe. The 3 inch, 4 inch and 6 inch sizes are made with flanges.

Fish traps are made for all sizes of the Crown meter, and their use is particularly recommended in connection with the sizes above $1\frac{1}{2}$ inch, since they afford valuable protection against any foreign substance that is liable to work into the meters from the street main, and damage or destroy the working parts.

The prices of fish traps are: $\frac{3}{8}$ inch, $\frac{1}{2}$ inch, $\frac{3}{4}$ inch and 1 inch, $5.55 each; $1\frac{1}{2}$ and 2 inch, $6.66; 3 inch, $11.10; 4 inch, $16.66 and 6 inch, $22.22.

WORTHINGTON WATER METER.

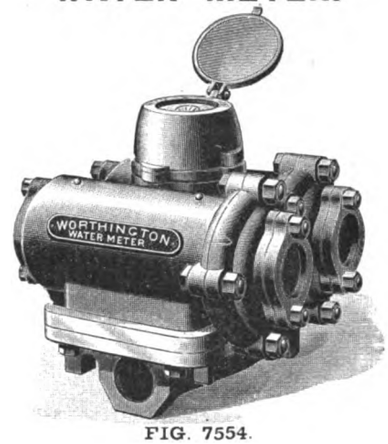


FIG. 7554.

PRICES.

Size of opening.	Greatest proper quantity per minute. Cub. ft.	Gall.	Prices.
$\frac{5}{8}$ in. pipe	1 or	$7\frac{1}{2}$	$ .....
$\frac{3}{4}$ "	2 "	15	.....
1 "	4 "	30	
$1\frac{1}{2}$ "	6 "	45	
2 "	8 "	60	
3 "	18 "	130	
4 "	60 "	450	
6 "	120 "	900	

CROWN METERS.



FIG. 7555.

HAY AND STRAW ROPE TWISTING MACHINES.

FOR USE IN IRON FOUNDRIES.

DESCRIPTION, FIG. 7556.

Length over all, 5 feet 10 inches; width, 3 feet 9 inches. Feeding screw, made of crucible cast-steel, $2\frac{1}{4}$ inches diameter; it runs in genuine bronze bushings.

Journals 5 inches long by 4 inches diameter. All gears cast-steel. Capacity of spool, 2,400 feet of $\frac{3}{4}$ inch rope. Capacity of machine, 2,000 to 2,400 feet per hour, depending on operator.

Driving pulley, 20 inches by $3\frac{1}{2}$ inch face. Speed, 200 revolutions per minute. Spools—ten with each machine—have $\frac{1}{4}$ inch boiler plate ends bound by a riveted bead as shown, and are indestructible by any foundry usage.

PRICE, $425.00.

Long prairie grass for making straw rope, by the car-load or bale. Prices furnished on application. Care must be taken to select it as long as possible to make good rope.

IMPROVED MACHINE.

Extra length, 6 feet; extreme height, 2 feet 10 inches; extreme width, 2 feet 6 inches; shipping weight 850 lbs.

Motion of reel right to left; capacity of reel, about 1,000 feet of rope; product 5 to 10 reels per day, according to size of rope and skill of operator; size of rope, $\frac{1}{2}$ to $1\frac{1}{2}$ inches diameter.

PRICES, IMPROVED MACHINE.

Complete with one reel, no countershaft	$300.00
Countershaft, net	30.00
Extra reels, each, net	15.00

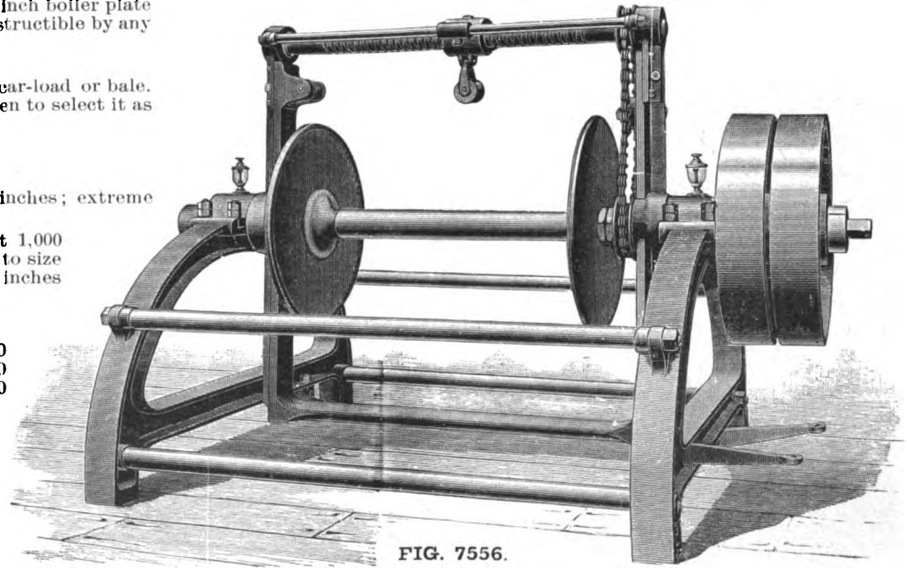


FIG. 7556.

POWER SAND SIFTER.

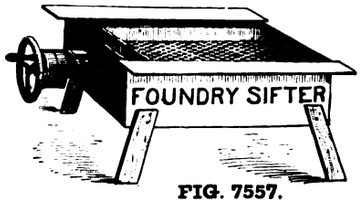


FIG. 7557.

Size 36 x 24, 30 in. high.

PRICES, COMPLETE, FIG. 7557.

With power and hand	$25.00
Movement only	15.00

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SCREENS, RIDDLES, BELLOWS AND RAPPING PLATES.

COAL SCREENS.

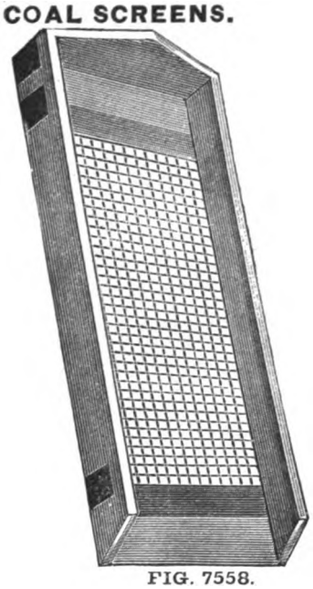


FIG. 7558.

SAND SCREENS.

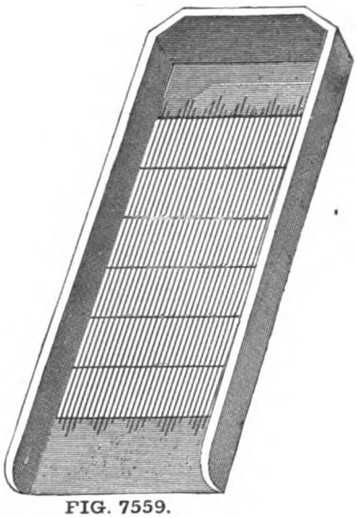


FIG. 7559.

PRICES, FIG. 7558.

33 inch heavy wire, 1 inch to 2 inch space between wires				$12.00 each.
33	"	"	¼ inch to ⅞ inch	" 10.00 "
27	"	"	¼ inch to 1 inch	" 7.00 "
With standard and leg, extra				3.50 "

MEASUREMENTS OF ABOVE.

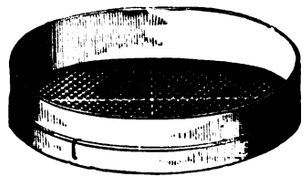
33 inch screens { 33 inches wide by 6 feet 1 inch high over all.
30 inches wide by 4 feet 3 inches high screening surface.

27 inch screens { 27 inches wide by 5 feet 4 inches high over all.
24 inches wide by 3 feet 7 inches high screening surface.

PRICES, FIG. 7559.

26 inch screens, laced wire				$4.50 each.
24 inch	"	"	"	4.00 "
26 inch	"	looped wire		6.00 "
24 inch	"	"	"	5.00 "

FOUNDRY OR MOULDERS' SIEVE.



PRICES, FIG. 7560.

BRASS.	STEEL.	GALVANIZED.
16 inch..per doz., $15.00	16 inch...per doz., $6.00	16 inch...per doz., $6.00
18 inch.. " 18.00	18 inch... " 7.00	18 inch... " 7.00
20 inch.. " 21.00	20 inch... " 8.00	20 inch... " 8.00

Nos. 2 and 3 mesh extra, brass $1.00.

MOULDERS' BELLOWS.

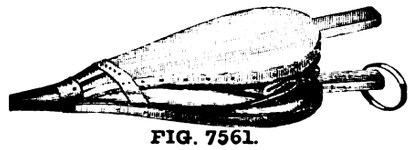


FIG. 7561.

Inch.....	9	10	11	12	13	14	16
Per dozen,	$15.00	$17 00	$20.00	$24.00	$26.00	$28.00	$33.00

SPRINKLING BELLOWS.

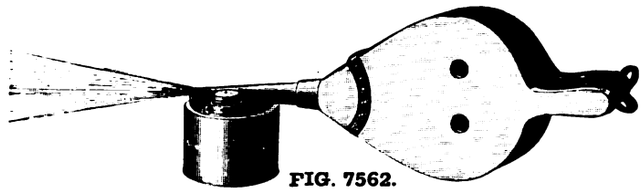


FIG. 7562.

For saturating moulds with water, benzine, kerosene, etc.

PRICE, EACH, $2.50.

FACING BELLOWS.

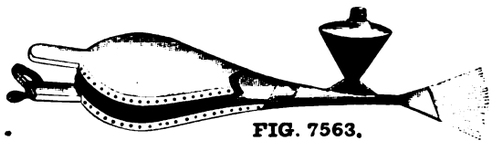


FIG. 7563.

For distributing blackings upward, and where they cannot be applied with the dust-bag.

PRICE, $2.25 each.

BENCH BELLOWS.

DESCRIPTION, FIG. 7564.

Short, light and strong, no spouts.

PRICES SAME AS FIG. 7561.

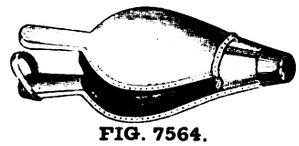


FIG. 7564.

RAPPING PLATES AND SCREWS.

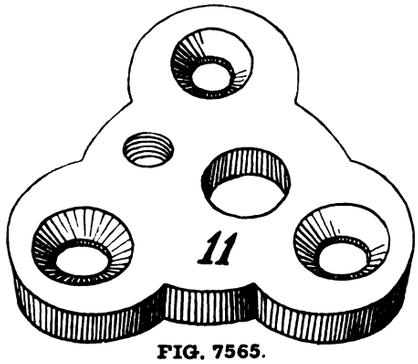


FIG. 7565.

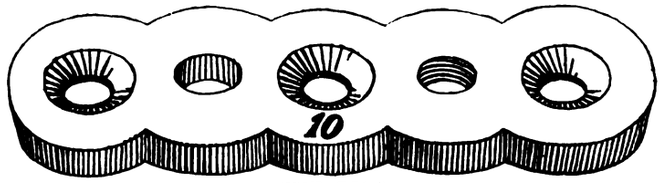


FIG. 7566.



FIG. 7567.

PRICES, FIG. 7570.

⅜	inch	per doz.,	$1.20
½	"	"	1.50
⅝	"	"	1.80
¾	"	"	2.20

LIFTING SCREWS, TAPERED SCREWS.

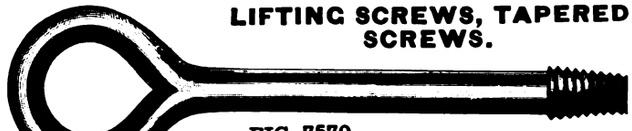


FIG. 7570.

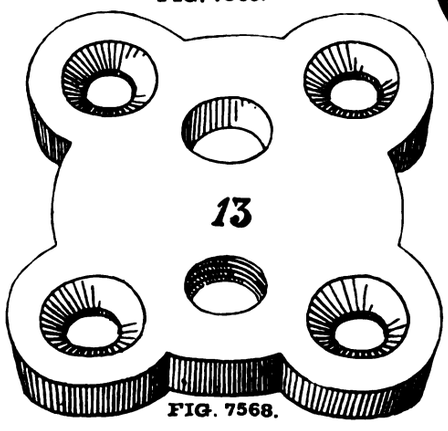


FIG. 7568.

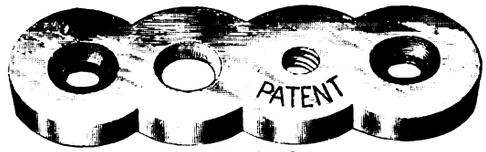


FIG. 7569.

These rapping plates and lifting screws are no longer an experiment. They are considered by leading machinery builders as necessary in a pattern shop as screws and nails, while the low price enables them to carry an assorted stock at very small expense, thereby effecting a large saving in their bills for repairs.

PRICES, FIGS. 7565 TO 7569.

No.	1	per dozen,	tapped	¾ inch	$0.35
"	2	"	"	"	.35
"	3	"	"	"	.35
"	4	"	"	"	.40
"	5	"	"	"	.40
"	6	"	"	"	.45
"	7	"	"	⅞ "	.50
"	8	"	"	"	.55
"	9	"	"	"	.60
"	10	"	"	"	.65
"	11	"	"	"	.70
"	12	"	"	⅝ "	.75
"	13	"	"	"	.85
"	14	"	"	"	.95
"	15	"	"	"	1.10
"	16	"	"	"	1.40
"	17	"	"	"	1.90
"	18	"	"	¾ "	2.20
"	19	"	"	"	2.60
"	20	"	"	"	2.90

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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RAPPING PLATES AND DRAWING IRONS.

These rapping plates are so designed that they are easily let into the pattern by boring three holes, as shown in cut at A; and, knowing the probability of spoiling a good bit at this work, we furnish a strong center bit that can be filed.

The drawing screws are four inches long and threaded at both ends, so as to be reversed in the handle when worn out; they also have a flute cut in them to prevent clogging.

PRICES, PER DOZEN.

1 dozen ½ inch plates	$0.20
1 " ¾ " "	.25
1 " 1 " "	.35
1 " 1¼ " "	.50
1 " 1½ " "	.75
1 " handles	.90
1 " drawing irons	.75

PRICES, PER 100.

100 ½ inch plates	$1.50
100 ¾ " "	2.00
100 1 " "	2.75
100 1¼ " "	4.00
100 1½ " "	6.00
100 handles	7.25
100 drawing irons	6.00

PRICES, PER SET.

The case is made of ash wood, and contains :

2 dozen ½ inch plates.	
2 " ¾ " "	
2 " 1 " "	
1 " 1¼ " "	
1 " 1½ " "	
½ " drawing irons and handles for moulder.	
1 gross ½ inch No. 10 wood screws.	
1 " ¾ " " 12 " "	
1 " 1 " " 14 " "	
1 " 1¼ " " 16 " "	
1 " 1½ " " 18 " "	
1 ½ inch center bit.	
1 ¾ " " "	
1 1 " " "	
1 1¼ " " "	
1 1½ " " "	

PRICE, complete set, **$7.50.**
WEIGHT, 48 LBS.

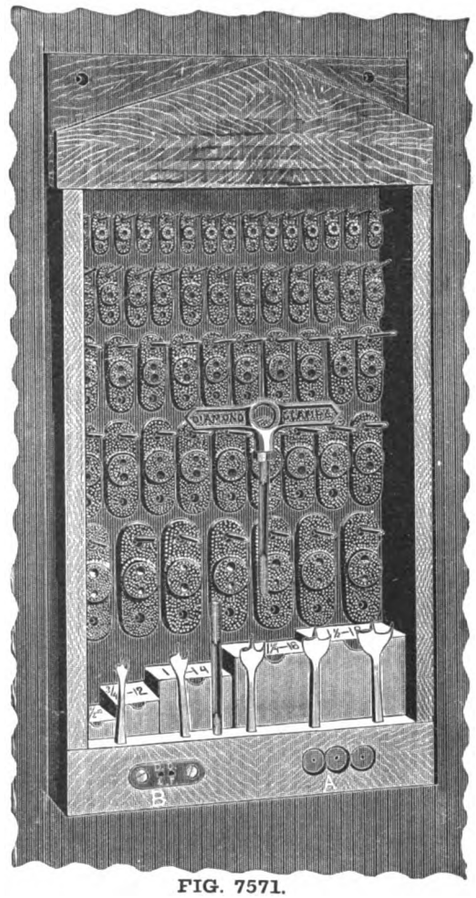


FIG. 7571.

FLEXIBLE METALLIC FILLETS.

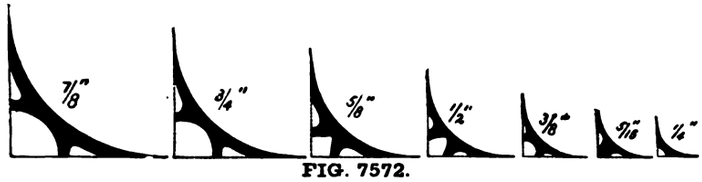


FIG. 7572.

PRICES, PER 100 FEET.

1 inch.	⅞ inch.	¾ inch.	⅝ inch.	½ inch.	⅜ inch.	⅛ inch.	¼ inch.
$14.00	$12.00	$10.00	$9.00	$8.00	$7.00	$6.00	$5.00

BENCH RAMMERS.


FIG. 7573.

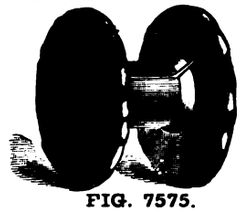

FIG. 7574.

PRICES, EITHER.

Per pair.

3½ in. face	$1.00
4 " "	1.20
3½ " " brass tips,	1.75
4 " " " "	2.00

FORCED DOUBLE HEAD CHAPLETS.

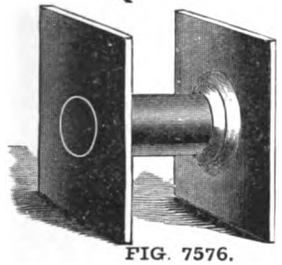

FIG. 7575.

PRICES.

Made of ⅜ inch round iron, from ¾ to 2½ inches long, with heads about ¾ inch diameter.

Price, per hundred, from ⅝ to 1⅜ inches $5.00
Price, per hundred, from 1½ to 2½ inches 6.00

D. H. CHAPLET STEMS, WITH SQUARE PLATES FITTED.


FIG. 7576.

PRICES.

Stems made of ⅜ round iron, from ½ to 2½ inches long.

Price, per hundred, ½ to 1 inch, with plates from ¾ to 1¼ inches $8.00
Price, per hundred, 1⅛ to 1½ inches, with plates from 1½ to 2 inches 9.00
Price, per hundred, 1⅝ to 2½ inches, with plates from 2 to 2½ inches 10.00

DOUBLE HEAD CHAPLET STEMS.


FIG. 7577.

PRICES, PER 100.

Made from ⅜ round iron.

From ⅝ to 1⅜ inches long $4.00
" 1½ to 2½ " " 5.00

FIRE AND CUPOLA BRICK.

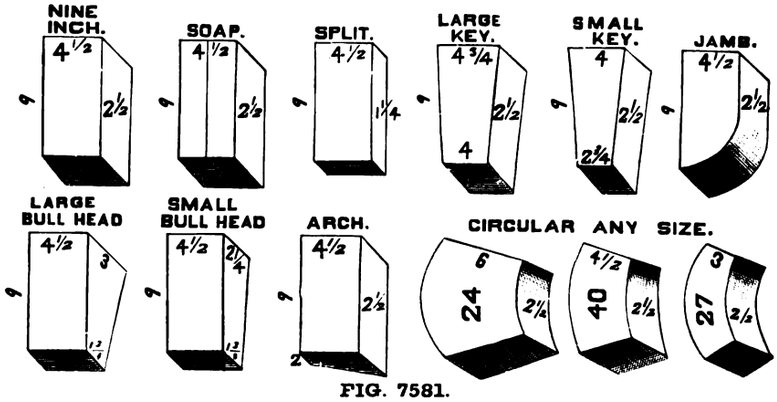


FIG. 7581.

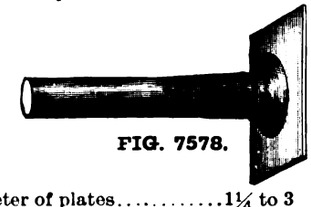
Special sizes made to order.

Prices, from $ ..... per 1,000 at the yards.

The above are regular stock sizes and shapes. Foundrymen desiring special sizes or shapes will please send us the inside diameter of their cupola shell and the height to which they wish to line it.

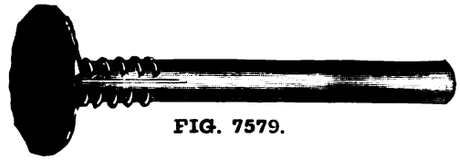
WROUGHT IRON CHAPLET STEMS.

WITH SQUARE PLATES FITTED.


FIG. 7578.

Diameter of plates ..... 1¼ to 3 inches.
Thickness of plates ..... ⅛ to ¼ "
Diameter of stem ..... ¼ to ¾ "
Lengths, 3 to 12 in. Plates curved to suit cores.

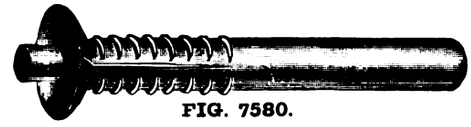
WITH FORCED HEAD.


FIG. 7579.

Diameter of heads ..... ½ to 1¾ inches.
Diameter of stems ..... ⅛ to ⅝ "
Lengths ..... 3 inches to 12 "

PRICES ON APPLICATION.

ENLARGED ENDS.


FIG. 7580.

In diameters from ¼ to ¾ of an inch, and lengths 3 to 12 inches.

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MOULDER'S TOOLS.

SQUARE TROWELS.



FIG. 7582.

PRICES, FIGS. 7582, 7583 AND 7584.

Width	Length, 4 in.,	4½	5	5½	6
1 in.,	$5.40	$6.00	$6 60	$7.20	$7.80
1¼ "	5.40	6.00	6.60	7.20	7.80
1½ "	6.60	7.20	7.80	8.40	9.00
1¾ "	....	....	9.00	9.60	10.20
2 "	....	....	10.20	10.80	11.40

HEART AND SQUARE.

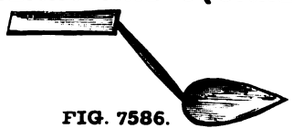


FIG. 7586.

Width	¾	1	1¼	1½	1¾	2 in.
Per doz	$4.80	$5.40	$6.60	$7.80	$9.00	$10.20

TAPER AND SPOON.



FIG. 7590.

Width	1	1¼	1½ in.
Per doz	$5.40	$6.60	$7.80

BENCH LIFTER.



FIG. 7591.

Width	⅜	½	⅝	¾ in.
Per doz	$4.80	$5.40	$6.00	$6.60

YANKEE.



FIG. 7595.

Width	½	⅝	¾	1 in.
Per doz	$5.40	$6.00	$6.60	$7.80

OVAL DOG TAIL.



FIG. 7598.

Width	¾	1	1¼ in.
Per doz	$6.00	$6.75	$8.25



FIG. 7602.

HALF ROUND CORNER.

Width,	1	1¼	1½	2 in.

Per doz., $6.00

CIRCULAR FLANGE.



FIG. 7605.

Width	½	⅝	¾	1 in.
Per doz	$9.60	$10.80	$12.00	$14.40

HUB TOOL.

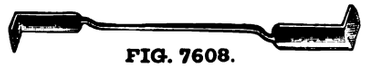


FIG. 7608.

Width	¾	1 in.
Per doz	$9.00	$10.80

FLANGE AND BEAD.

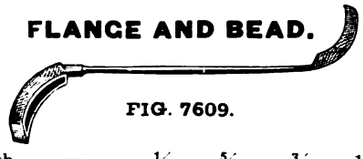


FIG. 7609.

Width	½	⅝	¾	1 in.
Per doz	$8.40	$9.60	$10.80	$13.20

FINISHING TROWELS.



FIG. 7583.



FIG. 7584.

Width $1\frac{1}{4} \times 5$, $1\frac{1}{2} \times 5$ } Length $5\frac{1}{2}$ 6, $5\frac{1}{2}$ 6

HEART AND SPOON.



FIG. 7587.

Width	1	1¼	1½ in.
Per doz	$5.40	$6.60	$7.80

SPOONS.



FIG. 7592.



FIG. 7593.

Width	1	1¼	1½ in.
Per doz	$5.40	$6.60	$7.80

SQUARE STRAIGHT.



FIG. 7596.

Width	½	⅝	¾	1 in.
Per doz	$5.40	$6.00	$6.60	$7.80

FLUTE.



FIG. 7599.

Width	⅜	⅝	⅞ in.
Per doz	$6.00	$7.20	$8.40



FIG. 7603.

SQUARE CORNER.

Width,	2	2½	3 in.

Per dozen, $6.00

FLAT FLANGE.



FIG. 7606.

Width	½	⅝	¾	1 in.
Per doz	$9.60	$10.80	$12.00	$14.40

LIFTERS.

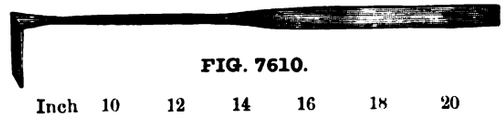


FIG. 7610.

Inch	10	12	14	16	18	20
⅛ x	$4.20	$4.80	$5.40	$6.00		
¼ x	4.20	4.80	5.40	6.00		
⅜ x	4.80	5.40	6.00	6.60		
½ x	5.40	6.00	6.60	7.20	$7.80	
⅝ x	....	6.60	7.20	7.80	8.40	
¾ x	....	7.20	7.80	8.40	9.00	$9.60
1 x	....	....	9.00	9.60	10.20	10.80

Per dozen.

HEART TROWELS.



FIG. 7585.

Width	2	2¼	2½	3 in.
Per doz	$6.00	$7.50	$9.00	$12.00

HEART AND LEAF.



FIG. 7588.

Width	1	1¼	1½ in.
Per doz	$5.40	$6.60	$7.80

TAPER AND SQUARE.



FIG. 7589.

Width	¾	1	1¼	1½ in.
Per doz	$4.80	$5.40	$6 60	$7.80

STOVE TOOL.



FIG. 7594.

Width	⅜	½	⅝	¾	1 in.
Per doz	$4.80	$5.40	$6.00	$6.60	$7.80

DOUBLE SQUARE.



FIG. 7597.

Width	½	⅝	¾	1 in.
Per doz	$5.40	$6.00	$6.60	$7.80

BEAD.



FIG. 7600.

Width	½	⅝	¾ in.
Per doz	$5.40	$6.00	$6.60



FIG. 7601.

PIPE.

Per dozen, $4.80

INSIDE SQUARE CORNER.



FIG. 7604.

Width,	2	2½	3 in.

Per dozen, $9.00

FLAT AND CIRCULAR FLANGE.

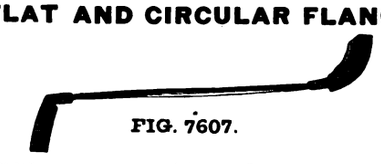


FIG. 7607.

Width	½	⅝	¾	1 in.
Per doz	$9.60	$10.80	$12.00	$14.40

FLANGE LIFTER.



FIG. 7611.

½ x 14	½ x 16	⅝ x 14	⅝ x 16	¾ x 14
$10.80	$11.40	$11.40	$12.00	$12.00
¾ x 16	¾ x 18	1 x 16	1 x 18	1 x 20
$12.60	$13.20	$15.00	$15.60	$16.20

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MOULDERS' TOOLS AND FOUNDRY BRUSHES.

BOX LIFTERS.

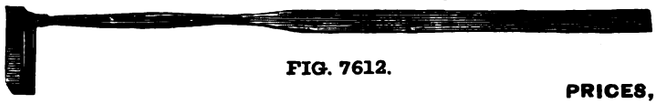


FIG. 7612.

HUB LIFTERS.



FIG. 7613.

PRICES, PER DOZEN.

⅝ x 14	⅝ x 16	⅝ x 18	¾ x 16	¾ x 18	¾ x 20	½ x 12	14	16	¾ x 14	16	18	1 x 16	18	20
$13.20	$13.80	$14.40	$14.40	$15.00	$15.60	$6 00	$6.60	$7.20	$7.80	$8.40	$9.00	$9.60	$10.20	$10.80

ROUND STEEL WIRE BRUSHES.



FIG. 7614.

PRICES.

4½ inch wire	per doz.,	$7.00
6 " "	"	9.00
8 " " long handles	"	12.00

HANDLE STEEL WIRE BRUSHES.



FIG. 7615.

PRICES.

1 row 2½ inch wire	per doz.,	$3.00
2 " 2½ " "	"	4.00
3 " 2½ " "	"	5.00
4 " 2½ " "	"	6.00
5 " 2½ " "	"	7.00

STRAPPED STEEL WIRE BRUSHES.



FIG. 7619.

PRICES.

4 rows 2	inch wire	per doz.,		$5.50
4 " 2½	" "	"		6.00
4 " 3	" "	"		6.50
4 " 3½	" "	"		7.00
4 " 4	" "	"		7.50
4 " 4½	" "	"		8.00
4 " 5	" "	"		8.50
5 " 2	" "	"		6.50
5 " 2½	" "	"		7.00
5 " 3	" "	"		7.50
5 " 3½	" "	"		8.00
5 " 4	" "	"		8.50
5 " 4½	" "	"		9.00
5 " 5	" "	"		9.50
6 " 3	" "	"		9.00
6 " 4	" "	"		10.50
6 " 5	" "	"		12.00

CAMEL'S-HAIR CORE BRUSHES.

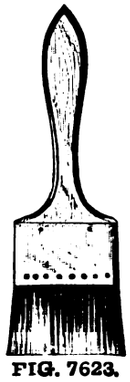


FIG. 7623.

PRICES, FIG. 7623.

1	inch	per doz.,	$7.65
1½	"	"	12.00
2	"	"	16.00
2½	"	"	21.00
3	"	"	23.00
3½	"	"	25.00
4	"	"	32.50

ROTARY STEEL WIRE BRUSH.

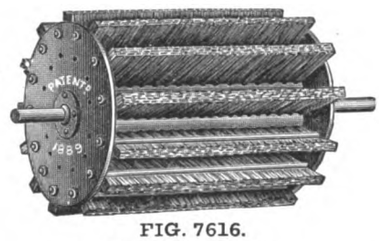


FIG. 7616.

PRICE, $45.00.

The above brush, without adjustable table, made any length or diameter required. The supporting bars to each row of wires prevent them from snapping, and can be adjusted lower when bristles wear down.

HARD FOUNDRY.

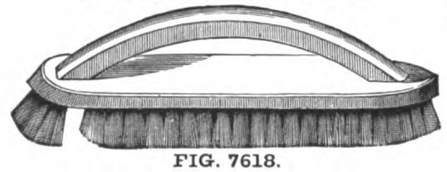


FIG. 7618.

PRICES.

With handle	per doz.,	$7.00
Without	"	7.00

STEEL WIRE BRUSHES. NO STRAPS.

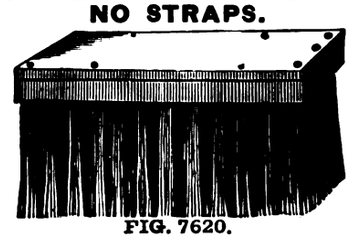


FIG. 7620.

Prices 25c. per doz. less than Fig. 7619.

HARD BRISTLE BRUSHES.



FIG. 7621.

PRICES.

No. 2 brush	per doz.,	$5.25
" 2 extra brush	"	8.50
" 3 brush	"	6.30
" 3 extra brush	"	12.00

ENGLISH BRISTLE CORE BRUSHES.

PRICES, FIG. 7624.

SINGLE THICKNESS.

½ inch	per doz.,	$1.90
¾ "	"	2.00

Per inch.

1 inch to 2½ in. inclusive,	$0.17
3 " " 4 " "	.22

DOUBLE THICKNESS.

½ inch	per doz.,	$2.55
¾ "	"	3.00

Per inch.

1 inch to 2½ in. inclusive,	$0.25
3 " " 4 " "	.32

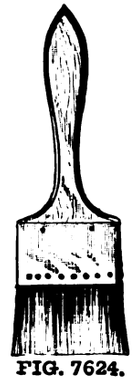


FIG. 7624.

ROTARY STEEL WIRE CLEANING BRUSH.



FIG. 7617.

PRICES ON APPLICATION.

With adjustable table; especially adapted for scaling in shovel factories, and other steel or iron plates. Can be made any size to suit plates to be scaled.

Give length and diameter of brush when writing for price.

The adjustable table is designed more particularly for shovel factories, but we have no doubt of its utility for other scaling and cleaning purposes.

MOULDERS' DUSTERS.

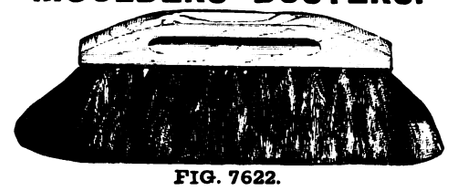


FIG. 7622.

Made of pure gray bristles for foundry use.

PRICES.

No. 35.	8	inch block	per doz.,		$7.12
" 55.	9	" "	"		8.00
" 45.	9	" "	"		8.44
" 65.	9	" "	"		9.60
" 5.	8½	" "	"		10.00
" 75.	10½	" "	"		12.80

WHITE BRISTLE FAN TOP CORE BRUSHES.

PRICES, FIG. 7625.

SINGLE THICKNESS.

1	inch	per doz.,	$4.75
1½	"	"	5.20
2	"	"	5.75
2½	"	"	7.60
3	"	"	8.50
3½	"	"	10.00
4	"	"	13.00

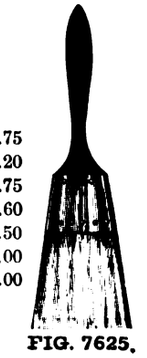


FIG. 7625.

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METALLIC PATTERN LETTERS AND FIGURES.

These are the sizes on the face of the letters, and are all finished and ready for use. They are fastened to patterns with a solution of gum shellac and alcohol. The dark lines over the letters represent the thickness of the letters.

STANDARD, ROMAN STYLE.

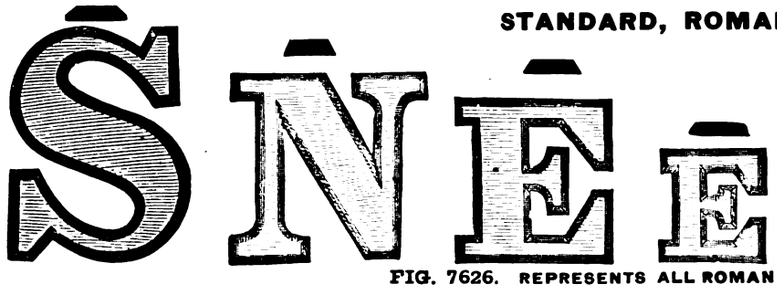


FIG. 7626. REPRESENTS ALL ROMAN LETTERS AND FIGURES.

Extra thin roman, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$ inch made to order, of about $\frac{1}{2}$ standard thickness.

Prices, same as standard roman.

Condensed face letters, same prices as standard roman.

NUMBERS ONLY.

Sizes, in inches	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$2\frac{5}{8}$	3	$3\frac{1}{2}$	4	5	6
Prices, each, cents	2	2	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	3	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	6	$7\frac{1}{2}$	9	14	14	16	18	30	35	40

FANCY THIN FLAT FACE, GOTHIC STYLE.

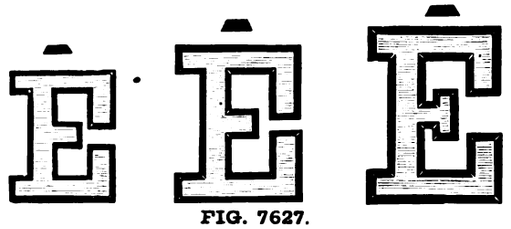
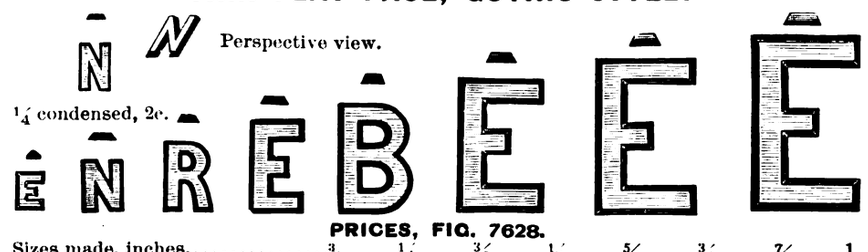


FIG. 7627.

Sizes, in inches	$\frac{3}{4}$	$\frac{7}{8}$	1
Prices, each, cents	$3\frac{1}{2}$	4	$4\frac{1}{2}$

THIN FLAT FACE, GOTHIC STYLE.



Perspective view.

$\frac{1}{4}$ condensed, 2c.

PRICES, FIG. 7628.

Sizes made, inches	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Prices, each, cents	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$

SHARP FACE GOTHIC.

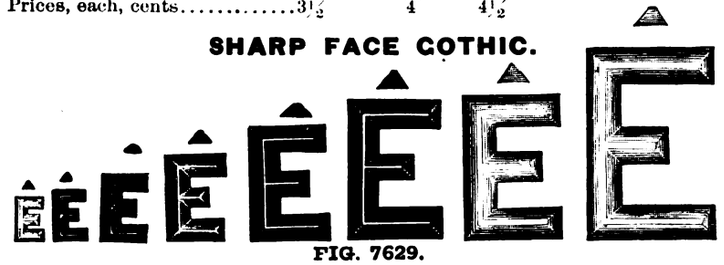


FIG. 7629.

PRICES.

Sizes made, inches	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1
Prices, each, cents	2	2	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3	$3\frac{1}{2}$	5

ANTIQUE, POINTED STYLE.

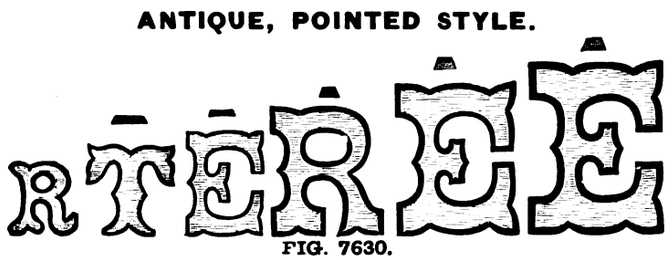


FIG. 7630.

PRICES.

Sizes made, inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$
Prices, each, cents	3	4	4	5	5	6	7

ROUND FACE, GOTHIC STYLE.



FIG. 7631.

PRICES.

Sizes made, inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$
Prices, each, cents	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3	$3\frac{1}{2}$	5	7

DORIC STYLE.

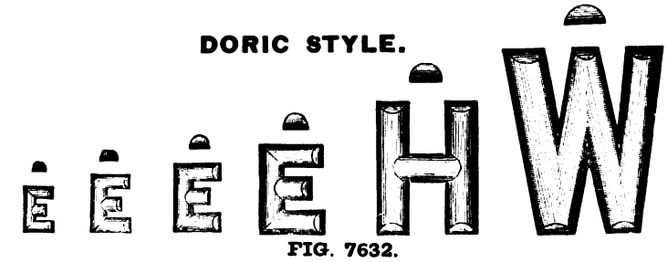


FIG. 7632.

PRICES.

Sizes made, inches	$\frac{3}{16}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1
Prices, each, cents	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	5

All the letters and figures shown above can be made with tacks in the backs for fastening them on wooden patterns, etc.

$\frac{3}{8}$ to $\frac{3}{4}$ inch, 3c. extra per letter.

$\frac{7}{8}$ inch and larger, 2c. extra per letter.

SHARP FACE GOTHIC, REVERSED.

For putting in molds of artificial stone work, etc.

$\frac{7}{16}$ inch, 3 cts.	$1\frac{1}{4}$ inch, 8 cts.	2 inch, 12 cts.
$\frac{3}{4}$ " 6 "	$1\frac{1}{2}$ " 10 "	3 " 15 "

FLATTENED FACE, SHARP GOTHIC STYLE.

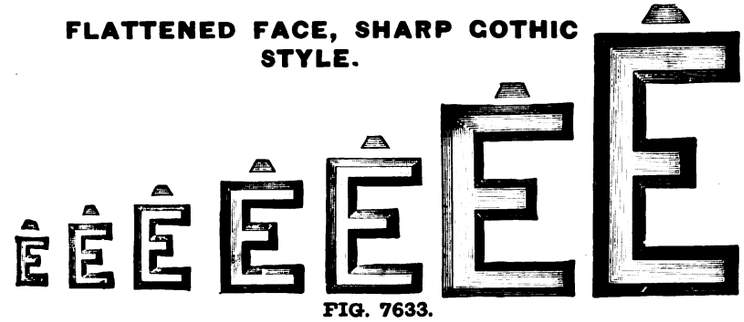


FIG. 7633.

PRICES.

Sizes made, inches	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	1	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	2	3
Prices, each, cents	2	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3	5	6	7	8	10	15

REVERSED GOTHIC AND ROMAN BRAND PATTERNS.



FIG. 7634. FIG. 7635. FIG. 7636.

Fig. 7636 is shown in perspective.

PRICES, EITHER.

Sizes made, inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$
Prices, each, cents	5	5	6	7	7	8

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WHITE METAL RELIEF FIGURES AND PLATES.

WITH TACKS IN BACK.

FIG.  7637.

1 in., 8 cents per figure, with tacks cast in each for fastening.

1¼ inch.....10 cts. each.
1½ " ..... 12 " "
2 " .....15 " "

IMITATION ENGRAVED PLATES.



FIG. 7638.

Price, ⅞ figure.....18 cts. each.

WHITE METAL NUMBERING PLATES, WITH JAPANNED BACKGROUND.

For church pews, state rooms, etc.
No extra charge when numbers run from 1 to 3 figures on a plate consecutively. Please state for what purpose desired.

FIG.  7639.

¼ inch,	10 cts.	½ inch,	12 cts.	Nickel-plated,	⅜ in., 18 cts.
⅜ "	10 "	¾ "	16 "		½ " 20 "
7/16 "	10 "	1 "	20 "		¾ " 24 "
					1 " 28 "

FOUNDRY FACINGS, SANDS, ETC.

Sea coal or bituminous, Lehigh or anthracite, X Mineral, XX " Soapstone, Charcoal,	Prices on application.	German lead, India silver lead, Core wash, Moulding sand, Fire clay and kaolin,	Prices on application.

HARD IRON STARS.



PRICES. FIG. 7653.

Hard iron stars, for rumbling: Small.....per pound, 15 cents. Medium..... " 10 " Large..... " 10 "

Malleable iron end pieces for boards.....25 cents each.

COPPER, BRASS, BRONZE, ETC., FLUXES.

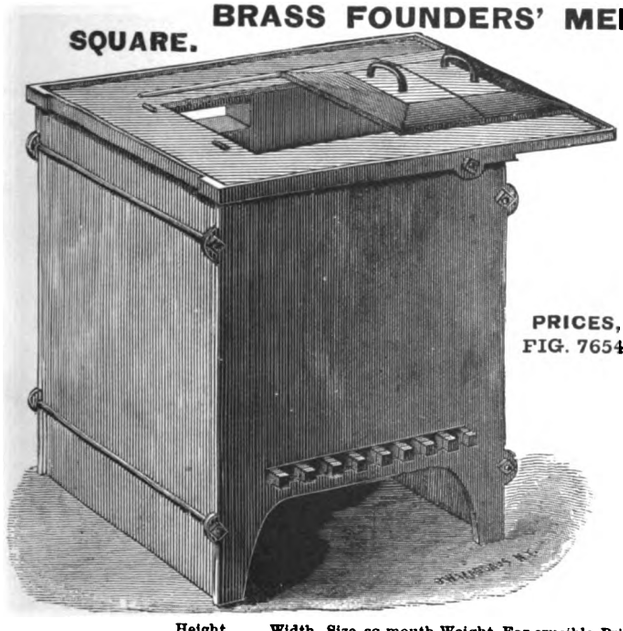
Melters of copper, brass, bronze, German silver, aluminum and alloys will find it a great helper in melting, as the time is lessened considerably. It increases the fluidity of the metal, removes the oxide, and cleanses the metal from dross and impurities. It eliminates the gases, makes the product free from the usual porosity and increases the electrical conductivity. In melting emery dust, buffings or burnt skimmings, results are very satisfactory, the product being clean and the slag free from metal.

Packed only in barrels of 300 pounds and in half-barrels of 150 pounds, in kegs of 100 pounds, and tubs of 50 pounds.

Price, 10 cents per pound less than 200 pounds.
" 8 " " " over 300 lbs.

BRASS FOUNDERS' MELTING FURNACES.

SQUARE.



PRICES, FIG. 7654.

	Height.	Width.	Size, sq. mouth.	Weight.	For crucible.	Prices.
No. 1. Inside measure,	23 in.	14 x 14 in.	9¾ in.	300 lbs.	No. 4.	$30.00
No. 2. " "	23 "	21 x 21 "	12 "	440 "	No. 25.	40.00
No. 3. " "	28 "	25 x 25 "	16 "	600 "	No. 80.	50.00

Complete, with exception of brick lining.

ROUND.

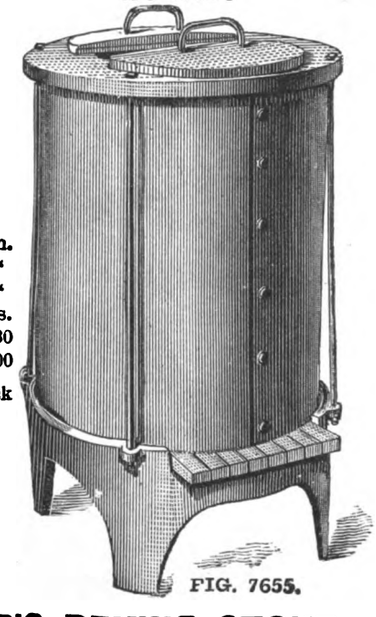


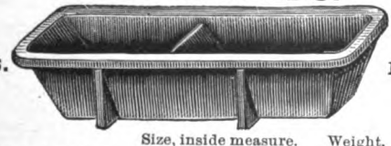
FIG. 7655.

PRICES.

Height	27 in.
Diameter, inside	22 "
Diameter of mouth	13 "
Weight	370 lbs.
For crucible	No. 30
Prices	$45.00

Complete, with exception of black lining.

INGOT MOULDS.

PRICES.  FIG. 7656.

	Size, inside measure.	Weight.	Prices, per lb.
Malleable iron	13 x 3½ x 2½ in.	24 lbs.	9 cents.
" " single mould	7 x 3 x 3 "	15 "	9 "

Plain or with raised letters in bottom.

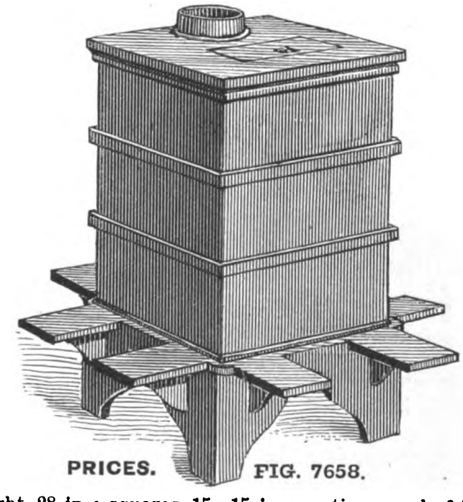
BRASS FOUNDERS' SPILL TROUGH.



PRICES, FIG. 7657.

Height.	Length.	Width.	Weight.	Prices, per lb.
10 in.	74 in.	14 in.	155 lbs.	6 cents.
10 "	74 "	24 "	300 "	6 "

BRASS FOUNDER'S DRYING STOVE.



PRICES. FIG. 7658.

Whole height, 28 in.; squares, 15 x 15 in.; sections, each, 6 in.; flange at bottom, 7 in. In three sections, top and bottom complete. The top fits any section, and the sections fit into each other. This stove makes an excellent cabinet maker's stove. Price, $37.00. Extra sections.....cents lb.

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BLACK LEAD OR PLUMBAGO CRUCIBLES, ETC.

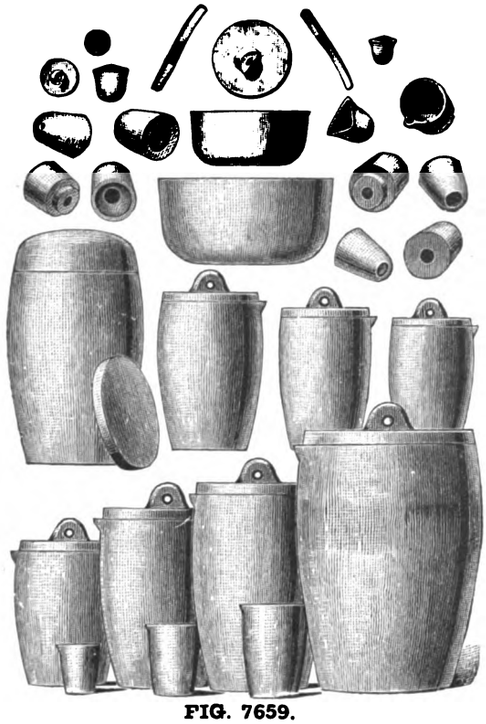


FIG. 7659.

CRUCIBLES OF ALL SIZES AND FOR ALL PURPOSES. BOWLS, DIPPERS, STIRRERS, STOPPERS, NOZZLES, ETC. SPECIAL WORK FROM SKETCH OR PATTERN.

Nos.	Height, outside. Inches.	Diameter at the top, outside. Inches.	Diameter at the bilge, outside. Inches.	Diameter at the bottom, outside. Inches.	Prices.	Holding capacity.
1	3¼	2⅝	2⅝	1⅝	15 cts. each.	
2	4	2⅞	2⅞	1⅞	18 " "	
3	4½	3½	3½	2¼	21 " "	
4	5	4	4	2⅜	24 " "	
5	5½	4⅛	4⅛	2¾	27 " "	
6	5¾	4½	4½	2¾	30 " "	
7	6¼	5	5	3¼	33 " "	
8	6¾	5¼	5¼	3¼	35 " "	Three
9	7½	5⅜	5⅜	3⅜	38 " "	
10	7⅝	6	6⅛	4½	40 " "	
12	8	6½	7⅛	5⅛	45 " "	lbs. of
14	8¼	6¾	7¼	5¼		
16	8¾	7	7⅜	5½		
18	9¾	7½	8	5⅝		molten
20	10¼	7¾	8⅜	6		
25	10½	8¼	9	6¼		
30	11¼	8⅝	9½	6⅝		metal
35	11⅝	9	9¾	7	No. 14	
40	12¼	9½	10½	7¾		
45	12¾	10	10¾	7½	and upwards	per
50	13½	10¼	11¼	7¾		
60	14	10½	11¾	8	3½ cents	
70	14½	10¾	12	8¼		number.
80	15½	11⅛	12⅜	8⅝	per No.	
90	15⅞	11½	12½	9		
100	16¼	11¾	12¾	9¼		
125	16½	12¼	13½	9½		
150	18¼	13	14¾	10⅜		
200	20	14¼	16	10¾		
300	21	15¼	17	11½		
CRUCIBLES FOR FILE TEMPERING.						
60	17¼	9	9¼	8	3½ cents per No.	
70	20½	9	9¼	8		
80	22¼	9	9¼	8		

MORTAR AND PESTLE.



FIG. 7660.

No.	Capacity. Gallons.	Diameter over top. Inches.	Depth inside. Inches.	Prices.
8	1	9½	9	$6.75
9	2	11½	8¼	8.25
10	3½	13	12	16.50

PRICES OF COVERS.

No. 1	10 cents each.
No. 2	10 " "
No. 3	10 " "
No. 4	10 " "
No. 5	10 " "
No. 6	15 " "
No. 7	15 " "
No. 8	15 " "
No. 9	15 " "
No. 10	15 " "
No. 12	18 " "
No. 14	18 " "
No. 16	18 " "
No. 18 and upward	1 cent per No.

Besides the above sizes of crucibles and covers, we carry an assortment of coloring bowls, spelter basins, stirrers, and other melters' implements.

BRASS MOULDERS' FLASKS AND FOUNDERS' SUPPLIES.

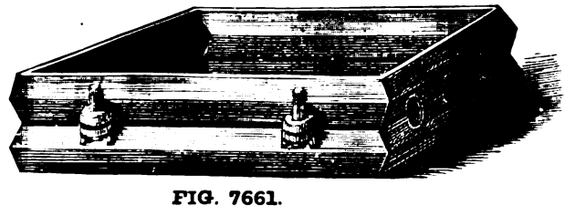


FIG. 7661.

These flasks are drilled with "Standard templets," bringing the holes the same in each flask, avoiding the necessity of matching, making them interchangeable.

The faces are all accurately planed and faced, the pins turned true, and bolted to the ears with nuts, which can be easily replaced when required.

DESCRIPTION, FIG. 7661.

The flasks are sold by inside measurements, and in ordering state measurements of width, length and depth. Smallest, 6 x 36 x 4½ or 5, 7 x 24 x 5 or 5½, 8 x 20 to 40 x 5 or 6, 9 x 12 to 26½ x 3½ to 7¼, 10 x 12 to 42 x 3½ to 8, 11 x 14 to 17 x 3 to 8, 12 x 12 to 38 x 4 to 14, 12½ x 18 to 22 x 4 to 12, 13 x 16 to 24 x 4 to 8, 14 x 14 to 42 x 4 to 10, 14½ x 19 x 5, 15 x 18 to 54 x 4½ to 8, 15½ x 20 x 5, 16 x 16 to 30 x 5 to 12, 18 x 18 to 39 x 4 to 8, 21 x 25 x 7, 22 x 30 to 42 x 4½ and 5, 23 x 27 and 42 x 10, 24 x 24 and 48 x 6 and 6½.

We also make a full line of straight side flasks, small jewelers' flasks and wood moulding boards, with hard wood end pieces tongued and grooved.

PRICES AND FURTHER DETAILS ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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FOLDING SNAP FLASKS.

FOLDED FOR SHIPMENT OR FOR STORING.

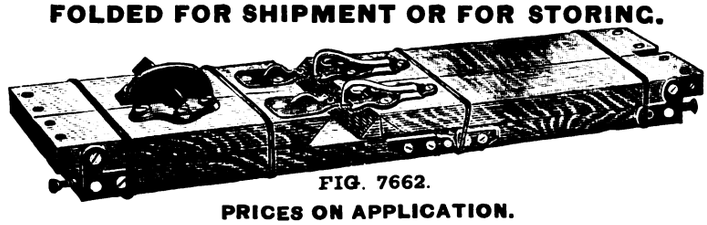


FIG. 7662.

PRICES ON APPLICATION.

READY FOR USE.

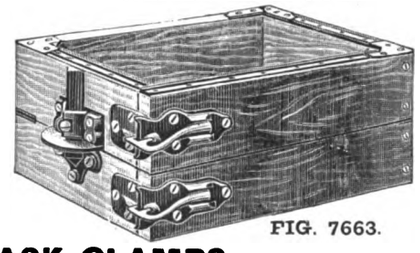


FIG. 7663.

These flasks are put together by interchangeable templates. A small piece of steel is inserted around top and bottom to prevent wear.

They are made of maple or beech, one inch thick, and are neatly varnished and are put up in sizes to suit.

PRICES, FIG. 7664.

¼ in. per doz. pairs	$0.60
⅝ in. " " "	.80
⅜ in. " " "	1.00
½ in. " " "	1.20
⅝ in. " " "	1.40
¾ in. " " "	1.60
⅞ in. " " "	1.80
1 in. " " "	2.00

MALLEABLE IRON DOWEL PINS.



FIG. 7664.

Pins and holes finished to fit.

FLASK CLAMPS.

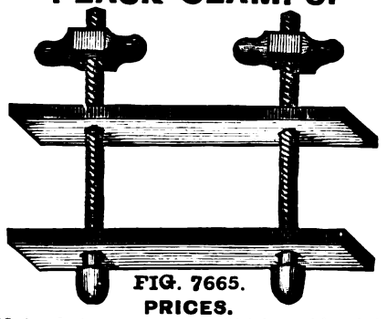


FIG. 7665.

PRICES.

	Per doz.
No. 0. Bars 12 in. between screws, 2½ in. wide, 1 in. thick; screws 15 in. under head, 1 inch diameter; nuts 6 in. long	$12.00
No. 1. Bars 16 in. between screws, 2¾ in. wide, 1¼ in. thick; screws 16 in. under head, 1¼ in. diameter; nuts 6 in. long	15.00
No. 2. Bars 16¾ in. between screws, 2¾ in. wide, 1⅜ in. thick; screws 16 in. under head, 1½ in. diameter; nuts 8½ in. long,	23.00
No. 3. Bars 18 in. between screws, 2¾ in. wide, 1⅜ in. thick; screws 16 in. under head, 1½ in. diameter; nuts 8½ in. long,	23.00

ADJUSTABLE FLASK PINS.

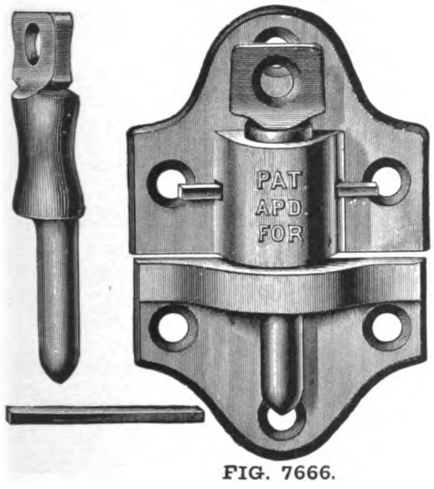


FIG. 7666.

PRICES.

No. 1.	For small flasks	40 cts. per pin.
No. 2.	For medium flasks	45 " " "
No. 3.	For large flasks	50 " " "

CORE BOX CLAMPS, NO. 1.

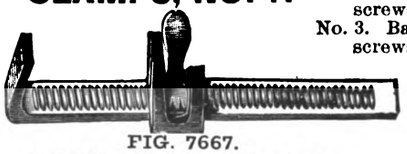


FIG. 7667.

PRICES, EACH, NO. 1, $5.00.

CORE BOX CLAMP, NOS. 2 AND 3.



FIG. 7668.

PRICES, No. 2, $7.00. No. 3, $13.00 each.

ADJUSTABLE FLASK CLAMPS.



FIG. 7669.

TO UNLOCK CLAMP.

HARD WOOD WEDGES.

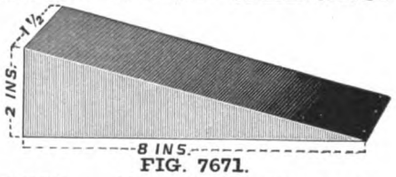


FIG. 7671.

PRICE, per bbl. of 250, 1 CENT EACH.

ADJUSTABLE FLASK CLAMPS.



FIG. 7669.

One dozen of these clamps will take the place of five dozen of the old style clamps.

PRICES, FIG. 7669. COMPLETE.

No. clamp.	No. head.	Adjustment.	Per doz.
5	1	From 6 to 10 in.	$3.40
6	1	" 10 to 14 in.	3.70
7	1	" 14 to 18 in.	3.80
8	1	" 18 to 22 in.	4.00
9	2	" 7 to 12 in.	5.00
10	2	" 12 to 17 in.	5.40
11	2	" 17 to 22 in.	5.80
12	2	" 22 to 27 in.	6.10
13	3	" 8 to 14 in.	6.75
14	3	" 14 to 20 in.	7.25
15	3	" 20 to 26 in.	7.80
16	3	" 26 to 32 in.	8.50

Special lengths made to order.

The above list gives the adjustment without coming through the head, although they will adjust from the smallest figures to the extreme length.

HOLLOW PIN AND ADJUSTABLE SOCKET.

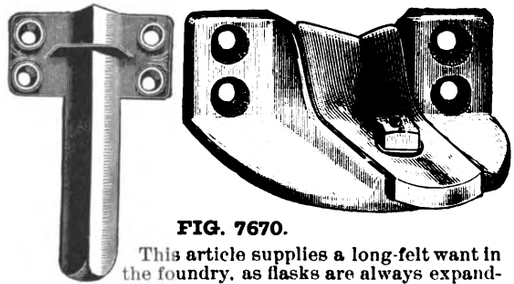


FIG. 7670.

This article supplies a long-felt want in the foundry, as flasks are always expanding, contracting, or wearing, thus working either too tight or too loose, and causing bad results. The Diamond socket can be adjusted in one minute to perfection. No packing up with paper, or driving in of nails.

PRICE, per doz., with screws, **$3.00.**

PRICES, HEADS ONLY, FIG. 7669.

No. 1 head	Per doz., $2.10
No. 2 "	" 3.00
No. 3 "	" 3.75

The heads are made of good malleable iron, with hardened balls, and the tails of standard square bar iron, in three sizes, viz., ⅝, ¾ and ⅞. We sell the heads by the dozen, or the clamps complete.

These clamps can be adjusted to suit any flask in an instant. Requiring no wedges.

SNAP FLASK HINGES, TOP AND OUTSIDE.

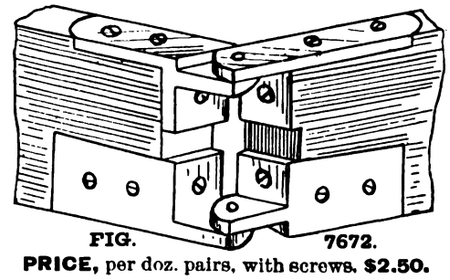


FIG. 7672.

PRICE, per doz. pairs, with screws, **$2.50.**

PLAIN OR MORTISED FLASK LATCHES.



FIG. 7672 1-2. SHOWS IT PLAIN.

PRICE, per doz., with screws, **$5.00.**

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STAMPING LETTERS, FIGURES AND BRANDS.

STEEL STAMPING LETTERS, ALPHABET.

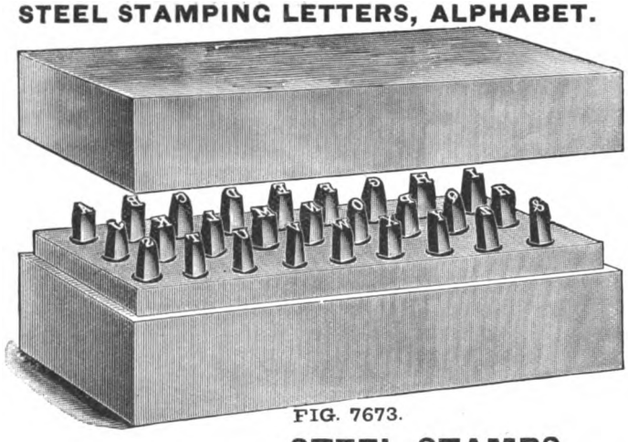


FIG. 7673.

PRICES.

Size, inches.	Set of 26 letters. Fig. 7673.	Set of 9 figures. Fig. 7674.
1/16	$2.70	$0.90
3/32	2.70	.90
1/8	2.70	.90
3/16	4.05	1.35
1/4	5.40	1.80
5/16	6.75	2.25
3/8	8.10	2.70
7/16	9.45	3.15
1/2	10.80	3.60
5/8	13.50	4.50
3/4	16.20	5.40

Die figures and letters double price of above.

STEEL FIGURES.



FIG. 7674.

STEEL STAMPS.

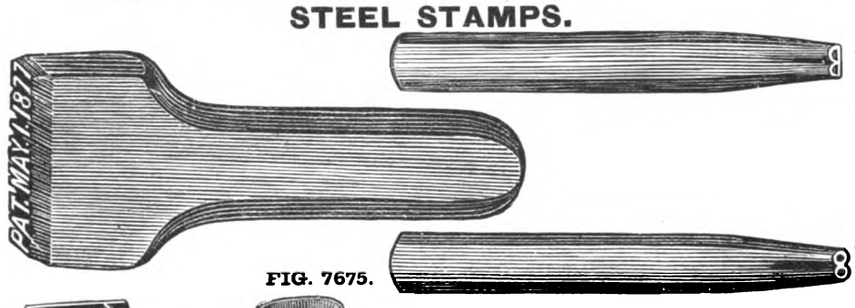


FIG. 7675.

Fig. 7675 is used for stamping leather, wood, tools and metals of all kinds. In ordering, state material you are going to stamp on, as we make different cuttings and temperings for different materials.

PRICES.

1/16 to 1/8 inch per letter or figure.....each, $0.15
3/16 " " " ..... " .20
1/4 " " " ..... " .30
5/16 " " " ..... " .35
3/8 " " " ..... " .40

On stamps less than five letters count price of one letter extra.

CAST IRON LETTERS AND FIGURES.

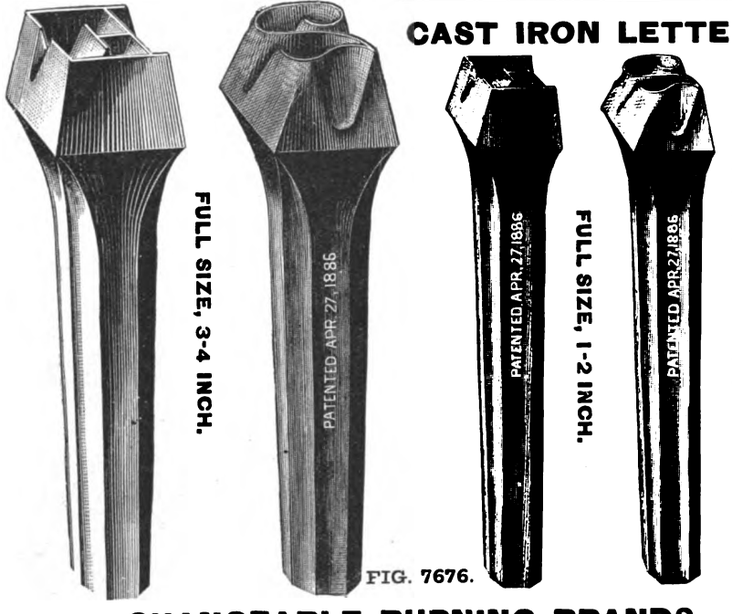


FIG. 7676.

For marking wood, soft metals, leather goods, etc., they are fully equal to steel, and at about one-third the price. May also be used for burning names and figures on wood and other substances.

PRICES, FIG. 7676.

1/2 inch, full set letters, 27 pieces.....per set, $6.00
1/2 ". " figures, 9 " ..... " 2.00
3/4 " " letters, 27 " ..... " 10.00
3/4 " " figures, 9 " ..... " 3.50

Packed, one set in a wooden box.

PRICES, FIG. 7677.

1/4 inch holders for from 1 to 10 letters.....each, $1.00
1/2 " " " 1 to 12 " ..... " 1.00
1/4 inch letters fitted in holder ready for use..... " .06
1/2 " " " " " ..... " .10

Periods and commas will be charged 1/2 price of letters when there are an unusual number in a brand.

SOLID BURNING BRANDS.

These are cast in one piece of solid metal, and the letters are cut much deeper and sharper, and are in every way more desirable and durable than Fig. 7677.

PRICES.

1/4, 3/8 and 1/2 inch, 5 letters or less.....$1.50 Extra letters, $0.30 each.
3/4 inch, 3 letters or less..... 1.50 " " .45 "
1 " 3 " " ..... 2.25 " " .60 "

CHANGEABLE BURNING BRANDS.

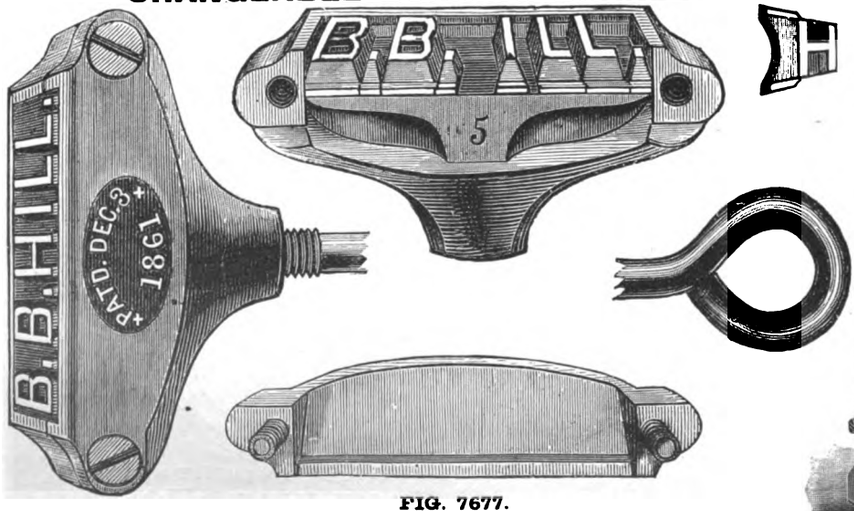


FIG. 7677.

NUMBERING MACHINES.



FIG. 7678.

STYLES OF FIGURES.

STYLE A. 12345 STYLE E. 12345 STYLE F. 12345

STYLE G. 12345

For printing numbers, operates consecutively, duplicates and repeats.

Figure disks change automatically and are self-inking.

The changing from consecutive to duplicate and continuous numbering is effected by the mere moving of the pointer in front of the dial.

PRICES, NUMBERING FROM.

4 wheels 1 to 9,999.....$14.00
5 " 1 to 99,999..... 16.00
6 " 1 to 999,999..... 18.00
7 " 1 to 9,999,999..... 20.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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HAND STAMPS AND STENCILS.

PRICES, FIG. 7680.

4-wheel machines, will number from	1	to	10,000		$10.00
5-wheel " " " "	1	to	100,000		12.00
6-wheel " " " "	1	to	1,000,000		14.00
7-wheel " " " "	1	to	10,000,000		18.00

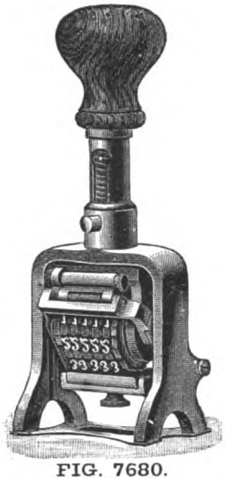
This machine can be furnished with wheels having any 10 letters of the alphabet, or 10 characters, or with the abbreviation "No." on. If with letters or characters, $3.00 extra per wheel; if with abbreviation "No.," $2.00 extra per wheel. Letters or characters can be on wheels to come before or after the figures at above prices.

AUTOMATIC NUMBERING MACHINE.

Sizes of Figures.

Style C, 1234567890
" D, 1234567890
" E, 1234567890
" F, 1234567890
" G, 1234567890
" FF, 1234567890

FIG. 7679.



Marks consecutive automatically; duplicates automatically; repeats any number desired indefinitely.

FIG. 7680.

THE AMERICAN DATER.

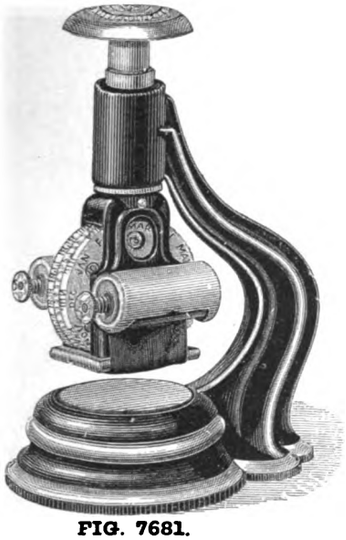


FIG. 7681.
PRICE, $6.00.

NO. 1 RAILROAD TICKET STAMP.

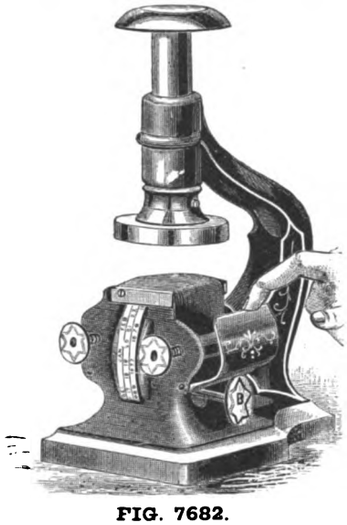


FIG. 7682.
PRICE, $7.00.

THE CENTENNIAL TICKET STAMP.

These stamps have an engraved dial, and each is furnished with an ink ribbon.

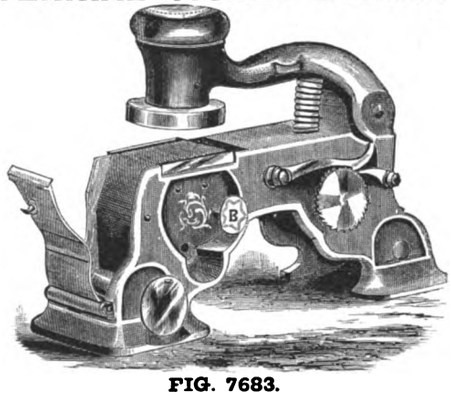


FIG. 7683.
PRICE, $8.00.

BRASS ALPHABETS AND FIGURES.



FIG. 7684.

MACHINE CUT BRASS ALPHABETS AND FIGURES.

PRICES, ALPHABETS.		PRICES, FIGURES.	
¼ inch	per set, $0.40	¼ inch	per set, $0.24
⅜ "	" .40	⅜ "	" .24
½ "	" .40	½ "	" .24
¾ "	" .50	¾ "	" .26
1 "	" .50	1 "	" .26
1¼ "	" .70	1¼ "	" .34
1½ "	" .80	1½ "	" .40
1¾ "	" 1.00	1¾ "	" .50
2 "	" 1.00	2 "	" .50
2½ "	" 1.60	2½ "	" .80
1½ " lower case,	" .80		

HAND CUT BRASS ALPHABETS AND FIGURES.

PRICES, ALPHABETS.		PRICES, FIGURES.	
3 inch	per set, $3.00	3 inch	per set, $1.00
3½ "	" 4.50	4½ "	" 1.50
4 "	" 5.25	4 "	" 1.75
4½ "	" 6.00	4½ "	" 2.00
5 "	" 6.75	5 "	" 2.25
6 "	" 9.00	6 "	" 3.00
7 "	" 12.00	7 "	" 4.00
8 "	" 15.00	8 "	" 5.00

DESCRIPTION, FIG. 7685.

Each box contains stencil alphabet and figures, ink and brush for marking boxes, barrels, bags and packages for shipment; printing all manner of show cards, notices, signs, numbers, prices, etc., and many other purposes.

STENCIL COMBINATION.



FIG. 7685.

PRICES, FIG. 7686.

ALPHABET, WITH FIGURES.

⅛ inch	$1.25	¾ inch	$1.50
¼ "	1.25	⅞ "	1.75
⅜ "	1.25	1 "	2.00
½ "	1.25	1¼ "	2.50
⅝ "	1.50		

WITHOUT FIGURES.

1½ inch	$2.00	2 inch	$3.00

FIGURES ONLY.

⅛, ¼, ⅜ in.	$0.60	2 inch	$1.50
½, ⅝ "	.70	2½ "	1.75
¾, ⅞, 1 "	.80	3 "	2.00
1¼ inch	1.00	3½ "	2.25
1½ "	1.25	4 "	2.50

PRICES.

½ inch size	$0.80
¾ " "	.90
1 " "	.90
1¼ " "	1.25
1½ " "	1.40
1¾ " "	1.65
2 " "	1.65
2½ " "	2.50
1½ " " with lower case	2.20

CIRCULAR ALPHABET AND FIGURES.

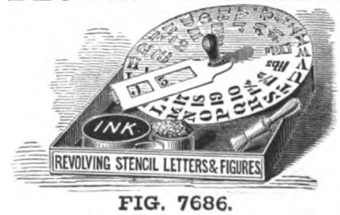


FIG. 7686.

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STENCILS AND BRASS CHECKS.

ADJUSTABLE STENCIL.

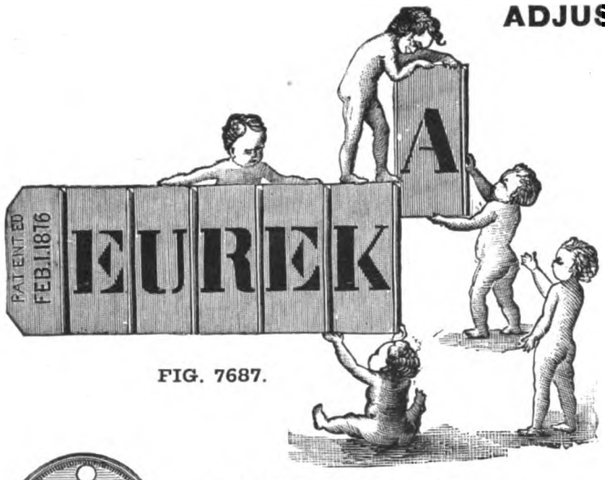


FIG. 7687.

The improvement consists in a beaded lock on the edge of the letters, so that they can be joined together, thereby enabling you to form any word, name or address, and, after being used for that purpose, they can be distributed and formed again for another address, and so on continually, while a common stencil plate can only be used for one certain brand.

By having a font of these stencils, you can address packages, make signs, show cards, etc., etc. The letters, when joined, are perfectly level on the under side, and are accurately spaced, so that when an impression is taken the print is perfect.

Alphabets contain 27 letters, beginner, ender, period, apostrophe, comma and blank.

PRICES OF ALPHABETS.

		PRICES.	
½	inch	Per set,	$0.80
⅝	"	"	.90
1	"	"	1.00
1½	"	"	1.25
2	"	"	1.75
2½	"	"	2.50

Figures contain, 1 to 0, $ mark, cent mark, period, beginner and ender.

PRICES OF FIGURES, 15 PIECES.

		PRICES.	
½	inch, 15 pieces	Per set,	$0.35
⅝	" "	"	.40
1	" "	"	.45
1½	" "	"	.55
2	" "	"	.80
2½	" "	"	1.15

PRICES, FONTS, BOXED WITH INK AND BRUSH.

	2 A, 55 PIECES.	3 A, 70 PIECES.	5 A, 100 PIECES.
½ inch	Per font, $1.55	Per font, $1.95	Per font, $2.65
⅝ "	" 1.75	" 2.15	" 2.95
1 "	" 1.90	" 2.35	" 3.25
1½ "	" 2.30	" 2.85	" 4.00

BRASS CHECKS.

IN QUANTITIES ONLY.



FIG. 7688.
$0.80


FIG. 7689.
$0.80

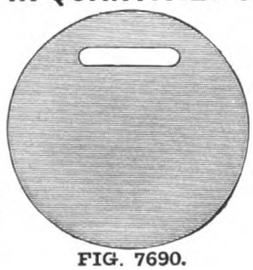
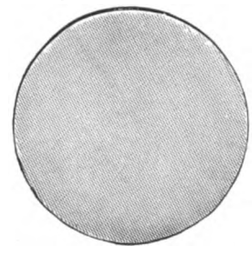

FIG. 7690.
$0.75

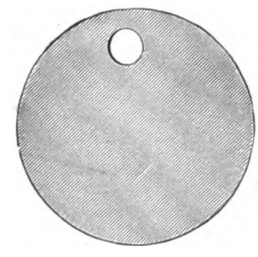

FIG. 7691.
$0.90 per lb.

BRASS CHECKS.

NOS. 9, 10, 13, 18, 19, 23 AND 24.



NOS. 16 AND 17.



NOS. 2, 15, 22 AND 25.

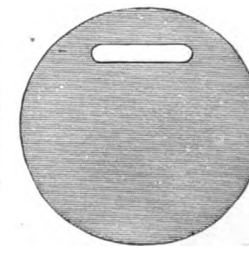
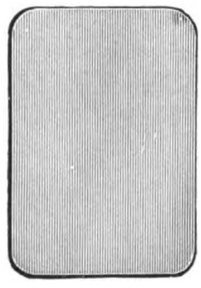
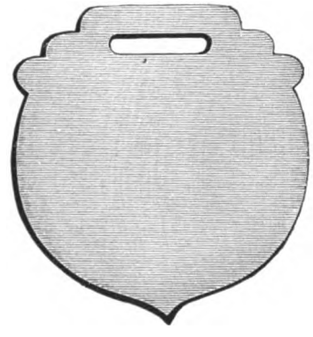


FIG. 7692.

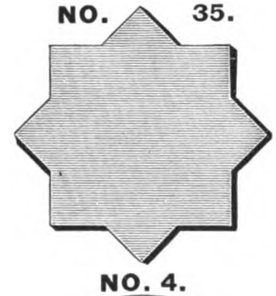
NO. 36.



NO. 5.



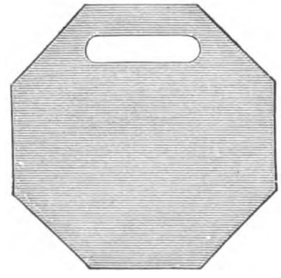
NO. 35.



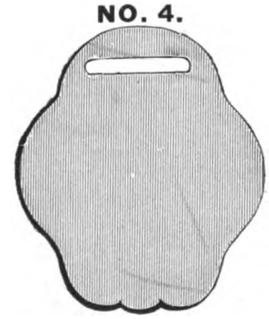
NO. 14.



NO. 27.



NO. 4.



NO. 6.



NO. 3.



NO. 7.



ALL BRASS CHECKS, NOS. 2 TO 36, ARE FIG. 7692.

PRICES, FIG. 7692. 2 TO 36.

No. 2	per 100,	$1.20
No. 3	"	1.20
No. 4	"	1.50
No. 5	"	2.00
No. 6	"	2.00
No. 7	"	2.00
No. 8	"	.75
No. 9	"	.50
No. 10	"	.60
No. 11	"	.90
No. 12	"	.90
No. 13	"	1.00
No. 14	"	1.00
No. 15	"	1.00
No. 16	"	1.00
No. 17	"	1.20
No. 18	"	.75
No. 19	"	1.20
No. 20	"	.75
No. 21	"	1.50
No. 22	"	2.00
No. 23	"	2.00
No. 24	"	1.50
No. 25	"	1.50
No. 27	"	1.50
No. 35	"	1.20
No. 36	"	1.50

Please observe that the above prices are for checks and plates not numbered or lettered; the price for numbering, in addition to price of checks, will be:

Any style check, with figures not exceeding ⅜ inch	per 100,	$1.00
Any style check, with figures not exceeding ½ or ⅝ inch	"	2.00

Checks lettered at the rate of ½ cent per letter. When large quantities are required, special estimates will be given.

BAGGAGE STRAPS.

Per hundred.....$3.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BROOMS.

PRICES, FIG. 7693. NO HANDLES.

RATTAN.

12	inch,	4	rows,	per doz	$4.50
14	"	4	"	"	5.00
14	"	5	"	"	5.50
14	"	6	"	"	6.00
16	"	4	"	"	5.50
16	"	5	"	"	6.00
16	"	6	"	"	6.50
14	"	4	"	extra full, with wire staples	5.50
16	"	4	"	" " " " "	6.00
16	"	4	"	Boston style, round back	6.00
16	"	4	"	Corporation	8.50

PITCH SET RATTAN.

12	inch,	4	rows,	square back, per doz	$4.50
14	"	4	"	" " "	5.00
16	"	4	"	" " "	5.50

Round backs, 50 cents per doz. extra.

COIR OR BASS.

12	inch,	4	rows	$5.00	
14	"	4	"	5.50	
16	inch,	4	rows		$6.00
9	"		pavement		4.00

STEEL.

12	inch,	4	rows, per doz	$4.00	
14	"	4	" "	5.00	
16	"	4	" "	6.00	
12	inch,	6	rows, per doz		$6.00
14	"	6	" "		7.00
16	"	6	" "		8.00

Long handles, 35 cents per doz. extra.

UPRIGHT STEEL.



PRICES, FIG. 7694.

10 inch, 4 rows, per doz....$6.00 12 inch, 4 rows, per doz....$6.00

PUSH BROOMS.

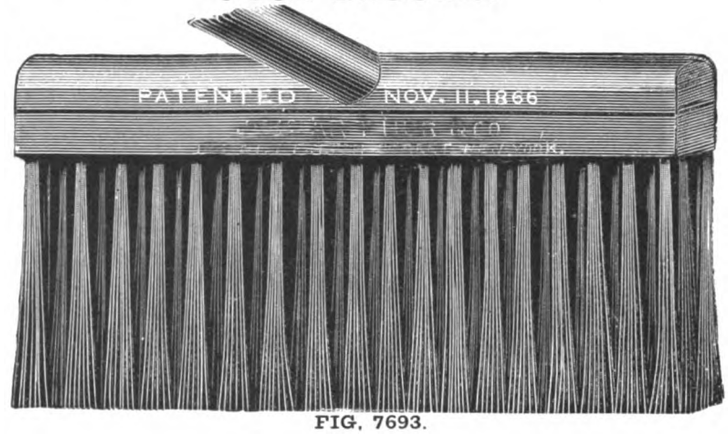


FIG. 7693.

UPRIGHT OR BARN.



FIG. 7695.

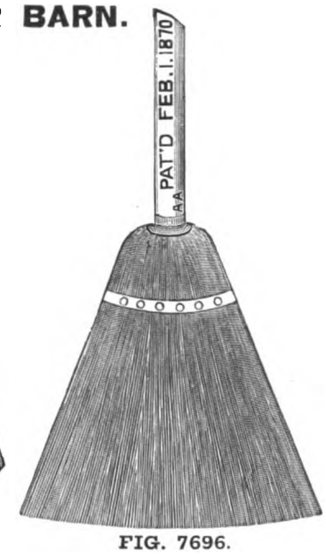


FIG. 7696.

PRICES.

A,	Patent upright, handles included,					Fig. 7696	$5.50
AA,	"	"	"	"	"	7696	6.00
AAX,	"	"	"	"	"	7696	6.50
Alden					"	7695	6.00

IRON BOUND STEEL-WIRE MILL BROOM.



FIG. 7697.

Price, per doz.....$13.50

TWO HANDLE STEEL-WIRE MILL BROOM.

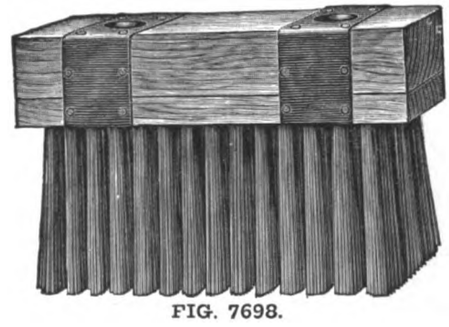


FIG. 7698.

Price, per doz.....$12.00

MACHINE SHOP.

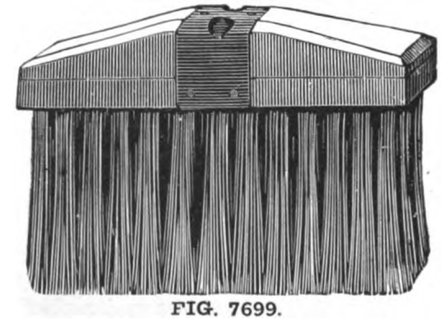


FIG. 7699.

Used extensively for stables, rolling mills, machine shops, blacksmith shops, yards, etc. Made of steel-wire splints.

PRICES, FIG. 7699.

Block,	12	inches	long, per doz	$10.00
"	14	"	" "	12.00
"	16	"	" "	14.00

STEEL WIRE RAILROAD SWITCH BROOM.

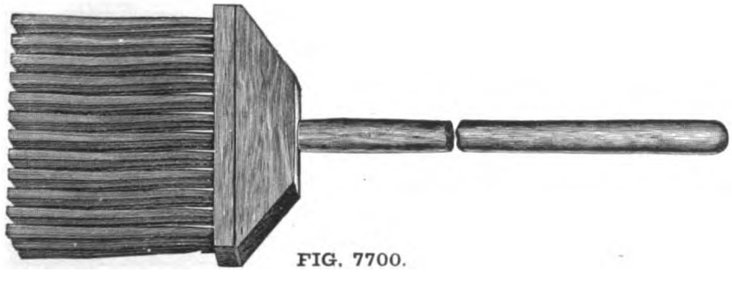


FIG. 7700.

PRICES, FIG. 7700.

A very serviceable and handy broom for sweeping dirt from frogs and switches.

Price, per doz.....$14.00

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TRACK, BENCH AND FLOOR BRUSHES.

STEEL WIRE TRACK BRUSH.



FIG. 7701.

PRICE, PER DOZEN, $16.00.

STREET CAR STEEL WIRE BRUSH.

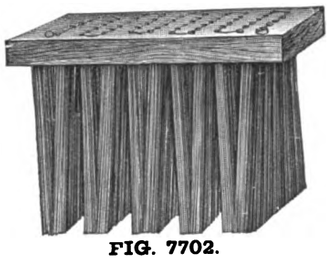


FIG. 7702.

PRICE, PER DOZEN, $10.00.

BENCH DUSTERS.

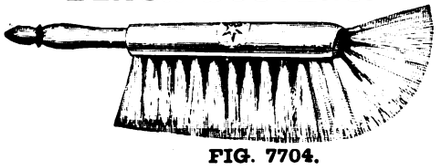


FIG. 7704.

PRICES.

QUALITY A-H.

ALL BRISTLES, WHITE AND GRAY. POLISHED BLOCK.

No. 1.	Per dozen	$4.10	No. 3.	Per dozen	$5.60
No. 2.	"	4.66	No. 4.	"	6.10

QUALITY A.

ALL BRISTLES, GRAY MIDDLE, CASED WITH WHITE. POLISHED BLOCK.

No. 1.	Per dozen	$4.66	No. 3.	Per dozen	$6.00
No. 2.	"	5.00	No. 4.	"	6.66

QUALITY B-W.

ALL BRISTLES, WHITE AND GRAY, LONGER THAN A. POLISHED BLOCK.

No. 1.	Per dozen	$6.66	No. 3.	Per dozen	$9.50
No. 2.	"	7.76	No. 4.	"	10.25

QUALITY B-B.

ALL BRISTLES, WHITE AND GRAY. POLISHED BOSTON BLOCK.

No. 21.	Per dozen	$6.25	No. 23.	Per dozen	$8.00
No. 22.	"	7.12	No. 24.	"	8.60

QUALITY M.

ALL BRISTLES, WHITE AND GRAY. ORNAMENTED BOSTON BLOCK.

No. 31.	Per dozen	$7.70	No. 33.	Per dozen	$9.70
No. 32.	"	8.88			

ROUND END BENCH DUSTERS.

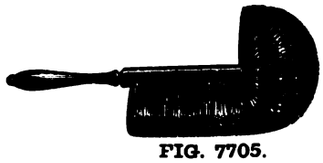


FIG. 7705.

PRICES.

QUALITY C-X.

MADE OF ALL GRAY BRISTLES, ON POLISHED BLOCK.

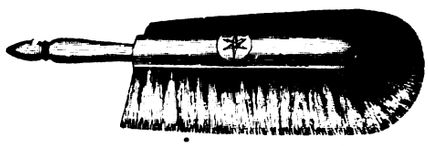
No. 1.	Per dozen	$10.00	No. 3.	Per dozen	$16.30
No. 2.	"	13.30			

QUALITY C.

MADE OF WHITE BRISTLES, ON POLISHED BLOCKS, SAME STYLE AS C-X.

No. 00.	Per dozen	$7.70	No. 2.	Per dozen	$15.88
No. 0.	"	8.60	No. 3.	"	18.50
No. 1.	"	12.00			

BENCH DUSTERS.



PRICES, FIG. 7703.

QUALITY D-C.

ALL GRAY BRISTLES. POLISHED BOSTON BLOCK.

No. 11.	Per dozen	$8.40	No. 13.	Per dozen	$11.66
No. 12.	"	9.60	No. 14.	"	13.70

QUALITY C-X.

ALL BRISTLES, EXTRA HEAVY, GRAY MIDDLE, CASED WITH WHITE. POLISHED BLOCK.

No. 4.	Per dozen	$8.44	No. 7.	Per dozen	$12.50
No. 5.	"	10.12	No. 8.	"	13.88
No. 6.	"	11.50			

FLOOR BRUSHES.

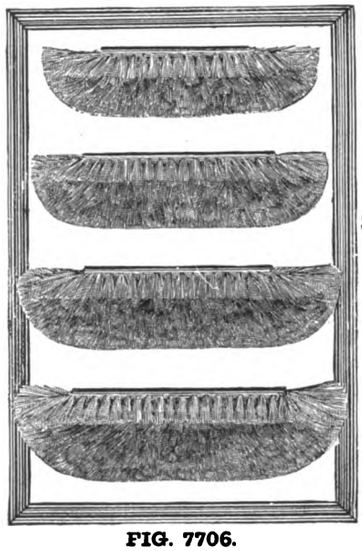


FIG. 7706.

PRICES, FIG. 7706.

"EXTRA."

WHITE OUTSIDE, GRAY CENTER, VERY FULL.

			Per dozen.
No. 4.	Wood,	12 in.	$10.00
No. 6.	"	13 "	12.00
No. 8.	"	14 "	16.00
No. 10.	"	14 "	20.00

SUPERIOR SWEEPING BRUSHES.

FOR RAILROAD CARS, PUBLIC BUILDINGS, ETC.

Made of selected Russia bristles, and warranted to be the most durable brush made.

No.	In.	Gray bristles, wood, per doz.	Black bristles, wood, per doz.
14	14	$24.00	$27.00
16	16	34.00	37.00
18	18	44.00	47.00

COMBINATION TOGGLE-JOINT SCRUB-BINC BRUSH.



FIG. 7707.

The operator may retain an upright position and the brush remain flat on the floor. It is admirably adapted for use in large halls, entry-ways, railroad depots, cars, etc.—in short, in any place where wood or tiled floors are to be cleaned.

PRICE, PER DOZEN, $18.00.

COPPER FASTENED RAILWAY CAR WASHERS.

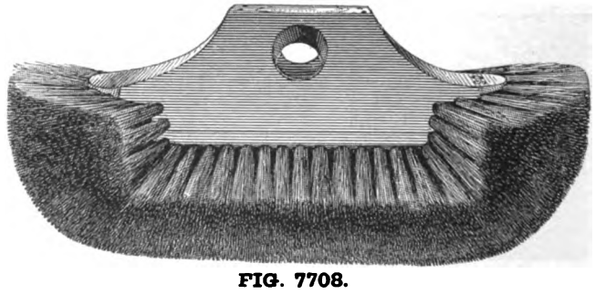


FIG. 7708.

PRICES.

No. 80.	Per dozen	$13.75	No. 90.	Per dozen	$17.00
No. 95.	"	15.75	No. 100.	"	20.00
Extra	"	16.25			

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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RAILROAD CAR WASHER.



FIG. 7709.

McLAUGHLIN'S RAILROAD CAR WASHER.

The improvement, patented, consists of a grooved block or stock, in which the bristles are inserted; and in this groove is placed, by its own elasticity, an endless ring or band of vulcanized rubber, presenting at all times an angular projection of the smallest possible surface, which, when in contact with any object, will equal no more than the thirty-second of an inch, and always elastic. Made of best bristles, copper-fastened, and warranted waterproof.

PRICES, FIG. 7709.

No. 4	per doz.,	$12.00
No. 3	"	17.00
No. 2	"	22.00
No. 1	"	29.00
No. 1, extra	"	36.00

FOUNTAIN CAR WASHER.



FIG. 7710.

DESCRIPTION, FIG. 7710.

Fig. 7710 can be placed on the end of a hose. The brushes are made of the best material, and put together in a strong and durable manner. They are complete, with stop cock and coupling to ¾in. hose—female end.

PRICE, $48.00 PER DOZ.

STOVE OR STEAM SAND DRYER.

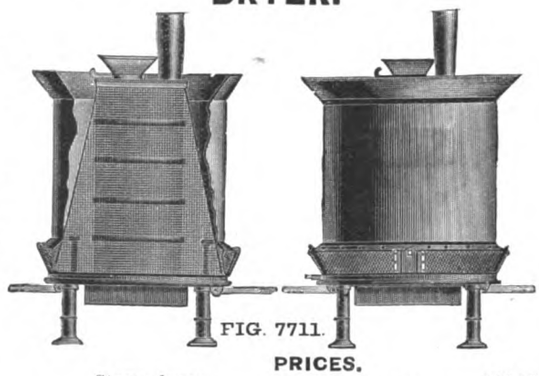


FIG. 7711.

DESCRIPTION, FIG. 7711.

Around the stove or steam coil there is a netting securely supported, and through this the sand falls as it dries, and the stones or other screenings pass to a separate compartment, where they cannot clog the dryer. The air space around the stove formed by the netting permits free escape of all moisture or vapors.

PRICES.

Stove dryer	$80.00
Steam dryer	110.00

SURVEYORS' TRANSITS.

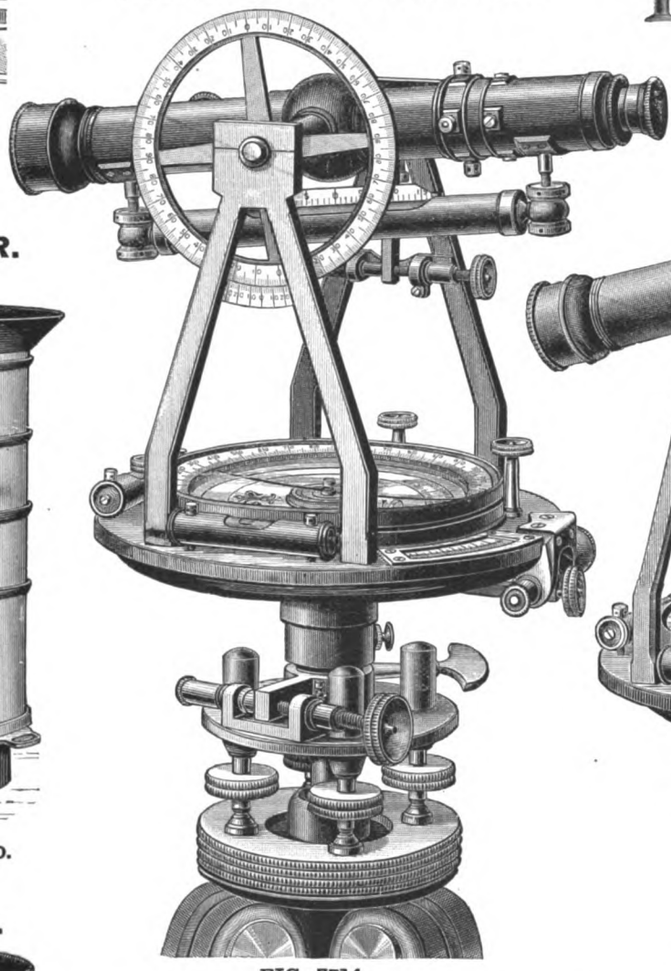


FIG. 7714.

ENGINEERS' TRANSITS.

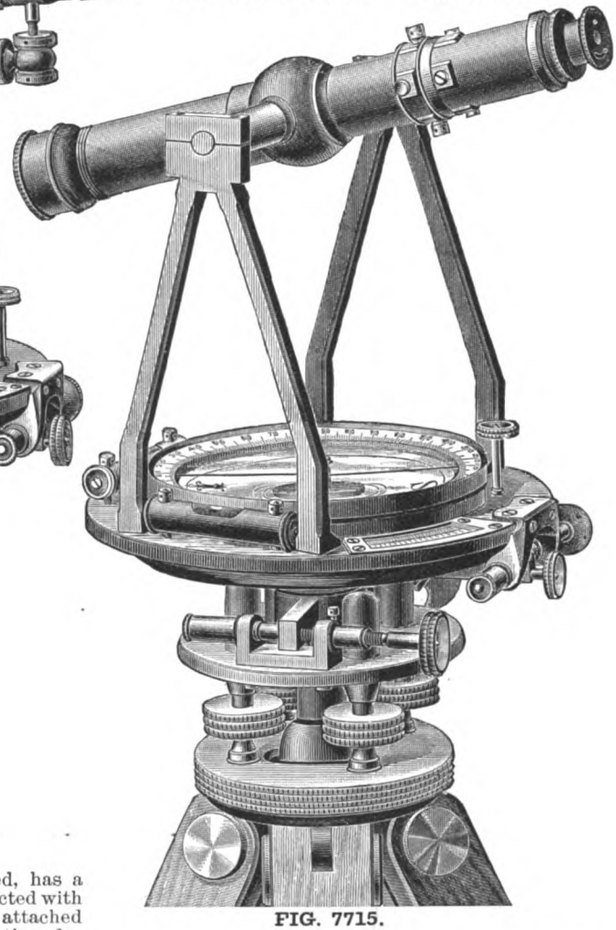


FIG. 7715.

CHAMPION SAND DRYER.

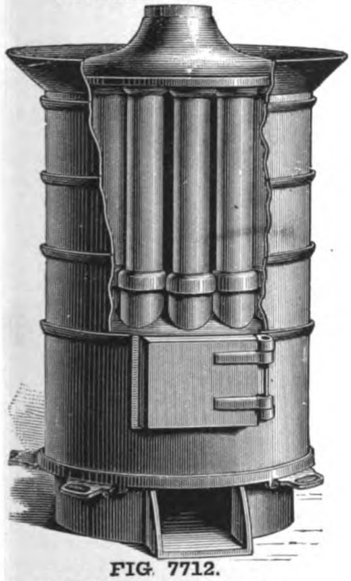


FIG. 7712.

PRICES, EACH, $90.00.

PERFECT SAND DRYER.



FIG. 7713.

Prices, No. 1, each.....$75.00
" No. 2, " 45.00

DESCRIPTION, FIG. 7714.

The surveyor's transit, as above illustrated, has a telescope from ten to twelve inches long, constructed with the finest lenses; under the telescope a level is attached for taking such levels as may occur in the practice of a surveyor. On one end of the axis of the telescope a divided circle, 4½ inches diameter, is attached for reading to minutes angles of elevation and depression. The rim of the compass box is divided to ½ degrees, and is provided with a nonius for adding and subtracting the magnetic variations of the needle. The limb on the divided circle outside the compass box is provided with two verniers at right angles to the telescope and read to minutes. The tripod head is arranged with shifting center, for setting the instruments quickly over a given point without the trouble of altering the position of the legs. The tripod legs are made of very strong mahogany.

DESCRIPTION, FIG. 7715.

The description given for Fig. 7714 for the surveyor's transit will apply for the engineer's transit, excepting that the latter has the axis or center running from the lower parallel plate of the tripod head to the center plate of the instruments, thus securing greater accuracy for laying of angles. The upper part of the transit does not separate from the tripod head, as in the surveying transit, but is permanently attached to the parallel plates and leveling screws, and when put in its box is unscrewed from the tripod at the lower parallel plate.

FOR PRICES, SEE NEXT PAGE.

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SURVEYORS' LEVELS AND COMPASSES.

ENGINEERS' LEVELS.

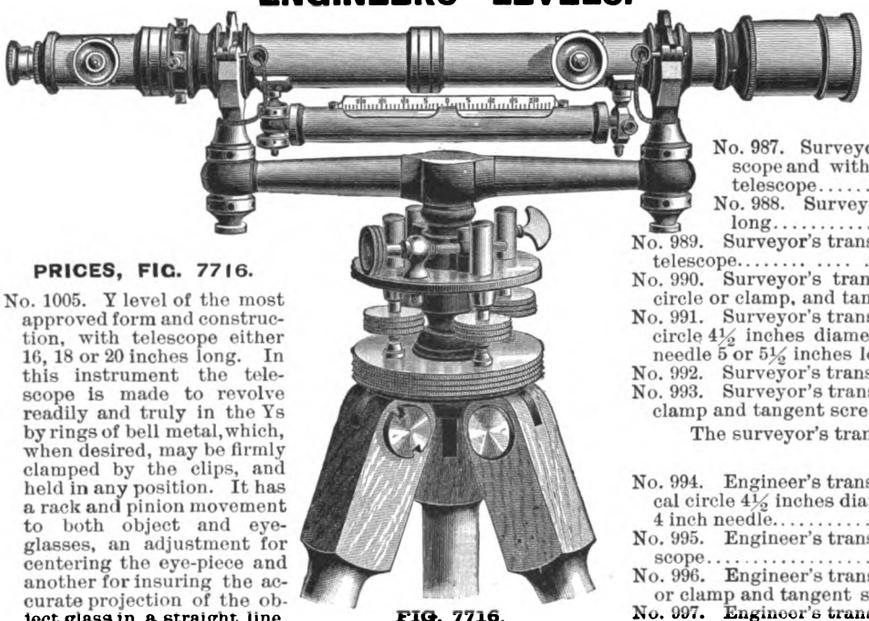


FIG. 7716.

PRICES, FIG. 7716.

No. 1005. Y level of the most approved form and construction, with telescope either 16, 18 or 20 inches long. In this instrument the telescope is made to revolve readily and truly in the Ys by rings of bell metal, which, when desired, may be firmly clamped by the clips, and held in any position. It has a rack and pinion movement to both object and eye-glasses, an adjustment for centering the eye-piece and another for insuring the accurate projection of the object glass in a straight line. Both of these are completely concealed from observation and disturbance by a thin ring, which slides over them. The Ys of this level are made large and strong, of the best bell metal, and each has two nuts, both being adjustable with the ordinary steel pin. The level bar is made round, of well hammered brass, and shaped so as to possess the greatest strength in the parts most subject to sudden strains. The tripod head has the same plates and leveling screws as that of the engineer's transit.....$110.00
No. 1005½. Same as 1005, but with telescope 22 ins. long, 115.00
No. 1106. " " " " 15 " " 90.00

RAILROAD COMPASSES.

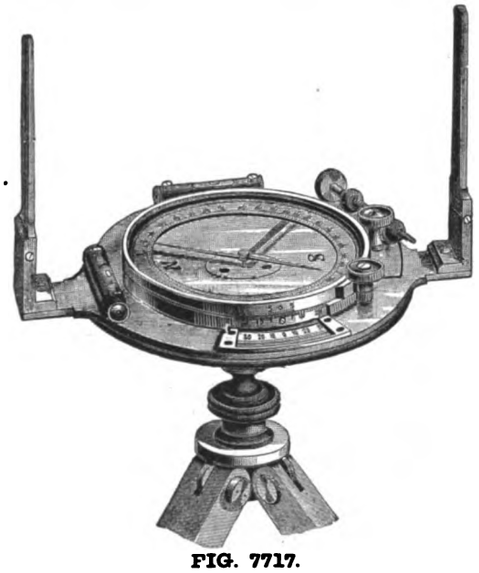


FIG. 7717.

POCKET COMPASSES.

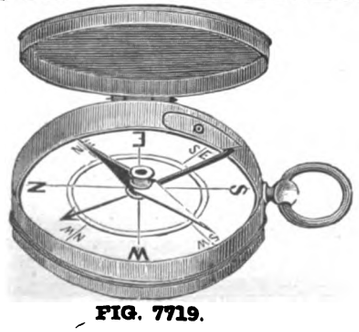


FIG. 7719.

PRICES, FIG. 7714.

No. 985. Surveyor's transit, with two verniers to limb, level under telescope, vertical circle 4½ inches diameter, with clamp and tangent screw to axis of telescope, needle 4 inches long.....$155.00
No. 986. Surveyor's transit, same as No. 985, but without vertical circle to axis of telescope.....$143.00
No. 987. Surveyor's transit, same as No. 985, but without level under telescope and without vertical circle and clamp and tangent screw to axis of telescope.....$125.00
No. 988. Surveyor's transit, same as No. 985, but with needle 5 or 5½ ins. long.....$160.00
No. 989. Surveyor's transit, same as No. 988, but without vertical circle to axis of telescope.....$148.00
No. 990. Surveyor's transit, same as No. 988, but without either level, vertical circle or clamp, and tangent screw to telescope.....$130.00
No. 991. Surveyor's transit, with one vernier to limb, level under telescope, vertical circle 4½ inches diameter, with clamp and tangent screw to axis of telescope, needle 5 or 5½ inches long.....$145.00
No. 992. Surveyor's transit, same as No. 991, but without vertical circle..... 133.00
No. 993. Surveyor's transit, same as No. 991, but without either level, vertical or clamp and tangent screw to telescope.....$115.00

The surveyor's transits, from No. 985 to 993, weigh about 13 lbs. each.

PRICES, FIG. 7715.

No. 994. Engineer's transit, with two verniers to limb, level under telescope, vertical circle 4½ inches diameter, with clamp and tangent screw to axis of telescope, 4 inch needle.....$175.00
No. 995. Engineer's transit, same as No. 994, but without vertical to axis of telescope.....$163.00
No. 996. Engineer's transit, same as No. 994, but without either level, vertical circle or clamp and tangent screw to telescope.....$145.00
No. 997. Engineer's transit, with two verniers to limb, level under telescope, vertical circle and clamp and tangent screw to telescope, needle 4½ or 5 inches long $180.00
No. 998. Engineer's transit, same as No. 997, but without vertical circle to axis of telescope.....$168.00
No. 999. Engineer's transit, same as No. 997, but without either level under telescope, vertical circle or clamp and tangent screw to telescope.....$150.00

All the transit instruments from No. 978 to 999, inclusive, are furnished with handsome mahogany boxes.

HAND LEVELS.

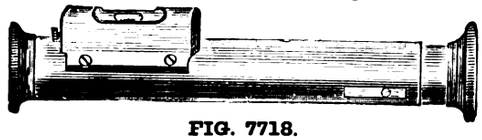


FIG. 7718.

PRICES.

No. 1017. Locke's hand level, made of German silver.....$10.00
No. 1018. Locke's hand level, made of brass..... 9.00

PRICES, FIG. 7717.

No. 975½. Railroad compass, 4½ inch needle, clamp and tangent movement to limb, vernier reading to single minutes, complete with tripod.....$45.00
No. 976. Tripod, with cherry legs, furnished to any of the compasses from Nos. 962 to 975.. 7.00
No. 977. Tripod, with cherry legs, with parallel plates and leveling screws, and clamp and tangent movement, furnished to any of the compasses from Nos. 962 to 975.....$18.00

All of the compasses are packed in handsome mahogany boxes.

PRICES, FIG. 7719.

No. 945A. Pocket compass of brass, 1½ inches diameter, with hinged cover, stop and agate center to needle..... $1.75
No. 945B. Pocket compass, same as No. 945A, but nickel-plated..... 2.00
No. 945C. Pocket compass, same as No. 945A, but German silver..... 2.50
No. 945D. Pocket compass, same as No. 945A, but 2 in. diam., with nickel-plated case.... 2.50

POCKET COMPASSES.



FIG. 7720. NO. 946A.



FIG. 7721. NO. 947A.

No. 946A. Pocket compass, watch pattern, nickel-plated hunting case, bar needle, 1½ inches in diameter, raised ring, metal face.....$4.00
No. 946B. Pocket compass, watch pattern, nickel-plated, but 1¾ inches in diameter..... 4.50
No. 947A. Pocket compass, nickel-plated hunting case, raised ring, stop to needle, folding sights, 2 inches in diameter.....$4.25
No. 947B. Pocket compass, nickel-plated hunting case, raised ring, stop to needle, folding sights, but 2¾ inches in diameter.....$7.00
No. 947C. Pocket compass, nickel-plated hunting case, raised ring, stop to needle, folding sights, with levels.....$8.00

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SURVEYORS' AND DRAUGHTSMEN'S INSTRUMENTS.

RANGING POLES.



FIG. 7722.

LEVELING RODS.

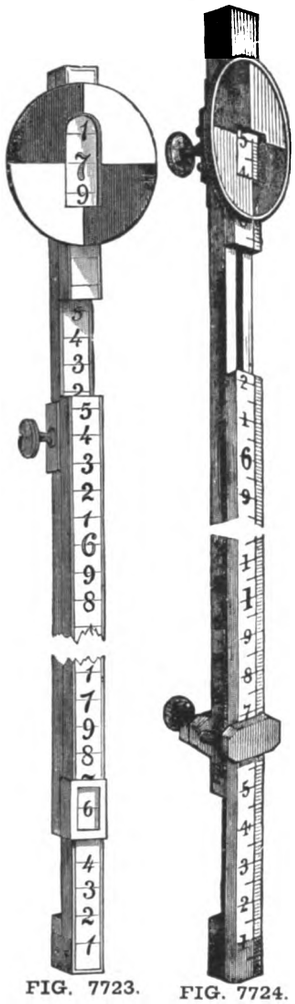


FIG. 7723. FIG. 7724.

No. **PRICES, FIG. 7722.**

1013. Ranging poles, 6 feet long, with steel-pointed shoe, and divided off in feet, which are painted red and white, alternately $2.50
1014. Ranging poles, 8 feet long, " " " 2.75
1015. " " 10 " " " " 3.00

PRICES, FIG. 7723 OR 7724.

1010. Philadelphia leveling rod, made of seasoned mahogany $16.00
1011. New York leveling rod, made of seasoned satin wood 16.00

PRICES, FIG. 7725.

1058. Marking pins, of No. 6 steel wire, 11 in a set, per set $2.00
1059. Marking pins, of tempered steel, 15 in. long, ¾ in. wide, 11 in a set, per set 7.50
1057½. Marking pins of No. 8 steel wire, 11 in a set, per set 1.00
1057¾. Marking pins of No. 7 iron wire, 11 in a set, per set ..... .75

MARKING PINS.

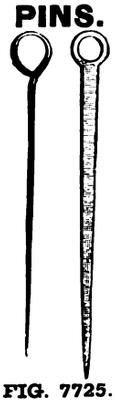


FIG. 7725.

SURVEYORS' CHAINS.



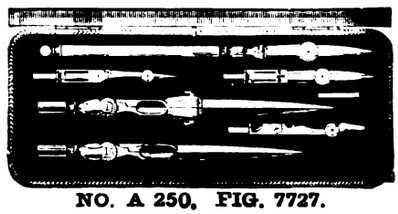
FIG. 7726.

PRICES, FIG. 7726.

1032. Surveyor's chain, 2 poles, 50 links, No. 9, wire oval rings $2.00
1033. " 2 " 40 " 8, " 2.75
1034. " 2 " 50 " 8, " 2.75
1035. " 2 " 50 " 7, " 3.75
1036. " 4 " 100 " 9, wire round rings ... 3.50

GERMAN SILVER INSTRUMENTS.

For engineers, architects and mechanical draughtsmen. Very best make. In fine velvet-lined morocco pocket cases.



NO. A 250, FIG. 7727.

A 250. Morocco case, containing
1 pair 3½ in. dividers, with pen, pencil, needle point, and lengthening bar.
1 pair 3½ in. plain dividers.
1 drawing pen, joint and pin, 4½ in.
1 box leads $5.00



NO. A 251. FIG. 7728.

A 251. Morocco case, containing
1 pair 5 in. dividers, with fixed needle point, pen and pencil points, and lengthening bar.
1 pair 5 in. plain dividers.
1 drawing pen, joint and pin, 5½ in.
1 box leads $4.50

A 252. Same as above, with addition of Figs. 7732, 7733 and 7734 ..... $9.00

STUDENT'S SET.

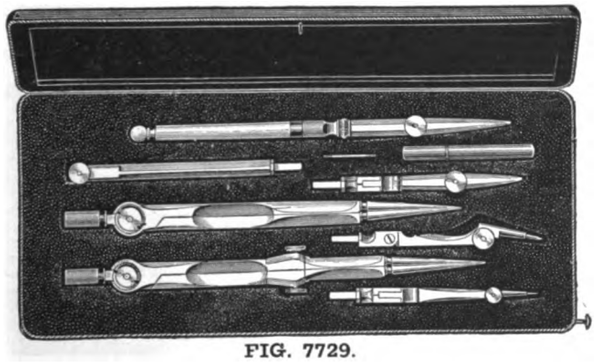
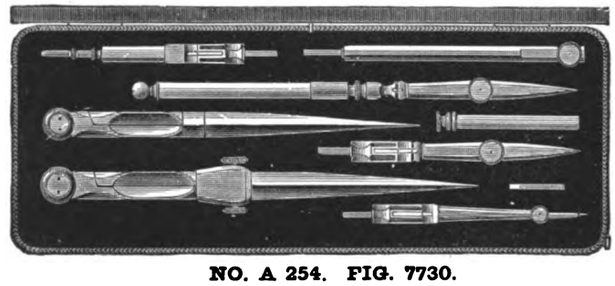


FIG. 7729.

It consists of a set of 6 inch German silver dividers, with steel points, with pen, pencil and needle points, and lengthening bar.
A pair of 5 and ½ inch plain dividers, with steel points.
One first-class drawing pen.
All in compact portable pocket case. **PRICE, $4.00.**

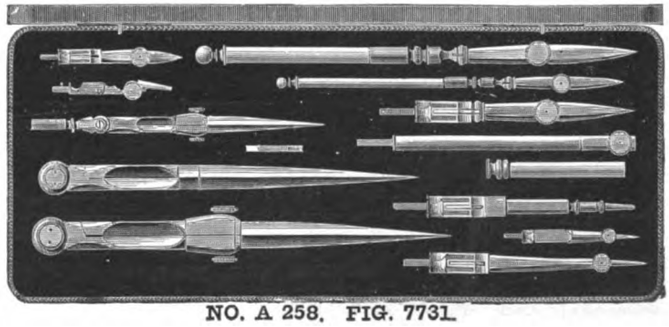


NO. A 254. FIG. 7730.

A 254. Morocco case, containing
1 pair 6 in. dividers, with pen, pencil, needle point, and lengthening bar.
1 pair plain dividers, 5 in.
1 drawing pen, with joint and pin.
1 box leads $6.00

PRICES, FIG. 7731.

A 258. Morocco case, containing
1 pair 5½ in. dividers, with pen and pencil, needle point and lengthening bar.
1 pair plain dividers, 5 in.
1 pair 3½ in. dividers, with pen, pencil and needle point.
1 drawing pen, joint and pin, 4½ in.
1 " " " " 5½ in.
1 German silver protractor.
1 German silver square.
1 box leads $10.50



NO. A 258, FIG. 7731.

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DRAUGHTSMEN'S INSTRUMENTS.

DIVIDER. PEN. PENCIL.



FIG. 7732.



FIG. 7733.

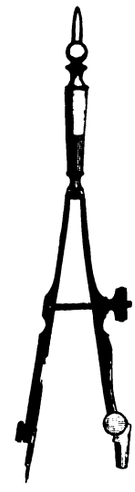


FIG. 7734.

PRICES.

Steel spacing divider, ivory handle, 3½ inch.....$1.25
Steel bow pen, 3½-inch needle point, with ivory handle..... 1.60
Steel bow pencil, 3½-inch needle point, with ivory handle.... 1.60

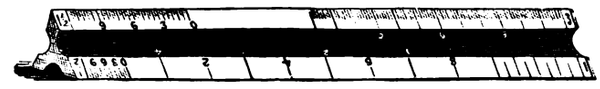
BOXWOOD SCALES.



NO. 462. FIG. 7735.

PRICES.

462. Triangular scale of boxwood, 24 inches long, graduated 10, 20, 30, 40, 50 and 60 to the inch; or, 20, 30, 40, 50, 60 and 80 to the inch..... $5.00
463. " " " " 12 inch. 1.50
463½. " " 12 inches long, graduated 100, 200, 300, 400, 500, 600 to the foot, each..... 2.00
464. " " 6 inches, graduated same as No. 462..... .80
464½. Triangular scales of boxwood for off-sets, 2 inches long, 10, 20, 30, 40, 50 and 60 parts..... .75



NO. 465. FIG. 7736.

PRICES.

465. Triangular scale of boxwood, 24 inches long, graduated, 3/32, 1/16, 1/8, ¼, 3/8, ½, ¾, 1, 1½, 3 inches and 16ths to the foot..... $5.00
466. " " " 12 inches long, 1.50
467. " " " 6 " .80

Boxwood triangular scales, 6 and 12 inches, put in strong paper boxes, and mailed to any address at an additional cost per scale of 25 cents.

SPACING OR SHADING T SQUARES.

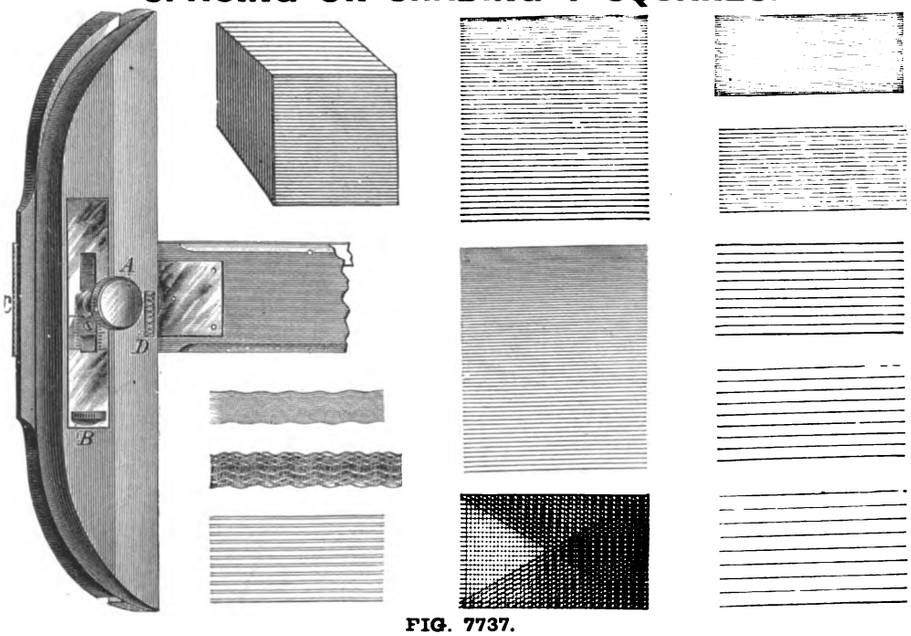


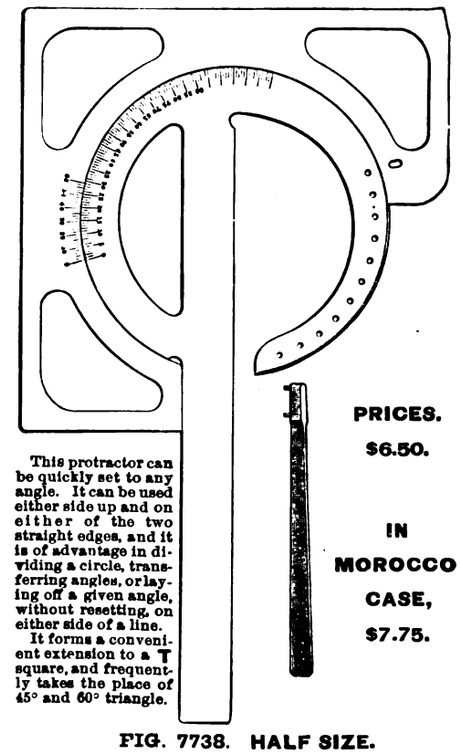
FIG. 7737.

PRICES.

Polished mahogany head, nickel mounted, blade brass lined, 18 to 24 inches..... $7.50
" " " " " 26 to 30 " 8.00

DRAUGHTSMAN'S PROTRACTOR.

VERNIER READS TO 2 MINUTES.



This protractor can be quickly set to any angle. It can be used either side up and on either of the two straight edges, and it is of advantage in dividing a circle, transferring angles, or laying off a given angle, without resetting, on either side of a line.

It forms a convenient extension to a T square, and frequently takes the place of 45° and 60° triangle.

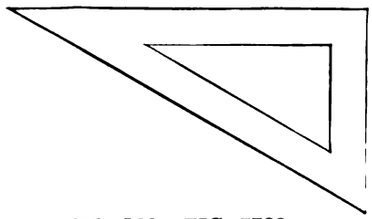
PRICES.

$6.50.

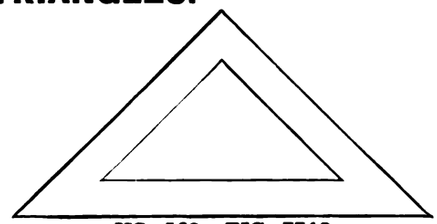
IN MOROCCO CASE, $7.75.

FIG. 7738. HALF SIZE.

WOOD TRIANGLES.



NO. 562. FIG. 7739.



NO. 563. FIG. 7740.

PRICES.

562. Pearwood or cherry triangles, framed open center, 30°x60°x90°.

5	7	9	12	14	16	
$0.20	$0.25	$0.25	$0.30	$0.40	$0.75	$1.00 19 inches long.

563. Pearwood or cherry triangles, framed open center, 45°x45°x90°.

5	6½	8	10	12	
$0.20	$0.25	$0.30	$0.40	$0.60	$0.75 14 inches long.

PRICES, FIG. 7741.

Hard rubber triangles, angles 30°x60°x90°, or 22½°x67½°, either solid or with open center.

Perpendiculars, 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17 inches.
$0.25	.25	.30	.35	.40	.55	.60	.65	.75	.95	1.10	1.25	1.50	1.75	2.00 each.

HARD RUBBER TRIANGLES.

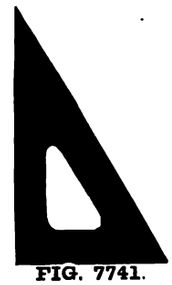


FIG. 7741.

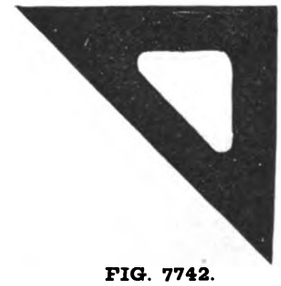


FIG. 7742.

PRICES, FIG. 7742.

Hard rubber triangles, angles 45°x45°x90°, either solid or with open center.

Isosceles sides, 3	4	5	6	7	8	9 ins.
$0.30	$0.30	$0.40	$0.50	$0.60	$0.70	$0.85 each.

Isosceles sides, 10	11	12	13	14 ins.
$1.10	$1.25	$1.35	$1.50	$1.65 each.

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STEEL RAILS AND FROGS.

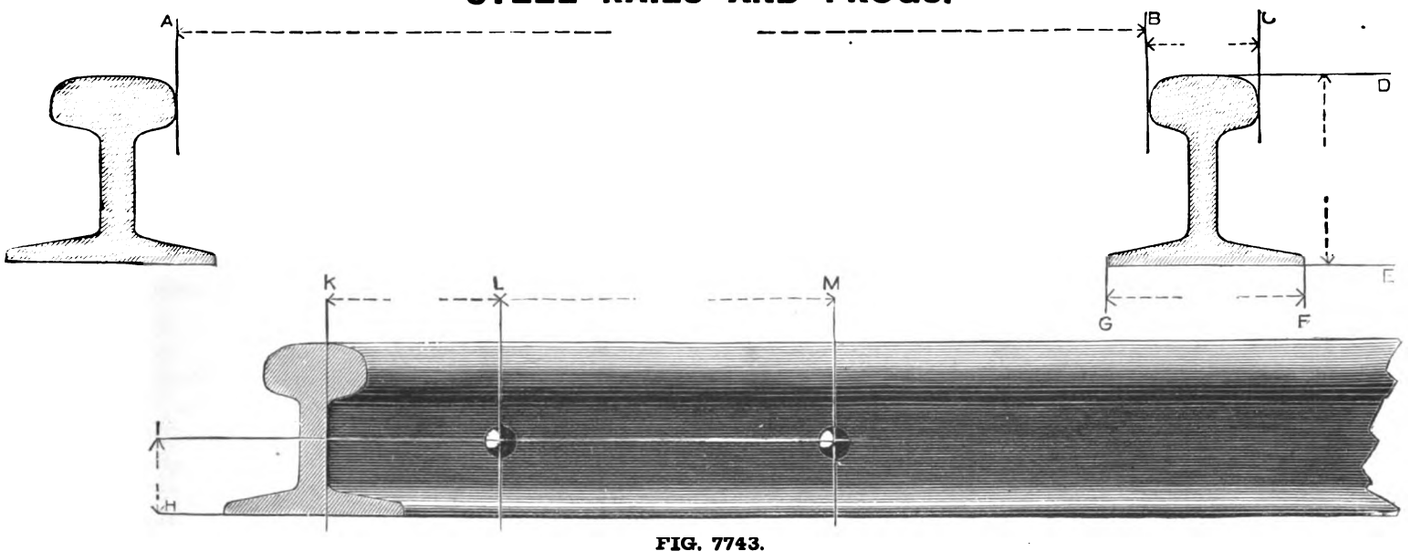


FIG. 7743.

A–B. Gauge of track.
B–C. Head of rail.
D–E. Height of rail.
F–G. Base of rail.
H–I. Center of holes from bottom of rail.
K–L. Center of first hole from end of rail.
L–M. Center to center of holes.
Diameter of bolts.....

FROGS.

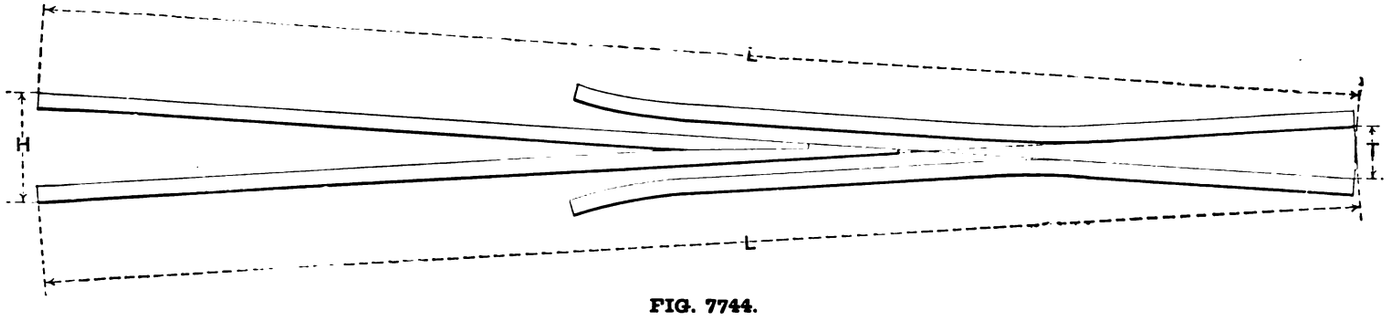


FIG. 7744.

To execute orders correctly, the following information must be given :

The frog angle, or number.
This always equals the length over all, divided by the sum of the spreads at heel and at toe.
L. Length over all.
H. Spread at heel.
T. Spread at toe.
A sample piece of the rail to be used, or a full size drawing of rail section, or number of section in rail manufacturer's catalogue.

The drilling for splice bars, as follows :
End of rail to center of first hole.
Center to center of holes.
Base of rail to center of hole.
Diameter of hole.

YOKED FROG.

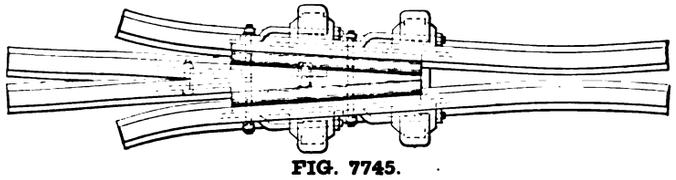


FIG. 7745.

Made for angle No. 6 and upward, of rail exceeding 3¼ inches in height.

PLATE FROG.



FIG. 7746.

Made for any angle and of any size of rail.

BOLTED PLATE FROG.

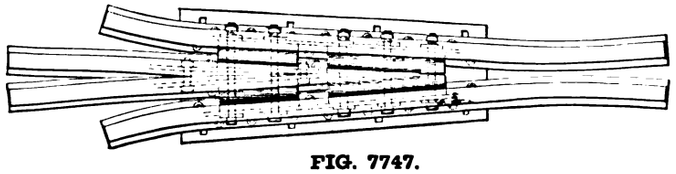


FIG. 7747.

Made for any angle, of rail exceeding 3¾ inches in height.

BOLTED FROG.

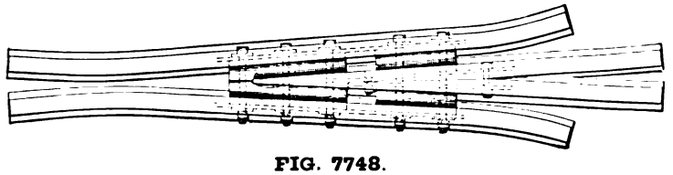


FIG. 7748.

Made for any angle, of rail exceeding 3¾ inches in height.

PRICES ON APPLICATION.

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RAILROAD FROGS AND SWITCHES AND CROSSINGS.

SPRING RAIL FROGS.

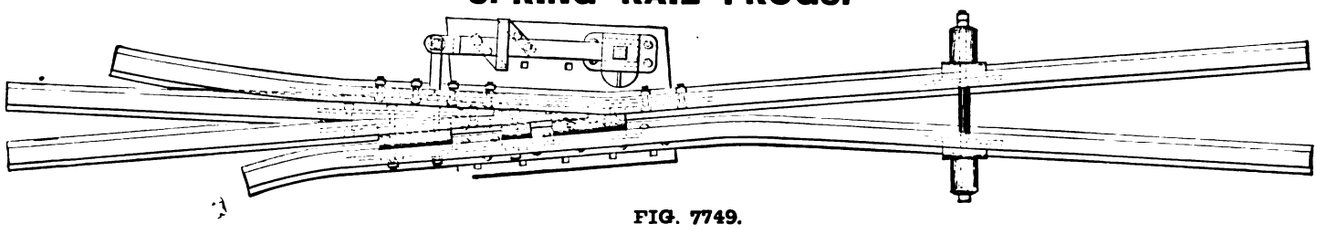
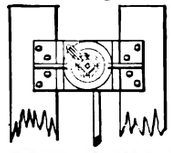


FIG. 7749.

Made for angle No. 7, and upward, of rail exceeding 3¼ inches in height, and commonly 15 feet long. When ordering spring rail frogs, state whether turnout is right or left hand.



SPLIT SWITCH.

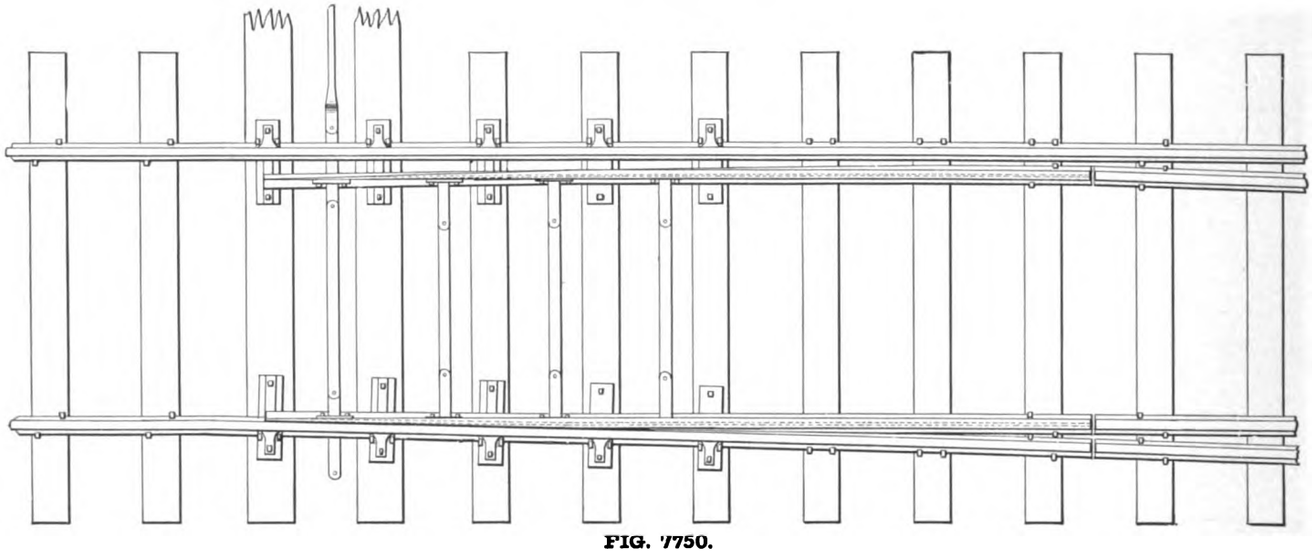


FIG. 7750.

To execute orders correctly, the following information must be given :

Gauge of track.
Length of switch points.
Throw, measured at point of attachment of stand.
The rail section and drilling for splice bars, as required for frogs.

CROSSINGS.

To execute orders correctly, a drawing should be furnished, giving the following information :

Gauge of tracks.
Angle of crossing.
Curvature, if any.
Distance between centers of tracks, when more than two tracks cross.
Also give rail section and drilling for splice bars, as required for frogs.

GROUND LEVER, FOR OPERATING STUB SWITCHES.

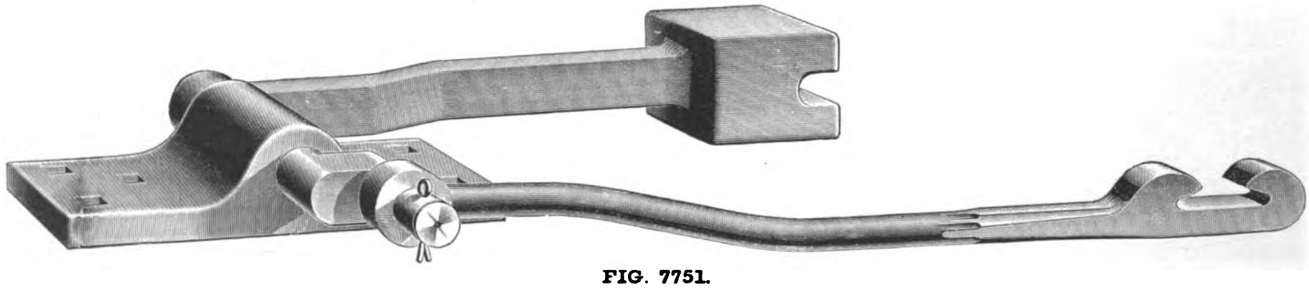


FIG. 7751.

HEAD CHAIRS AND TIE BARS FOR STUB SWITCHES.

When ordering stub switch material, please give the following information :

Gauge of track.
Amount of throw.
A sample piece of rail, or sketch of rail section.

PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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SAFETY SWITCH STANDS.

This stand is designed for the operation of split switches. If wrongly set it is readily and safely thrown into proper position by a train trailing through the switch. The figure shows the relation of the parts when the switch is half thrown by passing train, but does not show the rod connecting the stand with the switch nor the target, both of which will be furnished with the stand. The spindle will be extended to any desired height and the crank forged for any throw between 3½ inches and 5 inches.

The stand is made in the following styles:

E 109. Standing on two ties, as in figure, and applicable either to main line or yard use. 29¼ inches high from base to top of casting shown in figure.

E 115. Same dimensions as E 109, but resting on only one tie.

E 184. Standing on two ties and for main line, 35¼ inches high from base to top of casting.

E 120½. For yards, standing on two ties. Barrel and spindle horizontal. Not exceeding 20 inches high, exclusive of lantern tip.

E 442. For yard, standing on two ties. Spindle vertical. Extreme height to top of target, 32 inches.

To execute orders correctly, the following information must be given:

Style of stand desired.

Exact throw of switch measured at point of attachment.

Length of connecting rod between centers of holes, or distance from center of stand to wearing edge of nearest rail.

Dimensions of switch rod with which the jaw of connecting rod is to engage and diameter of hole in same.

Form and dimensions of target and of tip to fit lamp socket. These are shown best by drawings.

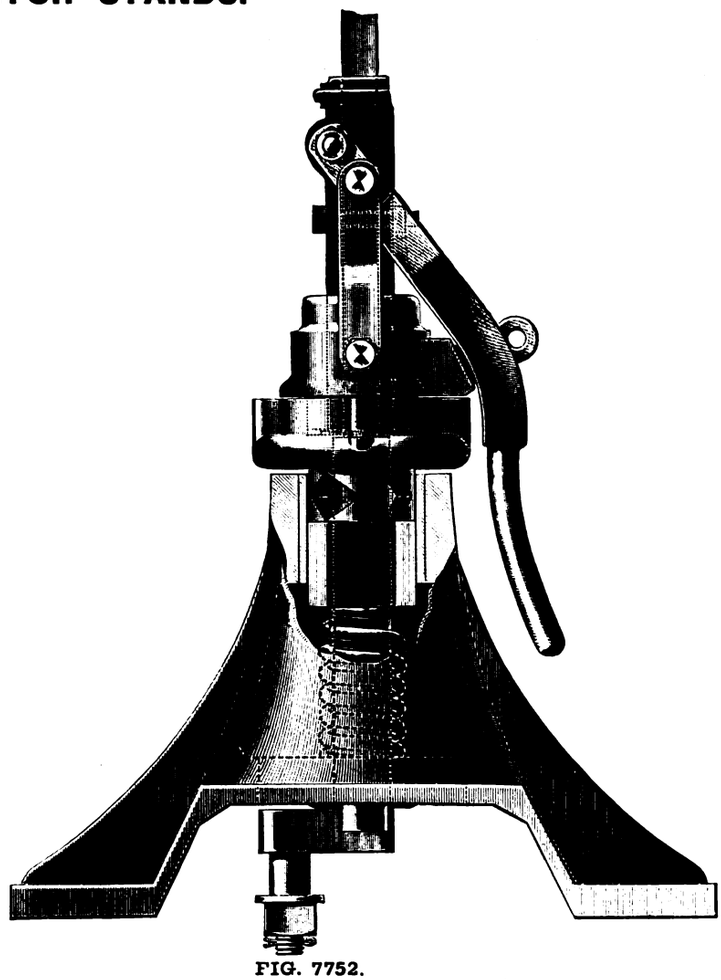


FIG. 7752.

PORTABLE IRON RAILROAD, WITH IRON CROSS BARS OR TIES.

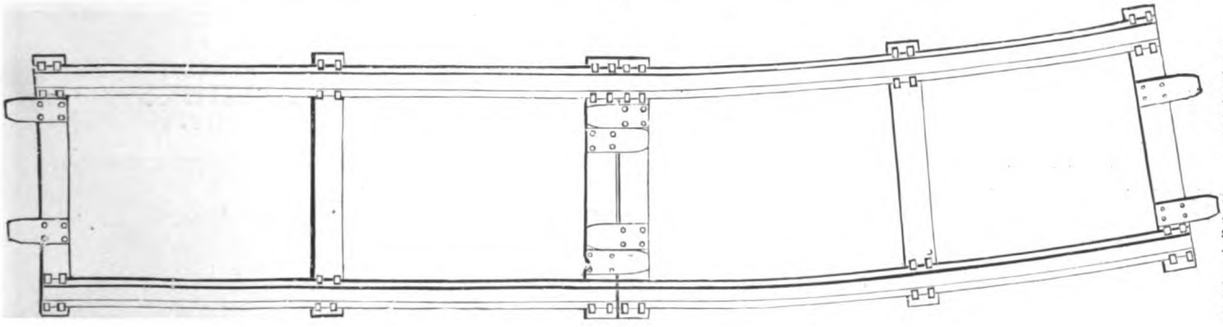


FIG. 7753.

PRICES ON APPLICATION.

This is designed for contractors, storehouses, mines, brick-yards, sugar plantations, etc., and is usually put up in 10-foot lengths.

In ordering, state weight of rail per yard, gauge of track, length of sections and number of cross-bars to each section, with plan of frogs and switches and crosses.

ALL-IRON OR WOOD PORTABLE TRACK, ETC.

It is simple in construction, cheap, indestructible, and can be used for any required rail and gauge. The rails are of iron, made in the usual form employed for railways, and the cross-pieces consist of T or flat iron bars; the rails are secured to the cross-pieces by means of square rivets, of the shape of hook spikes; these square rivets prevent the sections from changing their original shape, and thereby always secure a good fit of one section to another; the ends of each section are provided with projecting locking-pieces which are arranged so as to articulate with those on the end of the next section; these locking-pieces, being riveted to the upper surface of the end cross-pieces, are free to slide in end-wise and secure the sections from lateral motion when they are placed end to end; the sections are all of the same shape and length, and will therefore fit to each other as well as to the curves and switches.

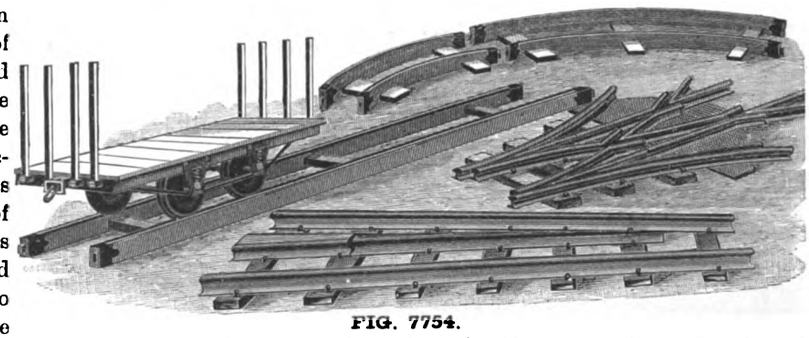


FIG. 7754.

With frogs and curves: channel iron platform car, with pedestals and springs, for wood, cane, staves, etc.

PRICES ON APPLICATION.

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RAILROAD TRACK BOLTS.

BUTTON HEAD, ELLIPTIC UNDER HEAD. T HEAD BOLTS.

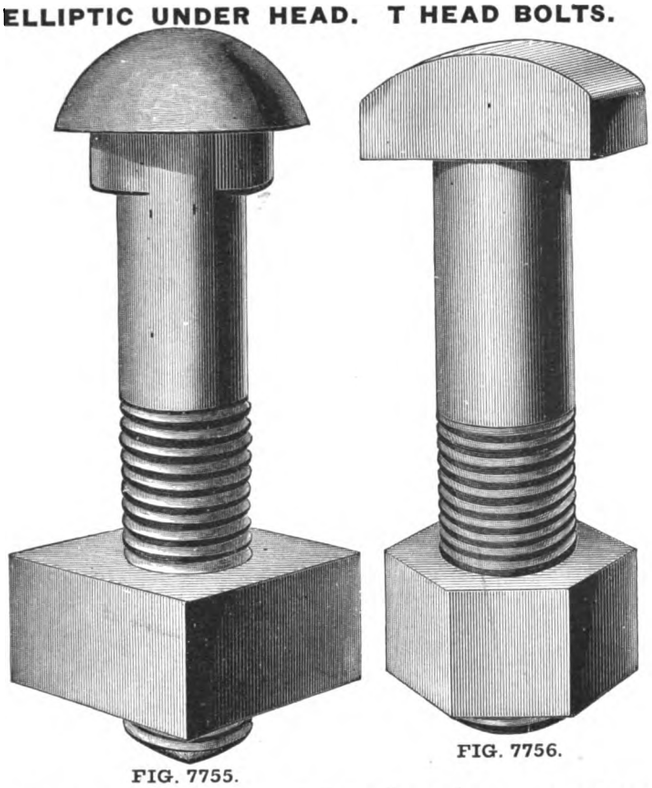


FIG. 7755. FIG. 7756.

Track bolts are furnished with square or hexagon nuts.

SIZES.

Button head	$\frac{3}{4}$ x $3\frac{1}{4}$ to 4 ins. long.	Square nut,	$1\frac{3}{8}$ x $\frac{3}{4}$
" "	$\frac{3}{4}$ x $3\frac{1}{4}$ to 4 "	" "	$1\frac{1}{4}$ x $\frac{3}{4}$
" "	$\frac{3}{4}$ x $3\frac{1}{4}$ to 4 "	Hex. nut,	c. advance on square.
Square and T head	$\frac{3}{4}$ x $3\frac{1}{4}$ to 4 "		

We are prepared to make track bolts of excellent finish and quality. We cut them with a perfectly fitting thread. The nuts are uniform and thoroughly interchangeable. By cutting the threads in a peculiar manner the nut will not shake or loosen, and no lock or expensive appliance is essential to keep them in place.

PRICES ON APPLICATION.

FISH PLATES.

Weight of rail.	Length of plate.	Weight of plate.	Bolts.	Weight of bolts and nuts.
16 lbs.	about 15 ins.	about $2\frac{1}{2}$ lbs.	2 x $\frac{1}{2}$	about $\frac{1}{5}$ lb. each.
20 "	" 15 "	" 3 "	$2\frac{1}{4}$ x $\frac{1}{2}$	" $\frac{1}{4}$ "
25 "	" 15 "	" $3\frac{1}{2}$ "	$2\frac{1}{4}$ x $\frac{1}{2}$	" $\frac{1}{4}$ "
30 "	" 15 "	" 4 "	$2\frac{1}{2}$ x $\frac{1}{2}$	" $\frac{1}{4}$ "
35 "	" 15 "	" $4\frac{1}{2}$ "	$2\frac{1}{2}$ x $\frac{9}{16}$	" $\frac{3}{8}$ "
40 "	" 18 "	" 7 "	$2\frac{3}{4}$ x $\frac{5}{8}$	" $\frac{1}{2}$ "
50 " and over	18 to 36 "	8 to 18 "	$3\frac{1}{2}$ x $\frac{3}{4}$	" 1 "

Angle plates weigh from 45 to 50 per cent. additional.

PRICES ON APPLICATION.

NATIONAL LOCK WASHERS.

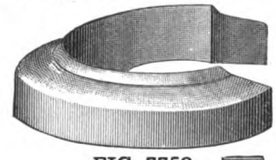


FIG. 7758.

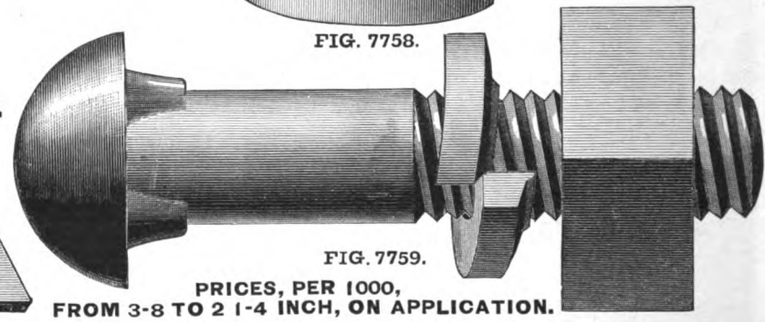
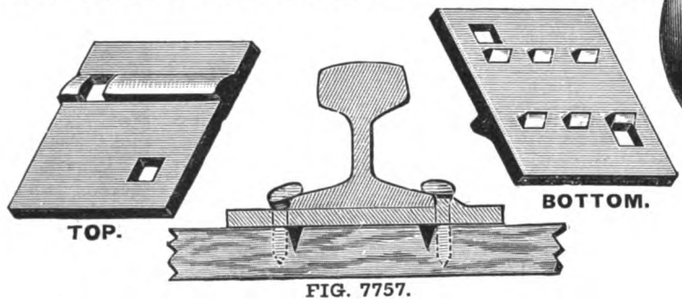


FIG. 7759.

PRICES, PER 1000, FROM 3-8 TO 2 1-4 INCH, ON APPLICATION.

RAILROAD TIE PROTECTOR PLATE.



TOP. BOTTOM.

FIG. 7757.

This tie protector plate is formed of steel, rectangular, either 8 or 9 inches long by 6 wide, of a substantial thickness.

On the upper surface of the plate there is a rib or shoulder, running directly across; this is for the flange of the rail to bear against, and is so divided that the head of the spike is fully utilized in holding the rail down.

On the lower surface there are 6 elongated lugs; these run across the plate parallel with the shoulder above, and when entering the tie cut across the grain of the timber. These lugs are 1 inch by $\frac{1}{4}$ at the base and taper down to an edge of $\frac{3}{4}$ x $\frac{1}{16}$ at a depth of $\frac{1}{2}$ an inch. Their shape and depth is such that they are driven completely home in the hardest tie by the passage of a single engine over them.

EXCELSIOR NUT LOCKS OR FISH PLATE SPRINGS.

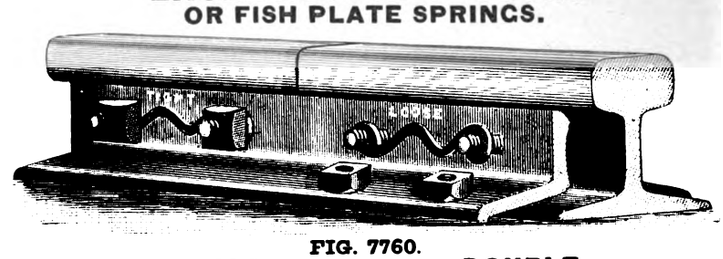


FIG. 7760.

JONES' POSITIVE LOCKS FOR WOOD.

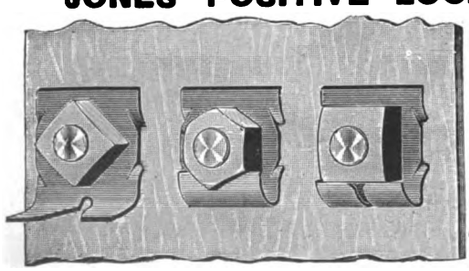


FIG. 7763. FIG. 7764. FIG. 7765.

SPUR NUT LOCK.

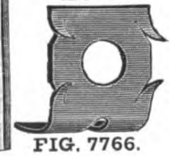


FIG. 7766.

SPUR WASHER.



FIG. 7767.

EDGE VIEW.



SINGLE.



FIG. 7761.

DOUBLE.

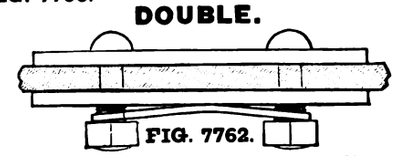


FIG. 7762.

PRICES ON APPLICATION.

VERONA NUT LOCK.



FIG. 7768.

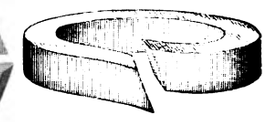


FIG. 7769.

PRICE, $.....PER 1000.

These locks are made to fit all sizes bolts and nuts. This spur-lock is made of one piece of metal, being a washer and lock combined, having four sharp, peculiar shaped spurs which are to be always driven into the wood before tightening up the nut.

PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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RAILROAD TRACK TOOLS.

RAIL FORKS.



FIG. 7770.

PRICE, solid cast steel, weight about 14 lbs., per lb., $0.30.

TRACK WRENCHES.



FIG. 7771.

PRICE, solid cast steel, round or flat handle, 20 in. long, per lb., $0.25.

RAIL TONGS.

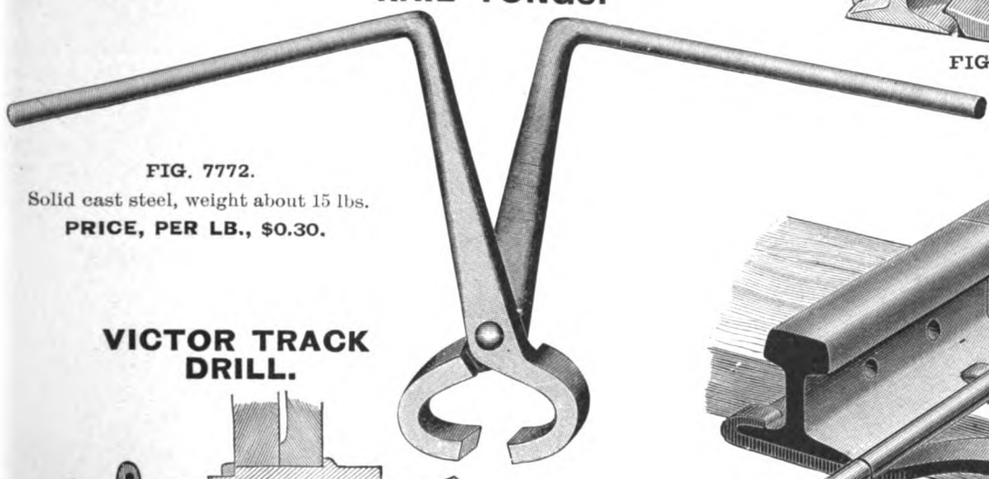
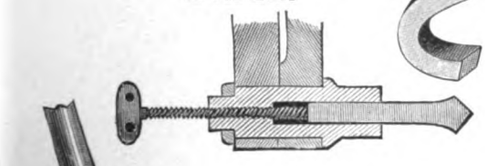


FIG. 7772.

Solid cast steel, weight about 15 lbs.

PRICE, PER LB., $0.30.

VICTOR TRACK DRILL.



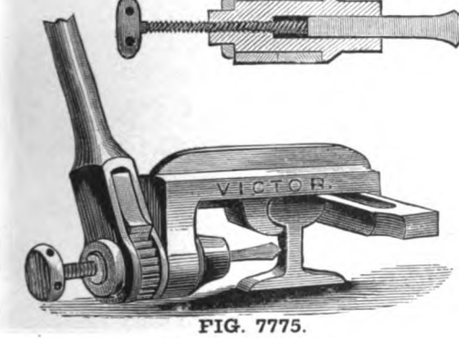


FIG. 7775.

PRICE, $12.00.

NOBLE SELF-FEED TRACK DRILL.

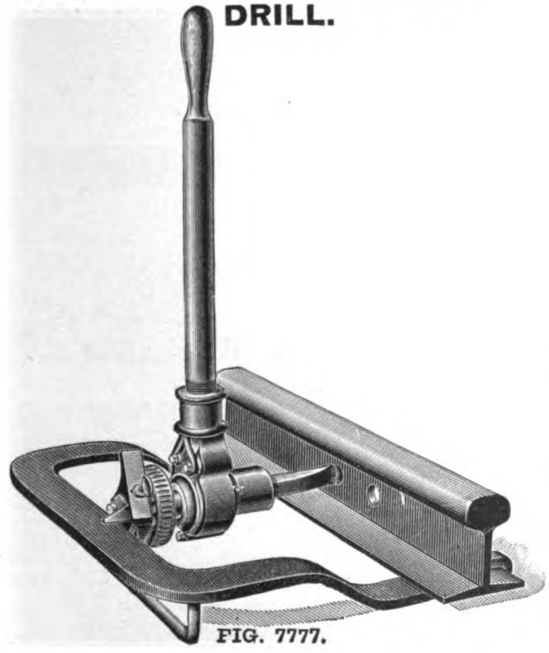


FIG. 7777.

I X L TRACK DRILL.

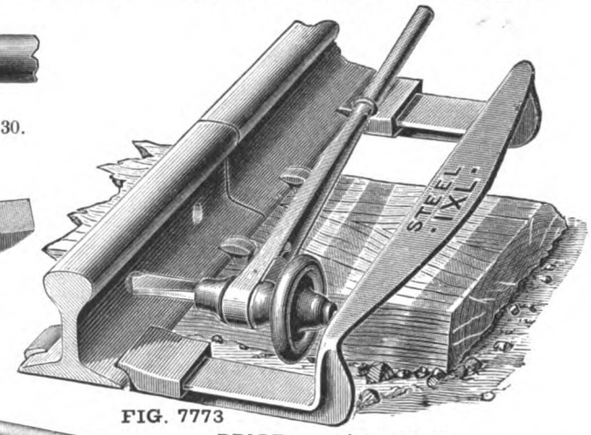


FIG. 7773

PRICE, complete, **$8.00.**

BELAND TRACK DRILL.



FIG. 7774.

PRICE, complete with 2 bits, **$10.00.**

UNDERWOOD TRACK DRILL.

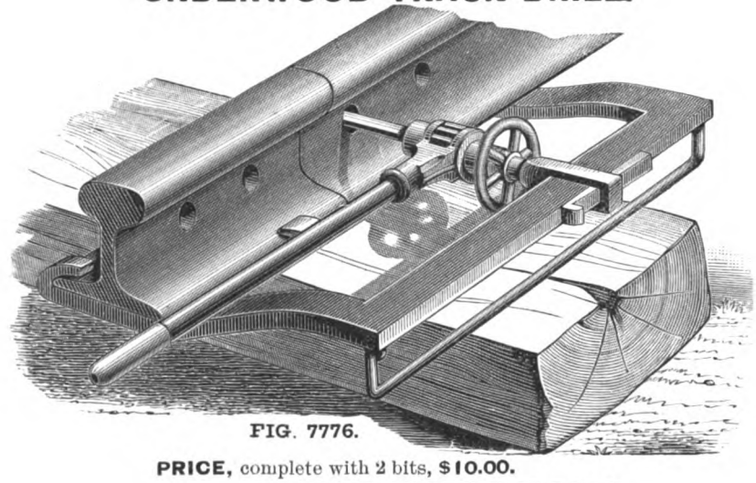


FIG. 7776.

PRICE, complete with 2 bits, **$10.00.**

UNION TRACK DRILL.

PRICE, FIG. 7777.

Price, complete with 2 bits, $10.00.

PRICE, FIG. 7778.

Price, complete with 2 bits, $12.00.

Will fit any rail from 40 to 80 lbs.

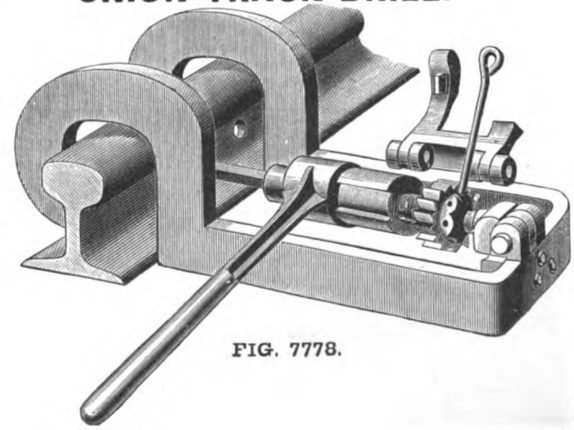


FIG. 7778.

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HART'S TRACK DRILL SCREW FEED.

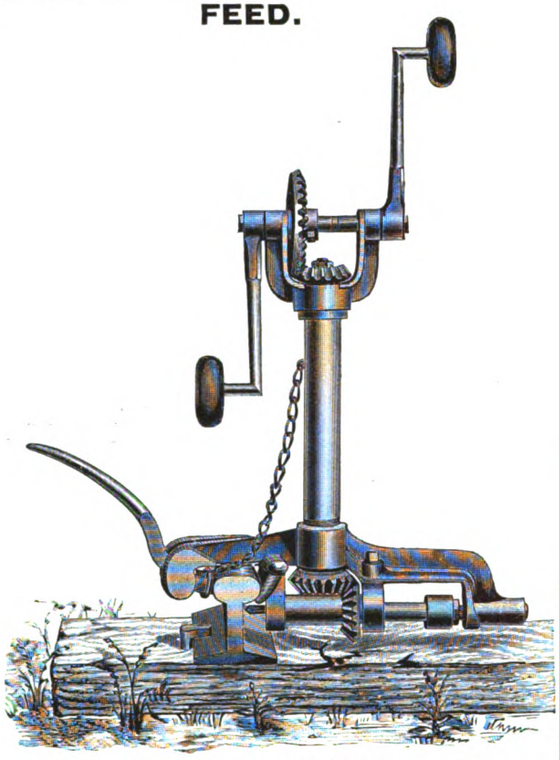


FIG. 7779.

PRICES, FIG. 7779.

No. 1 weighs 48 lbs., ordinary field work.....$30.00
No. 2 weighs 36 lbs., for ⅜ inch holes to attach Hart's foot-guards to rails.....$27.00
Prices include 3 drills.

A is a double-acting wrench to be used for turning on or off the nuts used on the splice bar bolts. It is a well made tool, with a socket long enough to reach under the wide tread of the Johnson or similar rails.

PRICES, FIG. 7781.

Drilling clamp, with 12 in. ratchet...$7.00 — 12 inch wrench.....$2.00
Drilling clamp, with 15 in. ratchet... 8.00 — 18 inch wrench..... 3.00
In ordering wrenches, please state shorter diameter of nut and not the diameter of bolt.

PORTABLE TRACK DRILLS.

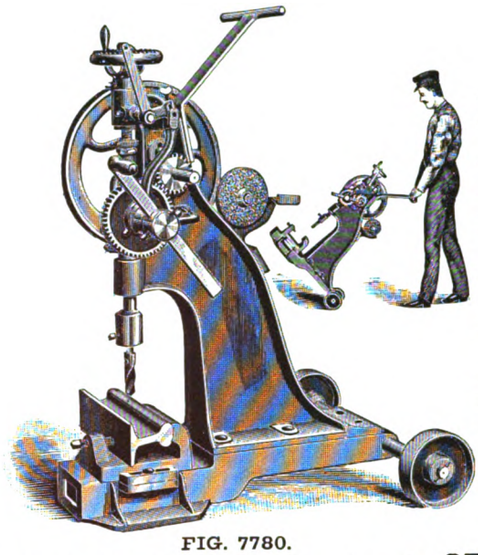


FIG. 7780.

Fig. 7780 represents a drilling machine for railroads, bridge builders and structural works.

This machine has automatic feed with four changes; it is double geared, so when the crank is put on the balance-wheel shaft the power is doubled. It will drill from 0 to 1¼ inch hole. The spindle has a run of 4 inches, and there is a hand wheel provided for quick return of same. The drill socket takes $\frac{41}{64}$ straight round shank.

We advise the use with this tool of twist drills. A feature of this machine is an emery grinder attachment for sharpening drills. It will drill up to 1¼ inch. The spindle has a run of 4 inches. Hole in spindle is $\frac{41}{64}$ diameter.

The chuck for holding the rail can be removed and admitting a great variety of work. Trucks are 6 inches in diameter by 2½ inch face.

WEIGHT, 200 LBS. PRICE, $35.00.

DESCRIPTION, FIG. 7781.

In this combination of tools, B represents a strong steel clamp that may be fastened firmly to the web of any shaped rail, and at any height desired, by means of the vise screw on the right.

C is a well made, substantial ratchet, for turning the drill, the feed being obtained from the screw on the left.

STREET RAILWAY DRILL.



FIG. 7781.

COMBINED TRACK LEVEL AND GAUGE.



FIG. 7782.

DESCRIPTION, FIG. 7782.

The stick is of ash, and the ends malleable iron. The glass is securely set in elastic packing. The ratchet for elevation is accurate and convenient.

PRICE, any length of gauge, each, **$4.00.**

HUNTINGTON TRACK GAUGE.

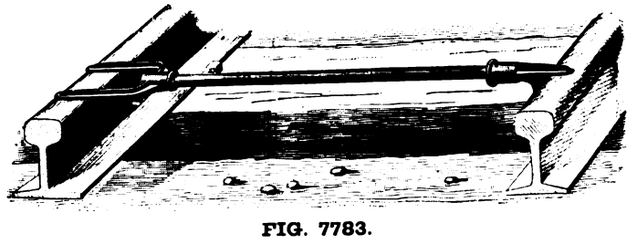


FIG. 7783.

These gauges are made of a piece of iron pipe with the malleable iron ends securely screwed and pinned on. The peculiar form of the left hand end brings the cross bar exactly at a right angle to the rail, and insures an accuracy of gauge on either curves or straight rails. In orders, state gauge of road. **PRICE, $3.50 EACH.**

LIGHT TRACK GAUGE.



FIG. 7784.

PRICE, PER DOZEN, $13.50.

TRACK LEVEL.



FIG. 7785.

PRICE, $4.00 EACH.

TRACK LEVEL.

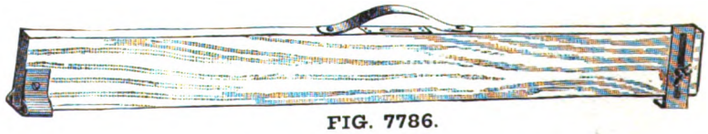


FIG. 7786.

This is a wooden bar, the ends shod with steel plates, and a spirit glass in the middle protected by a leather handle. On the right hand end is a sliding scale and stop thumb screw to set the level by to obtain any desired elevation of rail.

PRICE, $8.00 EACH.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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RAILROAD TRACK TOOLS.

R. R. TRACK LEVELS.



FIG. 7786A. PRICE, PER DOZEN, $36.00.

STREET ROAD TRACK LEVEL.

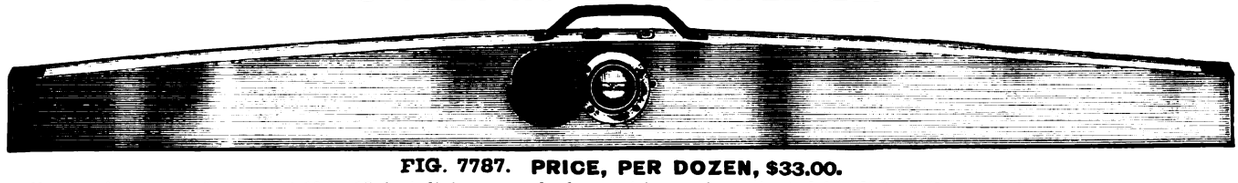


FIG. 7787. PRICE, PER DOZEN, $33.00.

The leveling appliance can be seen at 10 or 15 feet distance, and when not in use is protected by disks. Furnished for 4 ft. 8½ in. gauge, unless otherwise ordered.

GIANT RAIL STRAIGHTENER OR BENDER.

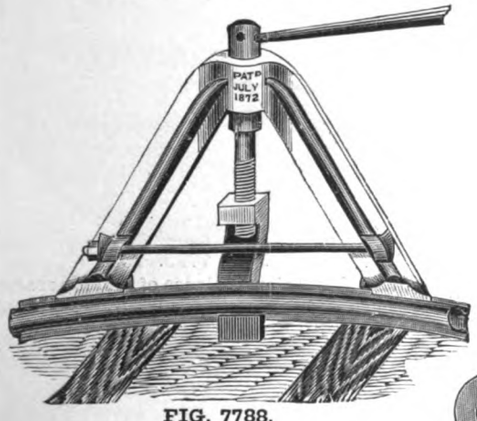


FIG. 7788.
PRICE, $25.00.

CIRCULAR TRACK GAUGES.

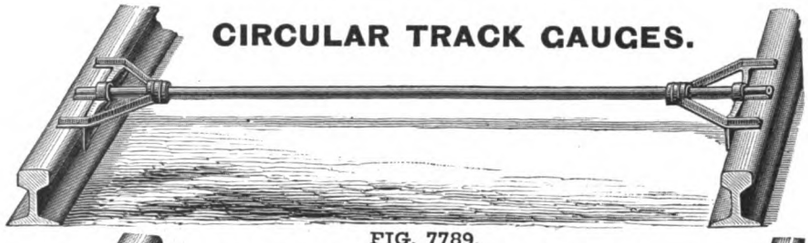


FIG. 7789.
PRICE, ANY GAUGE, PER DOZ., $30.00.

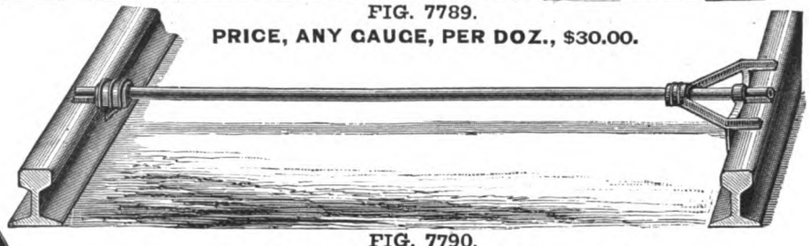


FIG. 7790.
PRICE, ANY GAUGE, PER DOZ., $30.00.

RAIL BENDER.

Will bend 56 to 90 lb. rail.

WEIGHT, 80 LBS. PRICE, $50.00.



FIG. 7791.

SCREW RAIL BENDER, OR "JIM CROW."

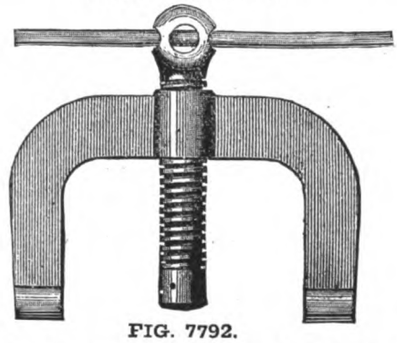


FIG. 7792.

DESCRIPTION, FIG. 7792.

Best wrought iron, with machine-cut, square thread screw.

Size No	1	2	3	3½	4
For steel rails, up to	20	45	65	75	90 lbs. per yard.
For iron rails, up to	30	55	75	85	100 " "
Prices, each	$21.00	$30.00	$42.00	$50.00	$59.00
Weight, with lever	65	100	140	155	185 lbs.
Span to center of claws	16	20	24	24	24 inches.
Diameter of screw	2	2¼	2½	2⅝	2¾ "

HYDRAULIC RAIL BENDER.

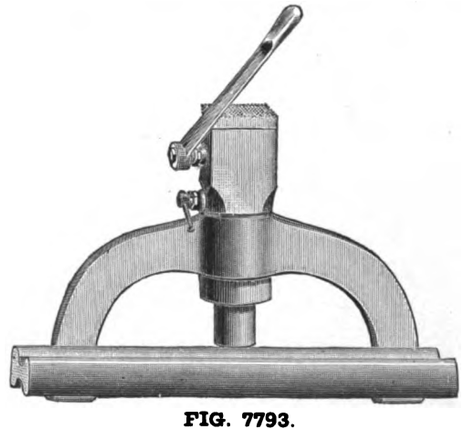


FIG. 7793.

DESCRIPTION, FIG. 7793.

By working the long lever, the ram is forced upon the rail. One turn of the lowering key, shown in the side of the head, allows the ram to be run back to its original position, ready for use again.

It can be worked in any position without loss of liquid.

No.		Prices.	Span to center of claws.	Weight.	Pressure.
A	For up to 45 lb. steel rails.	$55.00	20 inches.	120 lbs.	10 tons.
B	" " 65 lb. " "	78.00	22 "	160 "	20 "
C	" " 90 lb. " "	95.00	24 "	214 "	30 "

These benders can be made to suit any section of street rail, and when ordering, a sectional drawing of the rail should be sent.

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RAILROAD TRACK TOOLS.

ROLLER BENDERS.

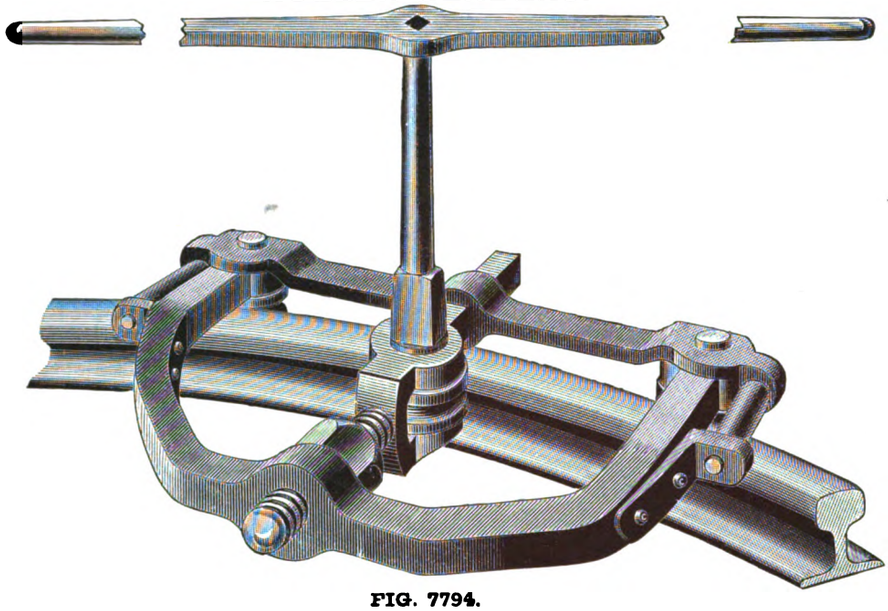


FIG. 7794.

PRICES.

No. 1.	For rail 20 to 40 lbs., inclusive,	$105.00	No. 4.	For rail 71 to 80 lbs., inclusive,	$180.00
No. 2.	" " 41 to 60 lbs., "	115.00	No. 5.	" " 81 to 90 lbs., "	230.00
No. 3.	" " 61 to 70 lbs., "	140.00	No. 6.	" " 91 to 100 lbs., "	300.00

Send tracing of rail section with orders.

ACME STREET RAIL BENDERS.

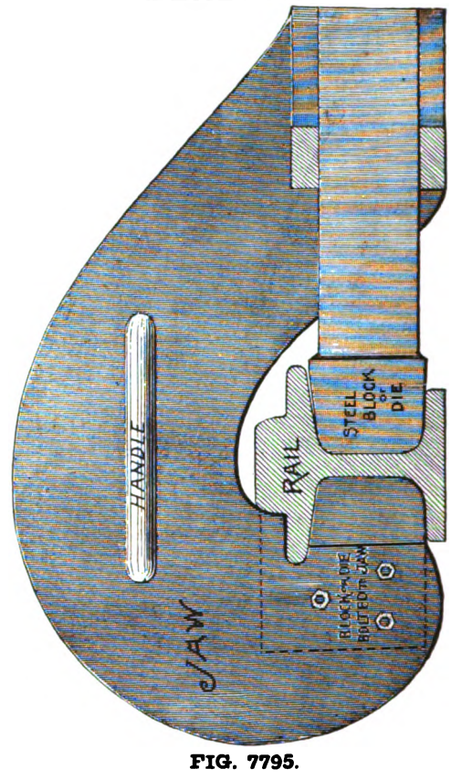


FIG. 7795.

Fig. 7795 shows claw; balance of tool is arranged the same as Fig. 7796. Prices according to style of rail to be bent.

EMERSON RAIL BENDERS.

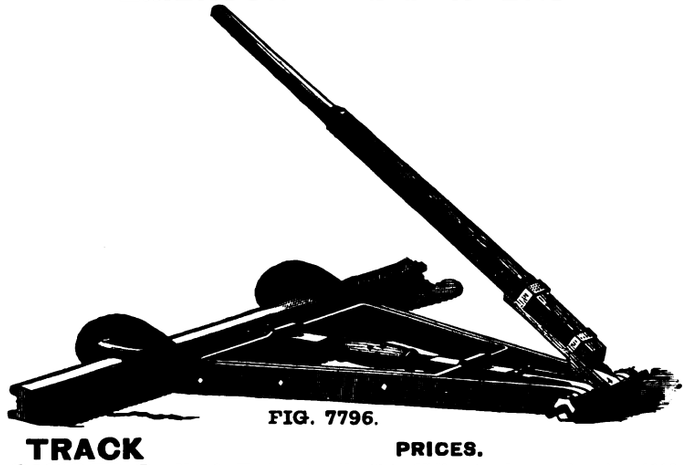


FIG. 7796.

PRICES.

No. 2.	To bend rails 45 to 65 lbs. to the yard, price,	$118.00			
No. 3.	" " " 65 to 90 lbs. " " "	143.00			

RAIL BENDER, WILLISTONS.

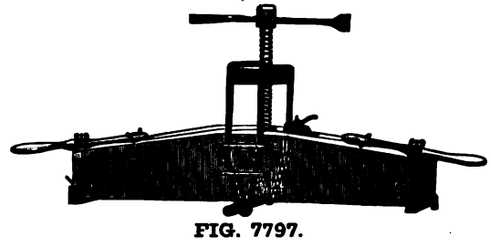


FIG. 7797.

PRICE, $50.00.

TRACK CHISELS.

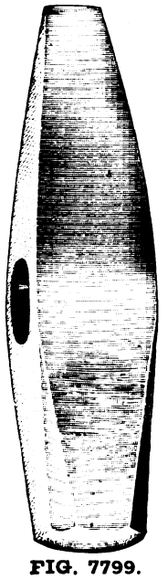


FIG. 7799.

DESCRIPTION, FIG. 7799.

High grade tool steel.

WEIGHT, 3 TO 5 LBS. PRICE, PER LB., $0.50.

RAILROAD MAULS.

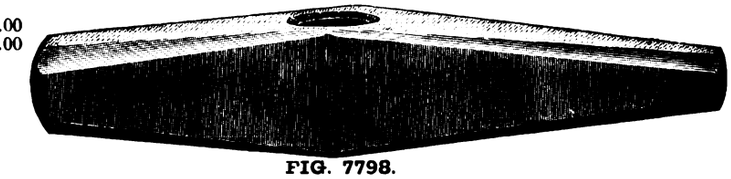


FIG. 7798.

Material.	Finish.	No.	Weight.	Per lb.
Solid cast steel.	Oil finished, polished face.	1570	6 to 12 lbs.	$0.30
" " "	Full polished.	1571	6 to 12 lbs.	.37½
" " "	Full polished and handled.	1572	6 to 12 lbs.	.45

RAILROAD TRACK PUNCHES.

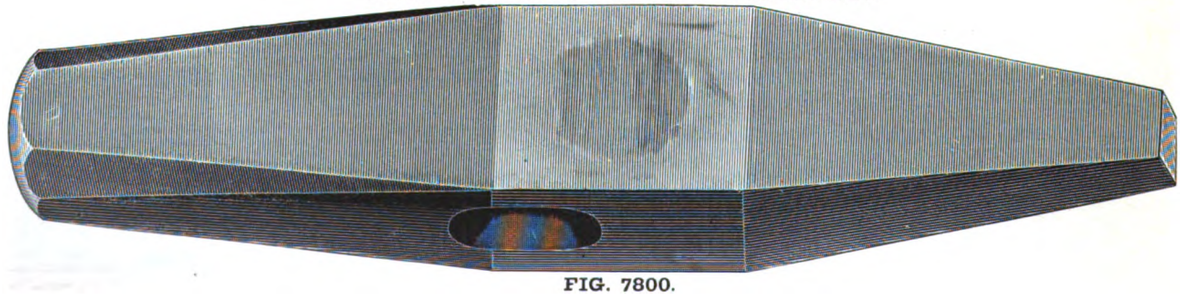


FIG. 7800.

HIGH GRADE TOOL STEEL. PRICE, PER LB., $0.40.

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SMITH'S PORTABLE RAIL SAWS.

This saw has an automatic feed and will cut a 70 lb. steel rail in from 10 to 12 minutes, and can be used on either loose rails or on rails fastened in position on ties.

It is portable, and can be transported without fear of injury.

Its use overcomes the generally conceded danger of crystallization of the material in rail, which is occasioned by the use of the chisel and sledge, and, in addition, the ends are left smooth and square, and as thin a piece as one-eighth inch can be cut off, which is impossible with the old method of cutting by chisel and sledge. This latter feature is very desirable where rails buckle, or in fitting around frogs and switches.

All the danger of injury to trackmen, which has been so common where rails are lifted and dropped after nicking with chisel to break them, is avoided.

It should not make over 70 to 80 strokes per minute, and weighs 120 lbs. Height, 36 inches.

PRICE, complete with 10 saws, **$200.00.**

Extra saws, each, $0.50.

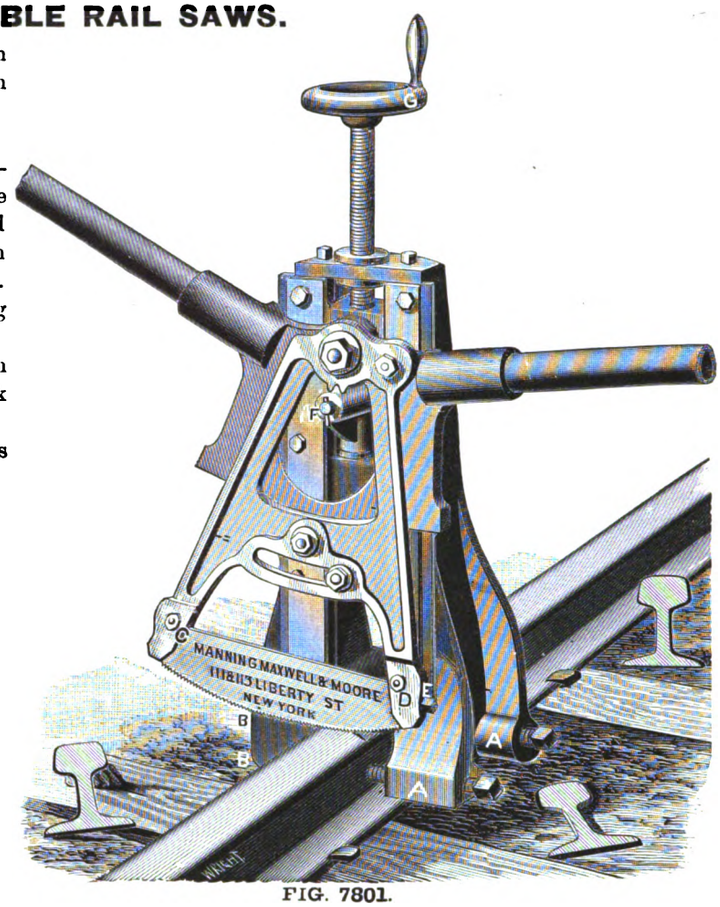


FIG. 7801.

RAILROAD SPIKES.

Size measured under head.	Average No. per keg of 200 lbs.	Ties 2 feet between centers, 4 spikes per tie, makes per mile.	Rail used, weight per yard.
5½ x 9/16	375	5,870 lbs.—29⅓ kegs.	45 to 70
5 x 9/16	400	5,170 " —26 "	40 to 56
5 x ½	450	4,660 " —23⅓ "	35 to 40
4½ x ½	530	3,960 " —20 "	28 to 35
4 x ½	600	3,520 " —17⅔ "	24 to 35
4½ x 7/16	680	3,110 " —15½ "	20 to 30
4 x 7/16	720	2,910 " —14¾ "	
3½ x 7/16	900	2,350 " —11 "	16 to 25
4 x ⅜	1,000	2,090 " —10½ "	
3½ x ⅜	1,190	1,780 " — 9 "	16 to 20
3 x ⅜	1,240	1,710 " — 8½ "	
2½ x ⅜	1,342	1,575 " — 7⅞ "	12 to 16

	Per lb.
RAILROAD SPIKES.	
5 and 5½ x 9/16 "Goldie Perfect"	
5 and 5½ x 9/16	
3½, 4, 4½ and 5 x ½	
3½, 4 and 4½ x 7/16	
3, 3½ and 4 x ⅜	
2½ x ⅜	
2½ x 5/16	
Reverse points, ¼ cent extra.	
STREET RAILWAY SPIKES.	
9/16 Square, "counter sunk head"	
½ " " " "	
7/16 " " " "	
⅜ " " " "	
5/16 " " " "	
Round counter sunk, 1/10 cent extra.	
BOAT SPIKES.	
Inches.	
½ inch square, 6 to 12 in length	
7/16 " 6 to 10 "	
⅜ " 4 to 10 "	
5/16 " 4 to 8 "	
¼ " 4 to 6 "	
¼ " 3 to 3½ "	
Shorter than 4 inches, ¼ cent extra.	
BARGE SPIKES.	
5/16	
¼	
Shorter than 4 inches, ¼ cent extra.	

TABLE OF TONS PER MILE REQUIRED OF RAILS OF FOLLOWING WEIGHTS PER YARD.

Weight per yard.	Tons of 2,240 lbs. per mile.	Weight per yard.	Tons of 2,240 lbs. per mile.
16 lb.	25 tons, 320 lbs.	35 lb.	55 tons, 0 lbs.
20 "	31 " 960 "	40 "	63 " 1,920 "
25 "	39 " 640 "	45 "	70 " 1,600 "
28 "	44 " 0 "	56 "	88 " 0 "
30 "	47 " 320 "	60 "	94 " 640 "

TOUCEY PATENT SPIKE.



FIG. 7808.

PRICES ON APPLICATION.

PROUT'S SPIKE PULLER.

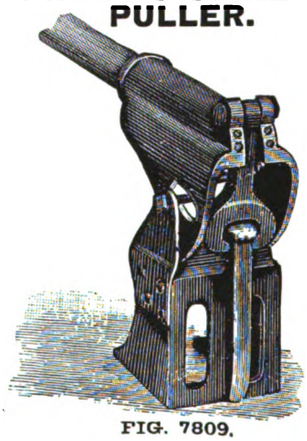


FIG. 7809.

CROSS TIES, PER MILE.

Center to center.	No. ties.
1½ feet	3,520
1¾ "	3,017
2 "	2,640
2¼ "	2,348
2½ "	2,113

SPLICE JOINTS, PER MILE.

2 bars and 4 bolts and nuts to each joint.

Rails 20 ft. lg.	528	joints.	
" 24 " "	440	"	
" 26 " "	406	"	
" 28 " "	378	"	
" 30 " "	352	"	

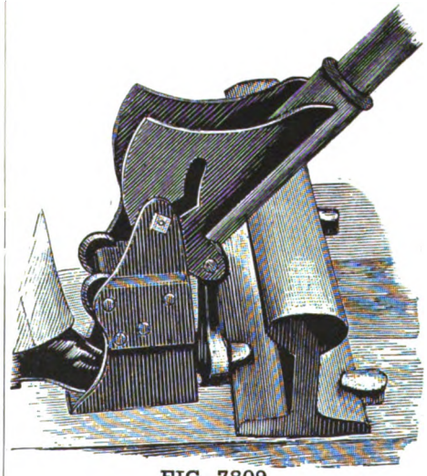


FIG. 7809.

PRICE, $7.50 EACH.

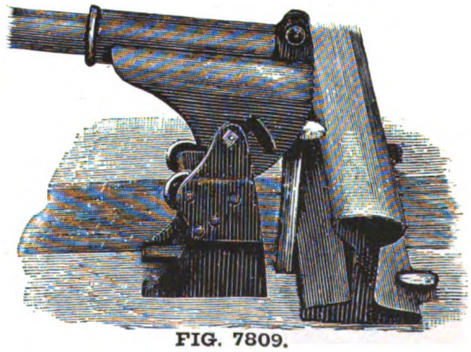


FIG. 7809.

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RAILROAD SPIKE PULLERS AND CROW BARS.

SPIKE PULLERS.

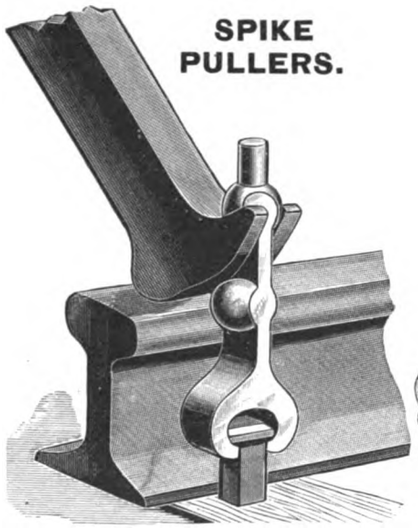


FIG. 7810. PRICE, PER LB., $0.50.

CLAW BARS, WITH HEEL.

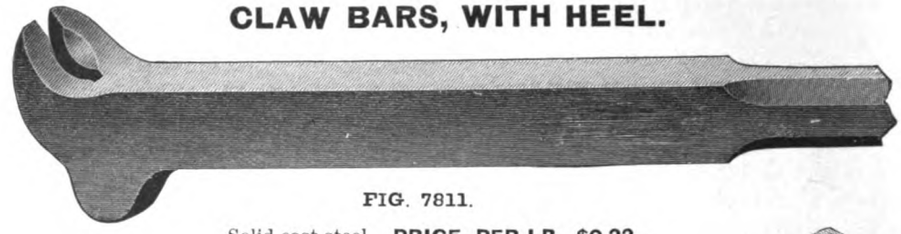


FIG. 7811.

Solid cast steel. PRICE, PER LB., $0.22.

GOOSE NECK CLAW BARS.

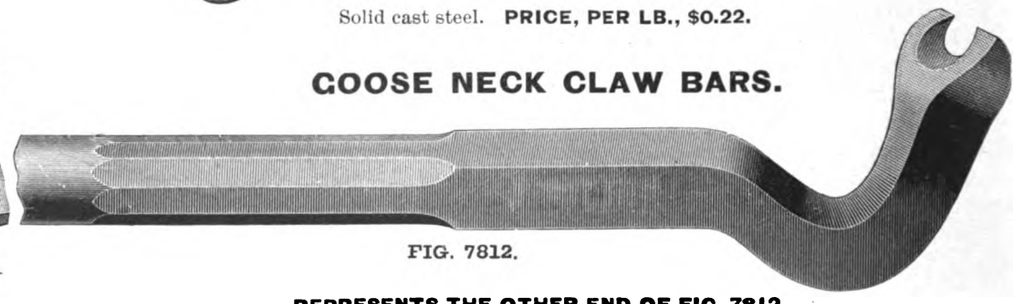
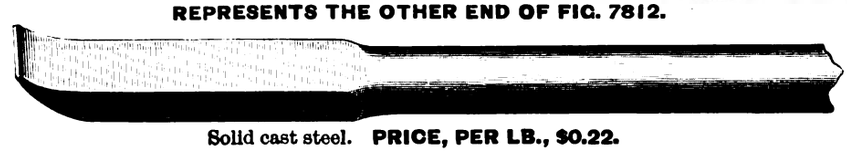


FIG. 7812.

REPRESENTS THE OTHER END OF FIG. 7812.



Solid cast steel. PRICE, PER LB., $0.22.

LINING. PINCH POINT. WEDGE POINT.

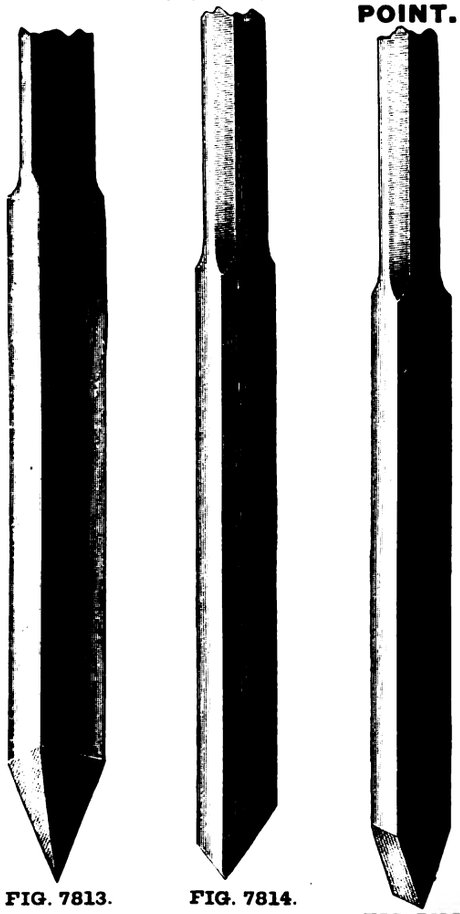


FIG. 7813. FIG. 7814. FIG. 7815.

PRICE, either bar, $0.12 PER LB.

CLAW BARS.



FIG. 7816.
PRICES ON APPLICATION.

SHACKLE BARS.



FIG. 7817.
PRICES ON APPLICATION.

FLAGGING BARS.

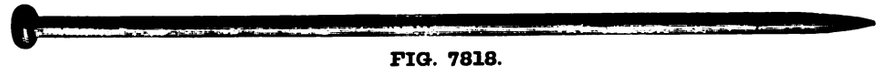


FIG. 7818.
PRICES ON APPLICATION.

TAMPING BARS.

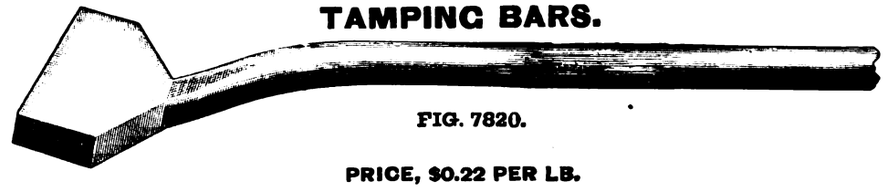


FIG. 7820.

PRICE, $0.22 PER LB.

BARRETT TRACK JACKS. SEE NEXT PAGE FOR PRICES.

NO. 2.



FIG. 7821.

NO. 18.



FIG. 7822.

NO. 19.



FIG. 7823.

NO. 1.

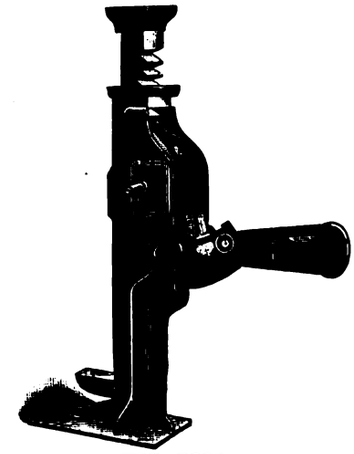


FIG. 7824.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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TRACK JACKS.

PRICES, FIGS. 7821 TO 7824.

No.	Height with bar down, inches.	Height with bar raised, inches.	Size of bar, inches.	Rise of bar, inches.	Weights, pounds.	Capacity, tons.	Prices.
1	24	37½	1½ x 1½	13½	50	10	$18.00
2	20½	30½	1⅝ x 1⅝	10	63	10	25.00
3	26½	41½	2 x 1½	15	80	12	30.00
4	20¼	30½	2¼ x 2	10	95	15	35.00
5	28	43	2¼ x 2	15	110	15	40.00
6	31	50	1⅞ x 1⅝	19	95	15	32.00
8	11	16	1⅝ x 1½	5	47	10	22.00
9	24	37½	1½ x 1½	13½	50	10	18.00
10	24¼	38¼	1½ x 1½	14	67	10	25.00
17	24	37½	1½ x 1½	13¾	60	10	20.00
18	21	31	1⅝ x 1½	10	65	10	25.00
19	28	45½	2 x 1¾	17½	90	15	35.00

PRICE, FIG. 7825.

For raising low joints, and light track repairs. 10 inch lift; weight, 40 pounds; 27 inches high with bar down. Frame and lever socket made of best air furnace malleable iron. Round lifting bar, 1¼ inches diameter. Steel pivots. Bronze boxes. Rings, hanger and lifting bar made of best refined wrought iron.
Price, with wooden lever, complete, each..... $16.00

PRICE, FIG. 7826.

For surfacing and track repairs. 12 inch lift; capacity, 5 tons; weight, 60 pounds; 31 inches high with bar down. Frame and lever socket made of best air furnace malleable iron. Round lifting bar, 1½ inches diameter. Steel pivots. Bronze boxes. Rings, hanger and lifting bar made of best refined wrought iron.
Price, with wooden lever, complete, each..... $20.00

PRICE, FIG. 7827.

For heavy ballasting, surfacing and general track repairs. 15 inch lift; capacity, 10 tons; weight, 90 pounds; 35 inches high with bar down. Frame and lever socket made of best air furnace malleable iron. Round lifting bar, 1¾ inches diameter. Steel pivots. Bronze boxes. Rings, hanger and lifting bar made of best refined wrought iron.
Price, with wooden lever, complete, each..... $24.00

PRICE, FIG. 7831.

For short and heavy lifts in surfacing. 7 inch lift; capacity, 10 tons; weight, 55 pounds; 22 inches high with bar down. Frame and lever socket made of best air furnace malleable iron. Round lifting bar, 1¾ inches diameter. Steel pivots. Bronze boxes. Rings, hanger and lifting bar made of best refined wrought iron.
Price, with wooden lever, complete, each..... $22.00

HAWKIN'S TRACK JACKS.

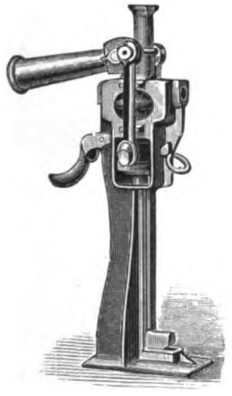


FIG. 7828.

TISCHER TRACK JACKS.

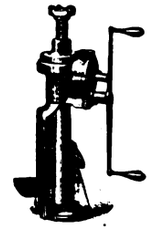


FIG. 7829.

PRICES, FIG. 7829.

5 ton, lifting from ground and top..... $50.00
10 " " " " " " 75.00
15 " " " " " " 90.00
20 " " " " " " 125.00
30 " " " " " " 175.00

PRICE, FIG. 7830.

Height of jack when bar is down, 27 inches; rise of bar, 16 inches; size of bar, 1½ x 1½ inches; weight of jack, 60 pounds; capacity, 10 tons.
Price..... $20.00

PRICES, FIG. 7828.

No. 4½ has a 12 inch lift; weighs 60 pounds, and is especially designed for section work.
Price..... $13.00

No. 4 has a 14 inch lift; weighs 110 pounds. It being very strong has no superior for track, yard and construction work.
Price..... $16.00

JENNE TRACK JACKS.

FRONT. NO. 0. REAR.

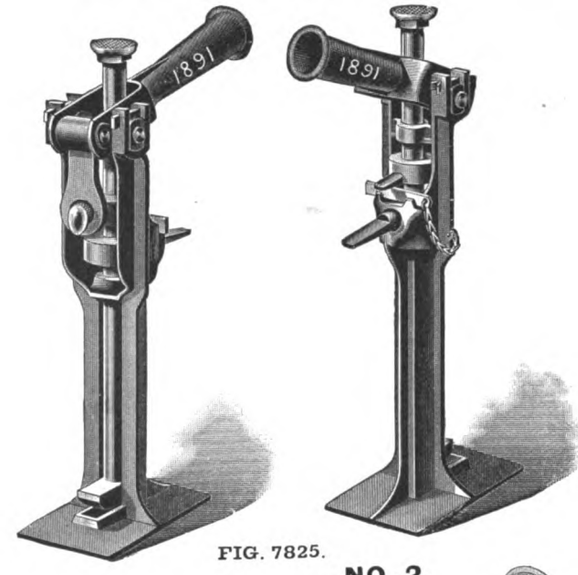


FIG. 7825.

NO. 1.

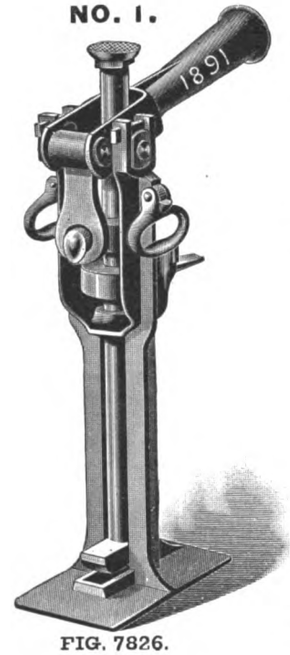


FIG. 7826.

NO. 2.

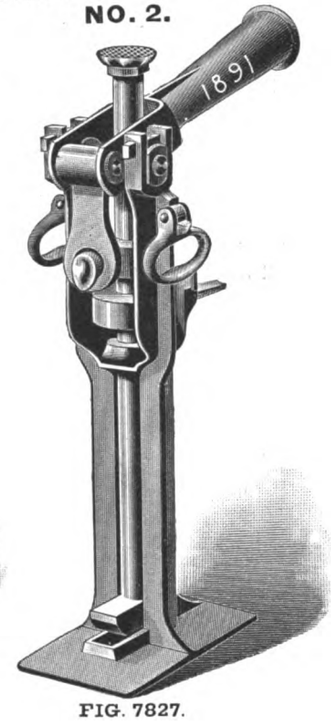


FIG. 7827.

NORTON TRACK JACKS.

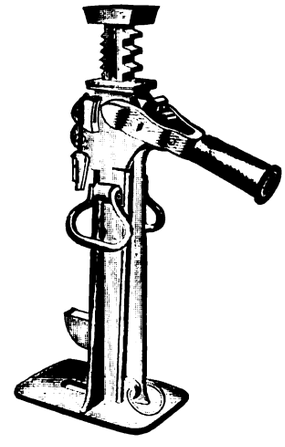


FIG. 7830.

NO. 4.

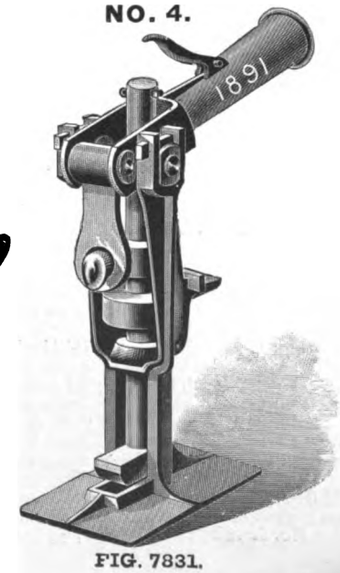


FIG. 7831.

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TRACK JACKS.

NO. 38. TOGGLE TRIP.

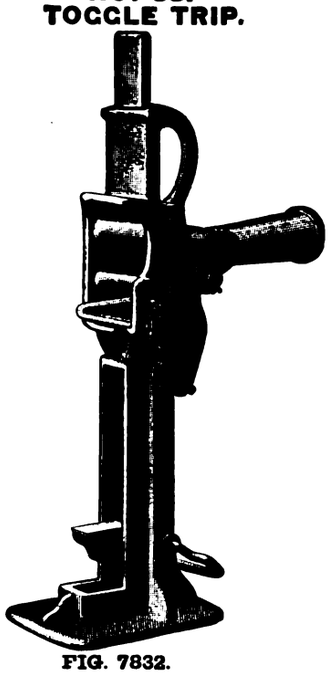


FIG. 7832.

Suitable for line work.

Height of jack when down, 26 in.
Rise of bar..... .....10 in.
Size of bar—square.....1½ in.
Weight of jack.....65 lbs.
Capacity.....4 tons.

PRICE, $18.00.

NO. 39. TOGGLE TRIP, FOR YARD.

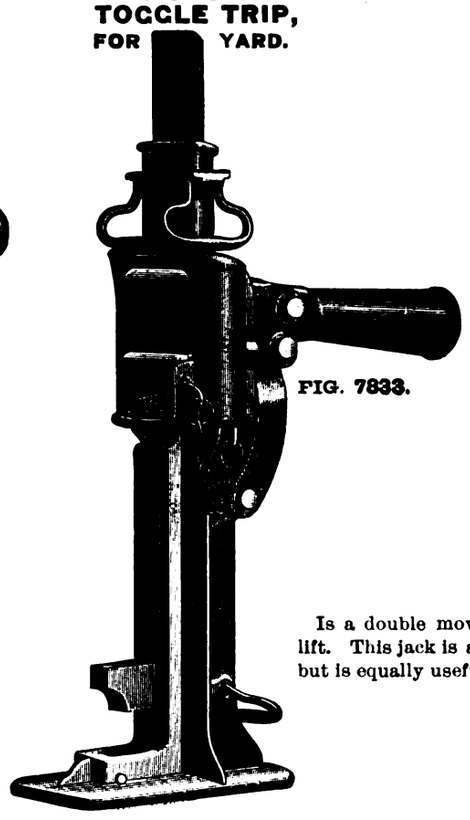


FIG. 7833.

PRICES, FIG. 7833.

Height when down.....29 in.
Rise of bar.....12 in.
Size of bar—square.....1¾ in.
Weight of jack.....75 lbs.
Capacity.....8 tons.

PRICE, $23.00.

NO. 26. RAPID, FOR BRIDGES.

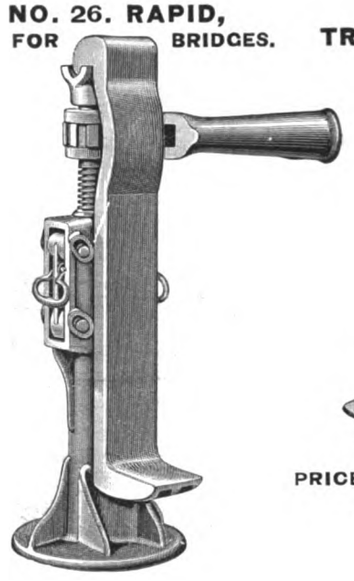


FIG. 7834.

Is a double movement ratchet screw jack, with ground lift. This jack is adapted especially for bridge track work, but is equally useful for any track service.

	PRICES, FIG. 7834.	PRICES, FIG. 7835.
Height of jack when down	19 inches.	29 inches.
Rise of screw	8 inches.	14 inches.
Diameter of screw	2 inches.	3 inches.
Weight of jack	45 lbs.	150 lbs.
Capacity	8 tons.	50 tons.
Price, with forked lever ratchet	$20.00	$90.00
Price, with spring ratchet	28.00	

NO. 18. TRACK AND BRIDGE.

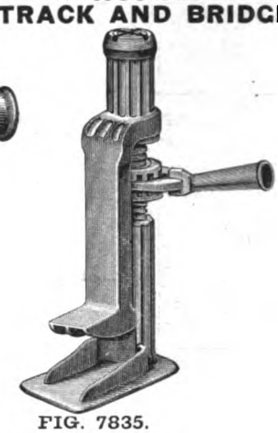


FIG. 7835.

PRICES, FIG. 7835.

See below.

MOSHER'S LIFTING JACKS.

NOS. 1, 2, 3, 4 AND 5.



FIG. 7836.

NO. 6.



FIG. 7837.

NOS. 7 AND 8.



FIG. 7838.

PRICES, FIGS. 7836 TO 7838.

No. 0. Weighs 19 lbs.; designed for car inspectors' use; has socket lever, so that the steel bar or hook they use will act as an extension lever. Price, $6.00.

No. 1. Weighs 25 lbs.; 11½ inches high; is used as a journal or oil-box jack; will raise 6 inches. Price, $12.00.

No. 2. Weighs 50 lbs.; 20 inches high; raises 10 inches; ¾ inch at a stroke; is used as a heavy track jack. Price, $15.00.

No. 3. Weighs 80 lbs.; 26 inches high; raises 15½ inches, 1 inch notches; is intended for heavy track, light cars and bridge work, and is a good 12-ton jack. Price, $22.50.

No. 4. Is 20 inches high; raises 12 inches; ⅞ inch at a stroke; weighs 72 lbs.; fulcrum, ½ inch; capacity, 15 tons; intended for all heavy work on narrow-gauge railroads. Price, $20.00; with ground lift, $25.00.

No. 5. Is 26 inches high; ½ inch notches; raises 15½ inches; weighs 90 lbs. Is intended for heavy car and locomotive work, and is extensively used for wrecking, bridge work, etc.; is not equaled by any as a general purpose jack; has stood working tests of more than 20 tons. Capacity, 15 tons. Price, $30.00.

No. 6. Is 24 inches high; raises 13½ inches; ½ inch notches; weighs 120 lbs.; and is designed for heavy car and locomotive work; is a good 18-ton jack; used extensively in wrecking. Price, $36.00.

No. 7. Is 34 inches high; raises 23 inches, ½ inch at a stroke; weighs 118 lbs.; base, 16 inches in diameter; is intended for car, coach or sleeper work; is a good 15-ton jack. Price, $38.00.

No. 8. Is 20 inches high; raises 10 inches, ⅜ inch at a stroke; weighs 34 lbs.; and is intended for track work. Price, $10.00.

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TRACK, CAR AND SUNDRY JACKS.

SCREW TRACK JACK.

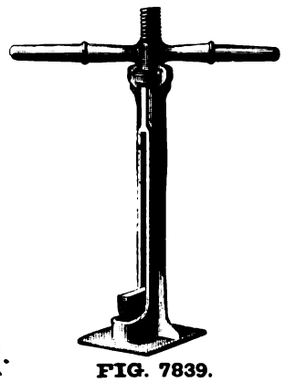


FIG. 7839.

Diameter of screw.. 1½ in.
Rise of screw.....15 "
Weight, complete...35 lbs.

PRICE, $6.00.

NOS. 1 AND 2 JACKS.

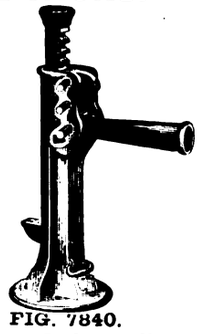


FIG. 7840.

PRICES, NO. 1.

Height of jack when down, 16 in.
Rise of bar..... 9 "
Size of bar, square..... 1¼ "
Weight of jack..... 25 lbs.
Capacity..... 2 tons.

PRICE, $10.00.

PRICES, NO. 2, FIG. 7840.

Height when down.....19 inches.
Rise of bar.....11 "
Size of bar, square.....1¼ "
Weight of jack.....25 pounds.
Capacity.....2 tons.

PRICE, $10.00.

SCREW TRACK JACKS.

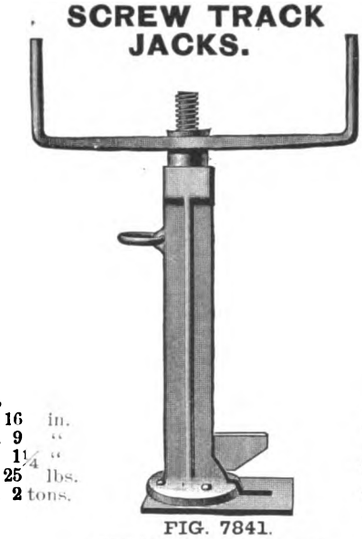


FIG. 7841.

Will lift 12 tons. Diameter of screw, 1½; lift, 18 inches.

PRICE, $13.00.

WROUGHT IRON SCREW.

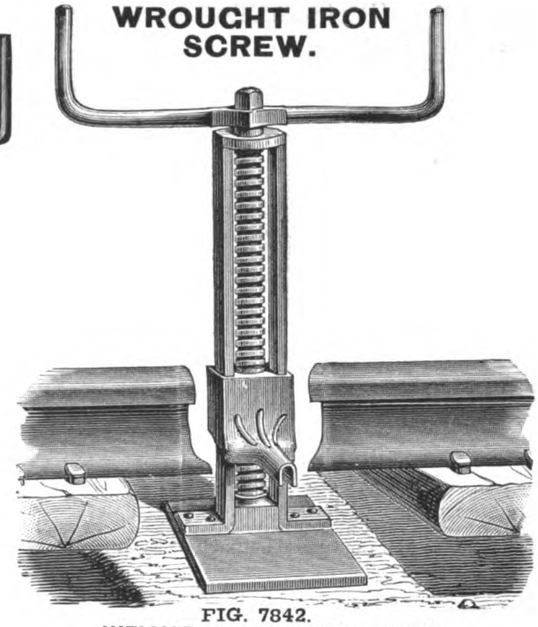


FIG. 7842.

WEIGHT, 50 LBS. PRICE, $5.00.

NOS. 5, 5A, 6 AND 7 JACKS.



FIG. 7843.

NO. 5 JACK

Is used generally for freight car service and for track work.

Height of jack when down.....28¾ inches.
Rise of bar.....15 "
Size of bar, square.....1¾ "
Weight of jack.....76 pounds.
Capacity.....8 tons.

PRICE, $23.00.

NO. 5A JACK

Is used generally for freight car service and for track work.

This jack is the same as No. 5, except that it is 4¾ inches shorter, to meet a demand for a short, heavy jack.

Height of jack when down.....24 inches.
Rise of bar.....10 "
Size of bar, square.....1¾ "
Weight of jack.....70 pounds.
Capacity.....8 tons.

PRICE, $23.00.

NO. 6 JACK

Is used as a heavy car and wrecking jack, and for other heavy work.

Height of jack when down.....28 inches.
Rise of bar.....15 "
Size of bar, square.....2 "
Weight of jack.....95 pounds.
Capacity.....15 tons.

PRICE, $26.00.

NO. 4 JACKS.

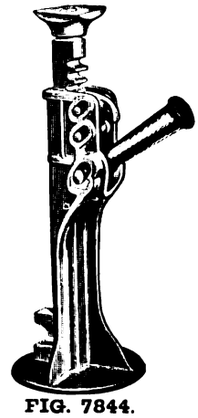


FIG. 7844.

NO. 4 JACK

Is used mainly as a railroad track jack.

Height of jack when down.....23 inches.
Rise of bar.....14 "
Size of bar, square.....1½ "
Weight of jack.....42 pounds.
Capacity.....4 tons.

PRICE, $16.00.

NO. 7 JACK, FIG. 7843,

Is a heavy wrecking and car jack, and is specially useful where a long run of the bar is desired.

Height of jack when down.....37½ inches.
Rise of bar.....25 "
Size of bar, square.....2 "
Weight of jack.....118 pounds.
Capacity.....15 tons.

PRICE, $30.00.

NO. 9 JACK, FIG. 7846.

This jack is used for heavy track and heavy yard work.

Height when down.....29 inches.
Rise of bar.....14 "
Size of bar, round.....2 in. diam.
Weight of jack.....90 pounds.
Capacity.....12 tons.

PRICE, $35.00.

NO. 3 JACK.



FIG. 7845.

Is used especially as a truck box jack.

Height of jack when down.....12 inches.
Rise of bar.....4 "
Size of bar, square.....1½ "
Weight of jack.....28 pounds.
Capacity.....4 tons.

PRICE, $10.00.

NO. 8. COMPOUND LEVER JACK.

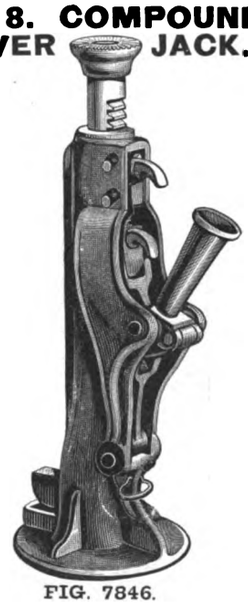


FIG. 7846.

We call this a car jack, but it is used for locomotive and wrecking work as well.

Height of jack when down.....29 inches.
Rise of bar.....14 "
Size of bar, round.....2 in. diam.
Weight of jack.....90 pounds.
Capacity.....12 tons.

PRICE, $35.00.

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RATCHET LEVER JACK SCREWS.

BALL'S TELESCOPIC JACK SCREWS.

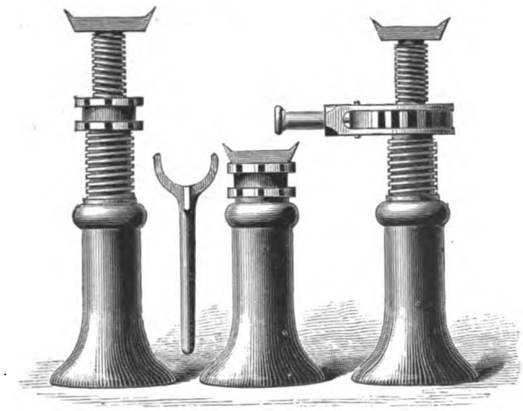


FIG. 7847. SHUT. FIG. 7848.

These jacks consist of two wrought iron screws, one working within the other, operating simultaneously. By this method of construction the screws can be run out nearly double the height of the base, and will raise a load in one-half the time required by the ordinary jack, without increasing the labor.

PRICES.

Size.	Height of base, inches.	Height closed, inches.	Net rise, inches.	Total height, inches.	Prices, Fig. 7847.	Prices, Fig. 7848.
No. 1	7½	10	11	21	$15.00	$25.00
No. 2	10	14	16	30	18.00	30.00
No. 3	13½	17	23	40	22.00	32.00
No. 4	18	21	31	52	25.00	35.00
No. 5	22	25	36	61	30.00	40.00

TRIPOD RATCHET JACK SCREWS.

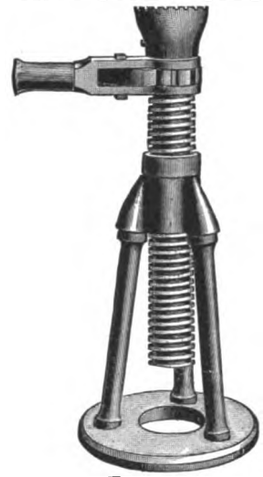


FIG. 7849.

Our tripod jack screws have wrought iron screws, legs and bases, brass nuts, and steel ratchets, pawls and handles.

Diam. of screw, inches.	Height over all, inches.	Lifting capacity, tons.	Prices.	Diam. of screw, inches.	Height over all, inches.	Lifting capacity, tons.	Prices.
2¼	18	28	$50.00	2½	36	32	$67.00
2¼	20	28	51.00	2¾	24	36	65.00
2¼	22	28	52.00	2¾	26	36	66.25
2¼	24	28	53.00	2¾	28	36	67.50
2½	18	32	56.50	2¾	30	36	68.75
2½	20	32	57.50	2¾	36	36	73.00
2½	22	32	58.50	3	24	40	70.00
2½	24	32	59.50	3	26	40	71.50
2½	26	32	60.75	3	28	40	73.00
2½	28	32	62.00	3	30	40	74.50
2½	30	32	63.25	3	36	40	79.00

NO. 9 COACH JACKS.



FIG. 7850.

PRICES, FIG. 7850.

Height, 31 inches. Rise of 21 inches. Weight, 100 lbs. Capacity, 30 tons. Gun metal nut, 4 inches deep. Steel screw, 2½ inches diameter. Closed ratchet. Head and stand made of the best air furnace malleable iron.

PRICE, $60.00 EACH.

NO. 8 LOCOMOTIVE JACK.



FIG. 7851.

Height, 12 inches. Rise, 6 inches. Weight, 27 lbs. Capacity, 20 tons. Gun metal nut. Steel screw, 2 inches diameter. Ratchet box, head and stand of malleable iron.

PRICE, $20.00.

NO. 7 LOCOMOTIVE JACK.

Same as No. 8, except that it has iron nut instead of gun metal nut.

PRICE, $17.00.

BELL BASE RATCHET JACK SCREWS.



FIG. 7852.

This jack has wrought iron screw, cast iron stand and cap, and steel ratchet, pawl and handle.

PRICES.

Diam. of screw, inches.	Height over all, inches.	Lifting capacity, tons.	Prices.	Diam. of screw, inches.	Height over all, inches.	Lifting capacity, tons.	Prices.
2	12	24	$16.00	2½	20	32	$23.50
2	14	24	16.75	2½	22	32	24.50
2	16	24	17.50	2½	24	32	25.50
2	18	24	18.25	2½	26	32	26.50
2	20	24	19.00	2½	28	32	27.75
2	22	24	19.75	2½	30	32	29.00
2	24	24	20.50	2½	34	32	33.00
2	26	24	21.50	2½	36	32	35.00
2	28	24	22.50	2½	38	32	37.00
2	30	24	23.50	2¾	20	36	27.50
2¼	18	28	21.00	2¾	24	36	30.00
2¼	20	28	22.00	2¾	28	36	32.50
2¼	22	28	23.00	2¾	30	36	34.00
2¼	24	28	24.00	2¾	36	36	40.00
2¼	26	28	25.00	3	20	40	32.00
2¼	28	28	26.00	3	24	40	35.00
2¼	30	28	27.00	3	30	40	40.00
2½	18	32	22.50	3	36	40	48.00

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RATCHET SCREW JACKS. DOUBLE MOVEMENT.

TENDER AND TRUCK BOX JACKS.

NOS. 12, 13 AND 14.



FIG. 7853.

NO. 15.

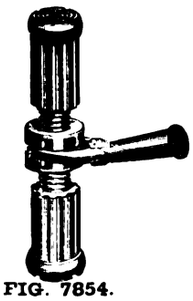


FIG. 7854.

NOS. 16, 17, 19 AND 22.

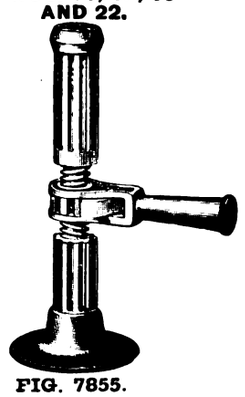


FIG. 7855.

NOS. 20, 21, 21 1-2 AND 23.

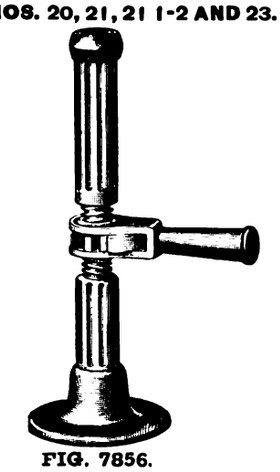


FIG. 7856.

NOS. 24, 25 AND 27.



FIG. 7857.

PRICES, FIGS. 7853 TO 7857.

No.	Diam. of screw.	Height when down.	Rise of screw.	Weight.	Capacity in tons.	Prices, each.
12	2	10	4	20	8	$10.00
13	2	12	6	28	8	10.00
14	2	13	7	25	8	10.00
15	2	13	7	20	8	10.00
16	2	16	10	36	8	17.00
17	2	20	13	43	8	18.00
19	2½	16	9	47	25	25.00
20	2½	20	12	55	25	30.00
21	2½	24	16	65	25	35.00
21½	2½	36	24	85	25	45.00
22	3	27	18	125	50	45.00
23	3	33	24	145	50	50.00
24	2	22	11	48	8	35.00
25	2½	27	15	90	25	50.00
27	2½	36¼	24	137	25	65.00

NO. 36 TRAVERSING JACKS.

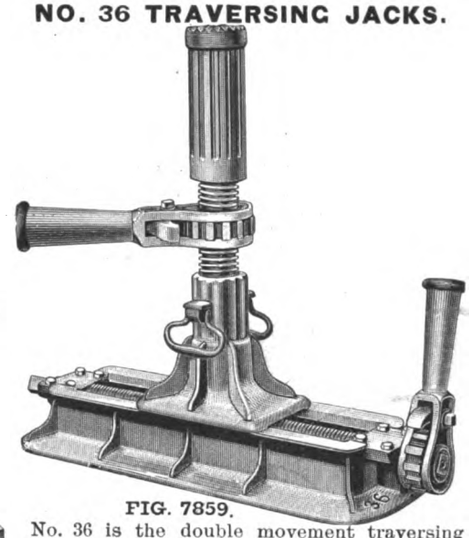


FIG. 7859.

No. 36 is the double movement traversing screw jack, suitable for locomotive, wrecking and bridge work.

This style can be made shorter when desired, in which case the safe elevation will be reduced by the amount it is shortened.

Height when down.....23 inches.
Safe elevation.....10 "
Horizontal movement.....15 "
Weight.....143 pounds
Capacity.....25 tons.

PRICE, $63.00.

NO. 37 TRAVERSING JACKS.

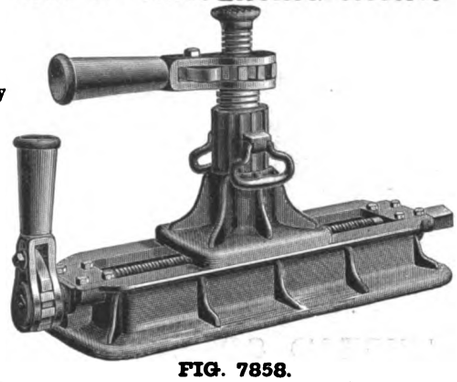


FIG. 7858.

This is our light telescope traversing jack, having the advantage of a low jack with a high lift. The base is the same as we use for No. 35. The telescope screw is gun metal bronze, and the interior screw is forged steel.

Height when down.....15 inches.
Rise of screw.....10 "
Horizontal movement.....15 "
Weight.....120 pounds.
Capacity.....8 tons.

PRICE, $65.00.

This cut represents our No. 35 rapid moving traversing screw jack. It is made from tasty and neat patterns, designed with special attention to strength and durability. The materials used are malleable iron, gun metal bronze and forged steel.

It is adapted to locomotive, wrecking and bridge work.

Height when down.....27 inches.
Horizontal movement.....15 "
Safe elevation.....10 "
Weight, complete.....150 pounds.
Capacity.....25 tons.

PRICE, $75.00.

NO. 35 TRAVERSING JACKS.

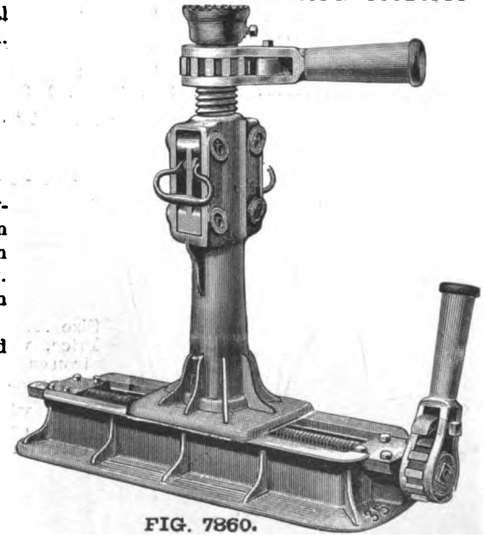


FIG. 7860.

PRICES, FIG. 7858.

NO. 37A.

Same as No. 37 except that this style has a 6-way head instead of a spring ratchet.

Height when down.....15 inches.
Rise of screw.....10 "
Horizontal movement.....15 "
Weight of jack.....115 pounds.
Capacity.....8 tons.

PRICE, $55.00.

NO. 60.

TELESCOPE TRAVERSING SCREW JACK.

Constructed entirely of malleable iron, gun metal bronze and forged steel. Same as Fig. 7858.

Height of jack when down.....18 inches.
Rise of screw.....14 "
Horizontal movement.....15 "
Weight of jack.....140 pounds.
Capacity.....10 tons.

PRICE, $75.00.

NO. 60A.

Same as No. 60 except that this style has 6-way head instead of spring ratchet.

Height of jack when down.....18 inches.
Rise of screw.....14 "
Horizontal movement.....15 "
Weight of jack.....135 pounds.
Capacity.....10 tons.

PRICE, $63.00.

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TRAVERSING JACKS.

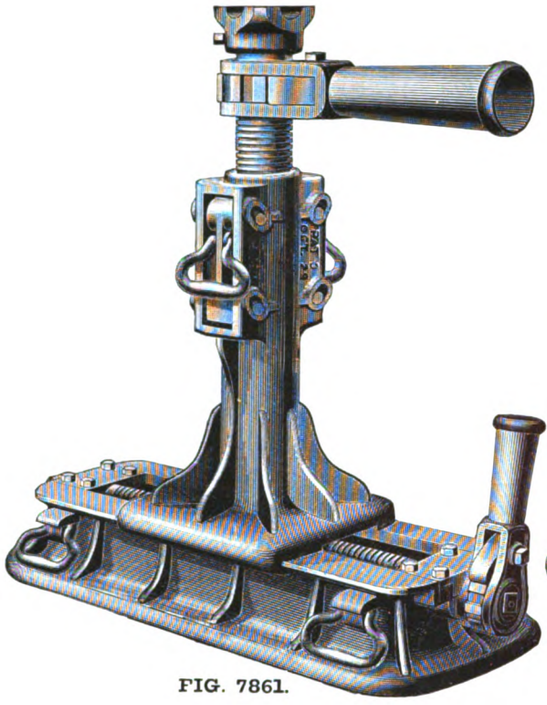


FIG. 7861.

Adapted for heavy bridge work.
Height when down, 30½ in. Horizontal movement, 15 in.
Rise of screw.....11 " Weight.....300 lbs.
Capacity, 50 tons.

PRICE, $150.00.

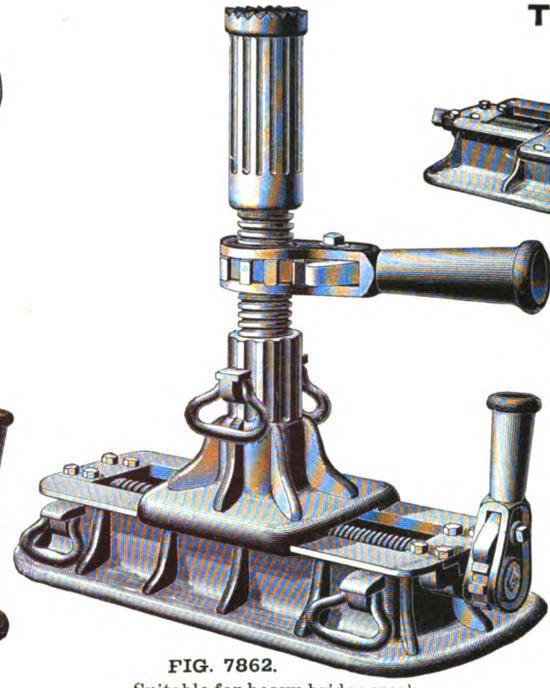


FIG. 7862.

Suitable for heavy bridge work.
Height when down.....26 inches.
Rise of screw.....12 "
Horizontal movement.....15 "
Weight of jack.....280 lbs.
Capacity.....50 tons.

PRICE, $125.00.

TRAVERSING BASES.



FIG. 7863.

We put a sliding plate or rest on this base instead of a jack, so that any jack can be readily used.
Horizontal movement... 15 inches.
Size of plate.....10 in. x 12 inches.
Weight.....90 lbs.
Capacity.....25 tons.

PRICE, $40.00.

PRICES, FIG. 7864.

Horizontal movement... 15 inches.
Size of plate.....13 in. x 13 inches.
Weight.....180 lbs.
Capacity.....50 tons.

PRICE, $60.00.

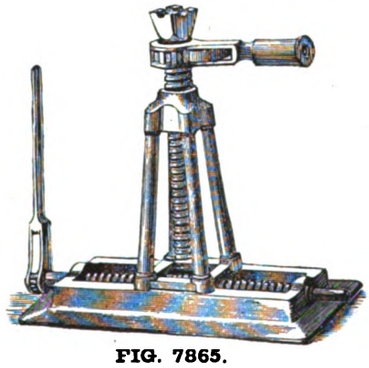


FIG. 7865.



FIG. 7866.

TRAVERSING BASES.

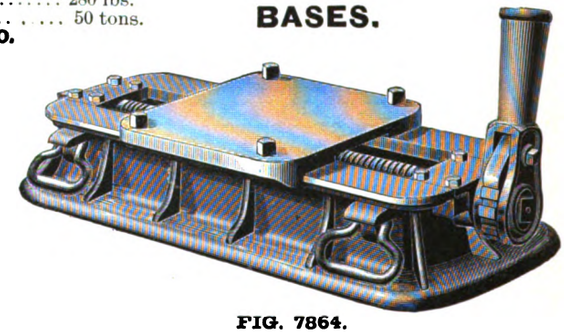


FIG. 7864.

WROUGHT IRON SQUARE THREAD SCREWS AND FRAME, BRASS NUTS, DOUBLE RATCHET TO ELEVATING SCREW.

PRICES.

No	1	2	3	4	5	6	
Diam. of elevating screw	2¼	2⅜	2 7/16	2½	2¾	3	inches.
Height when down	20	21	21	22	22	23	"
Will traverse	7	10	12	12	12	12	"
Approximate weight	75	90	100	113	138	162	lbs.
Either pattern	$48.00	$58.00	$62.00	$70.00	$90.00	$110.00	each.

The safe "run out" of each is 9 inches.

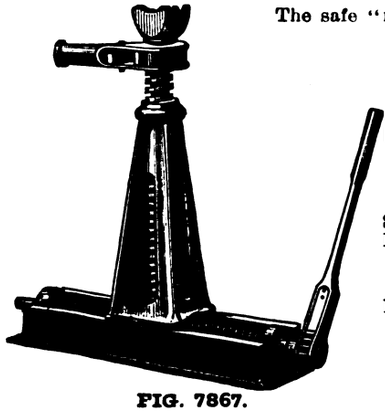


FIG. 7867.

DESCRIPTION, FIG. 7867.

The body and nuts are malleable iron. Wrought iron lifting and traverse screw with square threads.

DIMENSIONS AND SIZES SAME AS FIGS. 7865 AND 7866.

PRICES, FIG. 7867.

Size	1	2	3	4	5	6	
Price, with iron case as described	$38.00	$45.00	$50.00	$58.00	$74.00	$90.00	each.
Price, with brass case, extra fine	52.00	60.00	72.00	82.00	98.00	120.00	"

RATCHET CARRYING JACK SCREW.



FIG. 7868.

This jack has a steel base, brass nuts and wrought iron screws and legs. The ratchet, pawls and handles are made of steel and malleable iron.
Lifting capacity.....36 tons.
Diameter of lifting screw.....2¾ inch.
Diameter of traverse screw.....1⅝ "
Length of lifting screw.....18 "
Length of traverse screw.....18 "
Height, over all.....26 "

PRICE, $140.00.

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BALL-BEARING RATCHET.

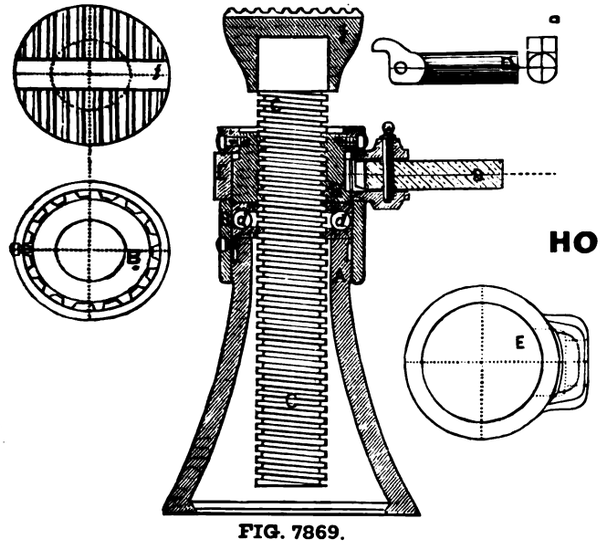


FIG. 7869.

JACK SCREWS. PRICES, FIG. 7869.

Capacity.	Lift.	Diameter, screw.	High.	Diameter, base.	Weight.	Prices.
5 tons.	4½ in.	1¾ in.	8½ in.	5 in.	18 lbs.	$17.00
5 "	6 "	1¾ "	11 "	5 "	25 "	20.00
10 "	8 "	2 "	14 "	7 "	40 "	25.00
10 "	8 "	2 "	18 "	7½ "	58 " foot-lift	36.00
10 "	18 "	2 "	24 "	8½ "	90 "	42.00
20 "	10 "	2½ "	19 "	8 " sq.	85 "	42.00
20 "	18 "	2½ "	25 "	10 " diam.	110 "	45.00
20 "	24 "	2½ "	32 "	8 "	130 "	50.00
30 "	10 "	3 "	20 "	10 "	130 "	55.00
30 "	24 "	3 "	30 "	12 "	200 "	60.00

HOLLOW SCREW JACKS.

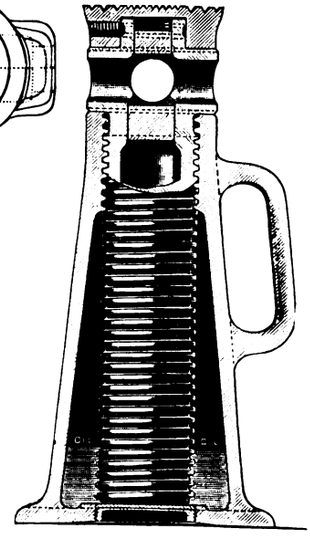


FIG. 7870.

BALL-BEARING JACKS.

STYLE H. STYLE A. WITH HOOK.

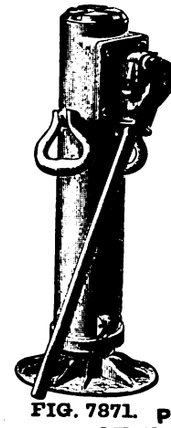


FIG. 7871.

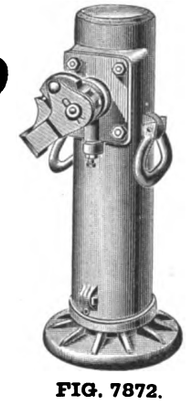


FIG. 7872.

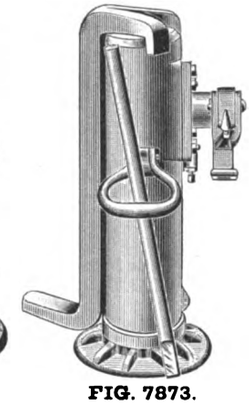


FIG. 7873.

PRICES, FIGS. 7872 AND 7873.

STYLE A. 20 AND 25 TONS.

Style.	Height.	Rise.	Diam. of base.	Weight.	Capacity.	Prices.	Extra hook.
A	26 in.	14 in.	10 in.	90 lbs.	20 tons.	$80.00	$6.00
A	26 "	14 "	10 "	90 "	25 "	90.00	6.00

PRICES, FIGS. 7871 AND 7873.

STYLE H. 20 AND 25 TONS.

H	33 in.	20 in.	12 in.	110 lbs.	20 tons.	$90.00	$6.00
H	33 "	20 "	12 "	110 "	25 "	95.00	6.00

FRICTIONLESS RAILWAY JACKS.

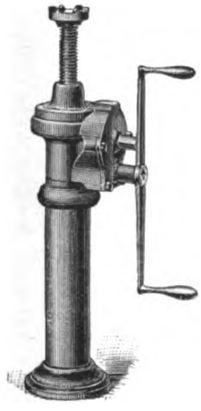


FIG. 7874.

PRICES, FIG. 7874.

5 ton, lifting from top only	$45.00
10 " " " " "	60.00
15 " " " " "	75.00
20 " " " " "	100.00
30 " " " " "	135.00

JOURNAL OR AXLE BOX JACKS.

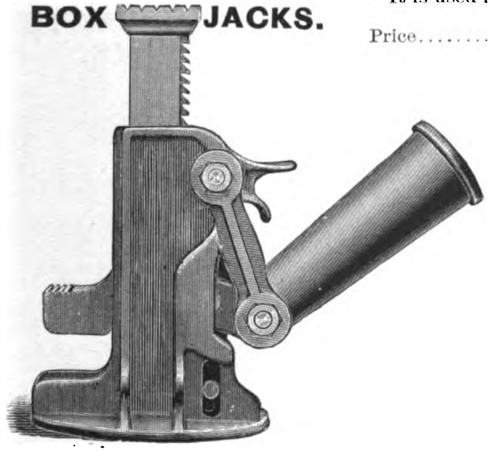


FIG. 7875.

PRICE, FIG. 7875.

This is a practical ratchet jack for car inspecting and journal box repairing.

Its height is adapted to standard journal boxes. It is very strong and powerful; quick and ready in movement.

Carried on engine or in caboose, it is a jack that is very useful.

The height of this jack is 11½ inches, the rise of the bar being 5 inches.

Weight of jack, 48 lbs. Capacity, 6 tons.

It is used for truck or axle box jack.

Price..... $16.00

PRICE, FIG. 7876.

The height of this jack is 28 inches, the rise of the bar being 15 inches.

Weight of jack, 115 lbs. Capacity, 13 tons.

It is a car and heavy yard jack.

Price..... $35.00

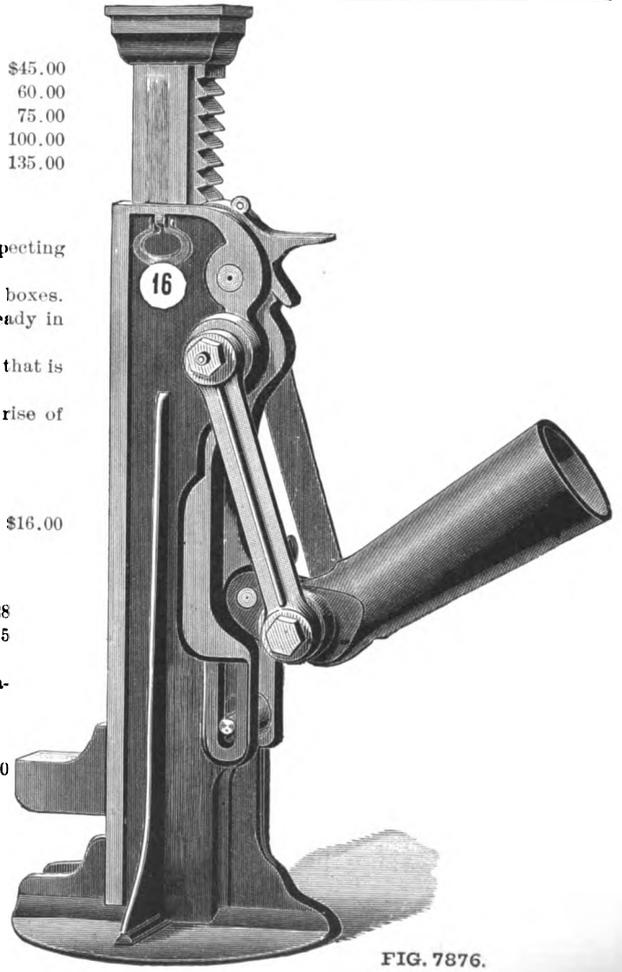


FIG. 7876.

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JACK SCREWS.

BELL BOTTOM JACKS.



FIG. 7877.

In these jacks, Nos. 101 to 124, the base is made of malleable iron, the screw is made of basic steel. The screws are our style of bracket thread, half square and half V, with the square side to the load.

The base is closed to keep the dirt from coming in contact with the screw, and the cap is thoroughly protected from dust, being accurately fitted with special tools, and covering the top of the screw entirely.

No. 171 is a special heavy, short jack, and has a gun metal bronze screw.

PRICES, FIG. 7877.

No.	Height when down.	Diameter of screw.	Rise.	Weight.	Prices.
101	10 in.	2 in.	4½ in.	19 lbs.	$5.00
102	12 "	2 "	6½ "	22 "	5.50
111	10 "	2¼ "	6 "	24 "	5.75
112	12 "	2¼ "	8 "	28 "	6.25
121	12 "	2½ "	5 "	33 "	8.00
122	14 "	2½ "	7 "	38 "	8.50
123	16 "	2½ "	9 "	42 "	9.00
124	18 "	2½ "	11 "	45 "	9.50
171	22 "	4½ "	12 "	150 "	65.00

TELESCOPE JACKS.



FIG. 7878.

PRICES, FIG. 7878.

The base is malleable iron, the telescope screw gun metal, bronze, the interior screw forged steel.

	No. 44.	No. 45.
Height when down	8 inch.	12 inch.
Rise of screw	8 "	12 "
Weight of jack	19 lbs.	30 lbs.
Capacity	6 tons.	8 tons.
Prices	$12.00	$15.00
" with spring ratchet	20.00	25.00

LOCOMOTIVE JACK SCREWS.

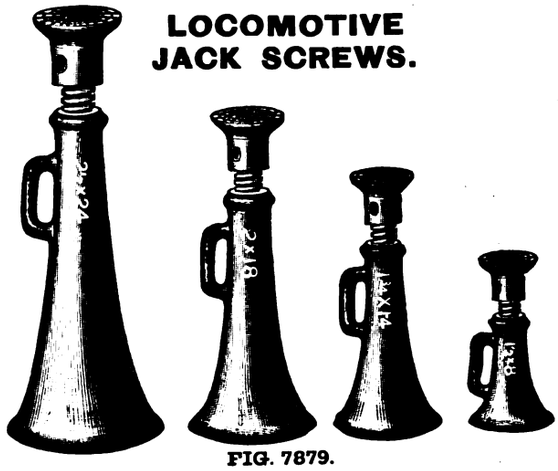


FIG. 7879.

These jack screws are made with swivel caps of the same diameter as the head, closed at the top to prevent dirt from entering between the cap and screw. The cap is held in place by a set screw running in a groove cut in the top of the screw.

PRICES.

Diam. of screw.	Height of stand.	Height over all.	Lifting capacity.	Prices.	Diam. of screw.	Height of stand.	Height over all.	Lifting capacity.	Prices.
1⅛ in.	6 in.	9 in.	8 tons	$2.90	2 in.	18 in.	22½ in.	20 tons	$10.25
1⅛ "	8 "	11 "	8 "	3.25	2 "	20 "	24½ "	20 "	11.50
1⅛ "	10 "	13 "	8 "	3.60	2 "	22 "	26½ "	20 "	12.50
1⅛ "	12 "	15 "	8 "	4.00	2 "	24 "	28½ "	20 "	13.50
1⅛ "	14 "	17 "	8 "	4.40	2¼ "	8 "	13 "	24 "	7.50
1¼ "	6 "	9 "	10 "	3.10	2¼ "	10 "	15 "	24 "	8.25
1¼ "	8 "	11 "	10 "	3.40	2¼ "	12 "	17 "	24 "	9.00
1¼ "	10 "	13 "	10 "	3.80	2¼ "	14 "	19 "	24 "	10.00
1¼ "	12 "	15 "	10 "	4.20	2¼ "	16 "	21 "	24 "	11.00
1¼ "	14 "	17 "	10 "	4.60	2¼ "	18 "	23 "	24 "	12.00
1½ "	5 "	8 "	12 "	3.50	2¼ "	20 "	25 "	24 "	13.25
1½ "	6 "	10 "	12 "	3.75	2¼ "	22 "	27 "	24 "	14.50
1½ "	8 "	12 "	12 "	4.25	2¼ "	24 "	29 "	24 "	15.75
1½ "	10 "	14 "	12 "	4.75	2½ "	6½ "	11 "	28 "	8.00
1½ "	12 "	16 "	12 "	5.25	2½ "	8 "	14 "	28 "	8.75
1½ "	14 "	18 "	12 "	6.00	2½ "	10 "	16 "	28 "	9.75
1½ "	16 "	20 "	12 "	6.75	2½ "	12 "	18 "	28 "	10.75
1¾ "	6 "	10 "	16 "	4.50	2½ "	14 "	20 "	28 "	12.00
1¾ "	8 "	12 "	16 "	5.00	2½ "	16 "	22 "	28 "	13.25
1¾ "	10 "	14 "	16 "	5.75	2½ "	18 "	24 "	28 "	14.50
1¾ "	12 "	16 "	16 "	6.25	2½ "	20 "	26 "	28 "	15.75
1¾ "	14 "	18 "	16 "	6.75	2½ "	22 "	28 "	28 "	17.00
1¾ "	16 "	20 "	16 "	7.50	2½ "	24 "	30 "	28 "	18.25
1¾ "	18 "	22 "	16 "	8.50	2½ "	28 "	34 "	28 "	22.00
2 "	5 "	9½ "	20 "	5.00	2½ "	32 "	38 "	28 "	26.00
2 "	6 "	10½ "	20 "	5.25	3 "	14 "	20 "	36 "	19.50
2 "	8 "	12½ "	20 "	6.00	3 "	16 "	22 "	36 "	20.75
2 "	10 "	14½ "	20 "	6.75	3 "	18 "	24 "	36 "	22.00
2 "	12 "	16½ "	20 "	7.50	3 "	20 "	26 "	36 "	23.25
2 "	14 "	18½ "	20 "	8.25	3 "	22 "	28 "	36 "	24.50
2 "	16 "	20½ "	20 "	9 25	3 "	24 "	30 "	36 "	25.75

Levers will be sent only when ordered, and will be charged extra.

CAR BOX JACK SCREWS.



FIG. 7880.

PRICES, FIG. 7880.

Diam. of screw.	Height of stand.	Height over all.	Lifting capacity.	Prices.
1½ in.	5 in.	8 in.	12 tons	$4.00
1½ "	6 "	10 "	12 "	4.25
1½ "	8 "	12 "	12 "	4.75
1½ "	10 "	14 "	12 "	5.25
1½ "	12 "	16 "	12 "	5.75
1¾ "	6 "	10 "	16 "	5.00
1¾ "	8 "	12 "	16 "	5.50
1¾ "	10 "	14 "	16 "	6.25
1¾ "	12 "	16 "	16 "	6.75
2 "	5 "	10 "	20 "	5.50
2 "	6 "	11 "	20 "	5.75
2 "	8 "	13 "	20 "	6.50
2 "	10 "	15 "	20 "	7.25
2 "	12 "	17 "	20 "	8.00
2 "	14 "	19 "	20 "	8.75
2¼ "	8 "	13 "	24 "	8.00
2¼ "	10 "	15 "	24 "	8.75
2¼ "	12 "	17 "	24 "	9.50
2¼ "	14 "	19 "	24 "	10.50
2¼ "	16 "	21 "	24 "	11.50
2½ "	6½ "	11 "	28 "	8.50
2½ "	8 "	14 "	28 "	9.25
2½ "	10 "	16 "	28 "	10.25
2½ "	12 "	18 "	28 "	11.25
2½ "	14 "	20 "	28 "	12.50
2½ "	16 "	22 "	28 "	13.75

KNOWLES JACKS.



FIG. 7881.

PRICES, FIG. 7881.

1⅛ inch screw,	8 inch	barrel		$4.00
1¾ " "	10 "	"		5.00
2 " "	12 "	"		6.50
2⅛ " "	15 "	"		12.00
2½ " "	20 "	"		14.00

Other sizes made to order.

OIL PRESS SCREWS.

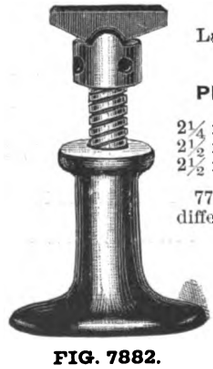


FIG. 7882.

Large bottom and top.

PRICES, EACH.

2¼ x 10	$12.00
2½ x 12	13.25
2½ x 14	14.00

77 other sizes and different styles made.

MACHINISTS' JACKS.

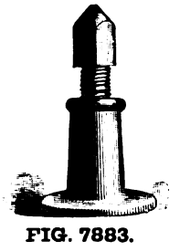


FIG. 7883.

For machine shops, cotton factories, etc.

PRICES, PER DOZ.

1, 1 in. screw	$18.00	3, ⅝ in. screw	$12.00
2, ¾ " "	16.00	4, ½ " "	9.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PRESS SCREWS.



FIG. 7884.

JACK SCREWS.

DESCRIPTION, FIGS. 7884 AND 7885.

These screws are made of wrought iron, with cast iron nuts and caps. The nuts are made to let into wood blocks.

LIFTING CAPACITY.

1¾ in. screw will raise 16 tons. 2½ in. screw will raise 28 tons.
2 " " " " 20 " 2¾ " " " " 32 "
2¼ " " " " 24 " 3 " " " " 36 "

PRICES.

Diam. of screws.	Height over all.	Prices.	Diam. of screws.	Height over all.	Prices.	Diam. of screws.	Height over all.	Prices.
2 in.	24 in.	$8.40	2½ in.	32 in.	$13.90	2¾ in.	48 in.	$24.80
2 "	26 "	8.80	2½ "	34 "	14.40	2¾ "	50 "	25.50
2 "	28 "	9.20	2½ "	36 "	14.90	2¾ "	52 "	26.20
2 "	30 "	9.60	2½ "	38 "	15.50	2¾ "	54 "	26.90
2 "	32 "	10.00	2½ "	40 "	16.00	2¾ "	56 "	27.60
2 "	34 "	10.40	2½ "	42 "	16.50	2¾ "	58 "	28.30
2 "	36 "	10.80	2½ "	44 "	17.10	2¾ "	60 "	29.00
2 "	38 "	11.20	2½ "	46 "	17.60	3 "	24 "	19.20
2 "	40 "	11.60	2½ "	48 "	18.10	3 "	26 "	20.00
2¼ "	24 "	10.30	2½ "	50 "	18.60	3 "	28 "	20.80
2¼ "	26 "	10.70	2½ "	52 "	19.10	3 "	30 "	21.60
2¼ "	28 "	11.10	2½ "	54 "	19.70	3 "	32 "	22.40
2¼ "	30 "	11.50	2½ "	56 "	20.30	3 "	34 "	23.20
2¼ "	32 "	11.90	2½ "	58 "	20.80	3 "	36 "	24.00
2¼ "	34 "	12.30	2½ "	60 "	21.30	3 "	38 "	24.80
2¼ "	36 "	12.70	2¾ "	24 "	16.40	3 "	40 "	25.60
2¼ "	38 "	13.20	2¾ "	26 "	17.10	3 "	42 "	26.40
2¼ "	40 "	13.60	2¾ "	28 "	17.80	3 "	44 "	27.20
2¼ "	42 "	14.10	2¾ "	30 "	18.50	3 "	46 "	28.00
2¼ "	44 "	14.60	2¾ "	32 "	19.20	3 "	48 "	28.80
2¼ "	46 "	15.00	2¾ "	34 "	19.90	3 "	50 "	29.60
2¼ "	48 "	15.40	2¾ "	36 "	20.60	3 "	52 "	30.40
2½ "	50 "	16.00	2¾ "	38 "	21.30	3 "	54 "	31.20
2½ "	24 "	11.90	2¾ "	40 "	22.00	3 "	56 "	32.00
2½ "	26 "	12.40	2¾ "	42 "	22.70	3 "	58 "	32.80
2½ "	28 "	12.90	2¾ "	44 "	23.40	3 "	60 "	33.60
2½ "	30 "	13.40	2¾ "	46 "	24 10			

HOUSE RAISING SCREWS.

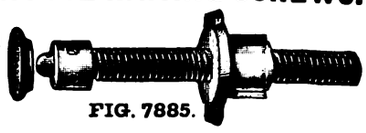


FIG. 7885.

PRICES.

Diam. of screws.	Height over all.	Prices.	Diam. of screws.	Height over all.	Prices.	Diam. of screws.	Height over all.	Prices.
1¾ in.	12 in.	$4.80	2 in.	24 in.	$8.40	2¼ in.	28 in.	$11.10
1¾ "	14 "	5.10	2 "	26 "	8.80	2½ "	12 "	8.50
1¾ "	16 "	5.40	2 "	28 "	9.20	2½ "	14 "	9.00
1¾ "	18 "	5.70	2¼ "	12 "	7.50	2½ "	16 "	9.60
1¾ "	20 "	6.00	2¼ "	14 "	7.90	2½ "	18 "	10.20
2 "	12 "	6.00	2¼ "	16 "	8.30	2½ "	20 "	10.80
2 "	14 "	6.40	2¼ "	18 "	8.80	2½ "	22 "	11.30
2 "	16 "	6.80	2¼ "	20 "	9.30	2½ "	24 "	11.90
2 "	18 "	7.20	2¼ "	22 "	9.80	2½ "	26 "	12.40
2 "	20 "	7.60	2¼ "	24 "	10.30	2½ "	28 "	12.90
2 "	22 "	8.00	2¼ "	26 "	10.70	2½ "	30 "	13.40

PRICES, FIGS. 7890 AND 7891.

No 1. 2 tons; wrought iron head; steel post; double steel gears; height, 2 feet 8 inches; lifts 1 foot 8 inches; weighs 65 lbs.....Price, $25.00
No. 2. 4 tons; wrought iron head; steel post; double steel gears; height, 2 feet 11 inches; lifts 1 foot 8 inches; weighs 100 lbs.....Price, $35.00
No. 3. 9 tons; wrought iron head; brass bushings; steel post; triple steel gears; height, 3 feet 4 inches; lifts 1 foot 8 inches; weighs 160 lbs.....Price, $65.00
No. 4. 12 tons; wrought iron head; brass bushings; steel post; triple steel gears; height, 3 feet 8 inches; lifts 1 foot 8 inches; weighs 250 lbs.....Price, $100.00

COTTON SCREWS.

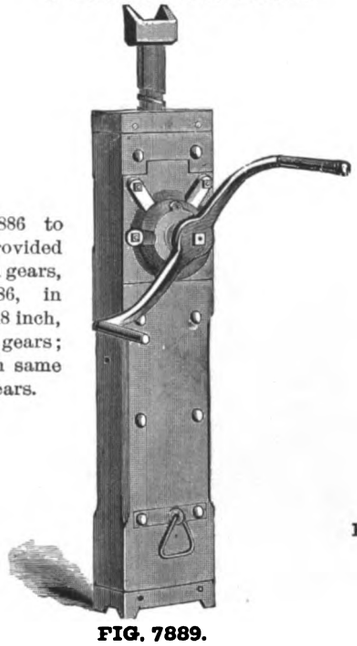


FIG. 7889.

STONE AND LIFTING JACKS.

NOS. 1 AND 2.

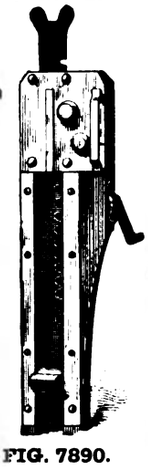


FIG. 7890.

NOS. 3 AND 4.

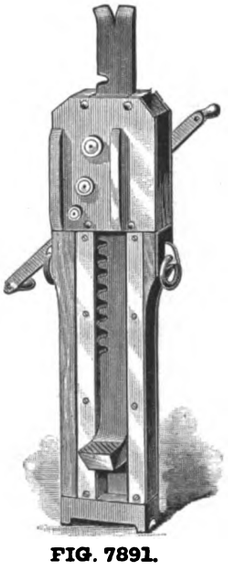


FIG. 7891.

CLAW AND TIMBER.

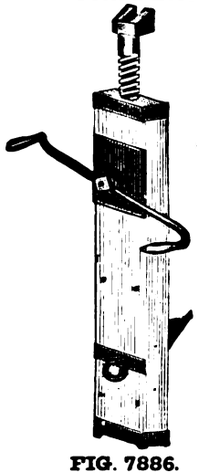


FIG. 7886.

PLANKER.

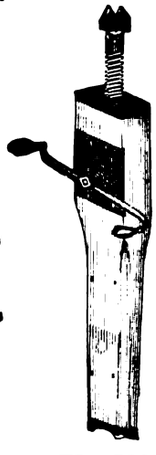


FIG. 7887.

SUGAR.

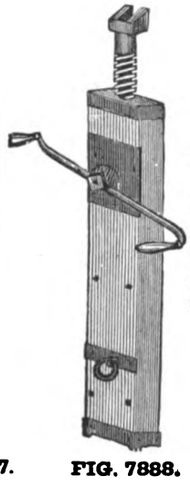


FIG. 7888.

Jacks Figs. 7886 to 7889 are all provided with composition gears, except Fig. 7886, in sizes 36, 42 and 48 inch, which have steel gears; also Fig. 7889, in same sizes, are steel gears.

PRICES, FIG. 7886.

Length of screw.	Size of screw.	Prices.
24 inch.	2 inch.	$20.00
30 "	2 "	22.00
33 "	2 "	23.00
36 "	2 "	24.00
33 "	2¼ "	29.00
36 "	2¼ "	32.00
42 "	2¼ "	36.00
36 "	2¾ "	50.00
42 "	2¾ "	55.00
48 "	2¾ "	60.00

PRICES, FIG. 7887.

Length of screw.	Size of screw.	Prices.
30 inch.	2 inch.	$19.00
33 "	2 "	19.50
36 "	2 "	20.00
42 "	2¼ "	28.00

PRICES, FIG. 7888.

24 inch.	2 inch.	$18.00
30 "	2 "	19.00
33 "	2 "	19.50
36 "	2 "	20.00

STONE JACKS.

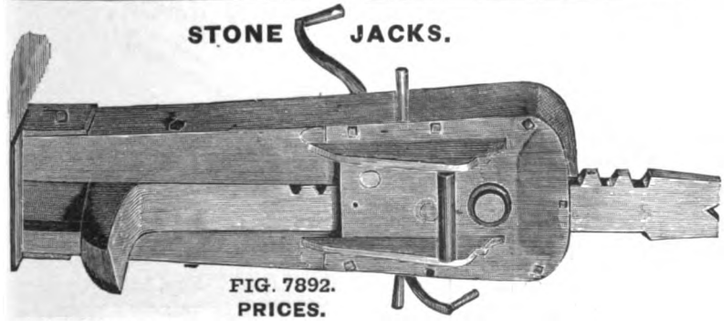


FIG. 7892.

PRICES.

Double geared stone jack, to handle 15 tons..... $125.00
Extra single " " " " 10 to 12 tons..... 85.00
Single " " " " 5 " 7 " 75.00
Light " " " " 4 " 5 " 65.00

PRICES, FIG. 7889.

Length of screw.	Size of screw.	Prices.
24 inch.	2¼ inch.	$24.00
30 "	2¼ "	25.00
36 "	2¼ "	26.00
42 "	2¼ "	28.00
36 "	2¾ "	45.00
42 "	2¾ "	48.00
48 "	2¾ "	52.00

PRICES, FIG. 7893.

No.	Height when down.	Rise of bar.	Size of bar.	Weight.	Capacity.	Prices.
2	19 in.	11 in.	1¼ in.	25 lbs.	2 ton.	$10.00
4	23 "	14 "	1½ "	42 "	4 "	16.00
5	28¾ "	15 "	1¾ "	75 "	8 "	23.00
6	28 "	15 "	2 "	95 "	15 "	26.00
7	37½ "	25 "	2 "	118 "	15 "	30.00

STONE JACKS.

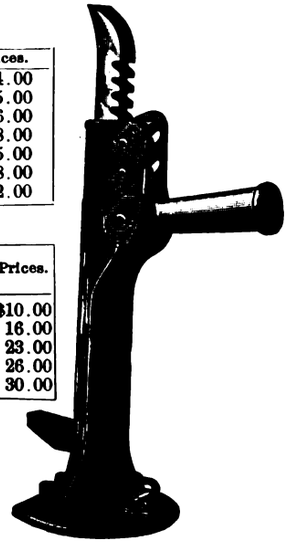


FIG. 7893.

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DUDGEON'S HYDRAULIC JACKS.

PLAIN JACKS.

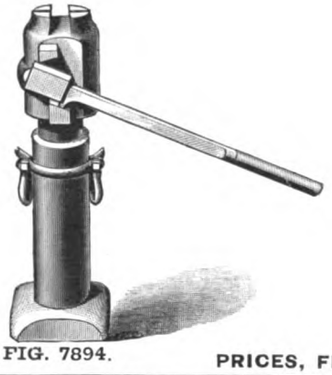


FIG. 7894.

PRICES, FIG. 7894.

Tons lift.	Run out.	Height.	Size, bottom.	Weight.	Prices.	Tons lift.	Run out.	Height.	Size, bottom.	Weight.	Prices.
4	12	24	4 sq	46	$60.00	15	24	39	6½ sq	140	$150.00
4	24	37	4 "	60	65.00	20	12	26	7 "	127	120.00
7	12	25	4½ "	64	70.00	20	18	33	7 "	155	145.00
7	18	32	4½ "	72	73.00	20	24	39	7 "	180	170.00
7	24	38	4½ "	80	75.00	30	9	22	8 rd	146	150.00
10	12	25	6 "	80	80.00	30	12	26	8 "	194	175.00
10	18	32	6 "	98	95.00	30	18	33	8 "	260	210.00
10	24	39	6 "	110	110.00	40	12	27	9 "	280	210.00
15	12	26	6½ "	102	100.00	40	18	34	9 "	320	250.00
15	18	32	6½ "	120	125.00						

BASE JACKS.

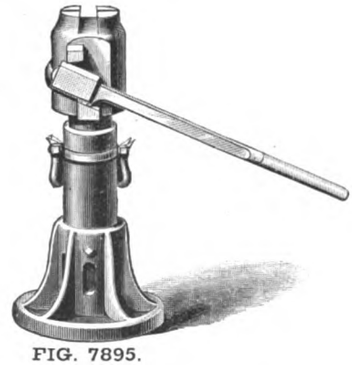


FIG. 7895.

PRICES, FIG. 7895.

Tons lift.	Run out.	Height.	Size, bottom.	Weight.	Prices.
4	12 in.	23 in.	9½ in. rd.	61	$60.00
4	24 "	37 "	9½ "	80	65.00
7	12 "	25 "	10 "	82	80.00
7	18 "	31 "	10 "	100	85.00
7	24 "	38 "	10 "	120	90.00
10	12 "	25 "	11 "	109	95.00
10	18 "	31 "	11 "	125	110.00
10	24 "	39 "	11 "	145	125.00
15	12 "	25 "	12 "	135	125.00
15	18 "	32 "	12 "	158	150.00
15	24 "	39 "	12 "	176	175.00
20	12 "	26 "	13 "	169	150.00
20	18 "	33 "	13 "	198	175.00
20	24 "	39 "	13 "	228	200.00
30	9 "	22 "	14 "	210	170.00
30	12 "	26 "	14 "	259	200.00
30	18 "	33 "	14 "	300	235.00
40	12 "	27 "	14½ "	320	240.00
40	18 "	33 "	14½ "	360	280.00

GROUND LIFTING JACKS.



FIG. 7896.

PRICES, FIG. 7896.

Tons lift.	Run out.	Height.	Size, bottom.	Weight.	Prices.
4	12 in.	24 in.	4 in. sq.	64	$60.00
4	24 "	37 "	4 "	94	65.00
7	12 "	25 "	4½ "	90	85.00
7	18 "	31 "	4½ "	110	88.00
7	24 "	38 "	4½ "	123	90.00
10	12 "	25 "	6 "	123	100.00
10	18 "	32 "	6 "	144	120.00
10	24 "	39 "	6 "	170	145.00
15	12 "	26 "	6½ "	162	150.00
15	18 "	32 "	6½ "	189	185.00
20	12 "	26 "	7 "	207	200.00
20	18 "	33 "	7 "	245	240.00
30	12 "	26 "	8 in. rd.	310	250.00

HORIZONTAL HYDRAULIC JACKS.

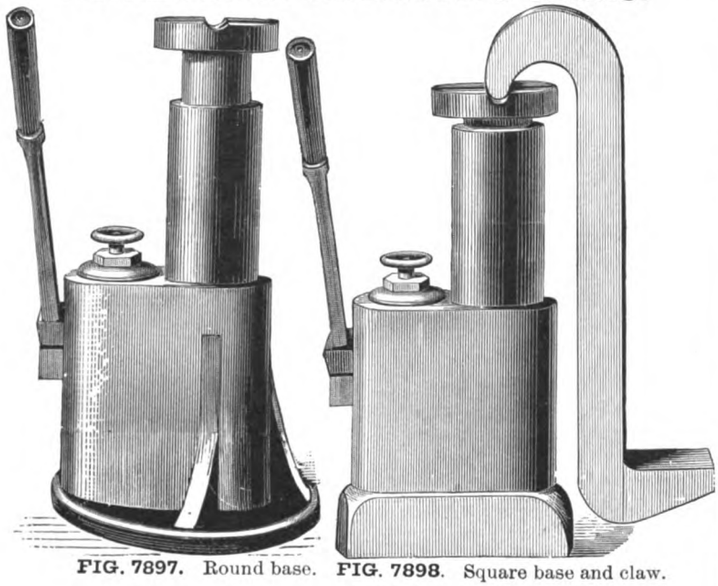


FIG. 7897. Round base. FIG. 7898. Square base and claw.

PRICES, FIGS. 7897 AND 7898.

Tons.	Run out.	Height.	Size of round base.	Size of square base.	Weight.	Prices.	Prices, with claw, used with sq're base only.
7	12 in.	20 in.	11 in.	9 x 5½	102	$80.00	$85.00
7	18 "	26 "	11 "	9 x 5½	120	85.00	90.00
10	12 "	20 "	12 "	9½ x 7	135	95.00	105.00
10	18 "	26 "	12 "	9½ x 7	166	110.00	125.00
10	24 "	32 "	12 "	9½ x 7	196	130.00	150.00
15	12 "	21 "	12 "	9½ x 7	150	125.00	150.00
15	18 "	26 "	12 "	9½ x 7	187	150.00	180.00
15	24 "	32 "	12 "	9½ x 7	200	175.00	215.00
20	12 "	21 "	13½ "	11 x 8½	197	150.00	185.00
20	18 "	27 "	13½ "	11 x 8½	242	175.00	215.00
20	24 "	33 "	13½ "	11 x 8½	255	200.00	250.00
30	12 "	22 "		12½ x 9	234	200.00	240.00
30	18 "	28 "		12½ x 9	285	235.00	285.00
40	12 "	22 "		13½ x 10	320	240.00	290.00
40	18 "	28 "		13½ x 10	355	280.00	340.00

OVAL BASE.

60 TONS AND OVER.



FIG. 7899.

Jacks of 30 and 40 tons are furnished with bases as shown in Fig. 7899.

PRICES, FIG. 7899.

Tons.	Run out.	Height.	Size of oval base.	Weight.	Prices.
60	9	17	14 x 12	320	$250.00
60	12	20	14 x 12	350	275.00
60	18	26	14 x 12	410	350.00
80	9	19	16 x 13	400	310.00
80	12	22	16 x 13	475	335.00
100	9	19	17 x 14½	520	375.00
100	12	22	17 x 14½	570	400.00
125	9	19	18 x 16	535	425.00
125	12	22	18 x 16	585	450.00
150	12	23	20 x 17½	920	500.00

Larger sizes made to order.

CAR BRASS JACK.

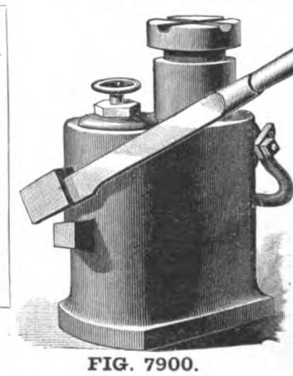


FIG. 7900.

Lift..... 7 tons.
Run out.....5 in.
Height .....11 "
Size, bottom, 8 x 5 "
Weight.....56 lbs.
Price.....$75.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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HYDRAULIC JACKS.

OUTSIDE PUMP.

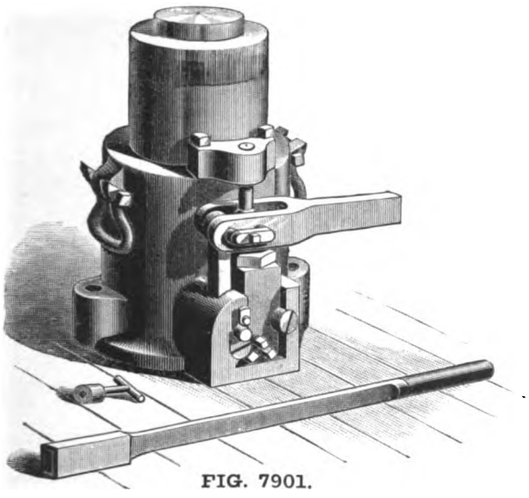


FIG. 7901.

Prices same as Fig. 7899.

DOUBLE PUMP.

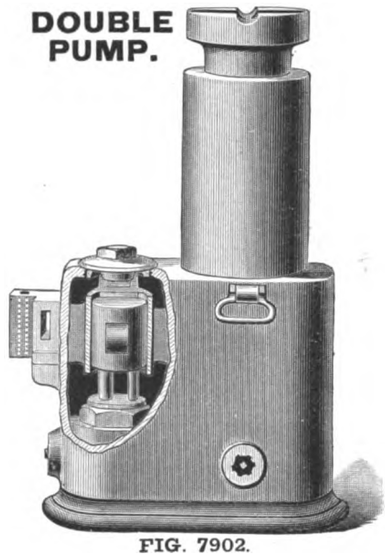


FIG. 7902.

Prices $50.00 extra on list Fig. 7899.

TRAVERSE JACKS.

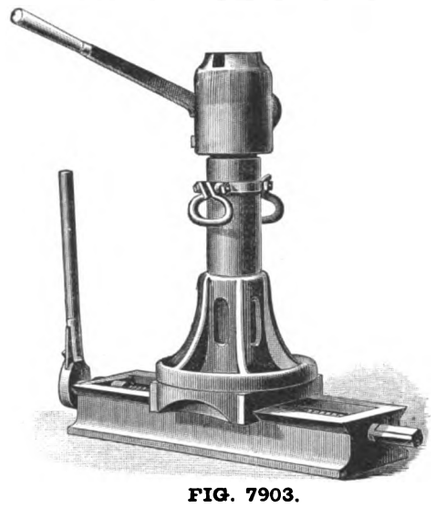


FIG. 7903.

In 10, 15, 20 and 30 tons. Prices on application.

REGULAR HYDRAULIC JACKS.

PLAIN.

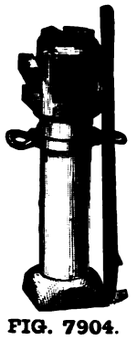


FIG. 7904.

BROAD BASE.

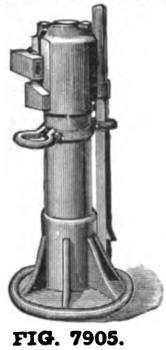


FIG. 7905.

CLAW.

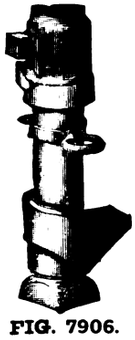


FIG. 7906.

HORIZONTAL CLAW.

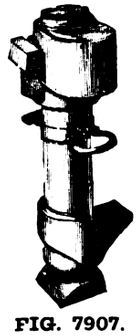


FIG. 7907.

CAR BOX. BASE STYLE.

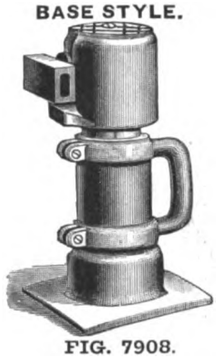


FIG. 7908.

CAR BOX. LOW STYLE.

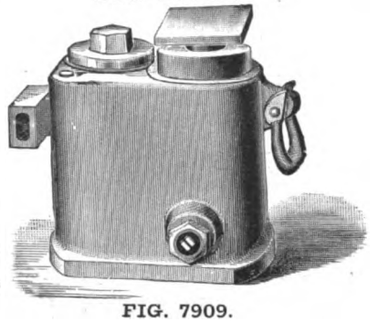


FIG. 7909.

HOOK HEAD, WITH CLAWS.

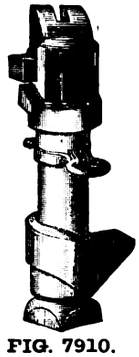


FIG. 7910.

PRICES, FIG. 7904.

Jack to lift.	Raise.	Height.	Size of bottom.	Weight.	Prices.
4 tons.	3 inch.	11 inches.	3½ inch. sq.	22 lbs.	$40.00
4 "	12 "	25 "	3½ " "	41 "	50.00
7 "	3 "	11 "	4½ " "	25 "	46.00
7 "	12 "	25 "	4½ " "	50 "	56.00
7 "	18 "	31 "	4½ " "	61 "	60.00
7 "	24 "	37 "	4½ " "	80 "	64.00
10 "	12 "	25 "	5¾ " "	70 "	64.00
10 "	18 "	31 "	5¼ " "	88 "	72.00
10 "	24 "	37 "	5¼ " "	100 "	80.00
15 "	12 "	25 "	6 " "	93 "	80.00
15 "	18 "	32½ "	6 " "	118 "	92.00
20 "	12 "	25½ "	6½ " "	115 "	96.00
20 "	18 "	32 "	6½ " "	140 "	115.00
30 "	9 "	20½ "	10 in. round.	160 "	120.00
30 "	12 "	27½ "	10 " "	218 "	140.00

Special lengths at prices of next longer length, for Figs. 7904 and 7905.

PRICES, FIG. 7905.

Jack to lift.	Raise.	Total height.	Diameter base.	Weight.	Prices.
4 tons.	3 inch.	11 inches.	5 inch. sq.	26 lbs.	$45.00
4 "	12 "	25 "	8 "	62 "	56.00
7 "	3 "	11 "	6 " sq.	32 "	50.00
7 "	12 "	25 "	11 "	71 "	64.00
7 "	18 "	31 "	11 "	83 "	67.00
7 "	24 "	37 "	11 "	100 "	70.00
10 "	12 "	25 "	12 "	100 "	76.00
10 "	18 "	31 "	12 "	110 "	88.00
10 "	22 "	36 "	12 "	115 "	96.00
10 "	24 "	38 "	12 "	120 "	100.00
15 "	12 "	25½ "	13 "	127 "	100.00
15 "	18 "	32 "	13 "	150 "	120.00
15 "	22 "	36 "	13 "	170 "	135 00
20 "	12 "	25 "	13¼ "	150 "	120.00
20 "	18 "	32 "	13½ "	188 "	140.00
20 "	22 "	36 "	13¼ "	210 "	150.00
30 "	9 "	20 "	13½ "	200 "	136.00
30 "	12 "	26 "	13½ "	250 "	160.00
30 "	18 "	32 "	13½ "	315 "	200.00
40 " all steel	12 "	12 "	15 "	280 "	180.00

PRICES, FIG. 7906.

Jack to lift.	Raise.	Height when down.	Height of claw.	Weight.	Prices.
4 tons.	12 inch.	25 inches.	4½ in.	60 lbs.	$58.00
7 "	12 "	25½ "	5 "	80 "	68.00
7 "	18 "	32 "	5 "	94 "	70.00
7 "	24 "	38 "	5 "	113 "	72.00
10 "	12 "	26 "	6¼ "	110 "	80.00
10 "	18 "	32 "	6¼ "	140 "	90.00
15 "	12 "	26¼ "	6¾ "	145 "	120.00
15 "	18 "	32 "	6¾ "	195 "	135.00
20 "	12 "	26½ "	6¼ " steel	190 "	160.00
30 "	12 "	26½ "	5¾ " "	300 "	200.00

PRICES, FIG. 7907.

Jack to lift.	Raise.	Length when closed.	Weight.	Prices.
4 tons.	12 inch.	26½ inches.	63 lbs.	$58.00
7 "	12 "	26½ "	80 "	68.00
7 "	24 "	38 "	115 "	72.00
10 "	12 "	25½ "	110 "	80.00
15 "	12 "	26 "	145 "	120.00
20 "	12 "	26 "	190 "	160.00
30 "	12 "	26 "	300 "	200.00

PRICES, FIGS. 7908 AND 7909.

	Capacity.	Total height.	Base.	Raise.	Weight.	Prices.
Plain style,	4 ton.	11 in.	3½ x 3½	3 in.	22 lbs.	$40.00
" "	7 "	11 "	4½ x 4½	3 "	25 "	46.00
Base "	4 "	11 "	5 x 5	3 "	26 "	45.00
" "	7 "	11 "	6 x 6	3 "	32 "	50.00
Low "	7 "	11 "	6 x 9	6 "	60 "	60.00
" "	10 "	11 "	6 x 9	6 "	75 "	70.00

PRICES, FIG. 7910.

Jack to lift.	Raise.	Height when down.	Height of claw.	Weight.	Prices.
4 tons.	12 inch.	27 inches.	4½ inches.	60 lbs.	$58.00
4 "	24 "	39 "	4½ "	76 "	62.00
7 "	12 "	27 "	5 "	80 "	68.00
7 "	24 "	39 "	5 "	115 "	72.00
10 "	12 "	27 "	6¼ "	110 "	80.00
10 "	18 "	34 "	6¼ "	140 "	90.00

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HYDRAULIC JACKS.

LOW JACKS. OUTSIDE PUMP.

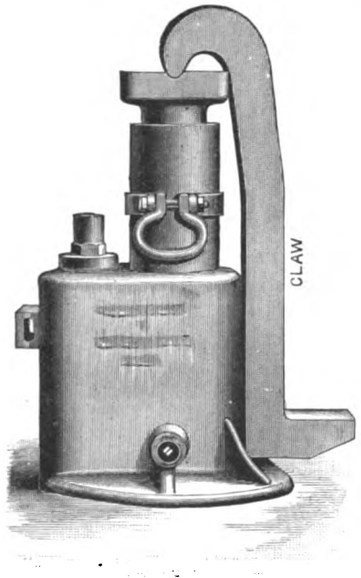


FIG. 7911.

These jacks pump out their whole lift horizontally.

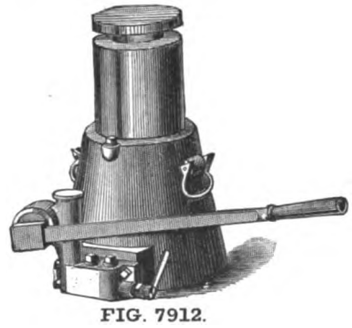


FIG. 7912.

DOUBLE PUMP.

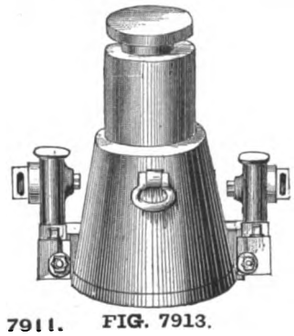


FIG. 7913.

PRICES, FIG. 7911.

Jack to lift, tons.	Raise, inches.	Height.	Total weight.	Diam. base.	Prices.	Extra for claw.
15	12	20 in.	160 lbs.	12	$100.00	$10.00
15	18	26 "	170 "	12	120.00	12.00
20	12	20 "	180 "	12	120.00	12.00
20	18	26 "	200 "	12	150.00	16.00
30	12	20 "	200 "	13	150.00	18.00
30	18	26 "	225 "	13	175.00	20.00
45	12	20 "	260 "	14	175.00	22.00
45	18	26 "	290 "	14	225.00	24.00
60	9	18 "	290 "	15	185.00	22.00
60	12	21 "	310 "	15	200.00	24.00
80	12	21 "	375 "	18	235.00	26.00
100	9	18 "	350 "	15	225.00	26.00
100	12	21 "	475 "	20	275.00	30.00

PRICES, FIG. 7912.

Jack to lift.	Raise, inches.	Total height.	Weight.	Prices.	Extra length, per inch.
60 tons.	12 inches.	22 inches.	300 lbs.	$220.00	$5.00
60 "	9 "	19 "	250 "	200.00	
100 "	12 "	22 "	400 "	300.00	6.00
100 "	9 "	19 "	360 "	275.00	
125 "	12 "	22 "	475 "	360.00	7.50
150 "	12 "	22 "	600 "	425.00	10.00

Prices of heavier jacks given upon application.
If wanted without cap or ram, deduct two inches from total height.

	60 ton.	100 ton.	125 ton.	150 ton.
Base diameters,	12 inches....	..13 inches.....	.14 inches.....	.15 inches.

Pump extends 4½ inches at one side.

PRICES, FIG. 7913.

These jacks have pumps with pistons ¾ inch and 1¼ inch diameter, the larger giving about one-third the pressure of the smaller, and working three times as fast.

They are used where there is a variety of work, or where the jack has to work under varying loads.

Jacks to lift	60 tons.....	12 inches.....	Price,	$320.00
" "	100 "	12 "	"	400.00
" "	125 "	12 "	"	460.00
" "	150 "	12 "	"	525.00

HORIZONTAL JACKS WITH OUTSIDE PUMP.

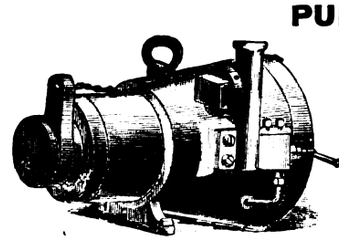


FIG. 7914.

These are used in pushing crank-pins in and out, pushing bridges and similar heavy work. The lever is worked perpendicularly, instead of horizontally, as in other makes, thus adding fifty per cent. to their power and ease of operation.

PRICES.

					Extra length, per inch.
Jack to push	60 tons.....	12 inches.. . .	Price,	$220.00	$5 00
" "	100 "	12 "	"	300.00	6.00
" "	125 "	12 "	"	360.00	7.50
" "	150 "	12 "	"	425.00	10.00

HYDRAULIC PULLING JACKS.

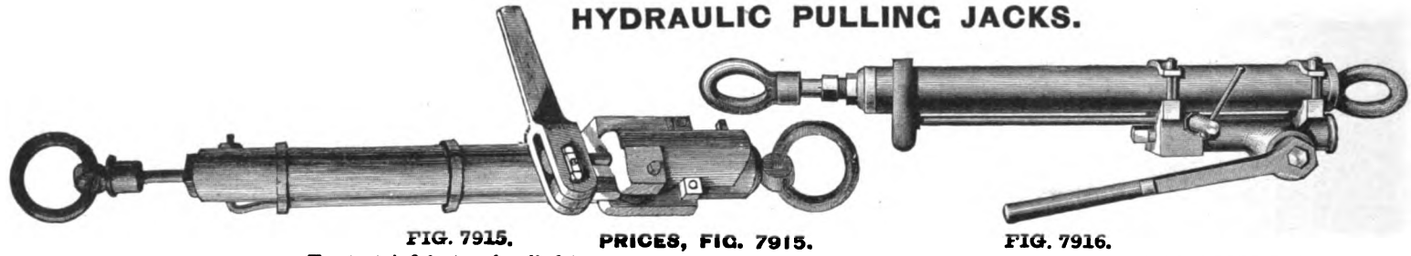


FIG. 7915. FIG. 7916.

PRICES, FIG. 7915.

To stretch	2 feet and	pull	8 tons.....	$200.00
"	2 "	"	10 "	240.00
"	2 "	"	15 "	300.00
"	2 "	"	20 "	350.00
"	2 "	"	30 "	450.00

PRICES, FIG. 7916.

Jack to pull	7 tons	2 feet.	Total length	42 inches....		$165.00
" "	10 "	2 "	" "	42 "	.....	220.00
" "	15 "	2 "	" "	44 "	.....	275.00
" "	30 "	2 "	" "	46 "	.....	400.00

BROAD BASE.



FIG. 7917.

GROUND LIFT.

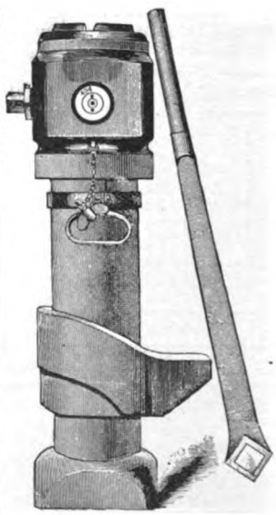


FIG. 7918.

PRICES, FIGS. 7917 AND 7918.

Capacity.	Lifts.	Height when closed.	Diameter of base. Fig. 7917.	Diameter of base. Fig. 7918.	Height when closed. Fig. 7917.	Height when closed. Fig. 7918.	Fig. 7917.		Fig. 7918.	
							Weight.	Prices.	Weight.	Prices.
10 ton	12 in.	26½ in.	9½ in.	5¾ in.	26½ in.	26½ in.	108 lbs.	$125.00	124 lbs.	$135.00
10 "	18 "	33 "	9½ "	5¾ "	33 "	33 "	124 "	135.00	140 "	150.00
15 "	12 "	27½ "	11¼ "	6 "	27½ "	27½ "	141 "	150.00	154 "	162.00
15 "	18 "	33½ "	11¼ "	6 "	33½ "	33½ "	164 "	165.00	182 "	175.00
20 "	12 "	27½ "	11 "	6½ "	27½ "	28 "	173 "	175.00	188 "	190.00
20 "	18 "	34½ "	11 "	6½ "	34½ "	35 "	199 "	190.00	218 "	205.00
30 "	12 "	27½ "	12¼ "	7½ "	27½ "	28 "	217 "	200.00	238 "	225.00
30 "	18 "	33½ "	12¼ "	.....	33½ "	.....	246 "	225.00		

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PULLING & TANGYE'S HYDRAULIC JACKS.

PULLING JACKS.

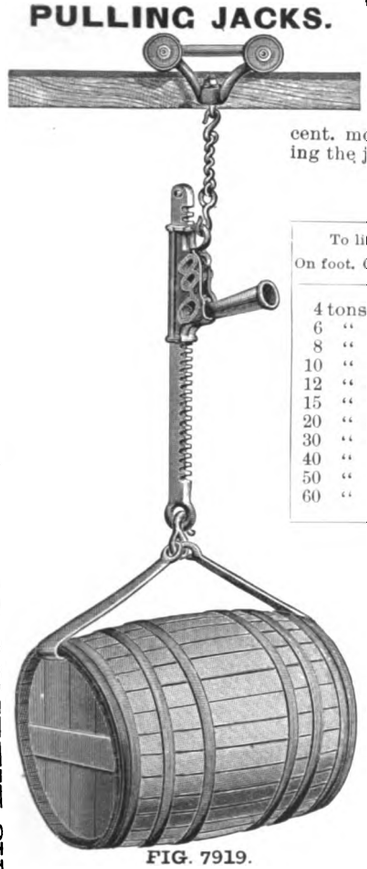


FIG. 7919.

PRICES.

No.	Capacity.	Run of bar.	Prices.	Extra run per inch
32	4 tons	2 feet.	$25.00	$0.25
33	8 "	2 "	30.00	.35
34	15 "	2 "	35.00	.50

DESCRIPTION, FIGS. 7923 AND 7924.

In this lifting jack the cylinder and base are in one piece and bored. The ram is fitted at the bottom end with a cup leather packing. The pump and plunger are gun metal. The cistern, outer casing and the claw are cast of special hydraulic metal in one piece.

The leather at the bottom is kept moist and ready for use as long as any fluid remains in the jack. The ram is protected by the outer casing from dirt and grit.

The jack is much shorter than the older style; the "run out" is, however, the maximum that is desirable to use. The full load can be lifted on the claw or head and can be raised by one man.

Each jack is tested by machinery to 25 per cent. above its maximum load.

PRICES, FIG. 7923.

To lift.	Height when down.	Height of claw.	Run out.	Approximate weight.	Prices, each.
Tons.	Inches.	Inches.	Inches.	Lbs.	
3	17	2½	7	60	$58.00
6	17½	2¾	7	68	78.00
10	18	3¼	7	80	98.00
15	18	3¾	7	108	118.00
20	19	4¼	7	150	127.00
30	19	5	7	190	147.00
40	19	5¾	7	260	178.00
60	19	6½	7	365	248.00

PRICES, FIG. 7924.

To lift.	Height when down.	Height of claw.	Run out.	Length of traverse.	Approximate weight.	Prices, each.
Tons.	Inches.	Inches.	Inches.	Inches.	Lbs.	
3	20	5¼	7	7	100	$88.00
6	21	5½	7	7	110	108.00
10	22	6¾	7	10	130	130.00
15	23	7½	7	12	185	158.00
20	23	8¼	7	12	250	173.00
30	24	10¼	7	18	340	225.00
40	25	11	7	18	400	260.00
60	26	12½	7	18	600	375.00

The jack can be taken away from the traverse bottom and used as a lifting jack only.

LIFTING JACKS.

DESCRIPTION, FIG. 7920.

With wrought iron ram and base in one piece. Cylinder of special hydraulic metal. Gun metal pump and plunger. Cistern so arranged that the jack can be worked in any position. The lifting capacity is specified for the foot lift, but we allow about 20 per cent. more for a direct lift on the top of same jack. The lever is for raising the jack, and the key in the side is for lowering.

PRICES, FIG. 7920.

To lift. On foot.	To lift. On top.	Prices, each.	Height of jack.	Height of claw.	Base. Length.	Base. Width.	Runs out.	Weight.
4 tons.	About 20% more.	$46.00	23 in.	3 in.	5½ x 4¼ inch.		10 in.	57 lbs.
6 "		50.00	24 "	3 "	6 x 4¼ "		10 "	68 "
8 "		57.00	26 "	3¼ "	6 x 4½ "		11 "	74 "
10 "		65.00	27 "	3½ "	6¼ x 4½ "		12 "	88 "
12 "		70.00	27 "	3½ "	7 x 5 "		12 "	94 "
15 "		80.00	28 "	4 "	7 x 5½ "		12 "	104 "
20 "		95.00	28 "	4¼ "	7¾ x 6 "		12 "	127 "
30 "		105.00	29 "	5 "	8½ x 6½ "		12 "	170 "
40 "		125.00	29 "	5¼ "	9 x 8 "		11 "	223 "
50 "		150.00	29 "	5¾ "	9½ x 7½ "		11 "	257 "
60 "		175.00	29 "	6¼ "	10 x 8 "		10 "	330 "

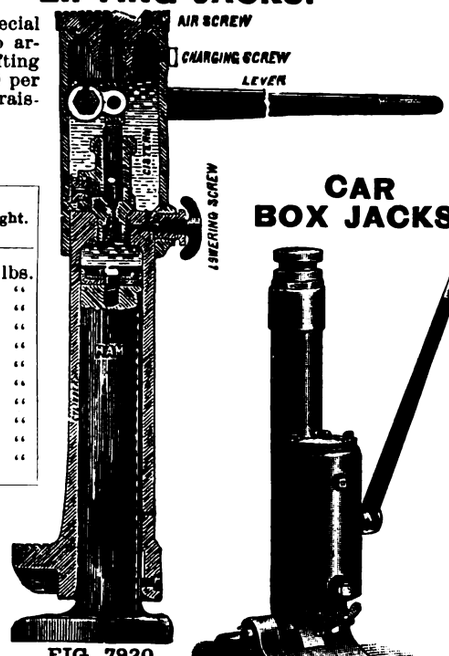


FIG. 7920.

PRICES, FIG. 7921.

Capacity.	Prices, each.	Approximate weight.
2 tons.	$60.00	92 lbs.
4 "	66.00	95 "
6 "	77.00	123 "
8 "	83.00	134 "
10 "	95.00	159 "
12 "	105.00	160 "

Height when down, 29 inches. Will run out 20 inches.

CAR BOX JACKS.

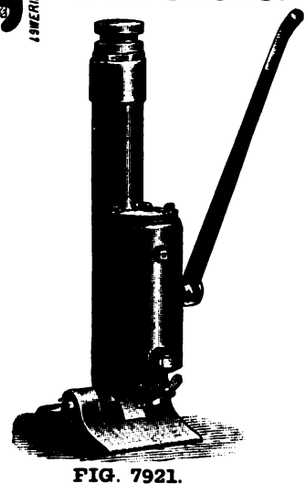


FIG. 7921.

TRAVERSING JACKS.

PRICES, FIG. 7922.

Capacity, tons.	Prices, each.	Height of top from floor.	Height of foot from floor.	Will run out.	Will traverse.	Approx. weight.
4	$64.00	26 in.	5½ in.	10 in.	6½ in.	96 lbs.
6	70.00	27 "	5¾ "	10 "	7 "	104 "
8	77.00	29 "	6 "	11 "	7 "	111 "
10	83.00	30 "	6 "	12 "	10 "	132 "
12	90.00	31 "	6½ "	12 "	12 "	147 "
15	100.00	31 "	6½ "	12 "	12 "	165 "
20	115.00	32 "	7 "	12 "	12 "	214 "
30	150.00	34 "	9 "	12 "	18 "	309 "
40	175.00	34 "	9½ "	11 "	18 "	346 "
50	225.00	34 "	11 "	11 "	18 "	480 "
60	260.00	34 "	11 "	10 "	18 "	564 "

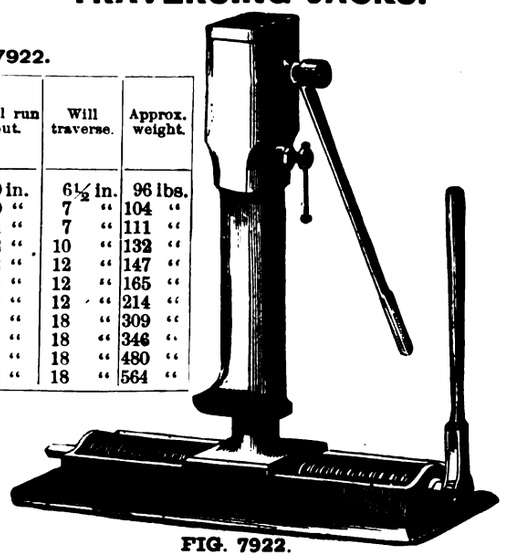


FIG. 7922.

SHORT LIFT JACKS.

LIFTING JACK.

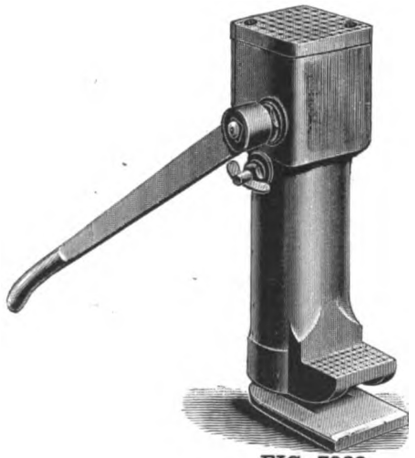


FIG. 7923.

JACK, WITH TRAVERSE BOTTOM.

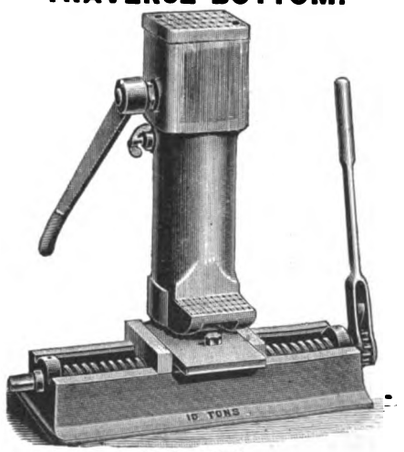


FIG. 7924.

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JACKS AND BARBED FENCING.

WAGON JACKS.

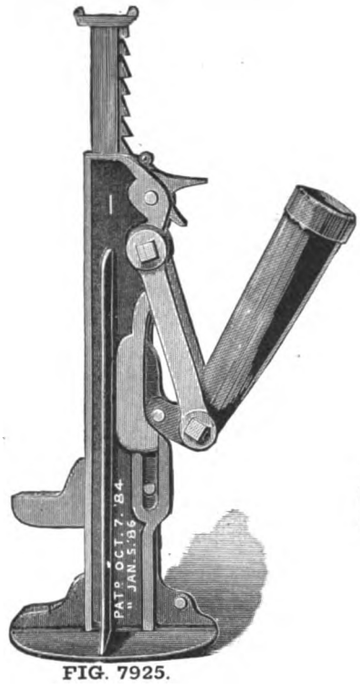


FIG. 7925.

The height of this jack is 16 inches, the run of the bar being 10 inches. Weight of jack, 32 lbs. Capacity, 4,000 lbs. Foot-lift, 2,000 lbs. It is intended for use with heavy wagons and oil tank wagons.

PRICE, $10.00.

SAMSON JACKS.

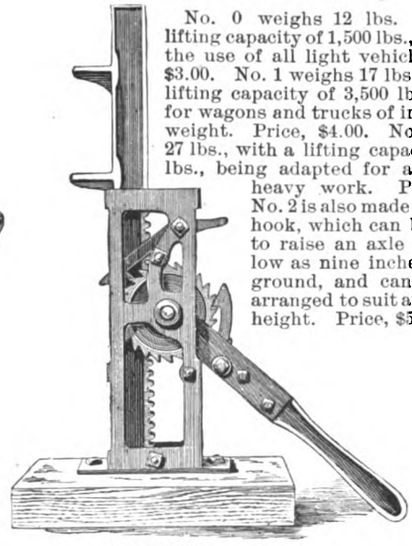


FIG. 7926.

No. 0 weighs 12 lbs. and has a lifting capacity of 1,500 lbs., adapted to the use of all light vehicles. Price, $3.00. No. 1 weighs 17 lbs., and has a lifting capacity of 3,500 lbs., suitable for wagons and trucks of intermediate weight. Price, $4.00. No. 2 weighs 27 lbs., with a lifting capacity of 6,000 lbs., being adapted for all kinds of heavy work. Price, $5.00. No. 2 is also made with a drop hook, which can be adjusted to raise an axle standing as low as nine inches from the ground, and can be readily arranged to suit any ordinary height. Price, $5.75.

SCREW JACKS.



FIG. 7927.

These jacks are made with wrought iron screws and cast iron stands.

CARRIAGE JACKS.

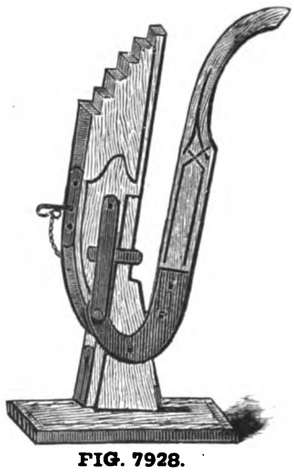


FIG. 7928.

PRICES.

No. 1. For light wagons $2.00
No. 2. For heavy wagons..... 3.00

PRICES, FIG. 7927.

Diameter, screw, 1½ in.		Height, stand, 12 in.		Lifting capacity, 12 tons.		Price, $5.25	
" " 1½ "		" " 14 "		" " 12 "		"	6.00
" " 1½ "		" " 16 "		" " 12 "		"	6.75
" " 1¾ "		" " 14 "		" " 16 "		"	6.75
" " 1¾ "		" " 16 "		" " 16 "		"	7.50

BUCK-THORN SOLID STEEL BARBED FENCING.

THE CUTS SHOW FULL SIZES.

REGULAR BUCK-THORN.



FIG. 7929.

½ inch wide. Barbs 1 inch apart. 15 feet to the pound.

THICK-SET BUCK-THORN.

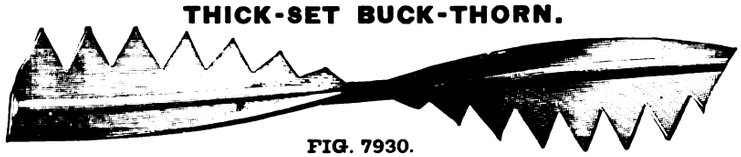


FIG. 7930.

⅝ inch wide. Barbs continuous, ¼ inch apart. 12½ feet to the pound.

PLAIN OR RIBBON FENCING.



FIG. 7931.

½ inch wide. No barbs. 12½ feet to the pound.

BARBED STEEL WIRE FENCING.



FIG. 7932.

Galvanized four-point barb wire, with barbs 6 inches apart, 15 feet to the pound.

Thick-set, with barbs 3 inches apart, 12 feet to the pound.

GALVANIZED TWIST WIRE.



FIG. 7933.

To parties objecting to barbs on wire, the twisted-strand affords a good substitute.

PRICES FOR ALL FENCING ON APPLICATION, ON REELS OF ABOUT 100 LBS. EACH.

REGULAR.



FIG. 7934.

WIDE TOP.

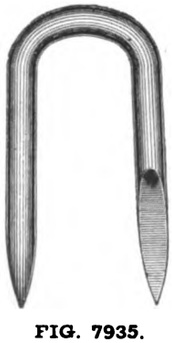


FIG. 7935.

PLAIN OR GALVANIZED STEEL FENCE STAPLES.

Either regular for wire, or wide top for ribbon wire.

PRICES ON APPLICATION, IN KEGS OF 100 LBS.

FENCING STRETCHERS.

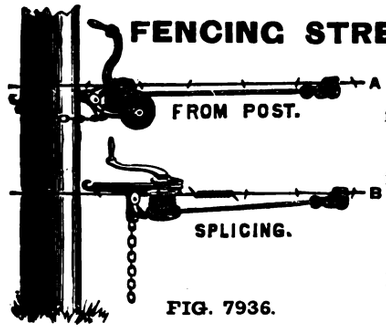


FIG. 7936.

Cut A, showing it in use for stretching from post.

Cut B, showing it in use for splicing wire.

PRICE, FIG. 7936.

Little Giant..$12.00 per doz.

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TURN TABLES.

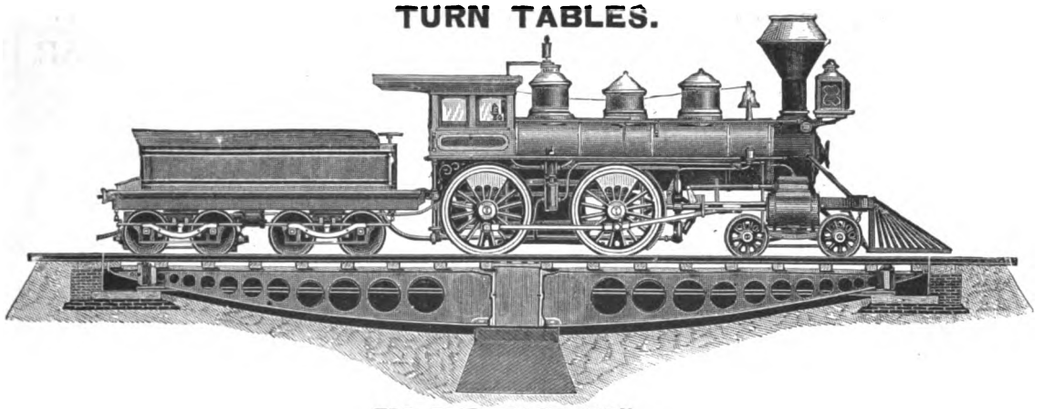


FIG. 7937. **CAST IRON.**

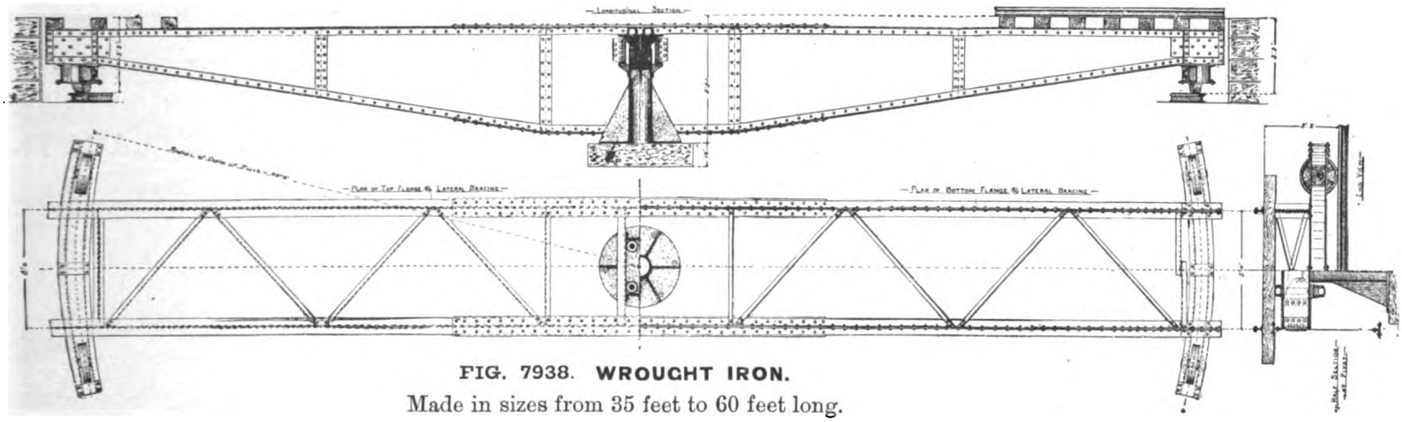


FIG. 7938. **WROUGHT IRON.**

Made in sizes from 35 feet to 60 feet long.

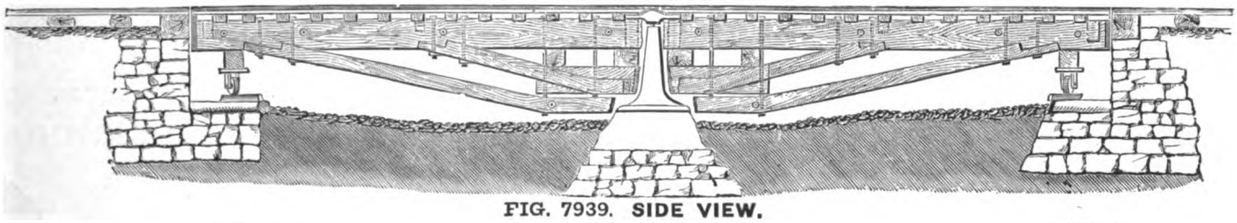


FIG. 7939. **SIDE VIEW.**

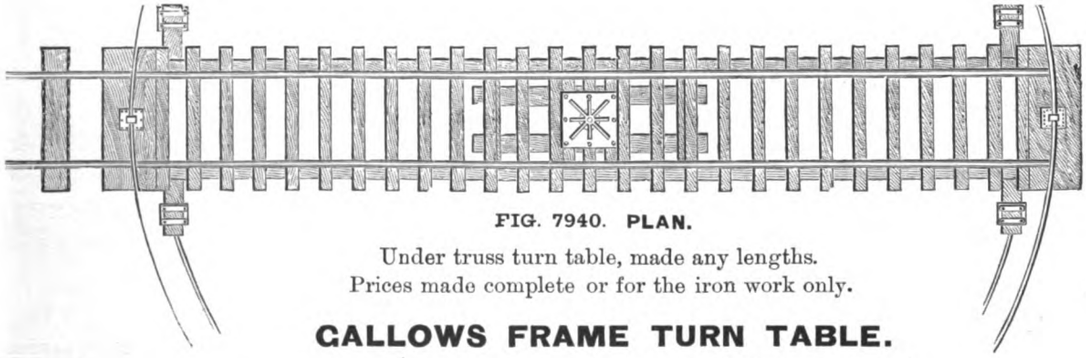


FIG. 7940. **PLAN.**

Under truss turn table, made any lengths.
Prices made complete or for the iron work only.

GALLOWS FRAME TURN TABLE.

Made in any lengths.
Prices made complete or for the iron work only.

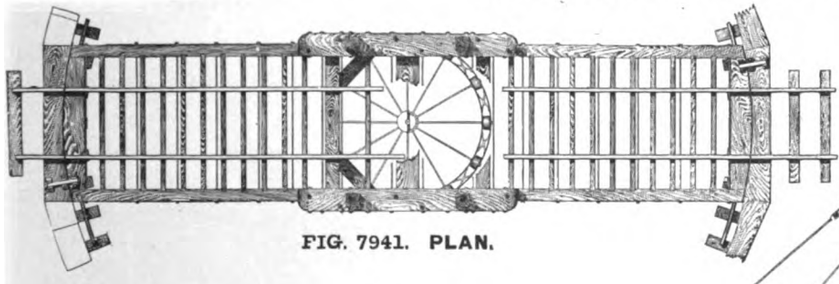


FIG. 7941. **PLAN.**

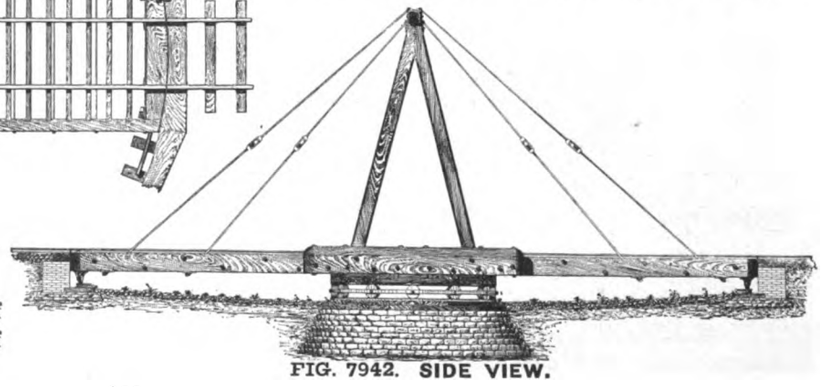


FIG. 7942. **SIDE VIEW.**

PRICES FOR ALL TURN TABLES ARE MADE ON APPLICATION.

In ordering, give gauge of tracks, weight and length of engine and tender on rails; also, for Fig. 7942, height of stack and width between the standards.

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TURNTABLE AND CAR REPLACERS AND STARTERS.

HORSE-CAR TURNTABLES.

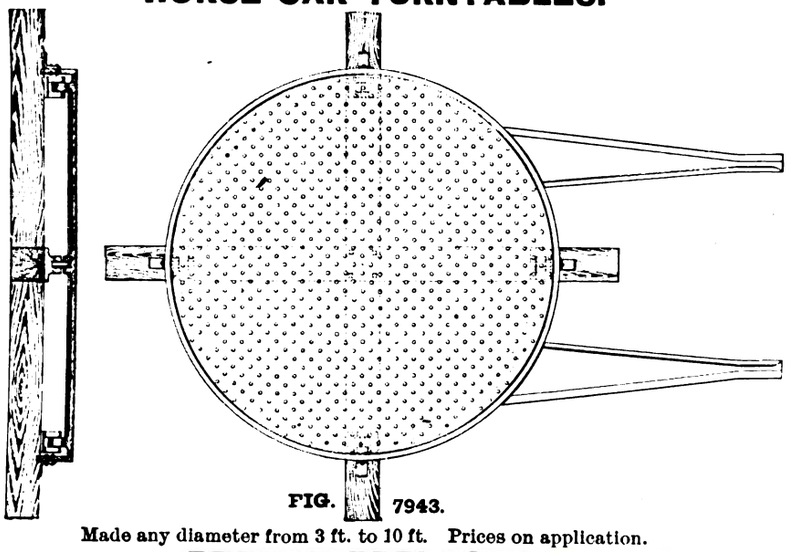


FIG. 7943.

Made any diameter from 3 ft. to 10 ft. Prices on application.

NEWCOMB CAR REPLACER.

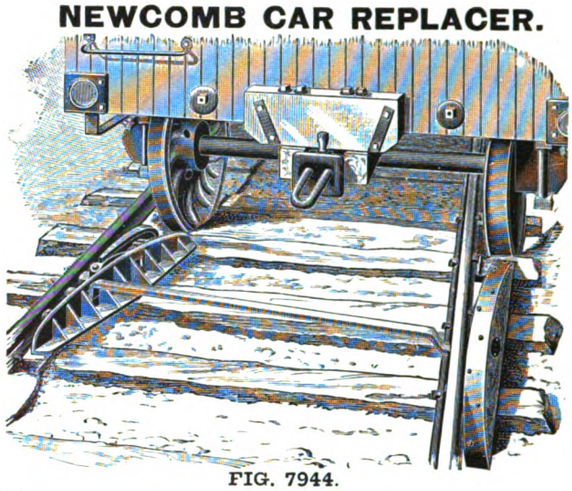


FIG. 7944.

Weight, 155 lbs. complete. Price, 4 ft. 8½ in. gauge, $20.00.

KEYSTONE CAR REPLACER.

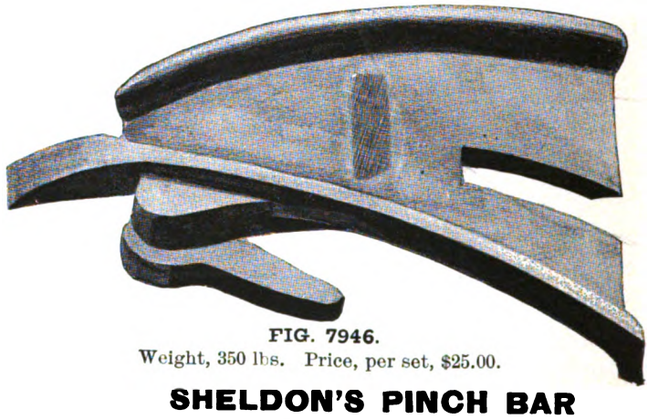


FIG. 7946.

Weight, 350 lbs. Price, per set, $25.00.

REEVES' REPLACER.

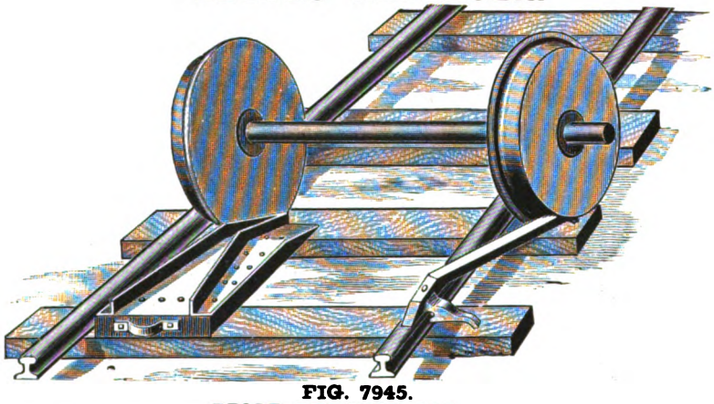


FIG. 7945.

PRICE, PER PAIR, $20.00.

SHELDON'S PINCH BAR STARTER.

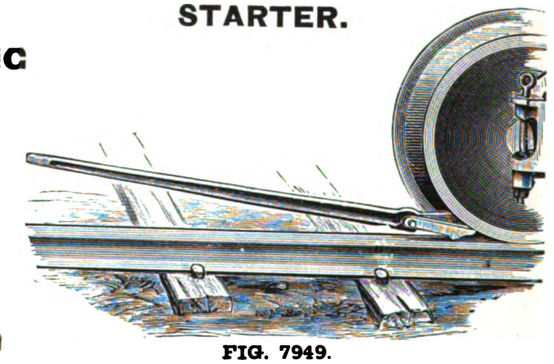


FIG. 7949.

PRICE, $5.00.

SHART'S REPLACER.

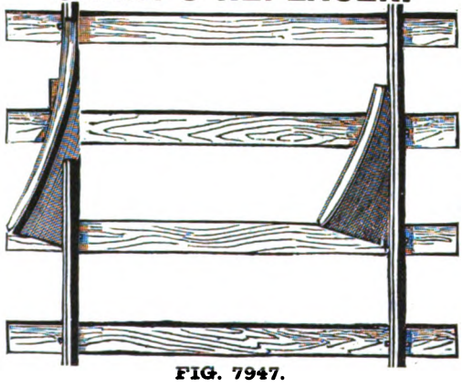


FIG. 7947.

PALMERTON WRECKING FROG.

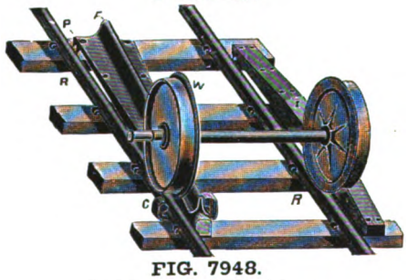


FIG. 7948.

PRICE, PER SET, $20.00.
PRICE, FIG. 7947, PER SET, $25.00.

CAR STARTER.

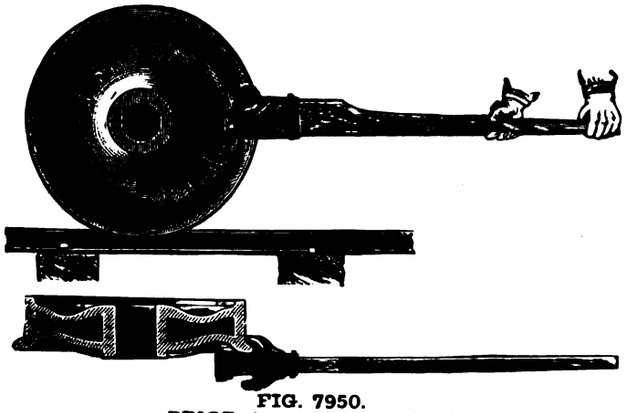


FIG. 7950.

PRICE, $48.00 PER DOZEN.

STEEL CAR PUSHER.

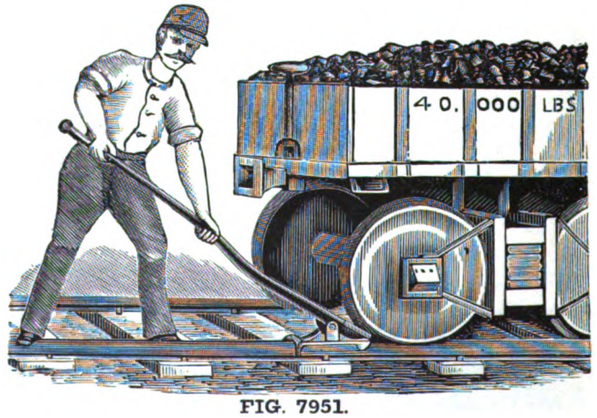


FIG. 7951.

One man can easily move a loaded car. Will not slip on either grease or ice.

PRICE, $60.00 PER DOZEN, OR $6.00 EACH.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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GIANT CAR PUSHER.

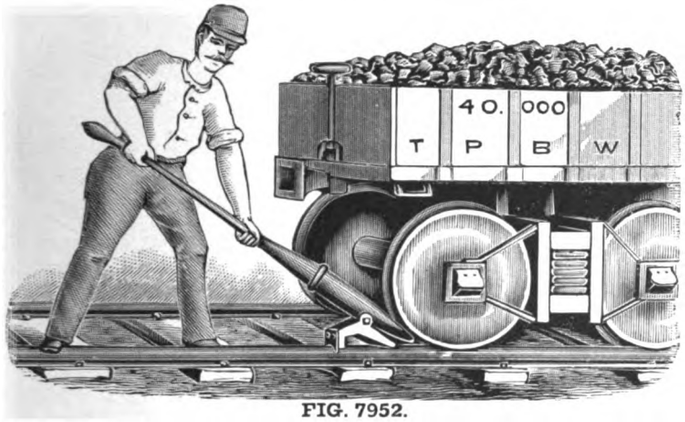


FIG. 7952.

PRICE, EACH, $5.00.

EASY CAR PUSHER.

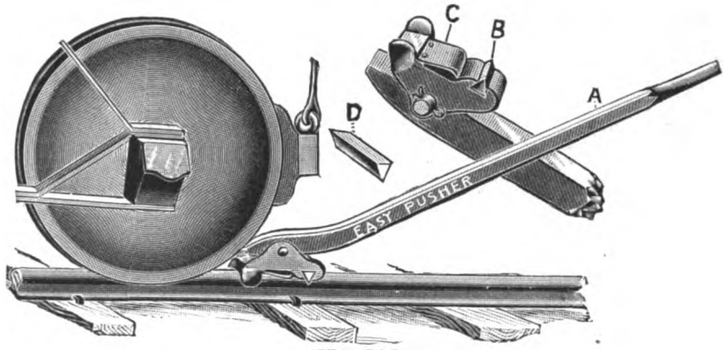


FIG. 7953.

PRICE, EACH, $5.00.

CHAMPION PINCH BAR.

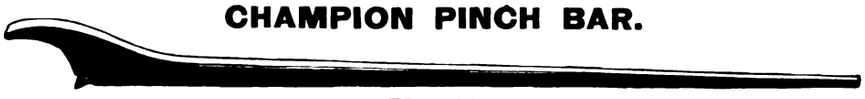


FIG. 7954.

PRICE, EACH, $5.00.

AXLE GRIP CAR MOVER.

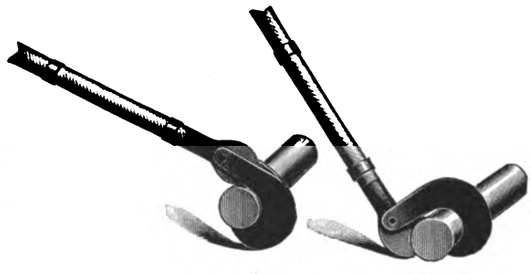


FIG. 7956.

A, shows position to push car from you.
B, shows position to draw car toward you.

PRICE, EACH, $10.00.

RAILROAD SWITCH ROPES.

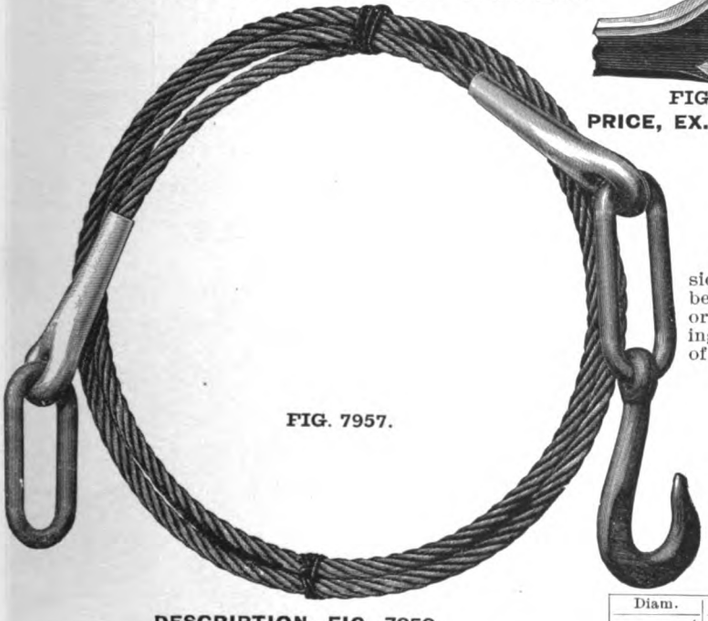


FIG. 7957.

HEAD.

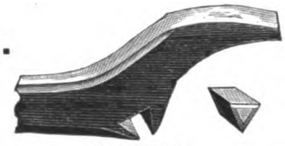


FIG. 7955.

PRICE, EX. HEADS, 35c.

SECURITY RAILROAD CHOCK.

For locking cars on sidings, preventing their being moved by accident or design. When ordering send drawing of head of rail.

PRICE, $6.00.

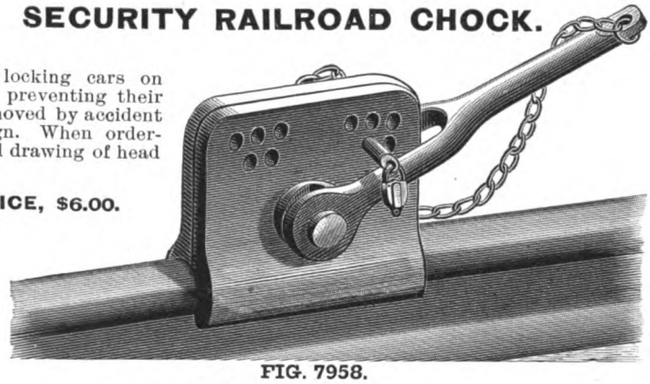


FIG. 7958.

PRICES, FIG. 7957.

Diam.	Length.	Prices.	Diam.	Length.	Prices.	Diam.	Length.	Prices.
¾ in.	20 feet.	$14.00	1 in.	20 feet.	$17.00	1¼ in.	20 feet.	$21.50
	25 "	15.00		25 "	18.50		25 "	24.00
	30 "	16.00		30 "	20.00		30 "	26.50
⅞ in.	20 "	15.50	1⅛ in.	20 "	19.00	1⅜ in.	20 "	27.50
	25 "	16.75		25 "	21.00		25 "	30.75
	30 "	18.00		30 "	23.00		30 "	34.00

DESCRIPTION, FIG. 7959.

The valve is of the piston type working in a cylinder, and has openings in the top end of the cylinder by which water is admitted to allow the valve to gravitate to its seat as the water passes through these openings, and allow the valve to close slowly.

It also has a pipe which is fastened to the piston, passing up through the cylinder and attached to lever, and has an air valve attached to the upper end, so that when the valve closes on its seat air is admitted through the valve and pipe, which allows the water to pass out without forming a vacuum, and prevents valve from rebounding on its seat.

The seat of the valve is made of brass and provided with a rubber ring closing on the brass seat. The galvanized iron pipe slips over ball, allowing pipe to accommodate itself to various radiuses.

PRICES.

6 inch.....	$50.00
7 "	60.00
8 "	70.00

BALL TANK PIPE FIXTURE.

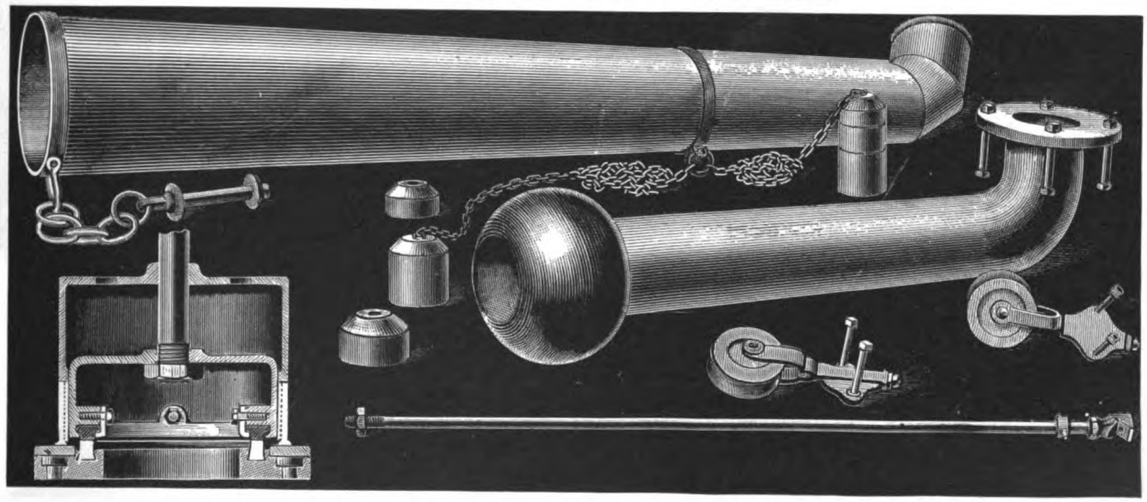


FIG. 7959.

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STANDARD AUTOMATIC WATER COLUMNS AND WINDMILLS.

This cut shows the regular column, placed at side of track, or between two parallel tracks, or in a Y, serving both tracks.

A modification is made when ordered, fitting it to serve two tracks crossing at right angles.

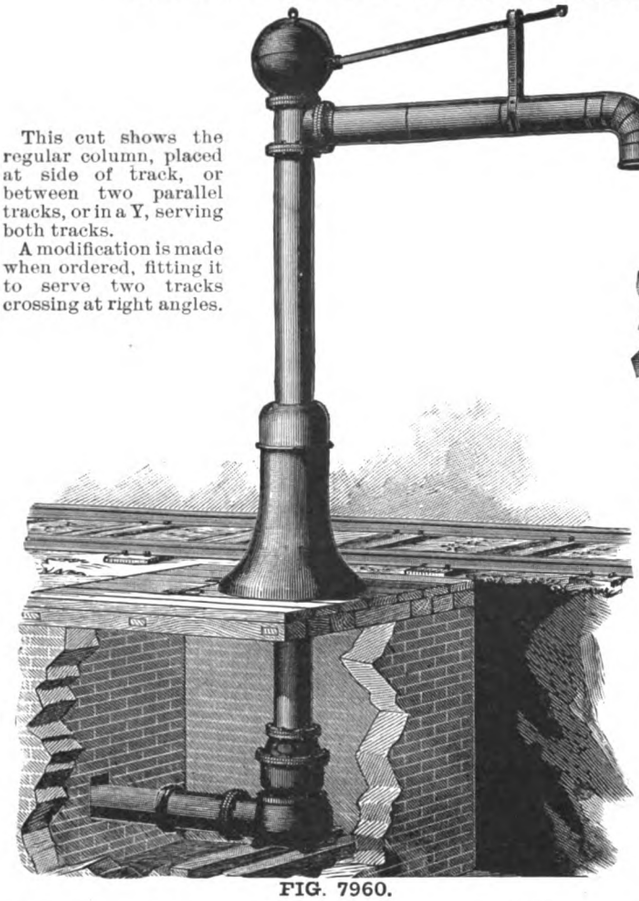


FIG. 7960.

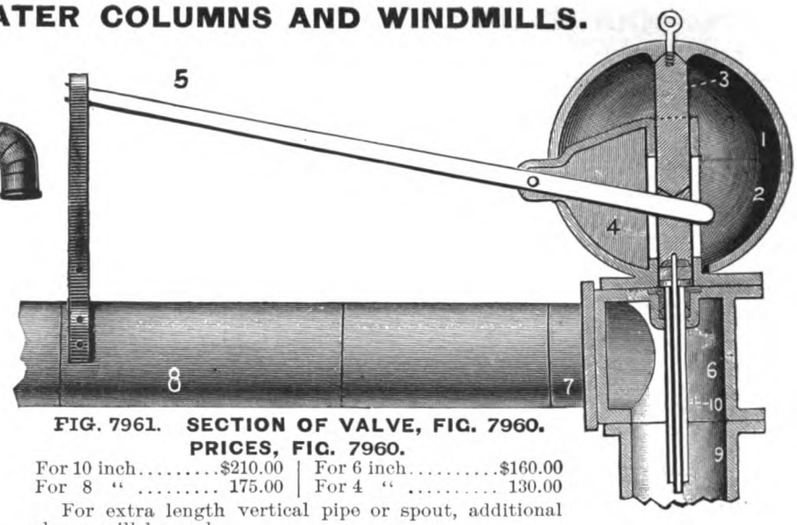


FIG. 7961. SECTION OF VALVE, FIG. 7960.

PRICES, FIG. 7960.

For 10 inch	$210.00	For 6 inch	$160.00
For 8 "	175.00	For 4 "	130.00

For extra length vertical pipe or spout, additional charge will be made.

PRICES, FIG. 7963.

No.	Diameter.	Revolutions per minute.	Length of stroke, in inches.	Weight, in pounds.	Prices.
5	14 feet.	42	6, 8, 9 and 10	1,440	$200.00
6	16 "	40	8, 9, 10 and 12	1,895	280.00
7	18 "	37	8, 9, 10 and 12	2,025	325.00
8	20 "	34	8, 9, 10 and 12	2,500	375.00
8½	22 "	32	8, 9, 10 and 12	2,820	425.00
9	25 "	30	12, 15 and 18	3,500	500.00
9½	28 "	28	12, 15 and 18	3,720	550.00
10	30 "	26	12, 15 and 18	3,866	575.00

When ordering these windmills, state height of tower, so that a suitable amount of blue wood rod connection and shut-off wire may be sent with each mill.

The bed plates to the Nos. 5 and 6 mills are made for 2-mast towers; other sizes for 4-mast towers.

N. B.—Prices given above do not include any part of the tower, pump or pipe.

VALVE FOR ENCLOSED TANK.

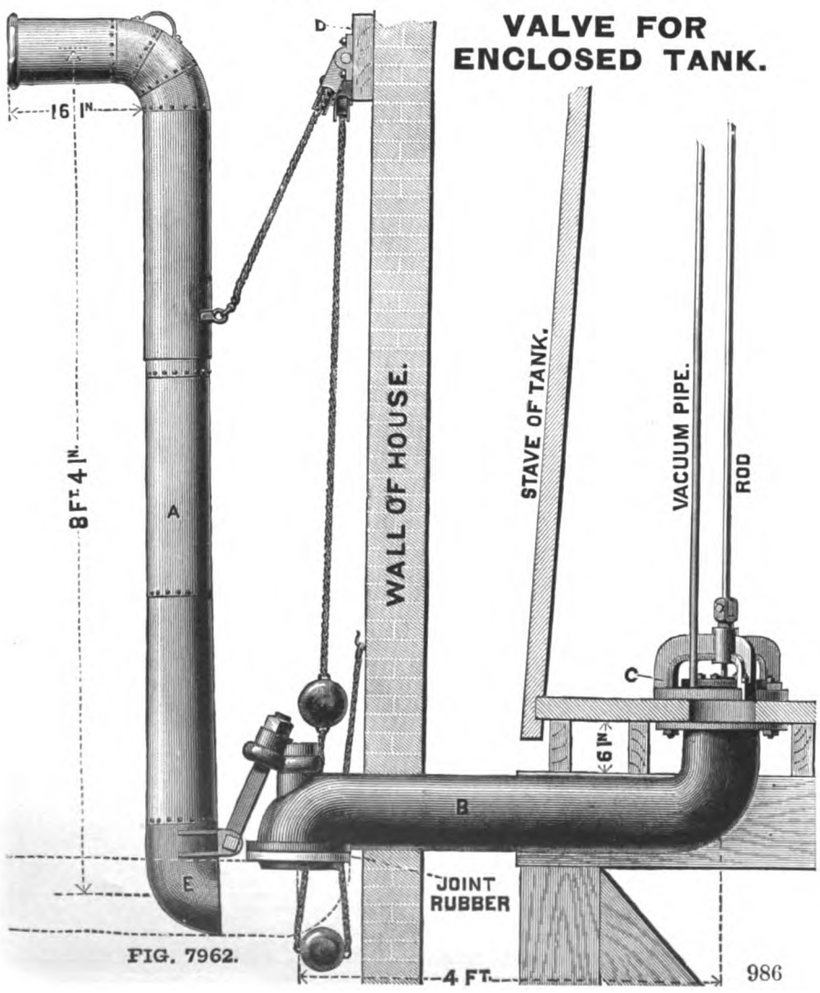


FIG. 7962.

WINDMILLS.



FIG. 7963.

DESCRIPTION, FIG. 7962.

It is 4 feet from center to center of pipe B, so that it will reach through the wall, and pipe B is 6 inches below the bottom of the tank, as shown in cut. Otherwise it is the same as one shown, Fig. 7965.

In ordering, call this "tank valve for inclosed tank," and give diameter of pipe desired.

PRICES.

Pipes, 6 inches	in diameter		$60.00
" 7 "	"		70.00
" 8 "	"		80.00

MANTING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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TANK FIXTURES.

SIDE TANK VALVES.

This cut shows the side tank valve, with pipes and valves similar to the two previous ones; differing from them, in that this is connected with the stave or side of tank.

If this kind is wanted, in ordering call for "side tank valve," and give diameter wanted.

PRICES.

Pipes, 6 inches in diameter.....	$55.00
" 7 " "	65.00
" 8 " "	75.00

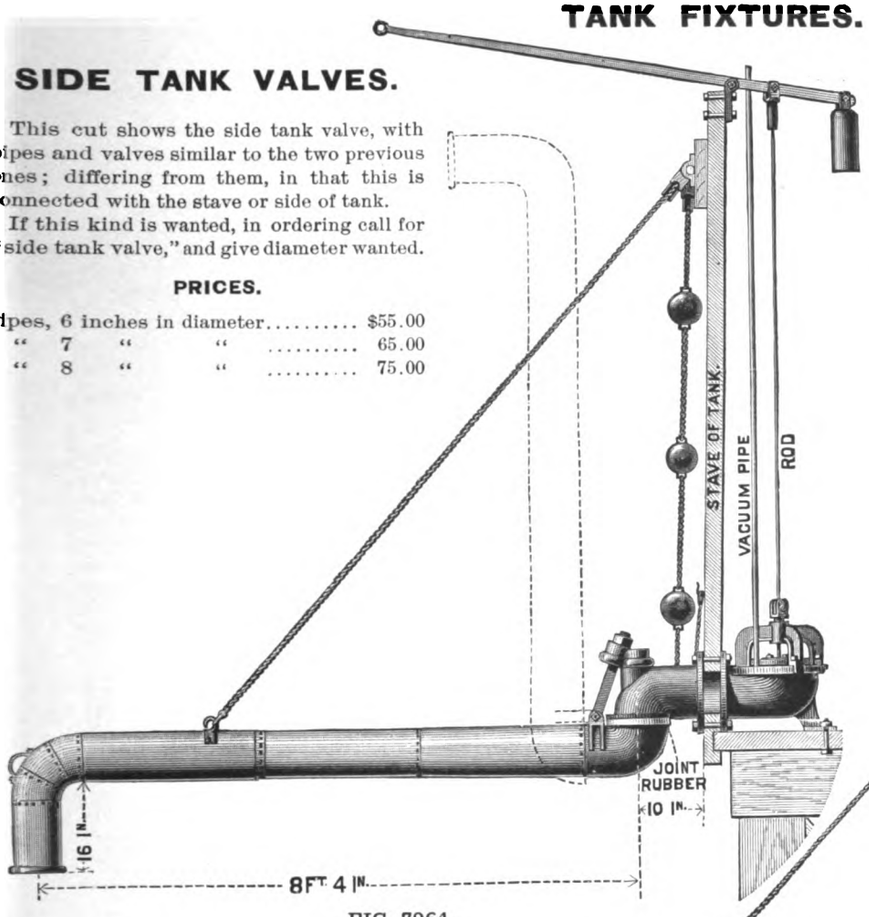


FIG. 7964.

WITH UNIVERSAL JOINT.

With pipe B 2 feet 9 inches long. This is the one generally ordered, and will be sent where tank valve is ordered without specially ordering the kind.

The standard length of pipe A is 8 feet 4 inches. Stock of this length on hand; other lengths made to order. For letters see Fig. 7962.

PRICES.

Complete as per cut.

Pipes, 6 inches in diameter.....	$55.00
" 7 " "	65.00
" 8 " "	75.00

BOTTOM TANK VALVES.

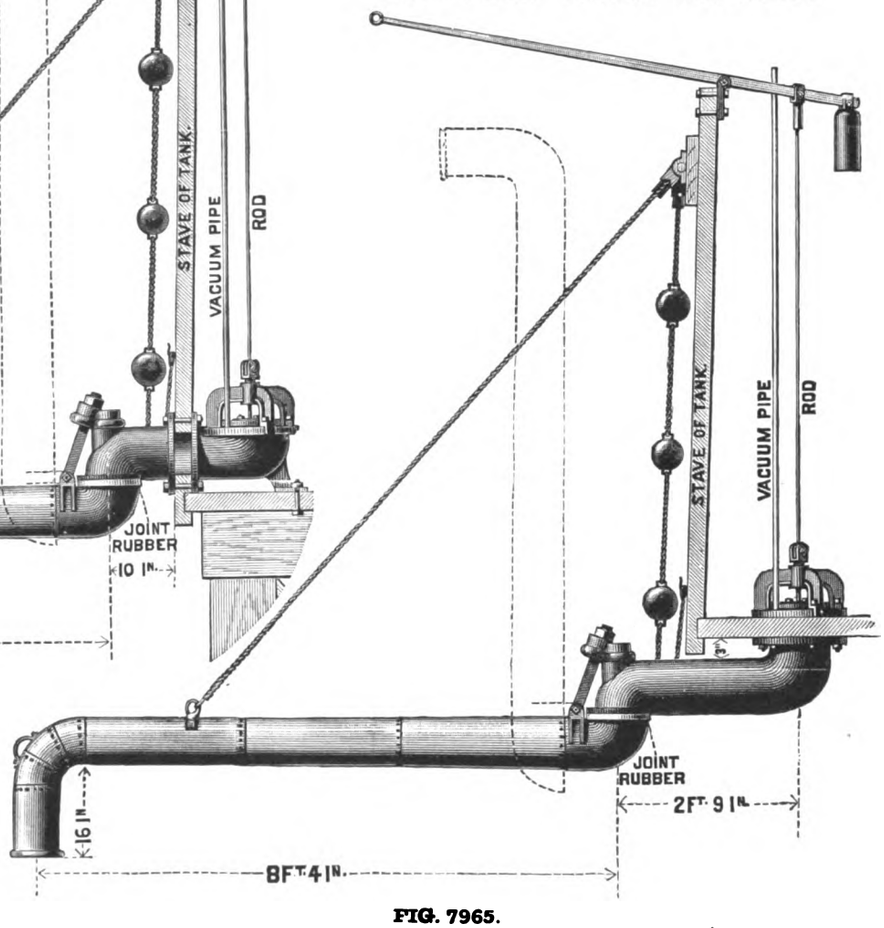


FIG. 7965.

FROST PROOF HALLADAY VALVE, OUTLET PIPE, GALVANIZED SPOUT AND FIXTURES.

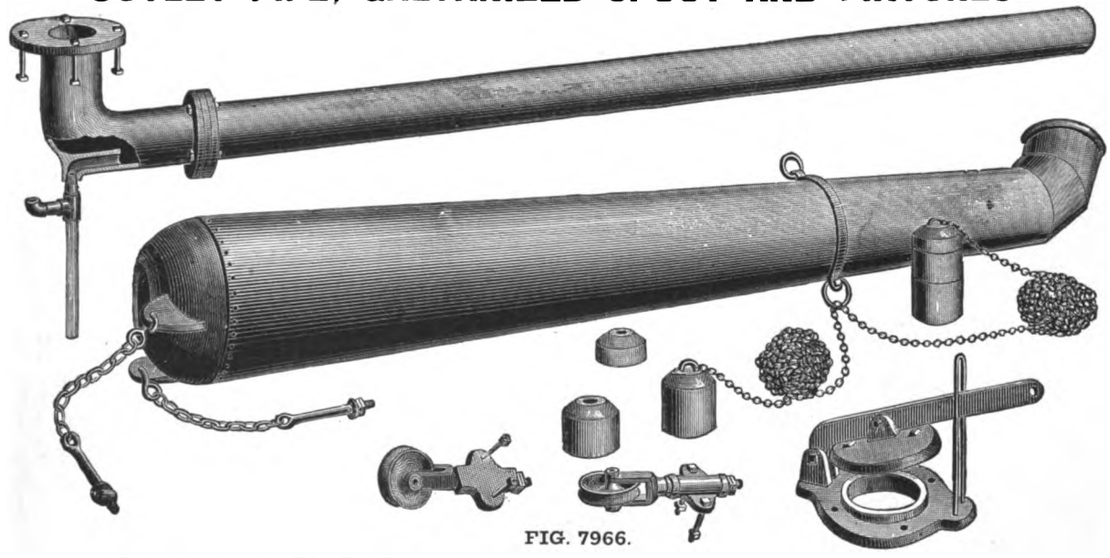


FIG. 7966.

PRICES, FIG. 7966.

6 inch valve.....	$12.00
7 " "	15.00
8 " "	18.00

SPOUT AND FIXTURES, EXCEPT VALVE.

6 in. for 16 feet diam. tank.. $65.00	6 in. for 30 feet diam. tank.. $82.50	7 in. for 24 feet diam. tank.. $85.00	8 in. for 20 feet diam. tank.. $90.00
6 " " 20 " " " .. 70.00	7 " " 16 " " " .. 75.00	7 " " 30 " " " .. 92.50	8 " " 24 " " " .. 95.00
6 " " 24 " " " .. 75.00	7 " " 20 " " " .. 80.00	8 " " 16 " " " .. 85.00	8 " " 30 " " " .. 102.00

N. B.—When ordering, always state the diameter of tank and gauge of track.

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ANTI-FREEZING WATER COLUMNS.

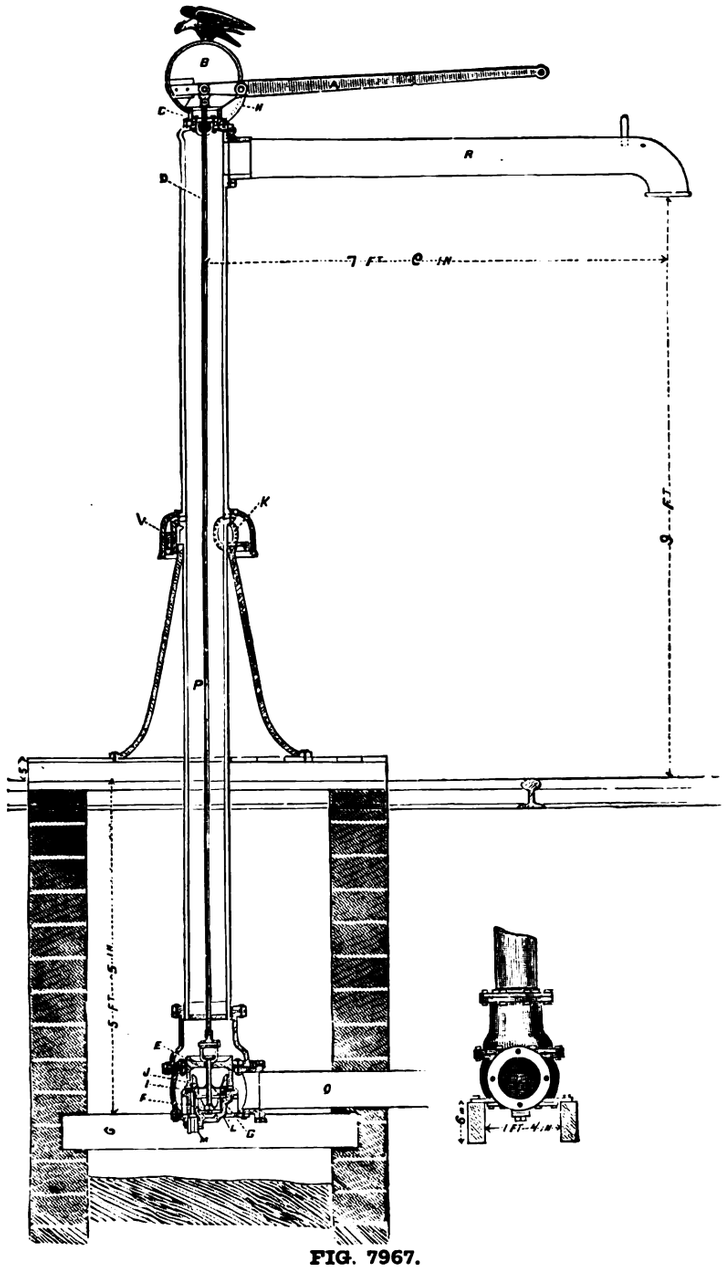


FIG. 7967.

PRICES.

6 inch.....$190.00 8 inch.....$220.00

FULLER-MEYER TANK REGULATORS.

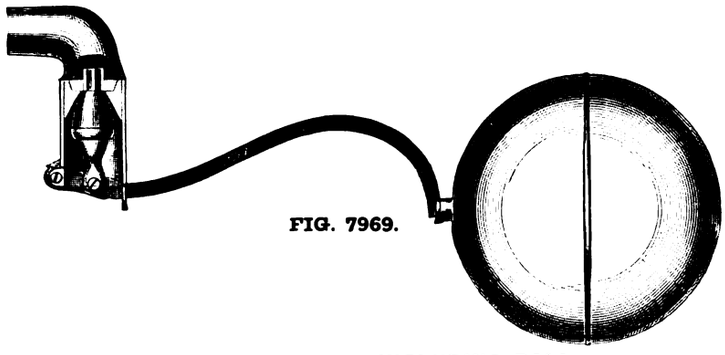


FIG. 7969.

PRICES, PER DOZEN, INCLUDING BALL.

Size.....	½	⅝	¾	1	1¼	1½	2	2½
Lead pipe..	$19.00	$21.50	$32.00	$38.00	$140.00	$200.00	$224.00	$240.00
Iron pipe ..	21.50	25.00	36.00	43.00	148.00	220.00	240.00	275.00

WATER TANKS.

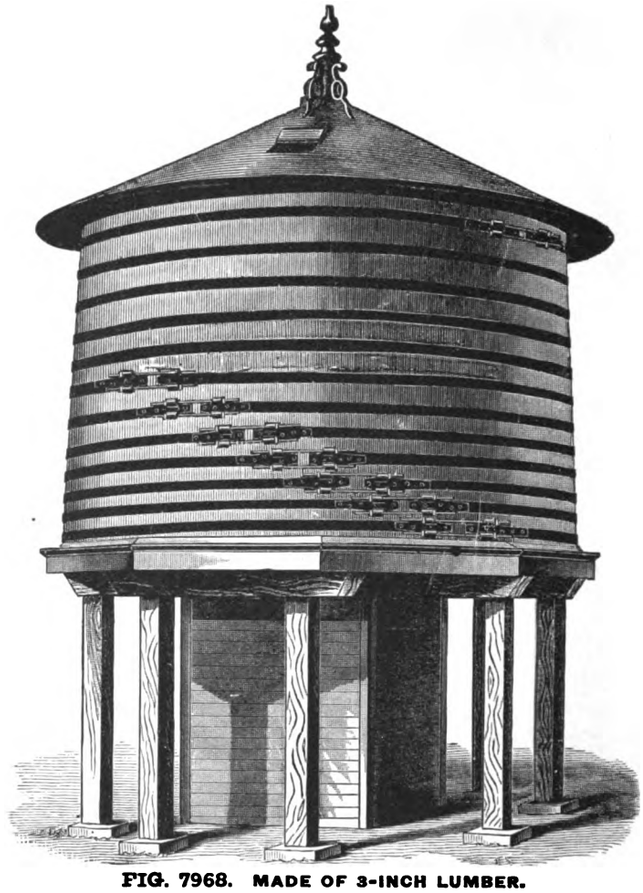


FIG. 7968. MADE OF 3-INCH LUMBER.

Size of tank. Length of stave.	Size of tank. Diameter of bottom.	No. of hoops.	Capacity. Gallons.	Capacity. Barrels.	Approximate weight. Lbs.	Prices, with lug hoops.
2½ ft.	8 ft.	3	663	21	700	$28.00
2½ "	10 "	3	1,010	32	1,000	38.00
2½ "	12 "	3	1,480	47	1,300	50.00
2½ "	14 "	3	2,040	64	1,800	63.00
10 "	12 "	8	7,007	222	4,000	118.00
12 "	12 "	9	8,499	270	4,500	138.00
10 "	14 "	8	9,721	308	4,900	142.00
14 "	12 "	10	9,989	317	5,200	155.00
12 "	14 "	9	11,789	374	5,800	160.00
10 "	16 "	8	12,875	409	6,400	180.00
14 "	14 "	10	13,857	440	6,400	183.00
12 "	16 "	9	15,617	496	6,700	198.00
14 "	16 "	10	18,357	582	7,500	220.00
12 "	18 "	9	19,982	634	7,500	225.00
16 "	16 "	11	21,096	669	8,000	245.00
14 "	18 "	10	23,487	745	8,600	255.00
12 "	20 "	9	24,884	790	9,000	285.00
16 "	18 "	12	26,992	857	9,500	288.00
14 "	20 "	10	29,249	922	11,000	315.00
16 "	20 "	12	33,614	1,067	12,500	350.00
14 "	22 "	11	35,643	1,131	12,500	365.00
16 "	22 "	12	40,963	1,300	13,000	395.00
18 "	22 "	14	46,283	1,469	14,500	445.00
16 "	24 "	13	49,037	1,557	14,500	462.00
18 "	24 "	14	55,404	1,759	16,000	500.00
20 "	24 "	16	61,771	1,961	18,000	585.00
16 "	30 "	14	77,610	2,464	23,000	672.00
18 "	30 "	15	87,491	2,777	25,500	720.00
20 "	30 "	17	97,372	3,091	28,000	830.00

HIGH PRESSURE FLOAT VALVES.

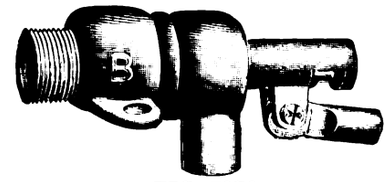


FIG. 7970.

1½ inch ball cock, with iron pipe thread inside. Each.....$8.00

Our 1½ inch ball cock has as large waterway as any 3 inch ball cock on the market, and we warrant a 7 inch float to close it under the heaviest pressure.

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PUSH CARS.—RAIL OR CONSTRUCTION CAR.

For use in laying track; wheels, 16 inches in diameter, weighing 104 lbs. each. Two long sills and four cross sills, 8 x 3 inches, covered with 3 x ½ inch iron; two rollers at each end; 2¼ inch axles with outside bearings running in Babbitt metal; capacity, 10 to 12 tons; weight, 1,350 lbs.

PRICE, $80.00.

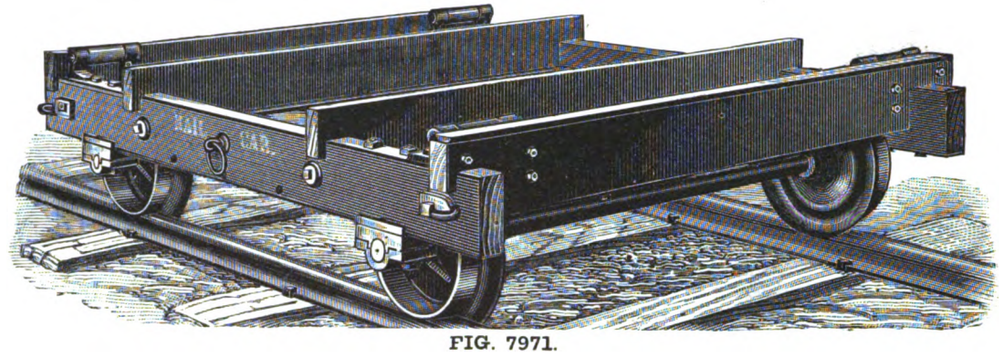


FIG. 7971.

HEAVY PUSH CARS, IRON, SPOKE OR PLATE WHEELS.

Standard gauge; spoke wheels, 22 inches in diameter; platform, 7 feet by 5 feet 7 inches; extra heavy frame; capacity, 5 tons; weight, 525 lbs.

PRICE, $32.00.

Same made with 18 inch standard plate wheels; 1½ inch axles; weight, 800 lbs.

PRICE, $36.00.

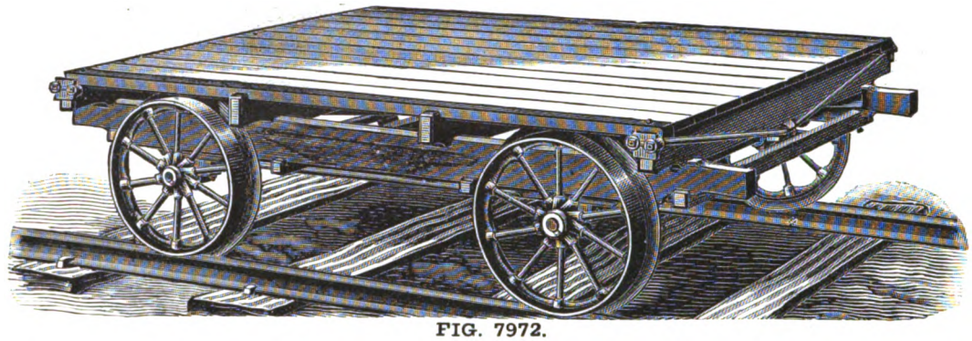


FIG. 7972.

WOOD WHEEL PUSH CAR.

Standard gauge; platform, 7 feet long by 5 feet 7 inches wide; wheels, 20 inches in diameter; hard machinery steel axle, 1½ inch diameter; weight, 450 lbs.

PRICE, $35.00.

Heavier framing with 1¾ inch steel axles; weight, 500 lbs.

PRICE, $36.00.

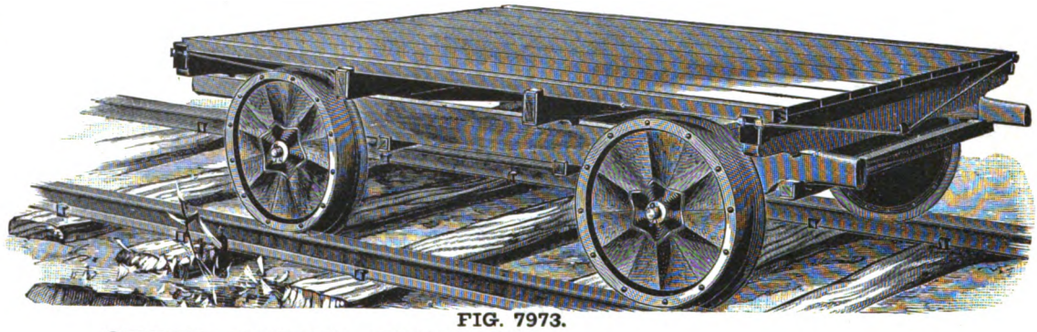


FIG. 7973.

STEEL WHEEL PUSH CAR.

This car is furnished with 1½ inch steel axles running in brass bearings; platform, 7 feet long by 5 feet 8 inches wide. Frame constructed of best selected white oak; decking of oak or soft wood as specified; oak rail across each end of platform, as shown in cut; thoroughly trussed and substantially built throughout; weight, 500 lbs.

PRICE, $40.00.

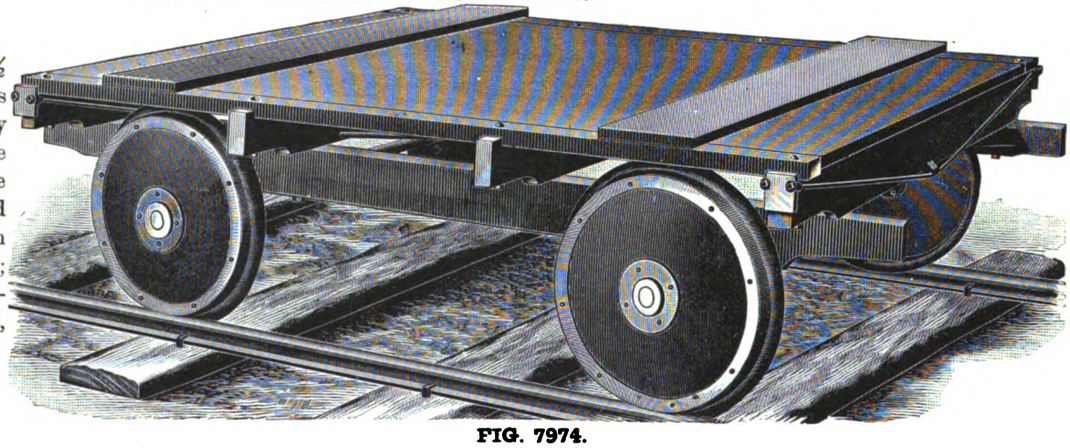


FIG. 7974.

NARROW GAUGE PUSH CAR.

Platform, 7 feet long by 5 feet wide. Outside bearings. Wheels, 20 in. diameter; weight, 425 lbs.

PRICE, $35.00.

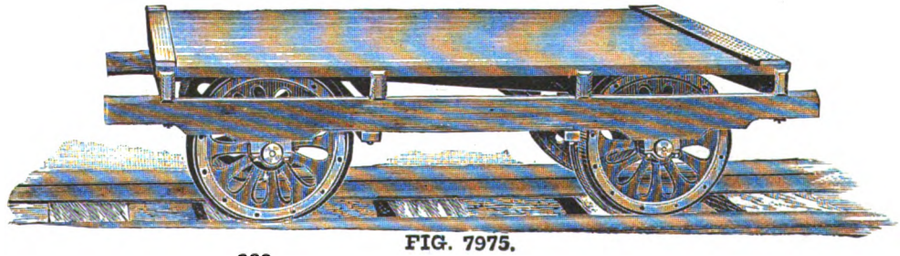


FIG. 7975.

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HAND CARS.

LIGHT WEIGHT SECTION.

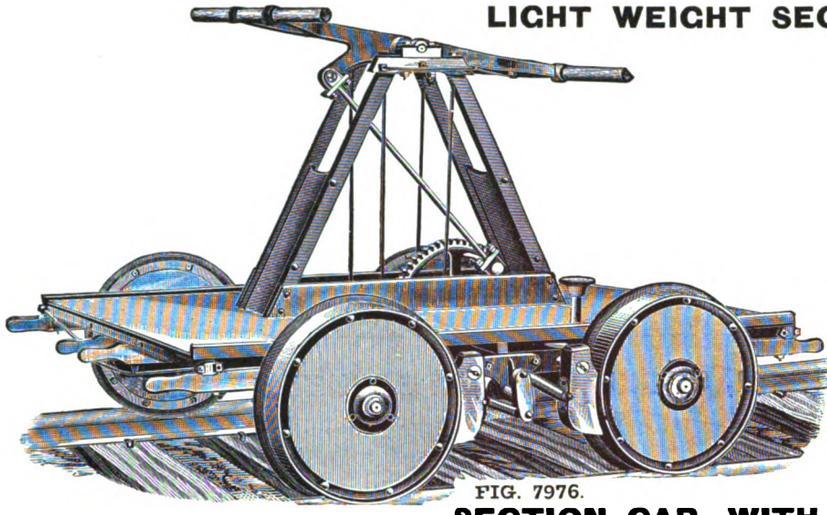


FIG. 7976.

FURNISHED WITH THE NEW STEEL WHEELS, SAME AS NO. 1.

Fitted with 1½ inch steel axles, 3 inch brass bearings, side brakes, and new, all steel wheels. Platform, 6 feet long, 4 feet 4 inches wide. Four long sills or handles, 1¼ x 2 inches; six cross sills, 1¼ x 1¾ inches. Decking matched.

The above-described car is very light and speedy, and easily propelled. It is easily handled by two men when removing from or placing upon the track. We recommend this car where small section forces are employed, but for heavy work would always advise our No. 1 standard, which is the strongest and most durable car in the market. Weight, 475 lbs.

PRICE, $55.00.

SECTION CAR, WITH SEATS.



FIG. 7977.

FURNISHED WITH THE NEW STEEL WHEELS, BUT NOT SHOWN IN CUT.

Platform, 7 feet 6 inches long x 4 feet 4 inches wide. For large section forces. Capacity, 12 to 14 men. We make narrow gauge same as above, excepting that platform extends over wheels, and is only 6 feet 4 inches long. Capacity, nearly the same. Weight, 600 lbs.

PRICE, $65.00.
PRICE, WITHOUT SEATS, $60.00.

DESCRIPTION, FIG. 7978.

Platform, 6 feet x 4 feet 5 inches. Wheels, 20 inches in diameter. Axles, steel, 1½ inches. Weight, 490 lbs. **PRICE, $50.00.**

WOOD OR STEEL WHEEL SECTION HAND CAR.

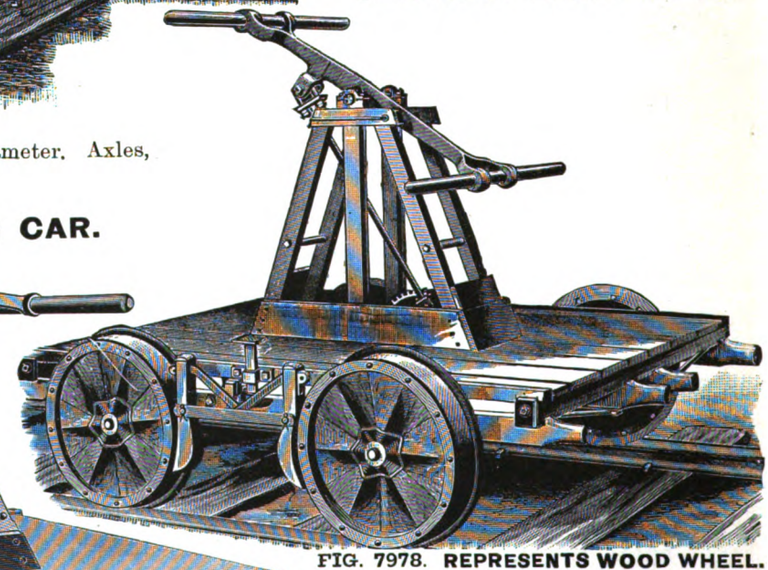


FIG. 7978. **REPRESENTS WOOD WHEEL.**

BRIDGE GANG CAR.

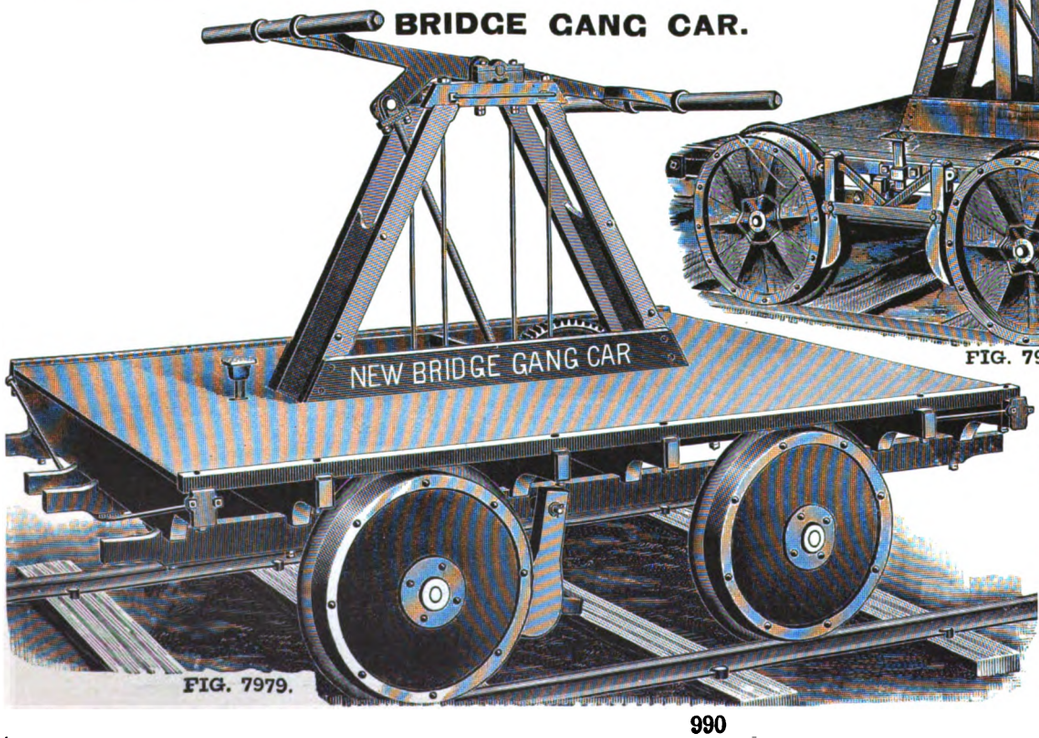


FIG. 7979.

FURNISHED WITH NEW STEEL WHEELS. 1 3-4 INCH HARD MACHINERY STEEL AXLES. BRASS BEARINGS THROUGHOUT.

Platform, 7 feet long x 5 feet 8 inches wide. Capacity, 12 to 15 men and tools. Four long sills, 3 x 1½ inches, six cross sills, 5¼ x 1½ inches. Inside bearings. Actual weight, 680 lbs. **PRICE, $70.00.**

Narrow gauge, smaller platform. Weight, 525 lbs. **PRICE, $55.00.**

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HAND CARS AND VELOCIPEDE CARS.

WEED CUTTING CAR FOLDED FOR RUNNING.

With this car the heaviest growth of weeds can be easily and quickly cut, and it will save its cost on any division several times over in a single season, besides leaving the regular force nearly all of their time to devote to their legitimate work; hence this work will be better done, and with less help.

WEIGHT, 750 LBS.

PRICE, with two sickle bars, **$150.00.**

FOR ONE OR TWO RIDERS.

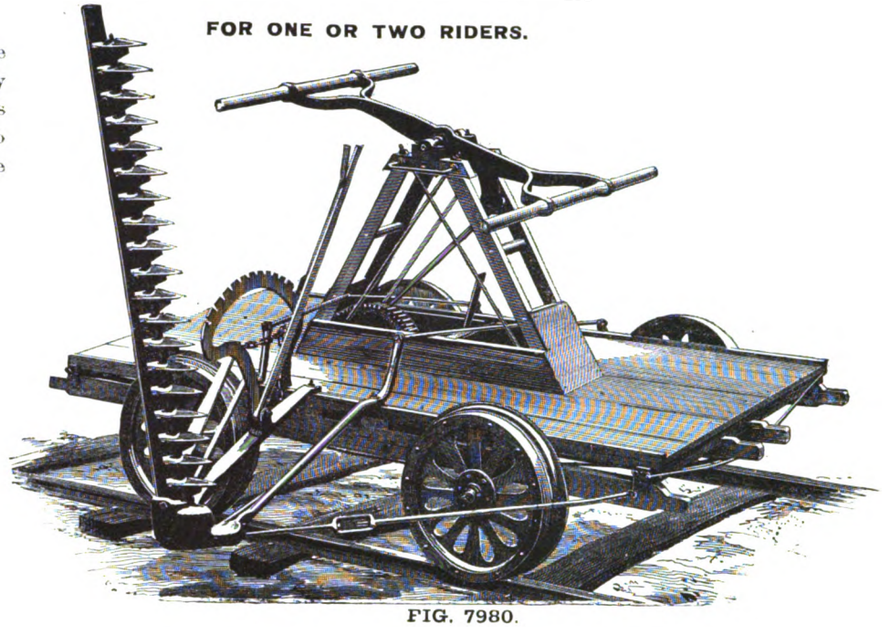


FIG. 7980.

STANDARD STEEL VELOCIPEDE.

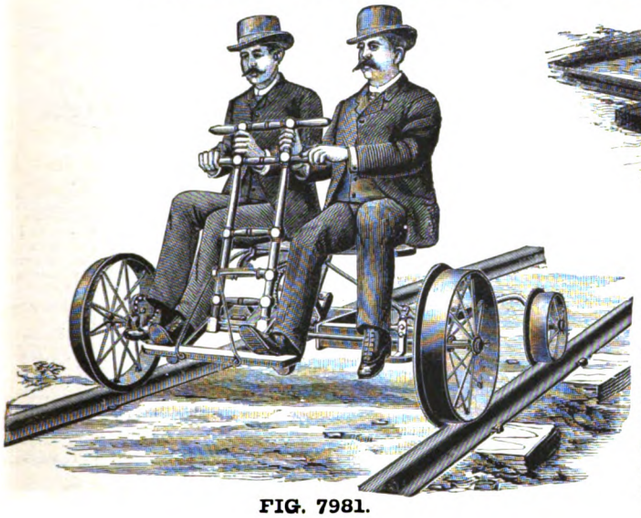


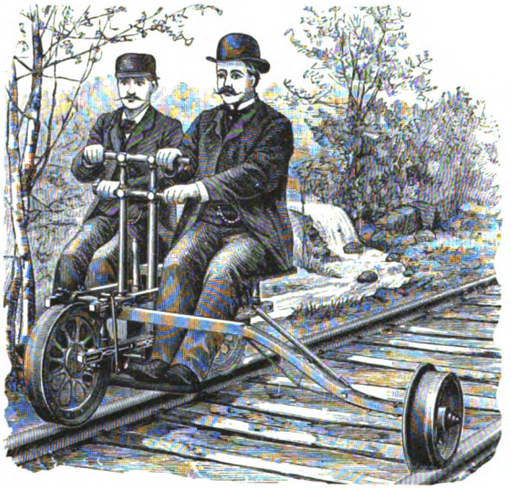
FIG. 7981.

DESCRIPTION, FIG. 7981.

The axles of these velocipede cars revolve under anti-friction rollers, with center bearings, and have brass oil cups; ⅞ or 1 inch hard machinery steel axle is furnished as ordered; 20 inch 20 lb. steel driving wheels.

WEIGHT, 135 LBS.
PRICE, $35.00.

1 OR 2 RIDER VELOCIPEDE CAR.



TELEGRAPH LINE REPAIRERS' CAR.

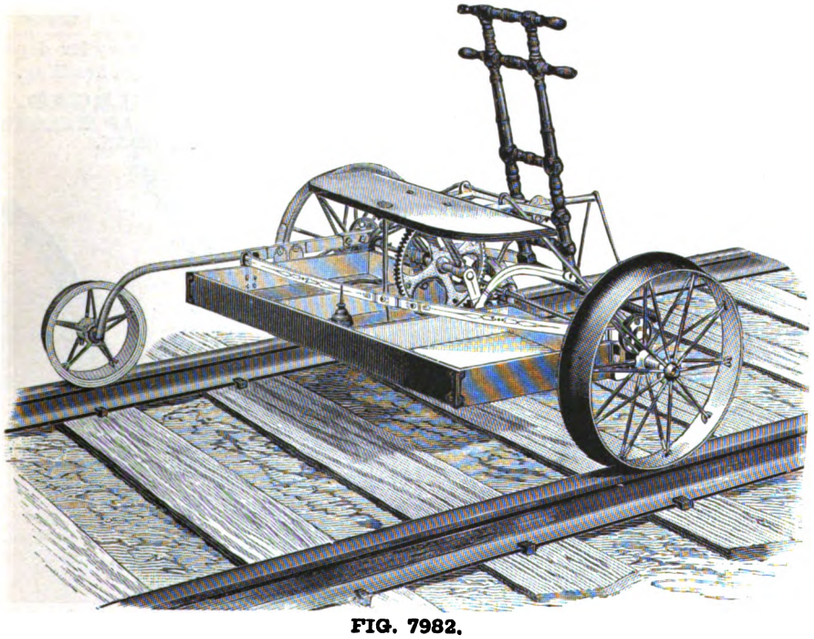


FIG. 7982.

ONE INCH STEEL AXLE.

This velocipede runs backward as well as forward—a great advantage. Above car carries one or two men and a load of 200 pounds.

WEIGHT, 150 LBS. **PRICE, $37.00.**

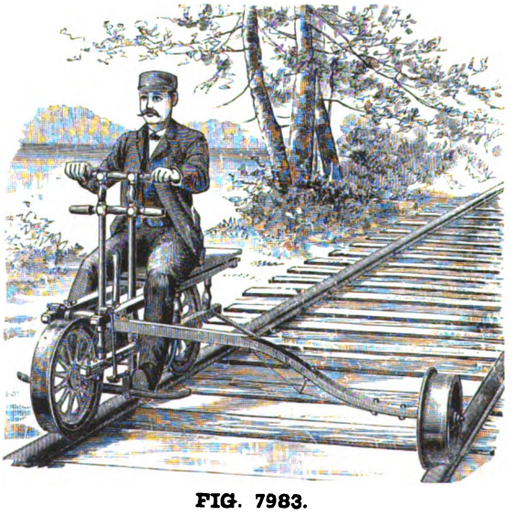


FIG. 7983.

ARRANGED FOR 1 OR 2 RIDERS.

WEIGHT, 145 LBS. **PRICE, $41.50.**

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HAND TRUCKS.

NEW YORK PATTERN.
HALF IRONED.



FIG. 7984.

BOSTON PATTERN.
HALF IRONED.



FIG. 7985.

WESTERN PATTERN.
HALF IRONED.



FIG. 7986.

COTTON.



FIG. 7987.

PRICES, FIG. 7984.

No.	Length of handles. Inches.	Width at nose. Inches.	Width at upper bar. Inches.	Size of wheels. Inches.	Half ironed. Each.	Strapped up. Each.
0	45	12	16½	6 x1½	$4.40	$5.15
1	48	13	18	6½x1¾	4.60	5.35
2	53	14	19	7½x2	6.10	7.10
3	56	15	20	9 x2⅜	8.00	9.00
4	60	15½	21	10 x2½	9.50	11.00
5	64	17	22	11 x2½	11.50	13.50

PRICES, FIG. 7985.

No.	Length of handles. Inches.	Width at nose. Inches.	Width at upper bar. Inches.	Size of wheels. Inches.	Half ironed. Each.	Strapped up. Each.
0	48	11	17½	6 x1½	$6.00	$7.00
1	50	11½	18	6½x1¾	6.50	7.50
2	55	13	19½	7½x2	8.50	10.00
3	57	14½	22	9 x2¾	11.00	12.50
4	66	15	22½	10 x3	....	15.50
5	73	15	23	11 x3	....	18.50

We make these trucks with wheels inside when desired, at 10 per cent. advance over above prices.

PRICES, FIG. 7986.

No.		Length of handles. Inches.	Width of truck. Inches.	Diameter of wheels. Inches.	Prices. Each.
0	Half ironed.	44	18	6	$6.00
1	" "	48	19	6½	7.00
2	" "	52	20	7½	9.00
3	" "	56	22	9	13.00
1	Full "	48	19	6½	8.00
2	" "	52	20	7½	10.50
3	" "	56	22	9	15.00
4	" "	60	24	10	18.50

PRICES, FIG. 7987.

No.	Length of handles. Inches.	Width at nose. Inches.	Width at upper bar. Inches.	Size of wheels. Inches.	Prices. Each.
3	56	15	20	9x2⅜	$9.00
4	60	16½	21½	10x2½	12.00
5	64	18	23	11x2½	15.00

PRICES, FIG. 7988.

One wood and three curved iron cross-bars.

No.	Length of handles. Inches.	Width. Inches.	Diameter of wheels. Inches.	Strapped up. Each.
1	48	19	6½	$9.00
2	52	20	7½	11.00
3	56	22	9	16.00

PRICES, FIG. 7989.

No.	Length of handles. Inches.	Width at nose. Inches.	Width at upper bar. Inches.	Diameter of wheels. Inches.	Wood slats. Half ironed. Each.	Three curved iron cross-bars. Upper bar wood. Strapped up. Each.
1	48	13	18	6½	$5.60	$7.00
2	53	14	19	7½	7.10	9.00
3	56	15	20	9	9.00	10.50
4	60	15½	21	10	....	12.50
5	64	17	22	11	....	15.00

Furnished with all iron cross-bars, if so desired.

PRICES, FIG. 7990.

Length of handles. Inches.	Width of truck. Inches.	Diameter of wheels. Inches.	Prices. Each.
60	24	11	$20.00

PRICES, FIG. 7991.

Length of handles. Inches.	Width of truck. Inches.	Diameter of wheels. Inches.	Price. Each.
60	24	11	$22.00

These trucks are made extra heavy for depot and dock use, and will stand rough handling.

BARREL TRUCKS.

WESTERN PATTERN.



FIG. 7988.

NEW YORK PATTERN.



FIG. 7989.

RAILROAD.
TWO IRON STRAPS IN CENTER.

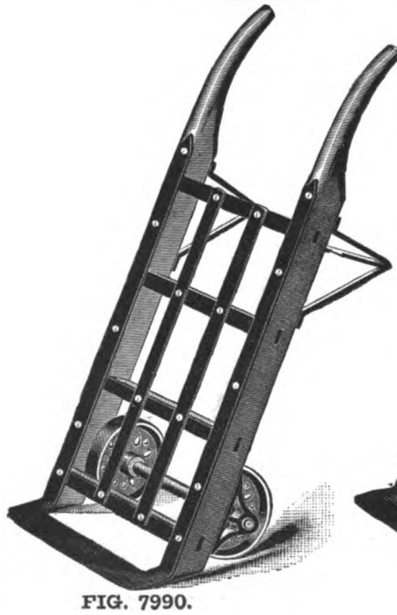


FIG. 7990.

EXTRA RAILROAD.
ONE MIDDLE STRAP WELDED TO NOSE.



FIG. 7991.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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HAND TRUCKS, BARROWS.

STEAMBOAT TRUCKS.



FIG. 7992.

Heavily ironed, and with bent flat iron cross bars.

PRICES.

No. 3. Length of handles, 56 in.; width at nose, 16 in.; width at upper bar, 20 in.; size of wheels, 9 x 2¾ in.; each, $20.00

No. 4. Length of handles, 60 in.; width at nose, 20 in.; width at upper bar, 22 in.; size of wheels, 10 x 3 in.; each.....$24.00

CURVED BAGGAGE BARROWS.

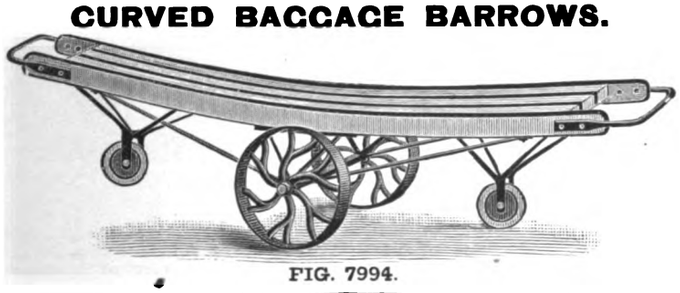


FIG. 7994.

Size.	Prices, each.
No. 1. 10½ ft. long by 27 in. wide, 22-inch cast wheels.....	$45.00
No. 2. 12 " " " 30 " " 24 " " "	65.00

WAGON TRUCKS.



FIG. 7996.

No.	Length of platform. Inches.	Width of platform. Inches.	Diameter of wheels. Inches.	Prices, each.
1	36	24	7½	$14.00
2	38	26	7½	15.00
3	40	28	7½	16.00
4	42	30	9	17.50
5	44	32	9	18.50
6	46	34	9	20.00

BOX TRUCKS.

PHILADELPHIA PATTERN.

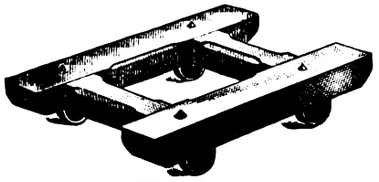


FIG. 7997.

No. 1. 16 x 24 inches, outside.....Price, each, $5.50

SLOPING BACK BAGGAGE BARROWS.

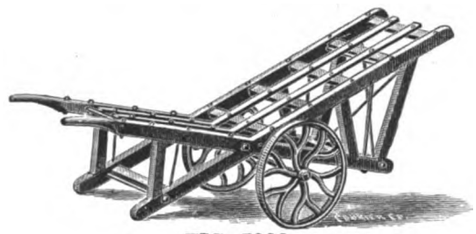


FIG. 7993.

PRICES.

Size.	Prices, each.
No. 1. 7 ft. long by 24 in. wide, 20-inch cast wheels...	$40.00
No. 2. 9 " " " 27 " " 22 " " " ...	45.00
No. 3. 9 " " " 30 " " 24 " " " ...	50.00

BAGGAGE WAGON, WITH WROUGHT SPOKE WHEELS.

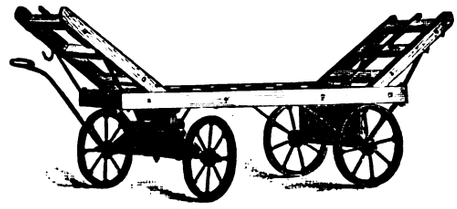


FIG. 7995.

PRICES.

Wrought iron fifth wheel, 20 in. in diameter.

Front wheels, 20 in. in diameter; rear wheels, 22 in. in diameter.

No. 1. Length, 7 ft.; width, 26 in.; dash, 28 in. long.....$70.00
No. 2. " 10 " " 27 " " 35 " " 80.00
No. 3. " 12 " " 32 " " 44 " " 90.00

Weight: No. 1, 475 lbs.; No. 2, 600 lbs.; No. 3, 725 lbs.

EXPRESS WAGONS, TRUSS BRACED.

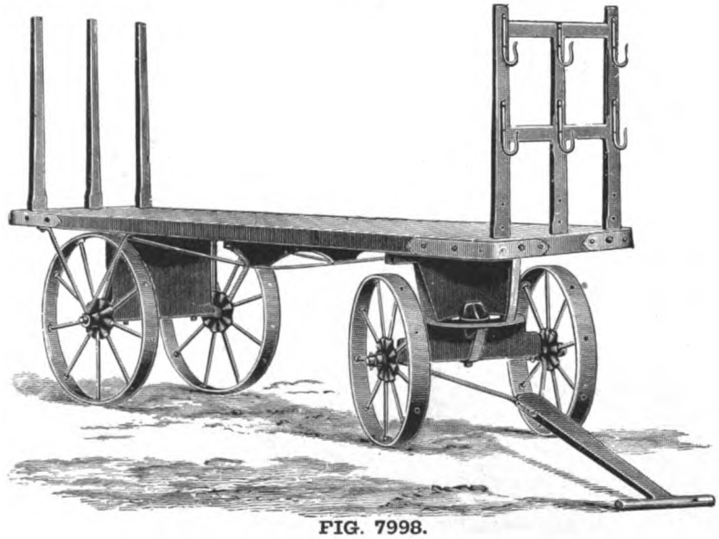


FIG. 7998.

PRICES.

Size.	Price.
10 ft. long by 40 in. wide; wrought wheels; fore, 28 in.; hind, 32 in. diameter.	$90.00

Since the requirements in express wagons are so variable, we cannot closely name prices, except on specification with description.

We are prepared to make to order, on short notice, almost any kind of baggage barrows, wagons or trucks, and solicit specification for prices.

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AUTOMATIC TRUCKS AND STEEL WHEELS.

FOR ROUND HOT STEEL, IRON WHEELS.

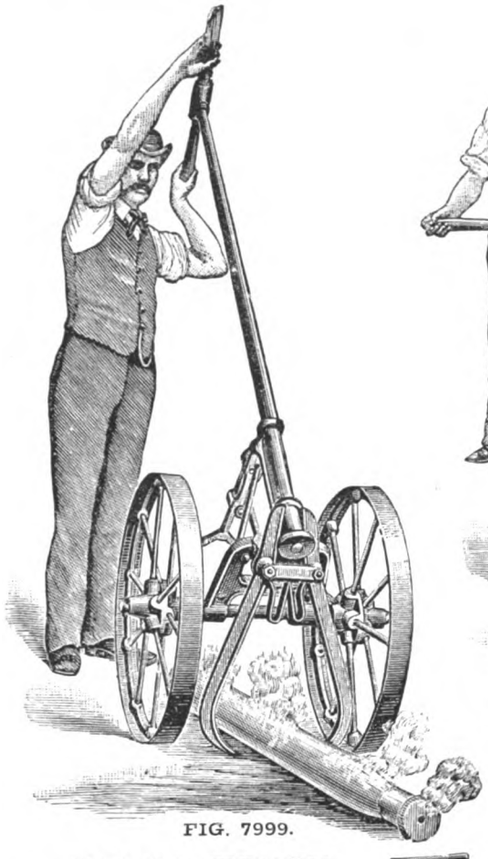


FIG. 7999.

METAL TRUCK.

This truck is adapted for tin plate, pig tin, sheet lead, shot, etc. Platform, 42 inches long, 20 inches wide, 1¾ inches thick, made of best selected seasoned oak, with heavy iron band around top and countersunk, as shown in cut. All bolts countersunk. Extra heavy wheels, 9¾ by 4 ins. Wrought iron fifth wheel, 7½ ins. in diameter. Iron handle, 36 ins. long. Well braced.



FIG. 8002.

WEIGHT, 235 LBS. PRICE, $30.00.

SPOKE CAR OR TENDER.

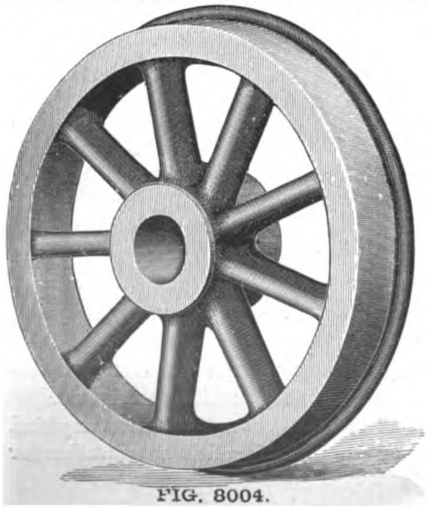


FIG. 8004.

FOR BEAMS, SARVEN'S WOOD WHEELS.

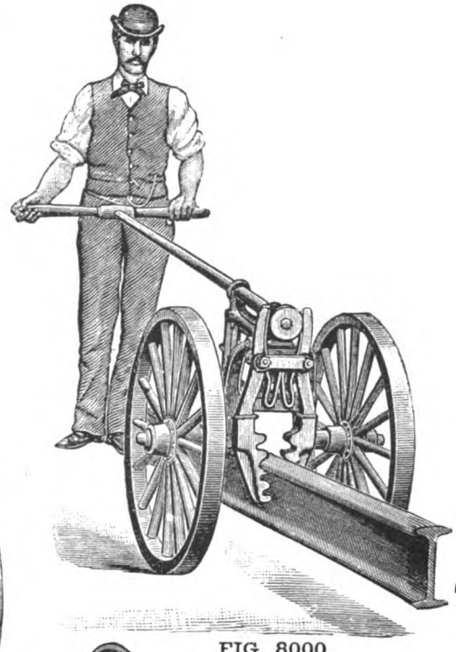


FIG. 8000.

3-WHEEL TRUCK.

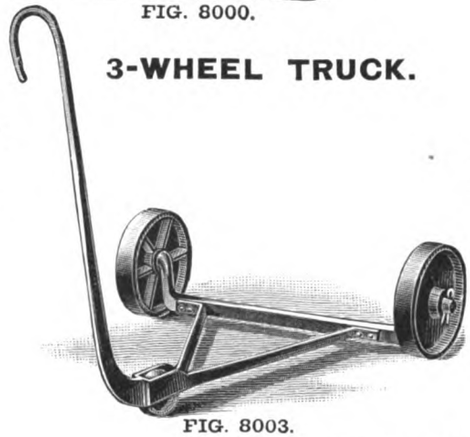


FIG. 8003.

SOLID CAST STEEL WHEELS.

CAR OR TENDER.



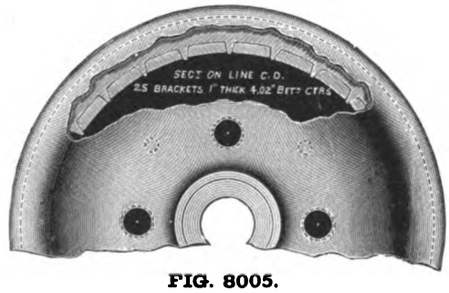


FIG. 8005.

Fig. 8004 shows our 30 inch solid steel spoke engine truck wheel, 2½ inch tread. This wheel can be treated same as driving wheel, Fig. 8006, when tread is worn out. Our 28 inch, 30 inch and 33 inch spoke and double plate truck and tender wheels are being used by various railroads throughout the country.

Fig. 8005 shows solid steel passenger coach wheel made in all sizes of diameter or tread.

LOCOMOTIVE DRIVER.

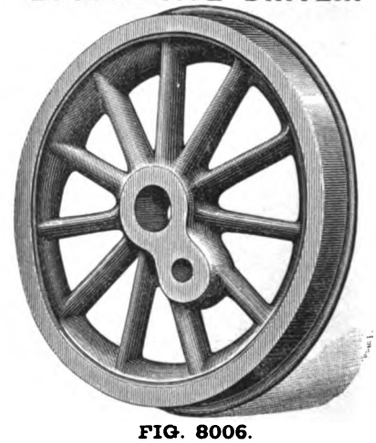


FIG. 8006.

We beg to call attention to our solid steel driving wheel, as per accompanying illustration. As this wheel has a practically indestructible center, which will last for an indefinite period, it is possible when tread is worn out to cut off flange and shrink new tire on. We also manufacture solid steel driving wheel centers.

PRICES FOR ALL ON APPLICATION.

PRICES, FIG. 7999.

30 inch iron wheel, wrought iron spokes, width 30 inches, capacity 2 to 9 in. diameter. Designed for locomotive and car axles, bar iron shafting, cast columns, etc.

WEIGHT, 235 LBS. PRICE, $75.00.

Same, wooden wheels.

WEIGHT, 175 LBS. PRICE, $80.00.

PRICES, FIG. 8000.

30 IN. OR 33 IN. SARVEN'S WOOD WHEELS.

Width, 30 in. Capacity, 4 in. to 15 in. This truck is designed for handling wrought iron beams and railroad iron.

WEIGHT, 175 LBS. PRICE, $80.00.

33 in. Sarven's wood wheels, designed for handling car wheels on axles.

PRICE, $85.00.

BAR IRON TRUCK.

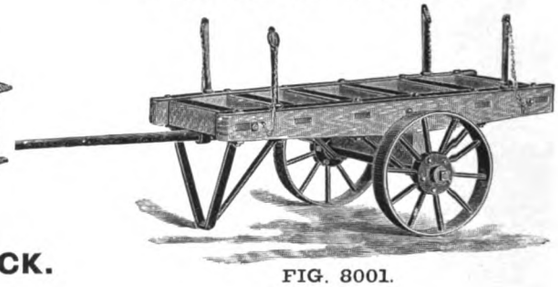


FIG. 8001.

A very heavy, strong and durable truck. Platform, 25½ inches wide by 63 inches long. Iron handle extends 59 inches in front of platform. Truck stands on platform scale 3 feet square. Patent steel spoke wheels 3 x 20 inches.

WEIGHT, 350 LBS. PRICE, $50.00.

PRICES, FIG. 8003.

No. 1.	Capacity, 750 lbs.	$10.00
No. 2.	Capacity, 1,000 lbs.	20.00
No. 3.	Capacity, 1,500 lbs.	25.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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PATENT CAR WHEELS.

PLATE, 36 AND 42 INCH DIAMETER.

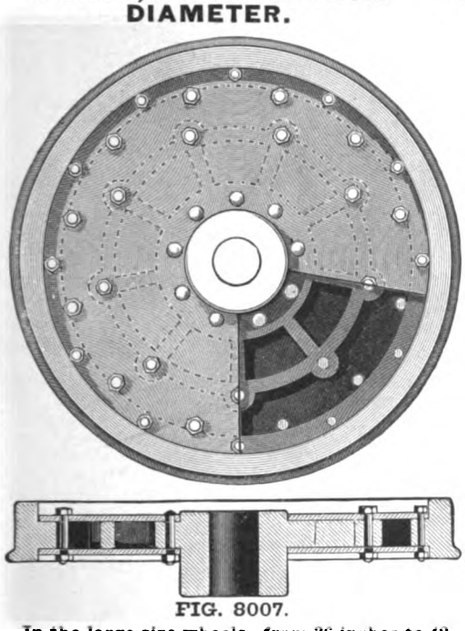


FIG. 8007.

In the large size wheels, from 36 inches to 42 inches, nominal outside diameter, we use the hub as shown in Fig. 8007. The two side plates are of steel each ½ inch thick, and are fitted closely into the tire and also on the hub; then bolted as shown above, with turned steel bolts, making, practically, a solid wheel.

PLATE, 24 TO 33 INCH DIAMETER.

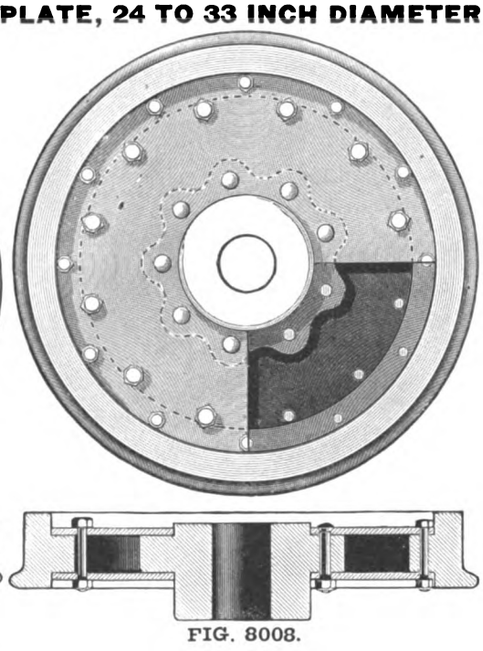


FIG. 8008.

In filling orders for 33 inch engine truck plate wheels, we use the same hub as for a 36 inch wheel.

All sizes of wheels have the same section of tire.

SPOKE.

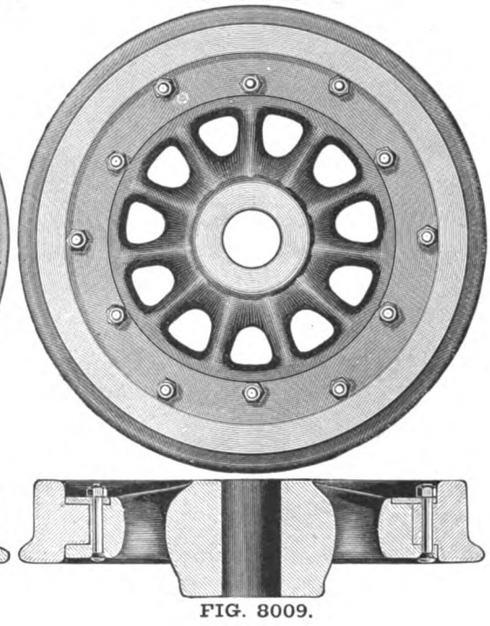


FIG. 8009.

The spoke wheel is made, largely, for engine trucks. The same section of tire is used, shrunk on to a cast iron spoke center, and to make it doubly secure, a steel retaining ring is bolted through the web of tire and also through the spoke center.

PRICES ARE NAMED ON APPLICATION ONLY FOR ABOVE OR OTHER PATENTED WHEELS.

BOLSTER SPRING.



FIG. 8010.

Capacity per set of 4 springs, 10 to 12 ton load.

GENERAL REMARKS ON SPRINGS.

The height of all bolster springs are made six inches full, unless otherwise ordered.

Spirals will be furnished with or without castings.

Any diameter, height or capacity will be furnished.

In ordering equalizing or elliptic springs, please give us the weight of car or locomotive, and the springs will be made and tested to insure easy riding.

All descriptions of spirals for machinery, valves, agricultural implements, etc., made to sample or specifications.

Any of the designs given as group bolster springs will be furnished with single or two coil springs.

PRICES ON APPLICATION.

ELLIPTIC SPRINGS.

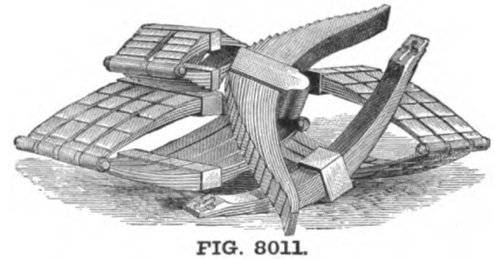


FIG. 8011.

TWO COIL DRAFT SPRINGS.



FIG. 8012.
5½ x 4 inches long.

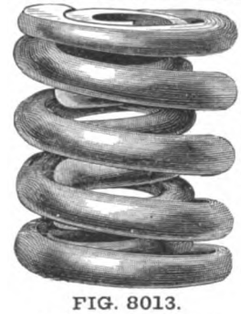


FIG. 8013.
5¾ x 6 inches long.

Any depth, diameter, capacity, or size of hole, made to order.

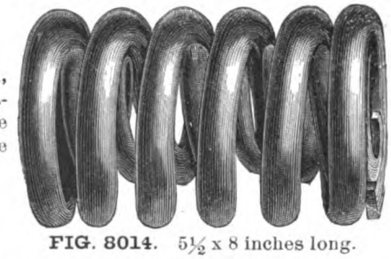


FIG. 8014. 5½ x 8 inches long.

LOCOMOTIVE AND CAR AXLES, TIRES, LINKS AND PINS, ETC.



FIG. 8015.

PRICES.

Steel tires, depending on size and point of delivery.		
" axles, " " " "		
" forgings		cents per lb.
" castings, not less than 100 lbs		"
Muck bar axles, hammered		"
Scrap axles		"
Links and pins		"

DESCRIPTION, FIG. 8016.

Group of 4 single coils. Diameter of case, 11 in. Height, 6 in. over all. Capacity of 4 groups, 25 and 30 tons.

PRICES ON APPLICATION.

BOLSTER SPRING.

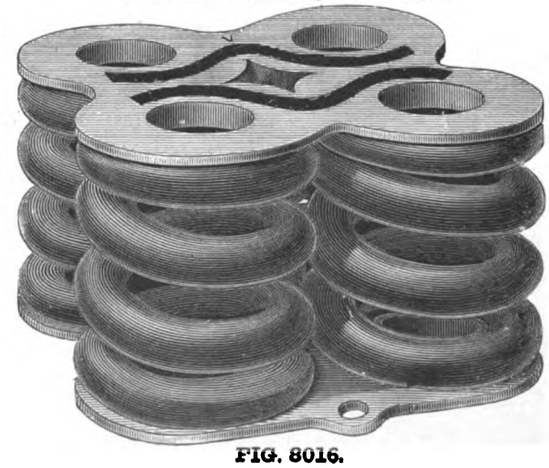


FIG. 8016.

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DENISON'S SUSPENDED WEIGHING MACHINES.

PRICES, FIGS. 8017 AND 8019.

Capacity.	Prices.	Approximate weight of machine.	Capacity.	Prices.	Approximate weight of machine.
½ ton, 500 kilos.	$80.00	44 lbs.	8 tons, 8,000 kilos.	$306.00	262 lbs.
1 " 1,000 "	90.00	62 "	10 " 10,000 "	338.00	318 "
1¼ " 1,250 "	104.00	68 "	12 " 12,000 "	360.00	335 "
1½ " 1,500 "	122.00	90 "	16 " 16,000 "	396.00	560 "
2 " 2,000 "	144.00	112 "	20 " 20,000 "	450.00	682 "
2½ " 2,500 "	162.00	122 "	26 " 26,000 "	530.00	752 "
3 " 3,000 "	190.00	126 "	30 " 30,000 "	594.00	896 "
4 " 4,000 "	225.00	154 "	40 " 40,000 "	730.00	1,120 "
5 " 5,000 "	266.60	184 "	50 " 50,000 "	855.00	1,540 "
6 " 6,000 "	280.00	200 "	60 " 60,000 "	1,080.00	1,830 "

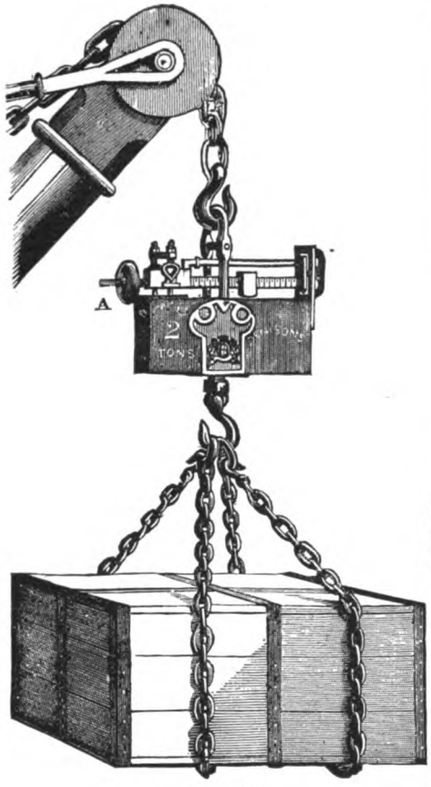


FIG. 8017.

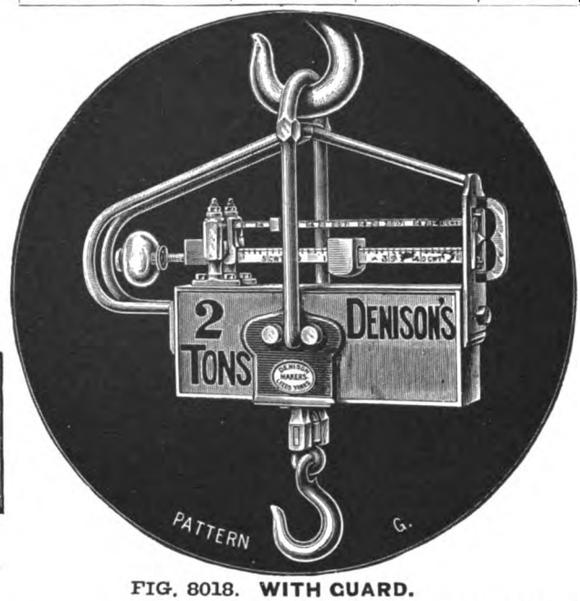


FIG. 8018. WITH GUARD.

It is arranged to tare off slings, etc., by means of the ball, A, and thus show the net weight on the indicating steelyard with perfect accuracy.

The steelyard is graduated by special machinery, and to the standard of any country. It is manipulated in the same way as the beam of an ordinary weighing machine.

The machine is constructed upon the compound lever principle, of the best forged iron and steel. All the knife edges and bearings are steel, scientifically tempered and hardened, and the working parts are protected from damp and dust by being enclosed in a strong iron or steel box.

DESCRIPTION, FIG. 8018.

This pattern is made and sent in sizes of ½ ton to 3 tons only, unless specially ordered to be like pattern Fig. 8017. It differs only in the form of suspension, the steelyard and internal arrangements being the same. The price is the same, but the weight is increased 10 per cent.

The heavy sizes from 16 to 100 tons have a bottom swivel eye—no hook—prepared to receive a hook or shackle, which is to be supplied and attached by the users to suit their own requirements.

EXTRA FOR GUARD, ETC., FIG. 8018, OVER PRICES, FIG. 8017.

½ ton	$7.00 extra.	2½ tons	$11.50 extra.
1 "	9.00 "	3 "	13.50 "
1¼ "	9.00 "	4 "	16.00 "
1½ "	10.50 "	5 "	18.00 "
2 "	11.50 "	6 "	19.00 "



FIG. 8019.

DOUBLE GRADUATIONS.

All our prices are for machines graduated in any one national standard. Two different graduations can be supplied with each machine if desired, which requires a double steelyard and double adjustment, at the following extra prices:

½ ton	$9.00 extra.	10 to 16 tons	$29.00 extra.
1, 1¼, 1½ tons	13.50 "	20 tons	33.00 "
2 to 3 tons	18.00 "	26 and 30 tons	36.00 "
4 tons	21.00 "	40 tons	43.00 "
5 and 6 tons	23.00 "	50 "	50.00 "
8 tons	25.00 "	60 "	60.00 "

The sensitiveness of these machines is shown as follows:

Up to 5 tons, actuated by 1 lb. 10 tons, actuated by 2 lbs. 20 tons, actuated by 4 lbs. 40 tons, actuated by 8 lbs. 60 tons, actuated by 10 lbs.

The machines of 5 tons and less are graduated by 1 lb. divisions up to 100 lbs.

DYNAMOMETERS.

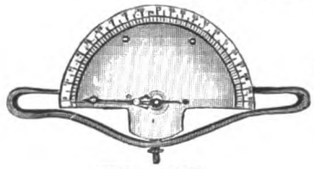


FIG. 8020.

PRICES, FIG. 8020.

Capacity, ranging from 500 to 2,500 lbs., each.....$36.00
Capacity, ranging from 3,000 to 5,000 lbs., each $48.00

POWER REGISTERING PULLEY.

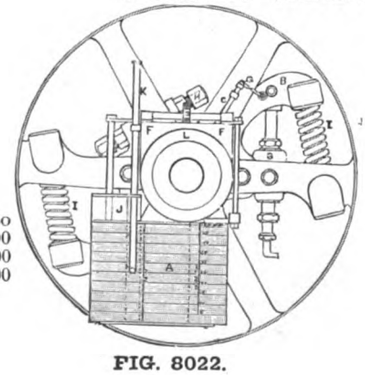


FIG. 8022.

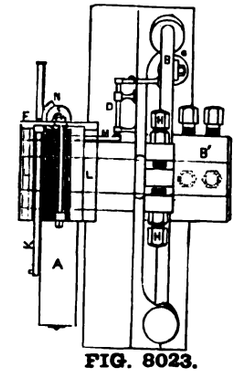


FIG. 8023.

FOR DESCRIPTION SEE NEXT PAGE.

DYNAMOMETERS.

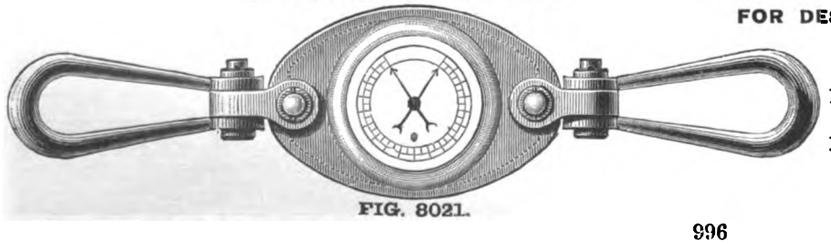


FIG. 8021.

PRICES, FIG. 8021.

For 500	1,000	2,000	3,000 lbs. tractive power.
$50.00	$60.00	$70.00	$80.00 each.
For 4,000	6,000	8,000	10,000 lbs. tractive power.
$100.00	$120.00	$135.00	$150.00 each.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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DESCRIPTION, FIGS. 8022 AND 8023.

This is a simple combination of a pulley with a registering device attached. It can be attached to any shaft, either driving or driven, or any machine, and it indicates the power used at any and all times. It is not complicated, does its work accurately, and registers the amount of power used on a card, which may be taken off at the end of the day, or at any time, filed away and replaced by a blank card. It can be used as a pulley by setting up one set screw.

This device is made in several designs to suit all conditions, as a pulley and in halves, so that it may be connected to any pulley or coupling on a shaft. It is simply a rotary registering scale, weighing the amount of power used as a merchant weighs his goods, and can be tested in a few minutes if required.

In ordering, please state diameter of pulley, width of, and whether round or straight face, diameter of shaft, and number of revolutions per minute. Prices on application.

PORTABLE PLATFORM SCALES.

WITH AND WITHOUT WHEELS.



FIG. 8024.

With brass sliding poise.

Capacity, lbs.	Platform, in.	No wheels. Prices.	With wh'ls. Prices.
2,500	26 x 34	$80.00	$85.00
2,000	25 x 33	70.00	75.00
1,500	21 x 28	52.00	56.00
1,200	20 x 28	45.00	49.00
1,000	17 x 26	39.00	43.00
800	17 x 26	34.00	38.00
600	16 x 25	30.00	33.00
400	15 x 21	23.00	26.00

WHEELBARROW SCALES.



FIG. 8028.

Brass sliding poise.

Capacity, lbs.	Platform, in.	No wheels Prices.	With wh'ls. Prices.
1,000	30 x 42	$70.00	$75.00
H PATTERN.			
Capa., lbs.	Platform, in.	No wheels. Prices.	With wh'ls. Prices.
1,000	30½x39¾	$60.00	$65.00

Prices include a set of inclines or bridges.

MINERS' AND TRANSPORTATION.

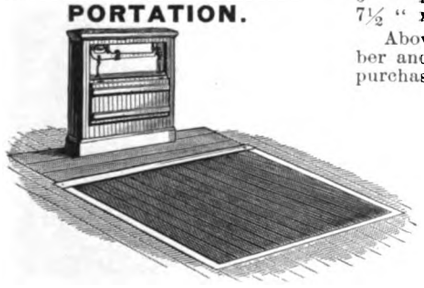


FIG. 8032.

Portable, complete with timber.

Tons.	Platform.	Prices, s'gle beam.	Prices, d'ble beam.
2	4½ ft. x 2 ft. 11½ in.	$155.00	$163.50
2	6 " x 4 " 11¾ "	180.00	188.50
3	6 " x 4 " 11¾ "	200.00	208.50

WITH WHEELS AND DROP LEVER.



FIG. 8025.

Notched beam.

Capacity, lbs.	Platform, in.	Prices.
2,500	26 x 34	$94.00
2,000	25 x 33	82.00
1,500	21 x 28	70.00
1,200	20 x 28	59.00
1,000	17 x 26	51.00
800	17 x 26	46.00
600	16 x 25	41.00
400	15 x 21	34.00

PORTABLE WAREHOUSE.

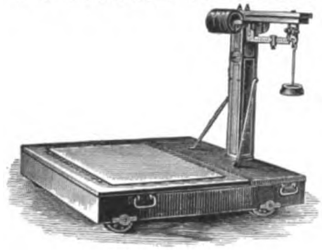


FIG. 8029.

With brass sliding poise.

Capa'y, lbs.	Platform, in.	No wheels. Prices.	With wh'ls. Prices.
5,000	48 x 48	$170.00	$185.00
3,500	42 x 44	110.00	125.00
2,500	37 x 46	95.00	105.00

Furnished also with drop lever at same prices.

SQUARE PLATFORM.

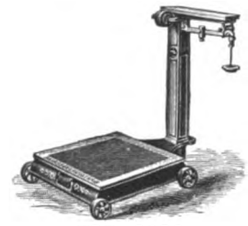


FIG. 8026.

Brass sliding poise.

Capac'y, lbs.	Platform, in.	No wheels. Prices.	With wh'ls. Prices.
600	23 x 23	$32.00	$35.00
1,000	25 x 25	42.00	45.00
1,200	27 x 27	50.00	53.00
1,500	29 x 29	56.00	60.00
2,000	31 x 31	75.00	80.00

FOR FOUNDRY USE.



FIG. 8027.

Heavy, with 12 inch wheels and drop lever; notched beam.

Capacity, lbs.	Platform, in.	Prices.
3,000	31 x 40	$125.00

With brass sliding poise; without drop lever.

3,000	31 x 40	$125.00

DORMANT WAREHOUSE SCALES.

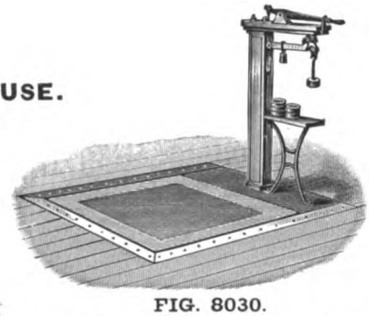


FIG. 8030.

With single wood pillar, drop lever and notched beam.

Capacity, lbs.	Platform, in.	Prices.
5,000	48 x 48	$150.00
3,500	42 x 44	105.00
2,500	37 x 46	92.00
2,000	25 x 34	78.00
1,500	21 x 31	68.00



FIG. 8031.

Capacity, lbs.	Platform, in.	Prices.
5,000	48 x 48	$170.00
3,500	42 x 44	125.00
2,500	37 x 46	105.00

With extra long neck, $135.00.

Double beam scales extra, 5,000 lbs., $10.00; 3,500 and 2,500 lbs., each, $8.00.

EXTRA PRICES, FIG. 8032.

Dormant, requiring timber.	S'gle beam.	D'ble beam.
4½ ft. x 2 ft. 11½ in.	$115.00	$123.50
6 " x 4 " 11¾ "	135.00	143.50
6 " x 4 " 11¾ "	155.00	163.50
6½ " x 4 " 10⅞ "	170.00	180.00
7 " x 4 " 9⅞ "	185.00	195.00
5 " x 4 " 0 "	185.00	195.00
7½ " x 4 " 8¾ "	205.00	215.00

Above prices for dormant pattern are exclusive of timber and foundation, which are to be furnished by the purchaser.

PLATFORM COUNTER SCALES.

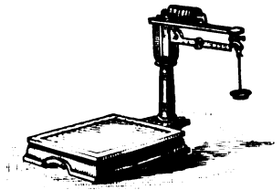


FIG. 8033.

With short iron pillar. Brass sliding poise.

Capacity.	Platform.	Prices.
2 oz. to 300 lbs.	13½ x 19 in.	$19.00
¼ " to 300 "	13½ x 19 "	35.00

RAILROAD DEPOT SCALES.

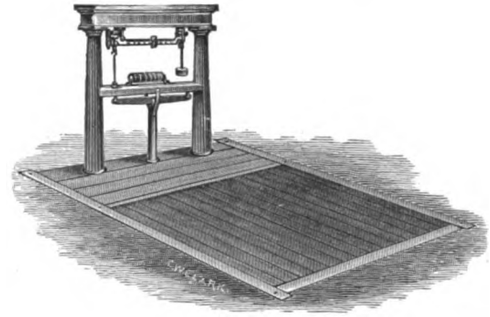


FIG. 8034.

Cap., lbs.	Size of platform.	Prices, s'gle beam.	Prices, double beam.
6	9 ft. 2¼ in. x 10 ft.	$280.00	$295.00
4	6 " 11 " x 9 "	230.00	240.00
3	4 " 11¾ " x 6 "	210.00	218.50
2	4 " 8¾ " x 7 " 6 in.	168.00	176.50

The prices for the above are exclusive of timber and foundation, which are to be furnished at purchaser's expense.

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SCALES AND HEAD LIGHTS.

IRON FRAME RAILROAD TRACK SCALES.

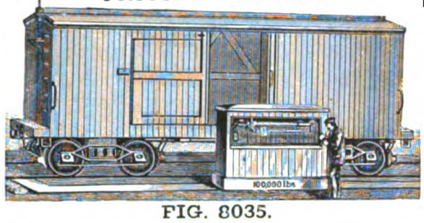


FIG. 8035.

PRICES.

Platform, 24 feet;	capacity,	25 tons	..	$700.00
" 34 "	"	30 "	..	975.00
" 36 "	"	30 "	..	1,000.00
" 40 "	"	50 "	..	1,100.00
" 46 "	"	60 "	..	1,200.00
" 50 "	"	50 "	..	1,325.00

HEAD LIGHTS.

Front and side numbers.



FIG. 8041.

23 inch signal No. Prices on application.

STANDARD HEAD LIGHT.

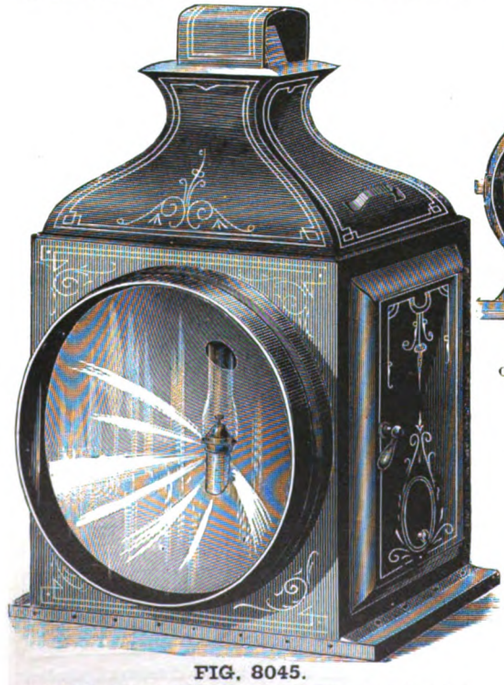


FIG. 8045.

23, 20, 18 and 16 inches. Prices on application.

EXPRESS PACKAGE.

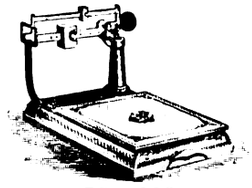


FIG. 8036.

Capacity, 1 oz. to 35 lbs.
Platform, 10½ x 12 in.

PRICE, $15.00.

FAMILY.



FIG. 8040.

POSTAL.

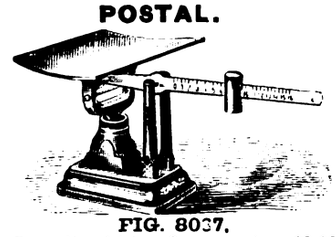


FIG. 8037.

Capacity, ½ to 8 oz.; price, $3.00
" 1 " 16 " " 4.00
" ½ " 34 " " 6.00

PRICES, FIG. 8040.

Capacity, ½ oz. to 240 lbs.
Platform, 10½ x 13½ in.

	S'gle beam.	D'ble beam.
With tin scoops..	$14.00	$15.00
" brass " ..	15.00	16.00

HEAD LIGHT SIGNAL.

Side numbers.

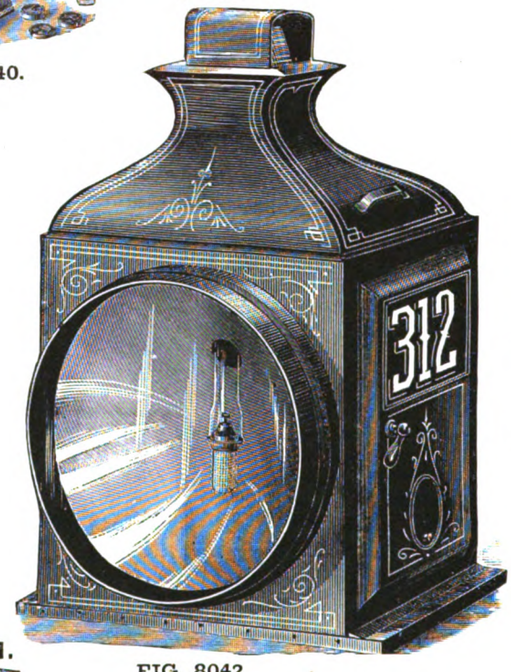


FIG. 8042.

23 inch. Prices on application.

10 INCH.

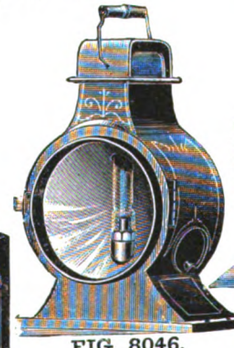


FIG. 8046.
Prices on application.

DESCRIPTION, FIGS. 8047 AND 8048.

This lamp is intended for use on caboose cars for freight trains. It is so arranged that the light is reflected down from the elevated deck or look-out into the car, and at the same time lighting the signals with a strong, full light.

6 in. semaphore lens, any color.
Body of lamp galvanized iron.
Prices on application.

CABOOSE SIGNAL LAMPS.

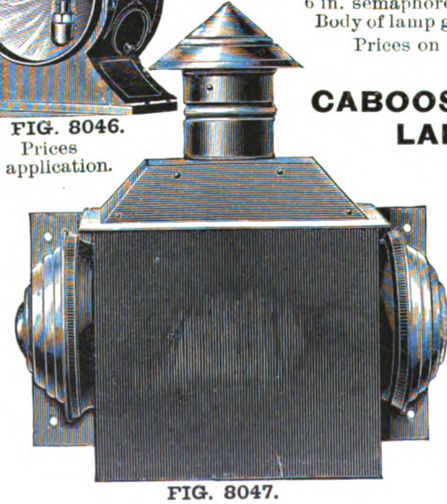


FIG. 8047.

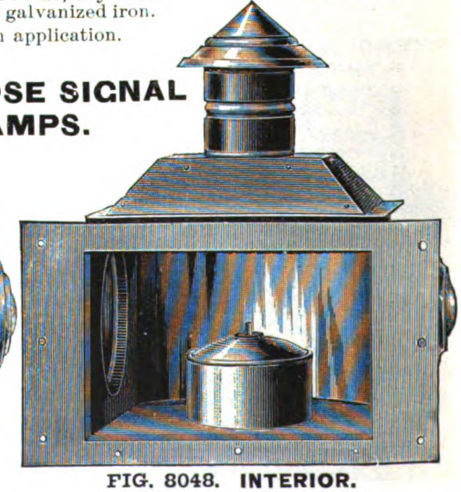


FIG. 8048. INTERIOR.

PACKAGE.

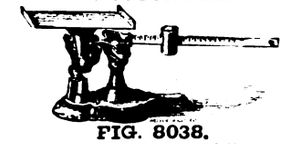


FIG. 8038.

Capacity, ½ oz. to 4 lbs.

PRICE, $8.00.

DOUBLE BEAM POSTAL.



FIG. 8039.

Capacity, ½ oz. to 6 lbs.

PRICE, $12.00.

12 INCH HEAD LIGHT.



FIG. 8043.

Prices on application.

14 AND 16 INCH ROUND HEAD LIGHT.



FIG. 8044.

Prices on application.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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TARGET, POLES AND SIGNAL LAMPS, ETC.

HEAD LIGHT BURNERS.

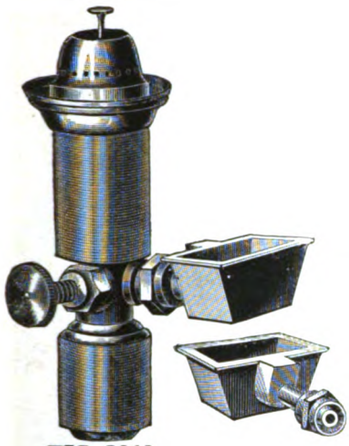


FIG. 8049.

PRICES ON APPLICATION.

SWITCH TARGET LAMPS.

POLE TARGET LAMPS.

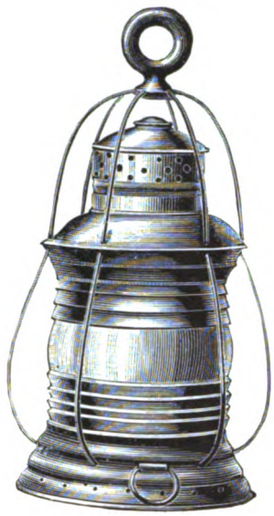


FIG. 8050.

With 6 inch white, blue, green or ruby fresnel.

TUBULAR SWITCH TARGET LAMPS.



FIG. 8051.

With 4 inch corrugated lens.

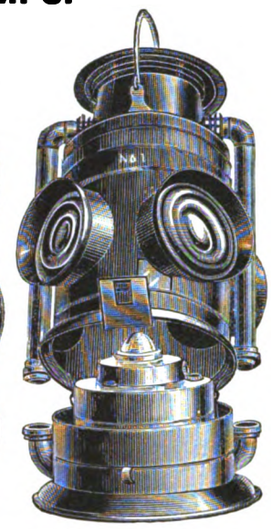


FIG. 8051. OPEN.

RAILROAD POLE TARGET LAMPS.

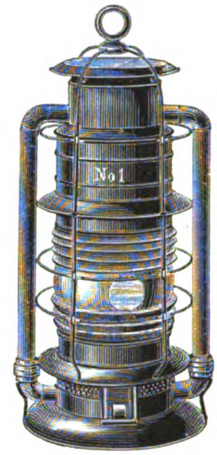


FIG. 8052.

⅝ wick.

REAR SIGNAL LAMPS FOR PASSENGER TRAINS.

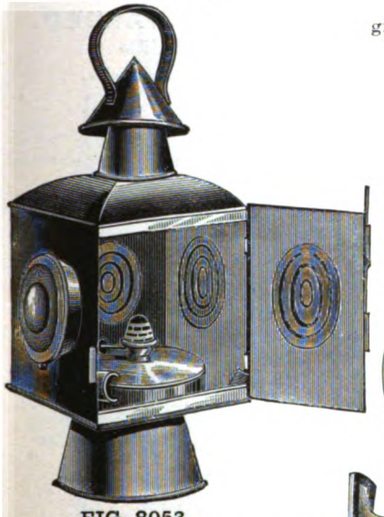


FIG. 8053.

4 inch corrugated lens, either white, ruby or green semaphore.

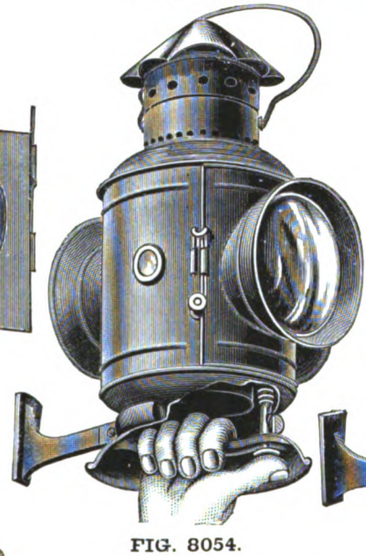


FIG. 8054.

4 inch corrugated lens, any color.

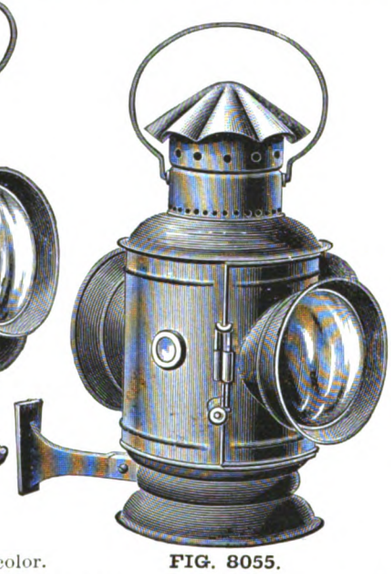


FIG. 8055.

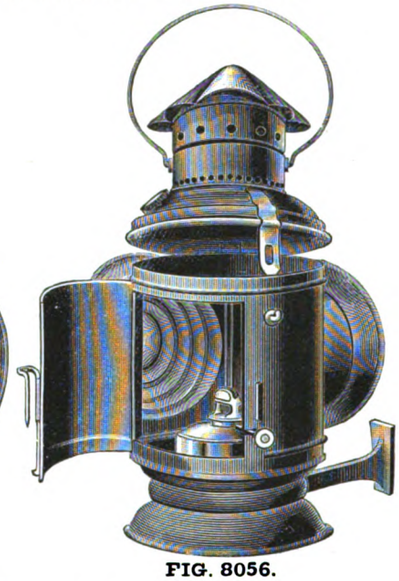


FIG. 8056.

PIER LAMPS.



FIG. 8057.

Made heavy, with 8 inch lens or flat glass, any color, with strong galvanized socket on back.

TICKET CANCELING BOX LAMPS.

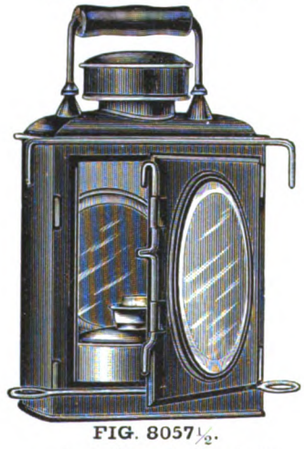


FIG. 8057½.

For use at stations, ferries, bridges, etc. For railways they have a ruby light back, which can be used for signaling.

BULL'S-EYE TAIL LAMPS.

SEMAPHORE LENS. BULL'S-EYE.

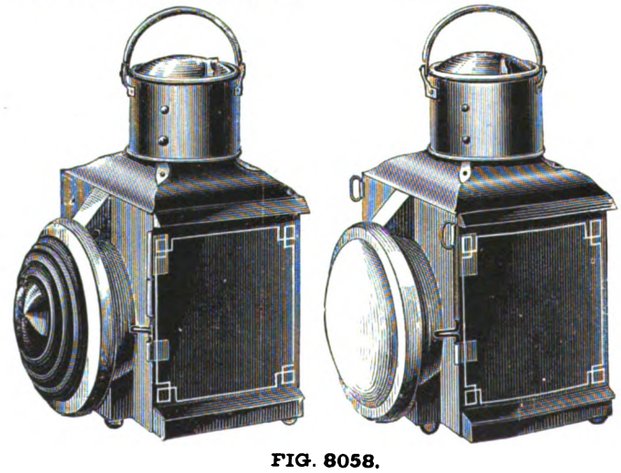


FIG. 8058.

Single 8 inch lens.

PRICES FOR ALL ABOVE LAMPS ON APPLICATION.

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LAMPS.

CAB LAMPS.



FIG. 8059.

PRICE, PER DOZ., $72.00.

CAUCE LAMPS.



FIG. 8060.

PRICE, PER DOZ., $42.00.

NO. 1 TUBULAR.



FIG. 8061.

These square tubular lamps require no chimneys and are furnished with silvered reflectors.

NO. 2 TUBULAR.

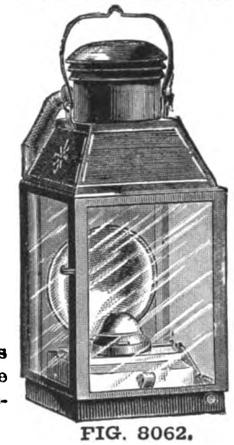


FIG. 8062.

PRICES.

No.	Size burner.	Size reflectors.	Size of wick.	Height.	Prices, each, boxed.
1	2	6	$\frac{5}{8}$	16	$3 00
2	3	8	$1\frac{1}{2}$	$21\frac{1}{2}$	4.00
3	3	12	$1\frac{1}{4}$	27	5.00

PRICES, FIG. 8070. Advance above list 75 cts.

NO. 3 TUBULAR.

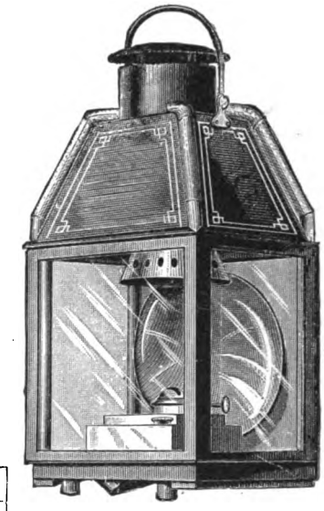


FIG. 8063.

LENSES.

BULL'S EYE.



SEMAPHORES.



OUTSIDE CORRUGATION.



INSIDE CORRUGATION.

FIG. 8064. **FIG. 8065.** **FIG. 8066.**

Give diameter of lens, from outside to outside, measured across back of rim, when ordering.

PRICES ON APPLICATION.

BOW TOP STATION.

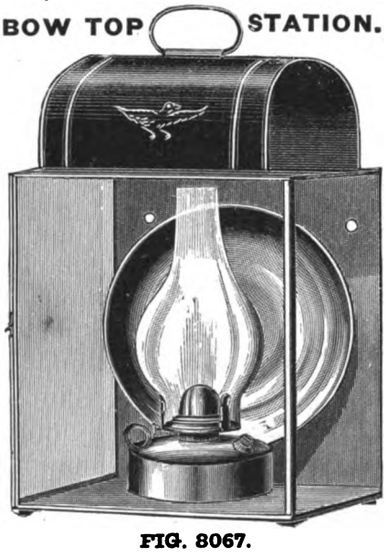


FIG. 8067.

Sizes.....7 x 11, 8 x 12, 9 x 13, 12 x 14
Prices, per doz., $14.00 $16.00 $18.00 $24.50

LAMP FOR BURNING GAS.

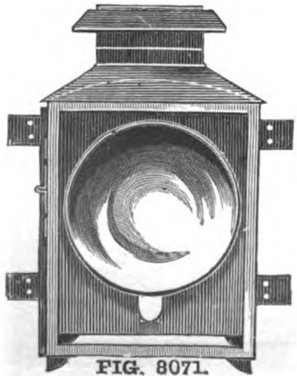


FIG. 8071.

SQUARE STATION LAMPS.

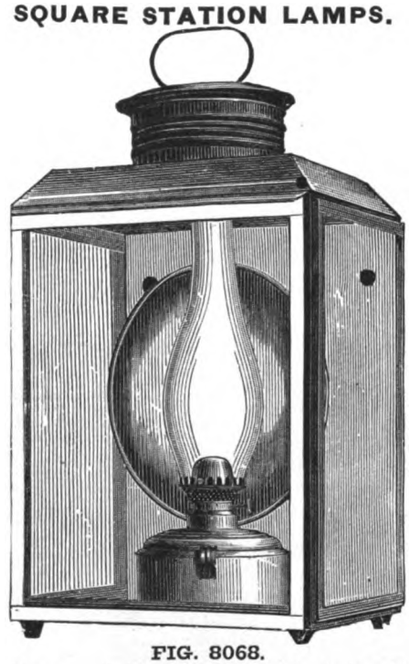


FIG. 8068.

Sizes.....7 x 11, 8 x 12, 10 x 14, 12 x 16
Prices, per doz., $14.00 $16.00 $20.00 $26.00

TRIANGULAR LAMPS.

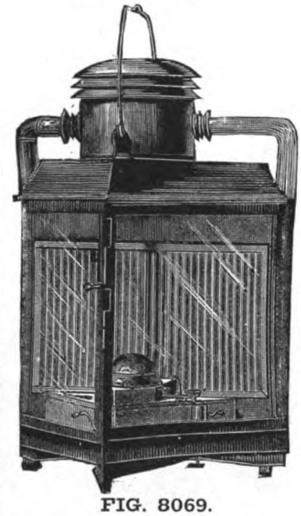


FIG. 8069.

TRIANGULAR STATION LAMPS.

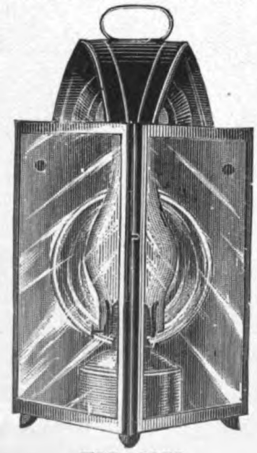


FIG. 8072.

STREET TUBULAR.



FIG. 8073.

WIRE GUARDED.

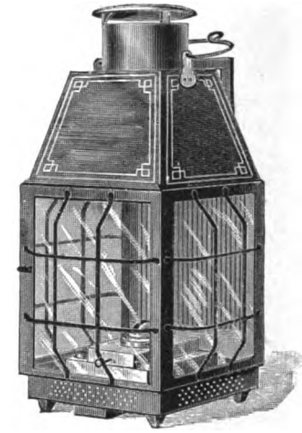


FIG. 8070.

PRICES, FIG. 8069.

No. 3 burner, No. $1\frac{1}{3}$ wick, 22 inches high. Will burn 20 hours without filling. Corrugated reflector.

PRICE, $5.00.

PRICES, FIG. 8071.

Painted green, glass bottom, nickel-plated reflectors.

Glass 9 x 12 in., per doz., $30.00
" 12 x 14 in., " 36.00

PRICES, FIG. 8072.

Glass 8 x 12 in., per doz., $16.00
" 9 x 13 in., " 19.00
" 10 x 14 in., " 21.00
" 12 x 16 in., " 24.00

PRICES, FIG. 8073.

No. 3 burner, $1\frac{1}{2}$ inch wick, corrugated top reflector, 36 inches high, 15 inches square.

This lamp has a regulator to burn 8, 12 or 16 hours, with automatic extinguisher outside wick regulator.

Packed one in case.

PRICE, $5.00.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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LAMPS AND LANTERNS.

ROUND STREET LAMPS.



FIG. 8074.

These lamps have the same extinguisher as described, Fig. 8073.

PRICES.

Tin, japanned	$3.50
Brass fount	4.00
All brass	5.00

NO. 0 REGULAR TUBULAR LANTERN.

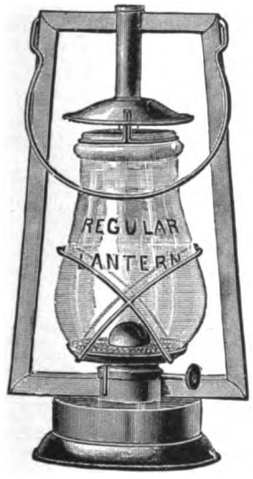


FIG. 8078.

COLORED GLOBES.

PRICES.

			Per doz.
No.	0	ruby tubular globes	$2.25
"	0	blue or green tubular globes	2.25
"	0	ruby tubular globes, Corning	7.75
"	1	" " " "	8.50
"	1	blue or green " "	6.25
"	39	ruby globes, Corning	8.00
"	39	blue or green globes, Corning	5.50
"	3	ruby tubular globes for street lamp	40.00
"	3	blue or green tubular globes for street lamp	30.00

TUBULAR SIDE LAMPS.

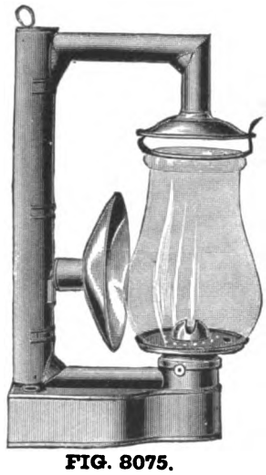


FIG. 8075.

HAND LAMPS.

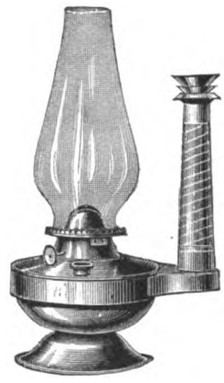


FIG. 8076.

HAND LAMPS AND REFLECTORS.

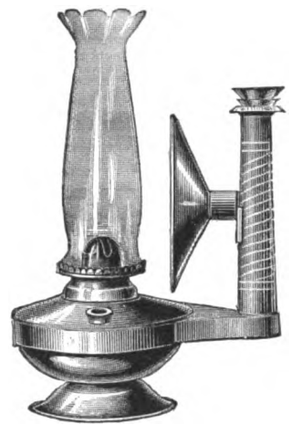


FIG. 8077.

PRICES.

	No.	Size burner.	Size reflector.	Size of wick.	Height.	Prices.	Extra for bull's-eye.	Packed.
Fig. 8075.	15,	No. 1	5	5/8		$9.00 per doz.,	$0.50	6 in case.
" 8075.	17,	" 2	6	1		11.00 "	.50	6 "
" 8076.	1,	" 1		5/8		5.50 "		
" 8077.	2,	" 2	5	1		11.00 "		

PRICES, PER DOZ., FIG. 8078, WITH GLOBES.

		White.	Ruby blue or green.
Regular tubular	with guard,	$3.50	$5.30
O. K. "	" "	3.75	5.55
Side lift " new	" "	4.00	5.80
Square lift tubular	" "	4.25	6.05
Lever tubular	" "	4.50	6.30
Anti-friction tubular, new	" "	4.50	6.30
Best square lift tubular	" "	5.00	6.80
Best round " "	" "	5.50	7.30
Brass plated sq. lift tubular,	" "	5.50	7.30
Copper " " " "	" "	5.50	7.30
Iron-clad " " " "	" "	6.00	7.80

Packed in cases of one dozen each, without charge.

When ordered packed in one-half dozen cases, a charge of ten cents per dozen will be made to cover additional expense.

PRICES, FIG. 8079.

	Per doz.
No. 2 round lift tubular, large oil pot	$9.00
" 2 " " reflector tubular, large oil pot	11.50
Extra tin top reflectors or shades	2.50

Packed in cases of one dozen each.

SAFETY TUBULAR LANTERNS.

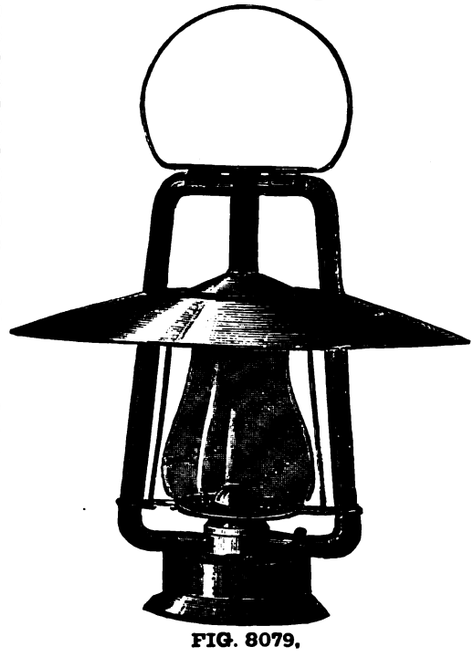


FIG. 8079.

EXTRA GLOBES.

NO. 39.



FIG. 8080.

NO. 0.



FIG. 8081.

SIDE LIFT TUBULAR LANTERN.

PRICES.

With guard, packed cases one dozen each.

Per dozen $5.75

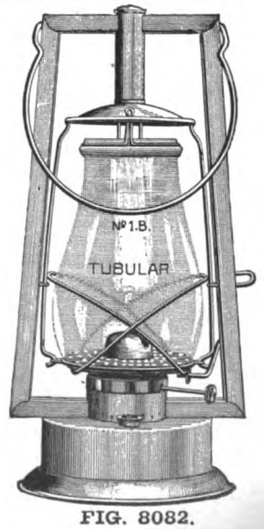


FIG. 8082.

WHITE GLOBES.

PRICES.

			Per doz.
No.	0	tubular globes	$0.60
"	0	" " flint glass	1.60
"	0	" bull's-eye globes	1.10
"	39	railroad globes	.87
"	39	" bull's-eye globes	1.20

WICKS.

PRICES EXTRA.

			Per gross.
No.	00	wicks, 1/4 inch	$0.50
"	0	" 3/8 "	.50
"	1	" 5/8 "	.70
"	2	" 1 "	1.00
"	3	" 1 1/2 "	1.60

PRICES INCLUDE REGULAR PACKAGE.

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LANTERNS.

IRON CLAD RAILROAD, NO. 39.

SINGLE GUARD. DOUBLE GUARD.

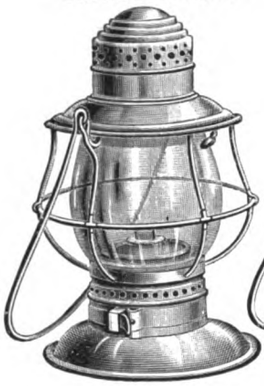


FIG. 8083.

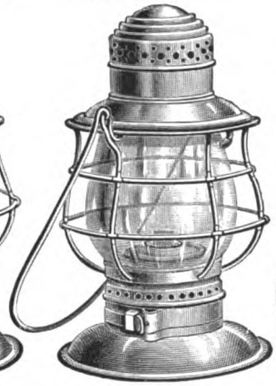


FIG. 8084.

These lanterns have the drawn oil pot in one piece, which makes it impossible for them to leak.

STANDARD RAILROAD, NO. 39.

SINGLE GUARD. DOUBLE GUARD.



FIG. 8085.



FIG. 8086.

These lanterns have regular soldered oil pots.

WIRE BOTTOM.



FIG. 8087.

Bail on guards.

NO. 43 OR COMMERCIAL.

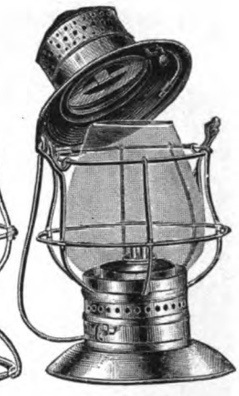


FIG. 8088.

Single or double guards.

PRICES, FIGS. 8083 TO 8088.

No. 39.	Single guard	per doz.,	$6.25
" 39.	Double guard	"	6.50
" 39.	Wire bottom	"	6.25

Oil pots with Bayonet catch or Langster spring.

No. 43.	Single guard	per doz.,	$6.00
" 43.	Double guard	"	6.25

Bayonet catch in oil pot, all packed in cases of one dozen each.

PRICES.

Fig. 8089.	No. 8. Brass wire base	per doz.,	$52.50
" 8089.	" 8. " " nickeled	"	60.00
Engraving name on globe		each,	.62
" "	" with wreath	"	.94
Fig. 8090.	No. 39. Single guard, brass	per doz.,	22 50
" 8090.	" 39. " " " nickeled	"	30.00
" 8090.	" 39. " " " wire bottom	"	25.00
" 8090.	" 39. " " " " " nickeled,	"	30.00
" 8091.	" 39. " " "	"	30.00
" 8091.	" 39. " " " nickeled	"	37.50

BRASS AND NICKEL-PLATED.

NO. 39. CONDUCTOR'S.

NO. 8. CONDUCTOR'S.



FIG. 8089.



FIG. 8090.

NO. 39. FIREMAN'S, WITH RING IN TOP.



FIG. 8091.

DAVY OR GAUZE SAFETY LAMPS.

THOMAS NO. 7.

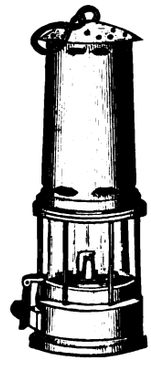


FIG. 8094.

PRICE, $4.00.

THE MARSAUT.

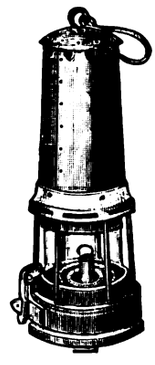


FIG. 8095.

PRICE, $4.00.

CAMBRIAN BONNETED CLANNY.

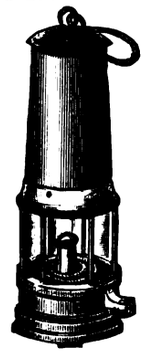


FIG. 8096.

PRICE, $3.80.

NO. 2. UNIVERSAL CLANNY.

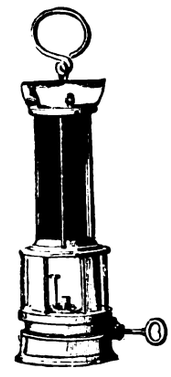


FIG. 8097.

PRICE, $2.90.

GERMAN LAMP TRIMMERS.

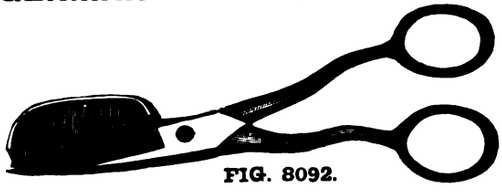


FIG. 8092.

PRICES, PER DOZEN.

No. 10.	Ordinary bright	$2.50
" 15.	Polished, brass lip, medium	2.80
" 30.	" japanned handles, cast steel, large	3.50
" 35.	" " " brass guard, medium,	3.30

CHALLENGE LAMP TRIMMERS.



FIG. 8093.

PRICE.

Japanned handles.....per doz., $4.00

NO. 4. NEWCASTLE DAVY.

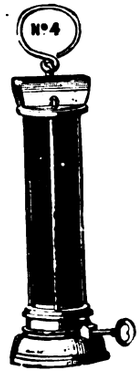


FIG. 8098.

PRICE, $2.30.

FIREMAN. NO. 10.

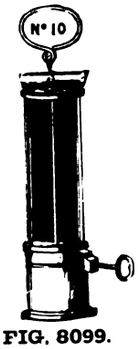


FIG. 8099.

PRICE, $2.30.

These safety lamps are for the detection of gas in coal mines, sewers and brewery vats. For producers and users of natural gas, coke ovens, etc.

The above prices are for ordinary screw lock and with iron gauze chimneys.

Lead seal locks, like No. 7, $1.50 per doz. extra. Copper gauze chimneys extra.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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TORCHES AND LAMPS.

LOCOMOTIVE TORCHES.

TIN AND STEEL. BRASS.

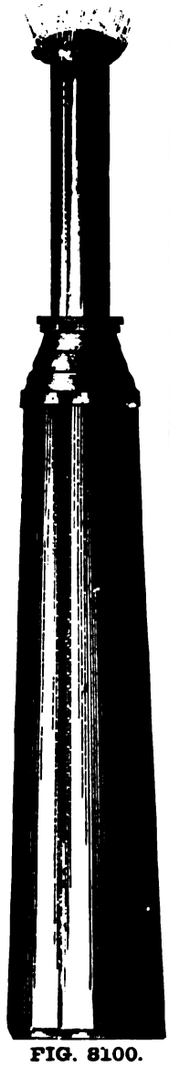


FIG. 8100.

1 pint, 13 inches long.

PRICES.

Brass, per doz., $12.00
Tin, " " 10.00

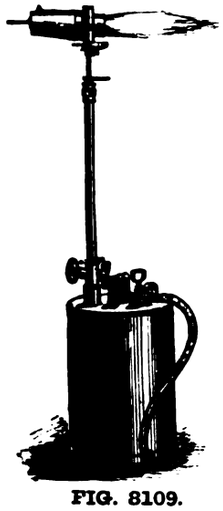


FIG. 8109.



FIG. 8101.

2 inch diameter, 15 inches high. Brass cap and tube.

PRICE, PER DOZ., $12.00.

IRON MILL LAMPS.

QUARTS. ONE SPOUT.



FIG. 8102.

2 QUARTS AND TWO SPOUTS.



FIG. 8103.

PINTS.



FIG. 8104.

PRICES, FIGS. 8102 TO 8104.

This mill, foundry, furnace and machine torch-lamp is made with one, two, three and four burners.

Pints		Per doz.,	$10.00
Quarts		" "	11.00
Half-gallons,	1 spout	" "	13.00
" "	2 "	" "	14.00
Gallons,	3 "	" "	18.00
"	4 "	" "	19.00

SOLID CAST IRON FURNACE LAMPS.



FIG. 8105.

No solder used in its construction.

PRICES.

No. 1, holding 3 pints	$12.00	per dozen.
No. 2, holding 2 pints	10.50	" "
Extra wicks, No. 1	.75	" "
Extra wicks, No. 2	.60	" "

HAND LAMPS.



FIG. 8106.

Spout is reversible. Long end for kerosene; short, for lard.

PRICES.

		Tin.	Brass.
Lamps	No. 1, per doz.	$2.00	$3.00
"	No. 2, "	2.25	3.75
"	No. 3, "	3.00	5.00

MALLEABLE IRON HAND LAMPS.



FIG. 8107.

PRICE, PER DOZEN, $5.50.

1 dozen in a case.

CAST IRON MINERS' LAMPS.



FIG. 8108.

For kerosene or whale oil. Brass collar and breast in one piece; spout and body in one piece. No seams to melt.

PRICE, PER GROSS, $18.00.

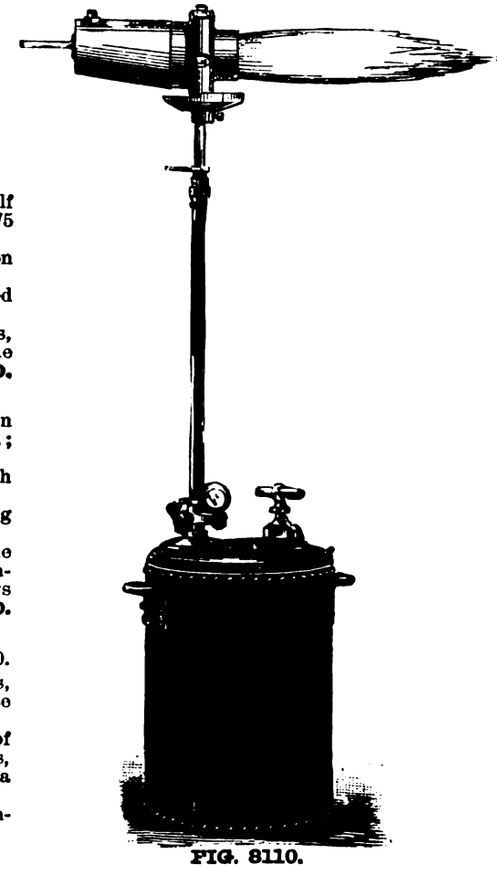


FIG. 8110.

WELLS' LIGHT TORCHES.

DESCRIPTION, FIG. 8109.

No. 1, 800 candle power. Flame 15 inches long; oil used, one-half gallon per hour. Size of tank, 10½ x 16 inches. Weight, when full, 75 lbs.; when empty, 45 lbs.

This size is designed for extreme portability, has a single handle on the top, and can be carried easily by a boy.

It holds sufficient oil to burn for about 5 hours, but can be refilled while burning, without danger, or putting out the light.

It is a handy shop light for foundries, boiler works, machine shops, round houses, etc., and in any work requiring a smaller light than the No. 3, and for repair work generally. **PRICE, COMPLETE, $75.00.**

DESCRIPTION, FIG. 8110.

No. 3, 2,000 candle power. Flame 30 inches long; oil used, one gallon per hour. Size of tank, 18 x 24 inches. Weight, when full, 245 lbs.; when empty, 110 lbs.

This tank is of steel boiler plate, galvanized, with handles on each side. It can be carried by two men, or on a carriage.

In actual tests this size light has been found of greater illuminating power than two arc lights rated at 1,200 c. p. each.

It holds sufficient oil to burn 14 hours, but may be refilled while burning. Absolutely free from danger, giving a clear white light without smoke or spray, is not dazzling, and does not throw intense shadows like the electric light. **PRICE, COMPLETE, $100.00.**

EXTRA BURNERS.

For No. 1 light.....$10.00. For No. 3 light.....$12.00.

An extra burner is of value where lights are in constant use in tunnels, mines, etc. A spare burner being kept always clean ready for immediate use is always an advantage.

No. 1 burners to work with No. 3 lights are very useful, as a light of 800 c. p. is often sufficient in clearing up foundries and in machine shops, and enables users to have either 800 or 2,000 c. p. light as desired with a No. 3 light.

All lamps sent complete with chimney, wind guard, spanners, cleaners and book of instructions.

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RAILROAD TORPEDOES AND PADLOCKS.

ROUND AND WEDGE TORPEDOES.

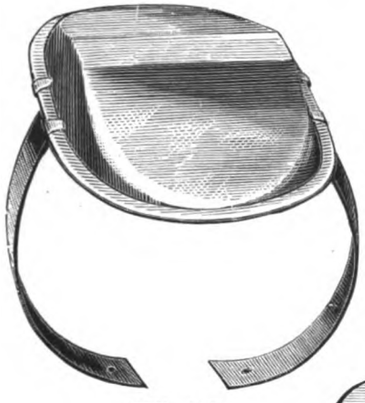


FIG. 8111.

PRICES.

Wedge shape.....per gross, $2.00
Round..... " 1.00

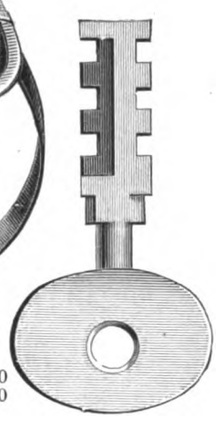


FIG. 8112.

SCANDINAVIAN PADLOCKS.



FIG. 8113.

PRICES, FIG. 8113.

LOOSE SHACKLE.	Per doz.	FAST SHACKLE.	Per doz.
Price.....	$10.50	Price.....	$10.50
Extra keys.....	3.00	Extra keys.....	3.00
Blank "	1.50	Blank "	1.50



FIG. 8114.

PRICES, FIG. 8114.

LOOSE SHACKLE.	Per doz.	FAST SHACKLE.	Per doz.
Price.....	$12.00	Price.....	$12.00
Extra keys.....	3.25	Extra keys.....	3.25
Blank "	1.65	Blank "	1.65

SCANDINAVIAN PADLOCKS.



FIG. 8115.

PRICES.

LOOSE SHACKLE.

Price.....per dozen, $13.50
Extra keys..... " 3.50
Blank " ..... " 1.75

FAST SHACKLE.

Price.....per dozen, $13.50
Extra keys..... " 3.50
Blank " ..... " 1.75

Weight, 25 lbs., per doz., two keys with each lock.

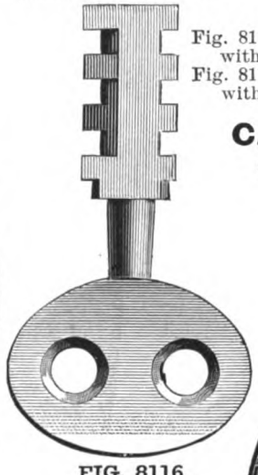


FIG. 8116.

Fig. 8113, weight, 15 lbs. per doz.; two keys with each lock.
Fig. 8114, weight, 22 lbs. per doz.; two keys with each lock.

CAST BRONZE METAL SPRING PADLOCKS.





FIG. 8117.

PRICES, FIG. 8117.

No.	Size.	Description.	Per doz. 12 kd.	Per doz. 24 kd.
119	2½ inch.	Heavy tumbler lock, spring cover and chain.	$14.00	$15.50

Above locks for railroad cars and switches. Made to suit any key furnished.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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CAST BRONZE METAL SPRING PADLOCKS.

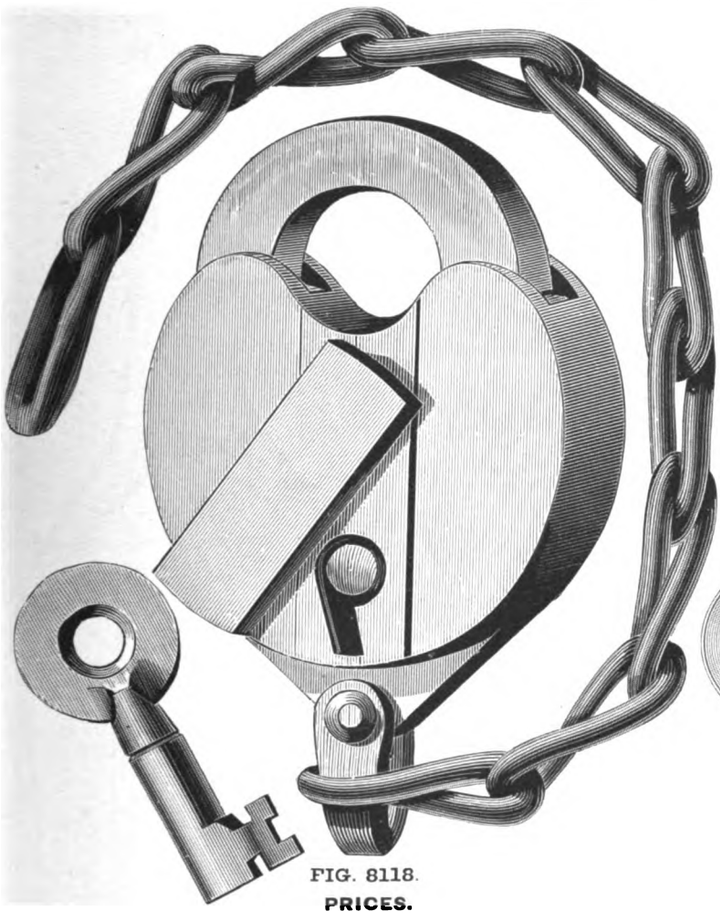


FIG. 8118.

PRICES.

No.	Size. Inch.	Description.	Per doz. 12 kd.	Per doz. 24 kd.
87	2½	Heavy tumbler lock, spring cover and chain.	$14.00	$15.50
88	2½	Ex. heavy " " " "	15.00	16.50



FIG. 8119.

PRICES.

No.	Size. Inch.	Description.	Per doz. 12 kd.	Per doz. 24 kd.
115	2½	Heavy tumb. lock, spring cover and chain.	$13.50	$15.00
116	2½	Heavy tumbler lock, spring cover and chain, malleable iron case.	10.25	11.75

Above locks are for railroad cars and switches. Made to suit any key furnished.

COMBINED SEAL AND LOCK.

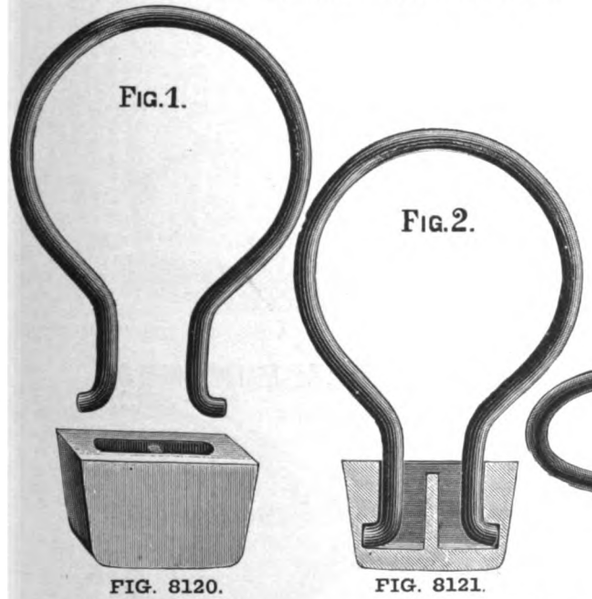


FIG. 8120. FIG. 8121.

SEAL PRESS FOR FIG. 8120.

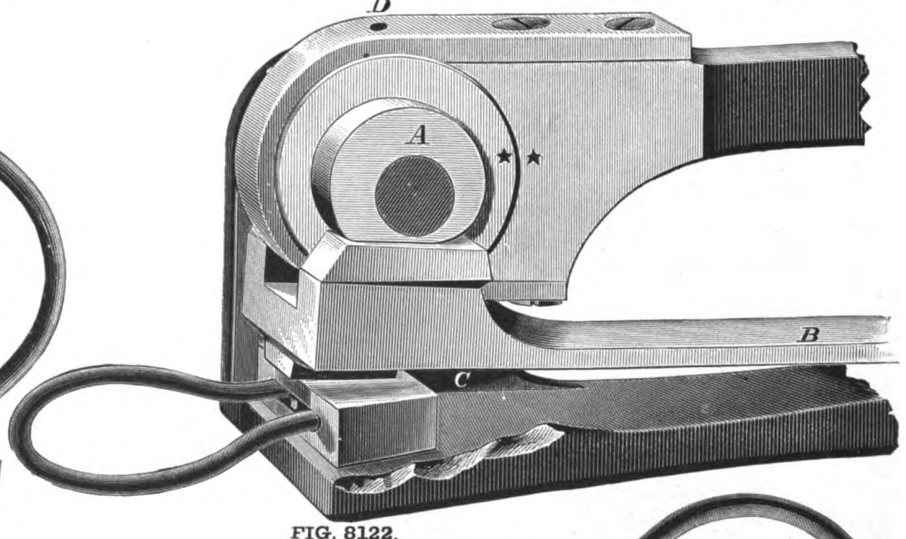


FIG. 8122.



FIG. 8123.

Fig. 8120 represents the seal as shipped; Fig. 8121, the lock wire inserted in soft metal seal; Fig. 8122, the seal inserted in press to be sealed, locked and stamped; Fig. 8123, the seal after leaving the press, Fig. 8122.

PRICES, FIG. 8120.

In lots of less than 25,000 ..... per 1,000, $15.00
In lots of over 25,000 ..... " 11.25

PRICES, FIG. 8122.

Complete, lettered to order ..... each, $5.25

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CAR SEALS, TICKET PUNCHES AND CHOPPERS.

HORSE SHOE LEAD SEALS.

NOT PRESSED. PRESSED, SHOWING ONE SIDE. PRESSED, SHOWING OTHER SIDE.



FIG. 8124.

PRESS FOR SEALING FIG. 8124.

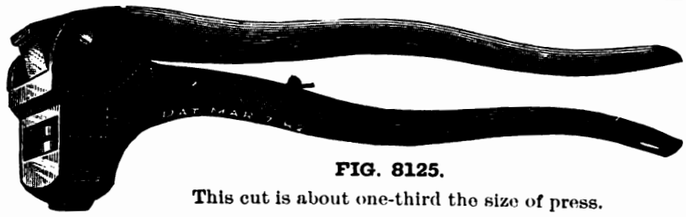


FIG. 8125.

This cut is about one-third the size of press.

When closed, it cannot be pried open with a toothpick, pointed wire, penknife, or any sharp-pointed instrument.

The single wire is used so as to prevent any cutting and retwisting of the wire.

The lead disk is cast on one end of the wire, saving loss and much time and trouble to men during the sealing of the cars.

One looped end of the wire is cast in the lead disk, and when the seal is pressed or locked the other loose looped end of the wire which fits into the horseshoe part of the lead disk is so pressed that the wires cannot be unlocked or tampered with without detection.

The press is composed of but two parts of steel with dies, weighing only one pound, one of the lightest presses in the market, and gives a perfect impression every time.

Seals and wires per 1,000, packed 2,500 or 5,000 in a box.. $4.00
Presses lettered and ready for use 4.00

EUREKA TICKET PUNCH.

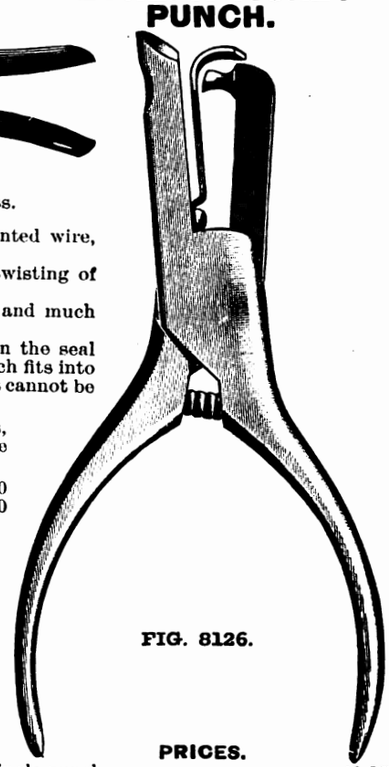


FIG. 8126.

PRICES.

Single punch			$2.25
General assortment of dies,	per doz.,		24.00
L punches	"	"	23.00
B punches	"	"	25.00
L punches, plain	"	"	22.00
Round dies	"	"	18.00
Square dies	"	"	19.00

NO. 1 TICKET PUNCHES.

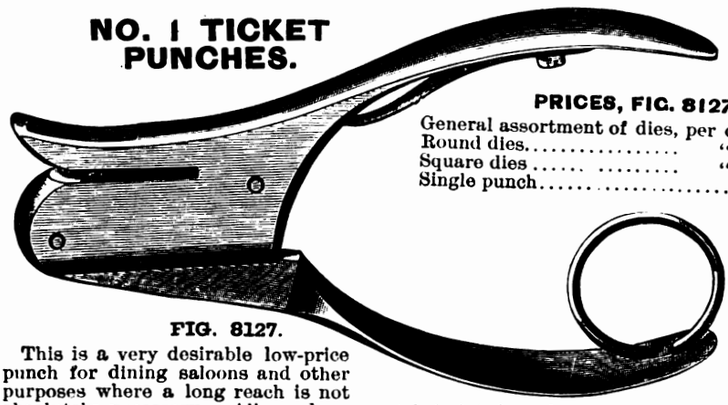


FIG. 8127.

PRICES, FIG. 8127.

General assortment of dies,	per doz.,	$24.00
Round dies	"	18.00
Square dies	"	19.00
Single punch		2.50

This is a very desirable low-price punch for dining saloons and other purposes where a long reach is not absolutely necessary. All goods are nickel-plated and made of best cast and tool steel. Will make punches from other manufacturers' lists, and to suit all kinds of purposes.

NO. 2 TICKET PUNCHES.

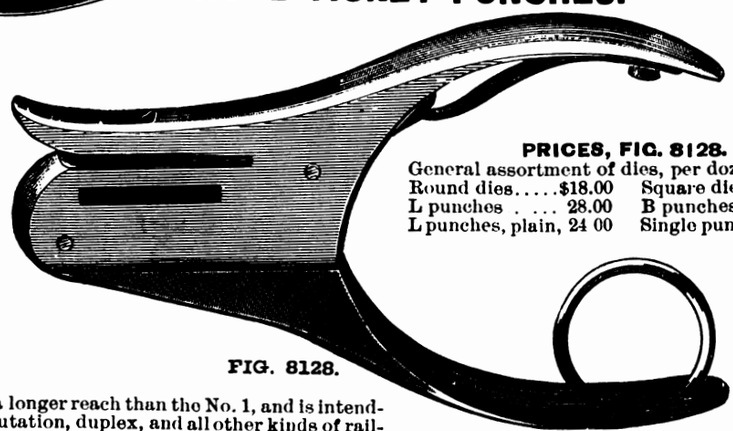


FIG. 8128.

PRICES, FIG. 8128.

General assortment of dies, per doz.			$30.00
Round dies	$18.00	Square dies	19.00
L punches	28.00	B punches	26.00
L punches, plain,	24 00	Single punch	3.00

This has a longer reach than the No. 1, and is intended for commutation, duplex, and all other kinds of railroad tickets. It is made in over five hundred different designs for dies; letters will cost extra, varying from $3.50 each to $7.00, according to design.

TICKET CHOPPERS.



FIG. 8129.

DESCRIPTION, FIG. 8129.

TICKET CANCELING BOX.

A substantial walnut pedestal surmounted with a plate glass box, in nickel-plated metal frame.

PRICE, $125.00.

CONDUCTORS' PUNCHES.

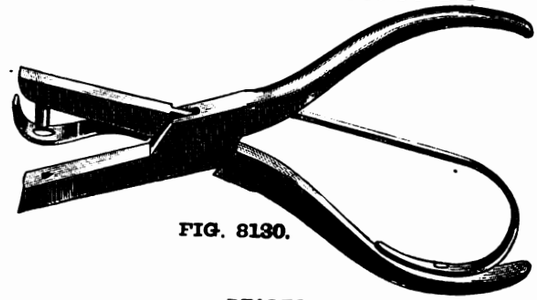


FIG. 8130.

PRICES.

No. 1.	Round hole, rubber spring, nickel-plated, per dozen..	$11.00
No. 2.	Round hole, steel spring, " " "	11.00
No. 3.	Fancy figure, steel spring, " " "	12.00
No, 4.	Fancy figure, rubber spring, " " "	11.00

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BELL CORD AND COUPLINGS, BAR STEEL AND IRON.

SOLID BRAIDED RAILROAD BELL CORD.

PRICES.

FANCY COTTON.

The regular style is drab in color, with a spiral pattern in red, yellow and blue. In coils of 1,000 feet each, unless otherwise ordered.

No. 8. 1/4 inch diameter.....65 cents per lb.
No. 9. 9/32 " " .....65 " "

PLAIN COLORS.

In coils of 1,200 feet each, or otherwise, as ordered. 1/4 or 9/32 inch diameter for cars. 3/8 inch diameter for engine bell cord.

A quality. White cotton.....50 cents per lb.
" Drab cotton.....55 " "
" Mahogany cotton.....60 " "
B quality. White cotton.....cents per lb.
" Drab cotton..... " "

HEMP.

Italian hemp.....cents per lb.

STEEL BELT COUPLINGS.



FIG. 8132.

FOR ROUND BANDS OF EVERY DESCRIPTION.

Size	1/8	5/32	3/16	7/32	1/4
Price, per doz.	$3.00	$3.00	$2.50	$2.50	$2.00
Size	9/32	5/16	11/32	3/8	7/16
Price, per doz.	$2.50	$2.50	$3.00	$3.00	$3.50
Size	1/2	9/16	5/8	11/16	3/4
Price, per doz.	$4.00	$5.00	$6.00	$7.50	$9.00
Size	7/8	1	1 1/8	1 1/4	
Price, per doz.	$13.00	$18.00	$22.00	$26.00	

BELL CORD COUPLINGS.

Size for No. 8 cord, unless ordered for No. 9.

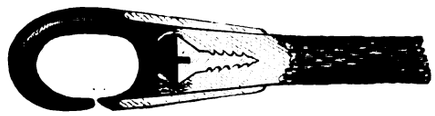


FIG. 8133.

Directions.—Draw the end of the cord through the coupling, and insert the screw far enough to bury its head. Then pull the cord back into place.

PRICES, COMPLETE, WITH SCREWS.

Japanned, mal. iron.....$0.60 per doz. hooks.
Brass.....1.00 " "
Nickel-plated, brass.....1.50 " "

BAR STEEL.

Base prices for bar steel are made on application. The prices quoted below, on classifications of the different grades noted, for sizes outside of base sizes, are extras, and are to be added to base prices.

CLASSIFICATION OF TOOL STEEL.

ROUND, SQUARE AND OCTAGON.

Extra, per lb.		Extra, per lb.	
5/8 to 2 in.	Base.	9/16 to 1/2 in.	0.5c.
2 1/8 to 3 "	1.0c.	17/32 to 3/4 "	1.0c.
3 1/8 to 4 "	1.5c.	5/8 and 1 1/8 in.	2.0c.
4 1/8 to 5 "	2.0c.	1/4 and 9/32 "	3.0c.
5 1/8 to 6 "	2.5c.	9/16 in.	5.0c.
6 1/8 to 7 "	3.0c.	5/8 "	10.0c.
7 1/8 to 8 "	3.5c.	7/8 "	18.0c.

FLAT.

5/8 to 2 in. thick x 9/16 to 2 in. wide.....Base.

FLAT.

Extra, per lb.		Extra, per lb.	
1/8 x 3/16	20.0c.	5/16 x 3/8 to 5/8	1.5c.
1/8 x 1/4	15.0c.	5/16 x 1 1/8 to 8	1.0c.
1/8 x 5/16	8.0c.	3/8 x 7/16 to 8	1.0c.
1/8 x 3/8	4.0c.	7/16 x 1/2 to 8	1.0c.
1/8 x 7/16 to 1/2	3.0c.	1/2 x 9/16 to 8	1.0c.
1/8 x 9/16 to 7.	2.0c.	9/16 x 2 1/8 to 8	1.0c.
1/8 x 7 1/8 to 8	3.0c.	5/8 to 2 in. x 2 1/8 to 7 in.	1.0c.
3/16 x 1/4	5 0c.	5/8 to 1 3/4 in. x 7 1/8 to 8 in.	1.0c.
3/16 x 5/16	4.0c.	1 7/8 to 2 in. x 7 1/8 to 8 in.	1.5c.
3/16 x 3/8	3.0c.	2 1/8 to 3 in. x 2 1/8 to 5 in.	1.0c.
3/16 x 7/16 to 5/8	2.0c.	2 1/8 to 3 in. x 5 1/8 to 8 in.	1.5c.
3/16 x 1 1/8 to 2	1.5c.	3 1/8 to 4 in. x 3 1/8 to 6 in.	1.5c.
3/16 x 2 1/8 to 7	1.0c.	3 1/8 to 4 in. x 6 1/8 to 8 in.	2.0c.
3/16 x 7 1/8 to 8	2.0c.	4 1/8 to 5 in. x 4 1/8 to 7 in.	2.0c.
1/4 x 5/16 to 3/8	2.0c.	4 1/8 to 5 in. x 7 1/8 to 8 in.	2.5c.
1/4 x 7/16 to 2.	1.5c.	5 1/8 to 6 in. x 5 1/8 to 8 in.	2.5c.
1/4 x 2 1/8 to 7	1.0c.	6 1/8 to 7 in. x 6 1/8 to 7 in.	3.0c.
1/4 x 7 1/8 to 8	2.0c.	6 1/8 to 8 in. x 7 1/8 to 8 in.	3.5c.

Cutting to multiples or specified lengths, 1/2c. per lb. for over 24 in.; under, according to contract.

CLASSIFICATION OF CRUCIBLE HAMMER AND CRUCIBLE MACHINERY.

ROUND AND SQUARE.

Extra, per lb.		Extra, per lb.	
3/4 to 3 in.	Base.	1/2 to 1 1/8 in.	0.2c.
3 1/8 to 4 in.	0.5c.	3/8 to 7/16 in.	0.5c.
4 1/8 to 5 in.	1.0c.	5/8 and 1 1/8 in.	1.0c.
5 1/8 to 6 in.	1.5c.	1/4 and 9/32 in.	1.5c.

Crucible machinery flats, one-half the extras of the flat tool steel classification.

In flat sizes of crucible hammer steel sections equivalent to the base sizes in squares may be sold at base.

Cutting to multiples or specified lengths, 1/2c. per lb., for anything over 24 inches long. For lengths, 24 inches or less, according to agreement.

CLASSIFICATION OF SPRING STEEL.

	Extra, per lb.
1 1/4 to 4 in. x No. 4 gauge to 1/2 in. incl.	Base.
1 to 1 1/8 in. x No. 1 gauge to 4 g'ge "	.0.2c.
1 to 3 in. x No. 5 gauge to 7 g'ge "	.0.5c.
3/4 to 15/16 in. x No. 1 gauge to 7 g'ge "	.0.5c.
7/8 to 1 1/8 in. x No. 1 gauge to 7 g'ge "	.1.0c.
3/4 to 3 in. x No. 8 gauge to 10 g'ge "	.1.0c.
3/4 to 3 in. x No. 11 gauge to 16 g'ge "	.1.5c.

ROUND AND SQUARE.

Extra, per lb.		Extra, per lb.	
5/8 to 1 1/2 in.	Base.	3/8 to 7/16 in.	0.5c.
1/2 to 9/16 in.	0.2c.	5/16 in.	1.0c.
1/4 in.			1.5c.

Cutting to lengths, 24 inches and over, 2/10c. per lb. extra; under 24 inches, according to agreement.

CLASSIFICATION OF OPEN HEARTH MACHINERY STEEL.

ROUND.

	Extra, per lb.
3/4 to 3 in. inclusive	Base.
3 1/8 to 4 in. "	.0.3c.
4 1/8 in.	.1.0c.
1/2 to 1 1/16 in. inclusive	.0.2c.
3/8 to 7/16 in. "	.0.3c.
5/16 and 1 1/32 in. "	.0.5c.
1/4 and 9/32 in. "	.0.7c.

Cutting to specified lengths above 24 in....0.1c.

Cutting to specified lengths, 12 to 24 in., according to agreement.

Prices for forgings, 4 1/4 to 10 in. round or square, quoted upon application.

CLASSIFICATION OF TIRE, TOE CALK AND SLEICH SHOE STEEL.

	Extra, per lb.
1 1/4 and wider x 3/8 to 1 in. thick	Base.
1 1/4 " x 1/4 to 5/16 in. "	.0.1c.
1 1/4 " x 3/16 and 7/32 in. "	.0.2c.
1 1/4 " x 1/8 and 5/32 in. "	.0.3c.
3/4 to 1 1/8 in. x 1/4 to 1 in. "	.0.2c.
3/4 to 1 1/8 in. x 3/16 and 7/32 in. "	.0.3c.
3/4 to 1 1/8 in. x 1/8 and 5/32 in. "	.0.5c.
3/8 to 5/8 in. x 1/4 to 1/2 in. "	.0.3c.
3/8 to 5/8 in. x 3/16 and 7/32 in. "	.0.5c.
3/8 to 5/8 in. x 1/8 and 5/32 in. "	.0.7c.
3/8 to 1 1/8 in. x 1/8 and 3/32 in. "	.2.0c.
1 1/4 to 3 in. x 1/8 and 3/32 in. "	.1.0c.

STEEL FORGINGS.

Die blocks, per lb., over base.....
Lathe spindles, under 5 lbs. weight.....
Lathe spindles, over " " .....
Crank pins.....
Piston rods.....
Locomotive side rods.....
Slide bars.....
Saw arbors.....

BAR IRON.

BASE PRICES AND EXTRAS ON APPLICATION.

COMMON IRON.

Price, per lb.	
1 to 6 in. wide x 3/8 to 1 in. thick	Base.
3/4 to 2 in. round and square	Base.
1 to 6 in. wide x 1/4 and 5/16 thick	
5/8 and 1 1/8 in. round and square	
1/2 and 9/16 in. round and square	

REFINED IRON.

1 to 4 in. wide x 3/8 to 1 1/2 in. thick	Base.
4 1/8 to 6 in. wide x 3/8 to 1 in. thick	Base.
3/4 to 2 in. round and square	Base.
1 to 6 in. wide x 1/4 and 5/16 in. thick	2 2/10

REFINED IRON RODS.

5/8 and 1 1/8 in. round and square	Base.
1/2 and 9/16 " " "	
7/16 in. round and square	
3/8 " " "	
5/16 " " "	
1/4 " " "	
3/16 " " "	

REFINED IRON.

LARGE ROUNDS AND SQUARES.

Prices, per lb.	
2 1/8 to 2 7/8 in.	Base.
3 to 3 1/2 in.	
3 5/8 to 4 in.	
4 1/8 to 4 1/2 in.	
4 5/8 to 5 in.	
5 1/4 to 5 1/2 in.	
5 3/4 to 6 in.	
6 1/4 to 6 1/2 in.	
6 3/4 to 7 in.	

OVAL, HALF OVAL AND HALF ROUND IRON.

7/8 to 2 in.	Base.
3/4 and 13/16 in.	
5/8 and 11/16 in.	
1/2 and 9/16 in.	

BAND IRON.

1 to 6 in. wide x 3/16 to No. 12 gauge.....

SCROLL IRON.

Prices						
Size 3/8 x	16	14	12	10	3/16	
Prices						
Size 1/2 x	16	14	12	10	3/16	1/4 and 5/16
Prices						
Size 5/8 x	16	14	12	10	3/16	1/4 and 5/16
Prices						
Size 3/4 x	16	14	12	10	3/16	1/4 and 5/16
Prices						
Size 7/8 x	16	14	12	10	3/16	1/4 and 5/16

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BAR IRON ANGLES, TEES, BEAMS, PLATES, ETC.

HOOP IRON.

Gauge.	Prices per lb.	Gauge.	Prices per lb.
½ in. x 22		1 in. x 19 & 20.	
½ in. x 19 & 20.		1 in. x 16 to 18.	
⅝ in. x 22		1 in. x 13 to 15.	
⅝ in. x 19 & 20.		1⅛ in. x 19 & 20.	
¾ in. x 22		1⅛ in. x 16 to 18.	
¾ in. x 19 & 20.		1⅛ in. x 13 to 15.	
⅞ in. x 19 & 20.		1¼ & up x 17 to 19	
⅞ in. x 16 to 18		1¼ & up x 13 to 16	
⅞ in. x 13 to 15.			

Horse shoe iron, ordinary sizes.

UNIVERSAL MILL PLATES.

Up to 36 inches wide.....

These plates are not sheared.

Edges guaranteed straight, and of uniform width, rendering reshearing unnecessary.

STEEL AND IRON PLATES.

	STEEL. Prices per lb.	IRON. Prices per lb.
Tank		
Refined		
Shell		
Flange		
Fire box		

SIZES.

3/16 in. to ½ in. up to 60 in. wide x 144 in. long.
3/16 in. to 7/16 in. 30 in. and narrower x 12 to 20 ft. long.
No. 8 to 16 up to 44 in. wide x 15 ft. long.
No. 17 to 20 up to 40 in. wide x 12 ft. long.
Circles ⅜ in. to 3/16 in., up to 72 in. diameter.

EXTRA REFINED IRON.

1 to 6 inch wide x ⅜ to 1 inch thick... } .....
¾ to 2 inches round and square..... }

Extras same as refined. See page 1007.

Burden's best iron, ordinary sizes.....
H. B. & S. " " .....
A. I. W. " " .....
B. B. " " .....
Norway iron bars, " .....
" " shapes, " .....
" " nail rods, " .....

SOFT STEEL SHEETS AND BLUE ANNEALED IRON SHEETS.

	STEEL. Prices per lb.	IRON. Prices per lb.
No. 10 gauge		
" 12 "		
" 14 "		
" 16 "		
" 17 "		
" 18 "		
" 19 "		
" 20 "		
" 21 to 24 gauge		
" 25 and 26 "		
" 27 gauge		
" 28 "		

Best bloom sheet iron.
Russia " "
Cleaned sheets, iron and steel.
Pickled and cold rolled sheets, iron and steel.

ULSTER IRON.

Prices per lb.

1 to 4 inches wide x ⅜ to 1 inch thick } .....
¾ to 2 inches round and square..... }

Extras same as refined iron.

ANGLE IRON.

1¼ to 4 inches.....
1.....
¾.....

TEE IRON.

1¼ to 4 inches.....
1.....

ROLLED I BEAMS ETC., IRON OR STEEL.

Prices per lb.

Beams.....
Channel iron.....
Teazle iron.....
Bead iron.....
Grooved iron.....

CRUCIBLE SHEET STEEL CLASSIFICATION.

Extra per lb.

To 21 gauge.....Base.
22 " ..... 1.0c.
23 " ..... 2.0c.
24 " ..... 3.0c.
25 " ..... 4.0c.
26 " ..... 5.0c.

CIRCULAR SAW PLATE CLASSIFICATION.

Extra per lb.

To 46 in. diameter.....Base.
48 in. " ..... 1.0c.
50 in. " ..... 2.0c.
52 to 54 in. " ..... 3.0c.
56 to 60 in. " ..... 5.0c.
62 to 64 in. " ..... 7.0c.
66 to 70 in. " ..... 9.0c.
72 in. " 11.0c

C NO. 1. BEST FLANGE. C H NO. 1. BEST FLANGE FIRE BOX. C H NO. 1 FLANGE. CIRCLES.

Boiler iron stamped and guaranteed.

CORRUGATED SHEET IRON.



FIG. 8155.

Galvanized, painted or black, for roofing, sidings, ceilings, doors, shutters, etc.

Gauge	16	18	20	22	24	26
BLACK.						
Weight per sq. foot	42	34	28	23	19	15 oz.
Prices, per lb	9c.	9c.	9c.	9½c.	9½c.	10c.
GALVANIZED.						
Weight per sq. foot	48	40	30	24	20	16 oz.
Prices, per lb	12c.	13c.	13c.	13c.	14c.	15c.

PAINTING.

Both sides, 75c. per 100 lbs. extra net.

Usual size of sheets, 26½ x 84 in.
Pattern sizes, up to 32 x 120 in., made to order.
Galvanized and black nails, rivets, etc.

BABBITT AND METALS.

Genuine.....per lb.
Anchor..... "
XXXX..... "
Sheet zinc..... "
Block tin..... "
Pig lead..... "
Antimony..... "
Bismuth..... "
Nickel..... "
Ingot copper..... "

SHEET LEAD.

Weight per sq. foot, 2½, 3, 3½, 4, 4½, 5, 6, 8, 9, 10 lbs. and upward.

GALVANIZED SHEET IRON.

Gauge	10 to 16	17 to 22	23 & 24	25 & 26	27	28	29 & 30
Price	12c.	13c.	14c.	15c.	16c.	17c.	20c. per lb.

Best bloom or 1st quality.....
Best refined or 2d " .....

Regular sizes, 24, 26, 28 and 30 in. x 84 inches.
Extra price for pattern lengths and widths.

TOBIN BRONZE, MANGANESE BRONZE, PHOSPHOR BRONZE, CRESCENT PHOSPHORIZED METAL, MUNTZ METAL.

Cast for pump rods, rolled for bolts, made for ship sheathing and fastenings, sheets and plates, pump linings, tube sheets. Round, square and hexagon bars.

PRICES ON APPLICATION.

HIGH BRASS RODS.

NOT LESS THAN 2 FEET LENGTHS.

Over 1 inch diameter.....per lb., 27c.
¼ in. to 1 in. diameter, both inclusive, " 24c.
No. 8, and less than ¼ inch diameter, " 26c.
Smaller than No. 8..... " 30c.
Hexagon, octagon and square, 2 cents per lb. advance over round rods.
Half-round and fancy shapes, not less than 4 cents advance over round rods.
Rods less than 2 feet lengths, add to above prices 1 cent per pound for each cut.

BUNTING.

Buntings of superior quality, in all colors and widths, for flags, railway signals and decorations. Warranted for durability and color equal to any.

	Royal and English.	Standard.	Eagle.	Anchor.	Signal.
9 in.					
12 "					
18 "					
24 "					
30 "					
36 "					

U. S. ARMY AND NAVY FLAGS.

REGULATION SIZES.

Length. Feet.	Width. Ft.	Width. In.	Length of Union. Ft.	Length of Union. In.	Width of Union. Ft.	Width of Union. In.	Width of stripe.	Prices of flags, complete.
36	19	6	12	0	10	7	18	
32	17	0	12	10	9	4	16	
30	17	0	12	0	9	4	16	
28	14	10	11	3	8	2	14	
25	13	2	10	0	7	0	12	
20	10	0	6	8	5	3	9	
16	8	6	6	5	4	8	8	
14	7	5	5	7	4	1	7	
12	6	3	4	10	3	6	6	
10	5	3	4	0	2	11	5	
8	4	2	3	2	2	4	4	
7	4	2	3	2	2	4	4	
6½	6	0	3	0	3	0	5½	
6	3	2	2	5	1	9	3	
5	3	2	2	5	1	9	3	

Flags are made with patent clamp dyed Union and Stripes.

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SHEET METALS.

BRASS.

IN ROLLS OR SHEETS.

(Numbered by Brown & Sharpe's gauge.)

When ordering brass, state thickness, width and temper required. If parties ordering sheet brass have no gauge, a small piece may be sent, which will answer for the gauge number.

COMMON SOFT AND HALF HARD HIGH BRASS.

	Over 2 in. to 10 in. incl.	Over 10 in. to 12 in. incl.	Over 12 in. to 14 in. incl.	Over 14 in. to 16 in. incl.	Over 16 in. to 18 in. incl.	Over 18 in. to 20 in. incl.	Over 20 in. to 22 in. incl.	Over 22 in. to 24 in. incl.
All Nos. to No. 20, incl....	.21	.22	.23	.25	.27	.29	.31	.33
Nos. 21, 22, 23 and 24.....	.22	.23	.24	.26	.28	.30	.32	.34
" 25 and 26.....	.22½	.23½	.24½	.27	.29	.31	.33	.35
" 27 " 28.....	.23	.24	.25	.28	.30	.32	.34	.36

	Over 24 in. to 26 in. incl.	Over 26 in. to 28 in. incl.	Over 28 in. to 30 in. incl.	Over 30 in. to 32 in. incl.	Over 32 in. to 34 in. incl.	Over 34 in. to 36 in. incl.	Over 36 in. to 38 in. incl.	Over 38 in. to 40 in. incl.
All Nos. to No. 20, incl....	.36	.39	.42	.46	.50	.55	.60	.65
Nos. 21, 22, 23 and 24.....	.37	.40	.43	.47	.51	.56	.61	.68
" 25 and 26.....	.38	.41	.44	.48	.52	.57	.63	.71
" 27 " 28.....	.39	.42	.45	.49	.53	.58	.65	.75

Sheets over 40 inches wide, special price; not less than 80c.

Add ½ cent per lb. additional for each No. thinner than No. 28 to 38, inclusive.

All brass thinner than No. 38 is platers' brass, at.....55c.

Add 9 cents per lb. for sheets cut to particular widths and lengths.

BRAZING, SPINNING AND SPRING BRASS.

One cent per lb. advance over common soft brass.

LOW BRASS.

Four cents per lb. advance over common soft brass.

GILDING, OROIDE AND BRONZE METAL.

Seven cents per lb. advance over common soft brass.

HOOP BRASS.

We carry but one thickness in stock: No 21 Brown & Sharpe's gauge.

Over ¼ in. to ½ in., inclusive..... Price per lb., 24c.
" ½ " 2 " " ..... " " 23c.

PRICES FOR ROLL AND SHEET PHOSPHOR-BRONZE.

Brown & Sharpe's gauge standard.

Width over to	2 6	6 8	8 10	10 12	12 14	14 16	16 18	18 20	20 in. 22 "
No. 1 to 20	48	50	52	54	56	58	60	62	64 cts.
" 21	49	51	53	55	57	59	61	63	"
" 22	50	52	54	56	58	60	62	64	"
" 23	51	53	55	57	59	61	63		"
" 24	52	54	56	58	60	62	64		"
" 25	53	55	57	59	61	63			"
" 26	54	56	58	60	62	64			"
" 27	56	58	60	62					"
" 28	58	60	62	64					"
" 29	60	62	64						"
" 30	62	64							"
" 31	64								"
" 32	66								"
" 33	68								"
" 34	70								"
" 35	72								"
" 36	75								"
" 37	100								"
" 38	125								"

Sheets and plates cut to particular sizes and lengths and sheets not included in above list .....special prices.

FOR SLITTING METAL.

To widths varying by ⅛ inch, add to list as follows:

Nos.	12 to 20	21 to 26	27 to 30	31 to 32
Over ½ to 2 in. wide....	2 cts.	3 cts.	4 cts.	5 cts.
" ¼ " ½ " "	4 "	6 "	8 "	10 "
¼ inch and narrower, not less than.....	6 "	9 "	12 "	15 "

Nos.	33	34	35	36
Over ½ to 2 in. wide..	6 cts.	7 cts.	8 cts.	9 cts.
" ¼ " ½ " "	12 "	14 "	16 "	18 "

Slit metal cut to particular lengths, not less than 12 inches, add 5c. per lb.

SOFT SHEET COPPER.

When ordering sheet copper, always state whether you require soft or cold rolled or "mirror finish." If you require sheets tinned on one side or plain on both sides. Give length and width desired. Give thickness by weight to square foot, or in parts of an inch, or by gauge; if by gauge, state whether by Stubs' or Brown & Sharpe's gauge.

The base price is.....c. per lb. This price applies to sizes printed "base." Where an advance is charged, on account of thickness or size of sheet, the advance stated in list is to be added to the "base" price, ...c. per lb.

Classification of regular and extra sizes.		Weight per square foot. 64 oz. and over.	32 oz. and up to 64.	16 oz. and up to 32.	14 oz. and up to 16.	12 oz. and up to 14.	10 oz. and up to 12.	8 oz. and up to 10.	Light'r than 8 oz.
		Cents per pound advance over base price.							
Not wider than 30 inches.	Not longer than 72 in.	Base	Base	Base	1	2	3	6	8
	Longer than 72 in.	Base	Base	Base	1	3	5	9	
Wider than 30 inches but not wider than 36 inches.	Not longer than 96 in.	Base	Base	Base	2	4	8	11	
	Longer than 96 in.	Base	Base	1	3	5	9	13	
Wider than 36 inches but not wider than 48 inches.	Not longer than 96 in.	Base	Base	2	4	6	10		
	Longer than 96 in.	Base	Base	3	5	7	11		
Wider than 48 inches but not wider than 60 inches.	Not longer than 96 in.	Base	Base	5	7	12			
	Longer than 96 in.	Base	1	6					
Wider than 60 inches but not wider than 84 inches.	Not longer than 96 in.	1	2						
	Longer than 96 in.	2	3						
Wider than 84 inches.....		3	5						

Bolt copper, ⅜ inch diameter and over, per lb., base price.

Circles, 60 inch diameter and less, 3c. per lb. advance over lowest prices of sheet copper of the same thickness.

Circles, over 60 inch diameter, up to 96 inch diameter inclusive, 5c. per lb. advance over lowest prices of sheet copper of the same thickness.

Circles, over 96 inch diameter, 6c. per lb. advance over lowest prices of sheet copper of same thickness.

Segment and pattern sheets, 3c. per lb. advance over price of sheets required to cut them from.

COLD OR HARD ROLLED COPPER.

14 oz. per square foot, and heavier, 1c. per lb. over the foregoing prices.
Lighter than 14 oz. per square foot, 2c. " " " " "

TINNING.

Soft, cold rolled or mirror finish copper.

Tinning sheets, on one side, 10, 12, and 14 in. x 48 in.....each, 8c.
" " " " 30 in. x 60 in..... " 30c.
For tinning boiler sizes, 9 in. (sheets 14 in. x 60 in.) ..... " 15c.
" " " " 8 " " 14 " x 56 " ..... " 12c.
" " " " 7 " " 14 " x 52 " ..... " 12c.
Tinning sheets, on one side, other sizes.....per square foot, 2½c.
For tinning both sides, double the above prices.

OBSERVE IN ORDERING:

All phosphor-bronze in sheets is numbered according to Brown & Sharpe's gauge.

All orders, when the name of gauge is not stated, will be filled as above.

In ordering sheet metal always state width and temper wanted.

WEIGHT OF ROLLED TOBIN BRONZE RODS OR BOLTS.

IN POUNDS, PER LINEAL FOOT.

Diameter in inches.	Weight per lineal foot.	Diameter in inches.	Weight per lineal foot.
⅜ in	.366	1½ in.....	5.93
½ "	.657	1⅝ "	6.96
⅝ "	1.02	1¾ "	8.06
¾ "	1.47	1⅞ "	9.22
⅞ "	2.06	2 "	10.54
1 "	2.62	2⅛ "	11.91
1⅛ "	3.33	2¼ "	13.32
1¼ "	4.09	2⅜ "	14.88
1⅜ "	4.98	2½ "	16.44

PRICES ON APPLICATION.

WEIGHT OF TOBIN BRONZE SHEET METAL.

IN POUNDS, PER SQUARE FOOT.

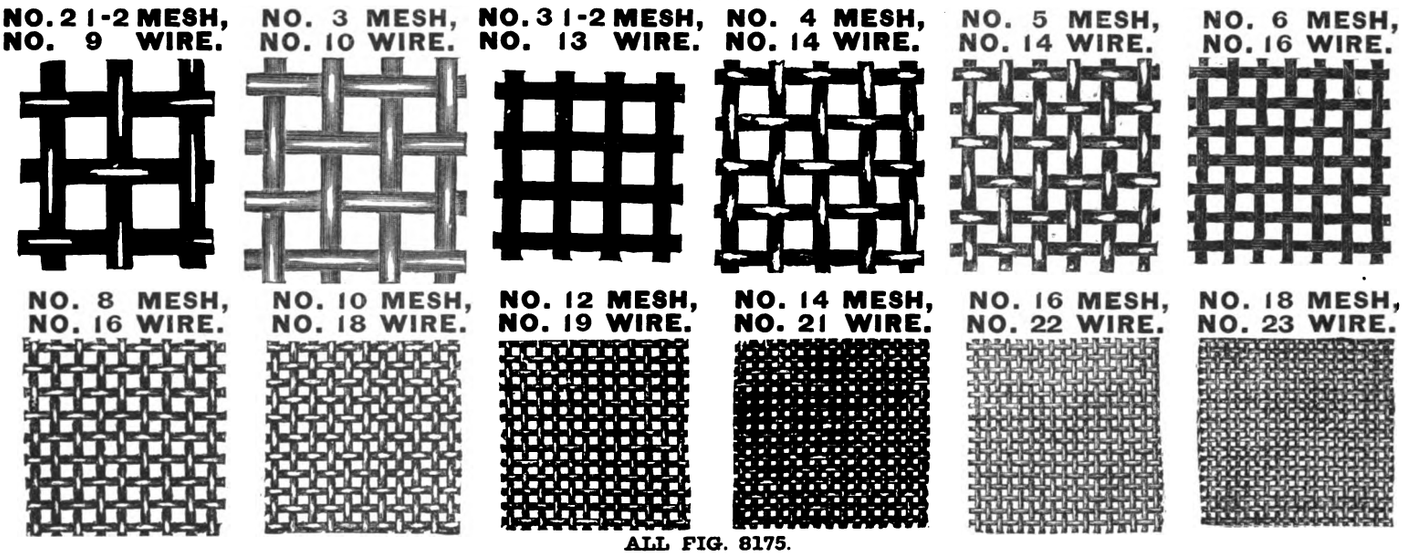
Thickness in inches.	Weight per sq. foot.	Thickness in inches.	Weight per sq. foot.
1/16 in	2.6	1 1/16 in.....	42.92
1/8 "	5.04	1 1/8 "	45.36
3/16 "	7.53	1 3/16 "	47.85
1/4 "	10.08	1 1/4 "	50.40
5/16 "	12.57	1 5/16 "	52.89
3/8 "	15.12	1 3/8 "	55.44
7/16 "	18.02	1 7/16 "	58.34
1/2 "	20.16	1 1/2 "	60.78
9/16 "	22.93	1 9/16 "	63.25
5/8 "	25.20	1 5/8 "	65.52
11/16 "	27.69	1 11/16 "	68.01
3/4 "	30.24	1 3/4 "	70.56
13/16 "	32.73	1 13/16 "	73.05
7/8 "	35.28	1 7/8 "	75.60
15/16 "	37.77	1 15/16 "	78.29
1 "	40.32	2 "	80.64

PRICES ON APPLICATION.

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IRON OR STEEL WIRE CLOTHS.

The following cuts are drawn to gauge, showing full size of wire and mesh.



ALL FIG. 8175.

When ordering wire cloth, please be particular and give the width, length, and size of wire, or grade wanted, as we cannot exchange wire cloth after being cut from the roll.

PRICES OF ALL GRADES IRON OR STEEL WIRE CLOTH.

The mesh in wire cloth is the distance from the center to the center of wire. No length less than 100 feet shall be understood to be a roll.

No.					Price per Sqr. Foot.
1	Mesh from No.	3	Wire		.88
1	" "	4	"		.73
1	" "	5	"		.60
1	" "	6	"		.48
1	" "	7	"		.38
1	" "	8	"		.32
1	" "	9	"		.27
1	" "	10	"		.22
1	" "	11	"		.17
1	" "	12	"		.14
1	" "	13	"		.12
1	" "	14	"		.10
1	" "	15	"		.08
1 1/4	Mesh from No.	4	Wire		.88
1 1/4	" "	5	"		.73
1 1/4	" "	6	"		.60
1 1/4	" "	7	"		.48
1 1/4	" "	8	"		.38
1 1/4	" "	9	"		.32
1 1/4	" "	10	"		.27
1 1/4	" "	11	"		.22
1 1/4	" "	12	"		.17
1 1/4	" "	13	"		.14
1 1/4	" "	14	"		.12
1 1/4	" "	15	"		.10
1 1/4	" "	16	"		.08
1 5/8	Mesh from No.	5	Wire		.88
1 5/8	" "	6	"		.73
1 5/8	" "	7	"		.60
1 5/8	" "	8	"		.48
1 5/8	" "	9	"		.38
1 5/8	" "	10	"		.32
1 5/8	" "	11	"		.27
1 5/8	" "	12	"		.22
1 5/8	" "	13	"		.17
1 5/8	" "	14	"		.14
1 5/8	" "	15	"		.12
1 5/8	" "	16	"		.10
1 5/8	" "	17	"		.08
2	Mesh from No.	8	Wire		.60
2	" "	9	"		.48
2	" "	10	"		.38
2	" "	11	"		.32
2	" "	12	"		.27
2	" "	13	"		.22
2	" "	14	"		.17
2	" "	15	"		.14
2	" "	16	"		.12
2	" "	17	"		.10
2	" "	18	"		.08
2 1/4	Mesh from No.	9	Wire		.60
2 1/4	" "	10	"		.48
2 1/4	" "	11	"		.38
2 1/4	" "	12	"		.32
2 1/4	" "	13	"		.27
2 1/4	" "	14	"		.22
2 1/4	" "	15	"		.17
2 1/4	" "	16	"		.14
2 1/4	" "	17	"		.12
2 1/4	" "	18	"		.10
2 1/4	" "	19	"		.08
3	Mesh from No.	10	Wire		.60
3	" "	11	"		.48
3	" "	12	"		.38
3	" "	13	"		.32
3	" "	14	"		.27
3	" "	15	"		.22
3	" "	16	"		.17
3	" "	17	"		.14
3	" "	18	"		.12
3	" "	19	"		.10
3	" "	20	"		.08
3 1/2	Mesh from No.	11	Wire		.60
3 1/2	" "	12	"		.48
3 1/2	" "	13	"		.38
3 1/2	" "	14	"		.32
3 1/2	" "	15	"		.27
3 1/2	" "	16	"		.22
3 1/2	" "	17	"		.17
3 1/2	" "	18	"		.14
3 1/2	" "	19	"		.12
3 1/2	" "	20	"		.10
3 1/2	" "	21	"		.08
4	Mesh from No.	12	Wire		.60
4	" "	13	"		.48
4	" "	14	"		.38
4	" "	15	"		.32
4	" "	16	"		.27
4	" "	17	"		.22
4	" "	18	"		.17
4	" "	19	"		.14
4	" "	20	"		.12
4	" "	21	"		.10
4	" "	22	"		.08
4 1/2	Mesh from No.	13	Wire		.57
4 1/2	" "	14	"		.45
4 1/2	" "	15	"		.35
4 1/2	" "	16	"		.29
4 1/2	" "	17	"		.24
4 1/2	" "	18	"		.19
4 1/2	" "	19	"		.15
4 1/2	" "	20	"		.13
4 1/2	" "	21	"		.11
4 1/2	" "	22	"		.09
4 1/2	" "	23	"		.07
5	Mesh from No.	13	Wire		.60
5	" "	14	"		.48
5	" "	15	"		.38
5	" "	16	"		.32
5	" "	17	"		.27
5	" "	18	"		.22
5	" "	19	"		.17
5	" "	20	"		.14
5	" "	21	"		.12
5	" "	22	"		.10
5	" "	23	"		.08
5	" "	24	"		.07
6	Mesh from No.	14	Wire		.60
6	" "	15	"		.48
6	" "	16	"		.38
6	" "	17	"		.32
6	" "	18	"		.27
6	" "	19	"		.22
6	" "	20	"		.17
6	" "	21	"		.14
6	" "	22	"		.12
6	" "	23	"		.10
6	" "	24	"		.08
6	" "	25	"		.07
7	Mesh from No.	15	Wire		.60
7	" "	16	"		.48
7	" "	17	"		.38
7	" "	18	"		.32
7	" "	19	"		.27
7	" "	20	"		.22
7	" "	21	"		.17
7	" "	22	"		.14
7	" "	23	"		.12
7	" "	24	"		.10
7	" "	25	"		.08
7	" "	26	"		.07
8	Mesh from No.	16	Wire		.60
8	" "	17	"		.48
8	" "	18	"		.38
8	" "	19	"		.32
8	" "	20	"		.27
8	" "	21	"		.22
8	" "	22	"		.17
8	" "	23	"		.14
8	" "	24	"		.12
8	" "	25	"		.10
8	" "	26	"		.08
8	" "	27	"		.07
9	Mesh from No.	17	Wire		.60
9	" "	18	"		.48
9	" "	19	"		.38
9	" "	20	"		.32
9	" "	21	"		.27
9	" "	22	"		.22
9	" "	23	"		.17
9	" "	24	"		.14
9	" "	25	"		.12
9	" "	26	"		.10
9	" "	27	"		.08
9	" "	28	"		.07
10	Mesh from No.	18	Wire		.60
10	" "	19	"		.48
10	" "	20	"		.38
10	" "	21	"		.32
10	" "	22	"		.27
10	" "	23	"		.22
10	" "	24	"		.17
10	" "	25	"		.14
10	" "	26	"		.12
10	" "	27	"		.10
10	" "	28	"		.08
10	" "	29	"		.07
12	Mesh from No.	19	Wire		.60
12	" "	20	"		.48
12	" "	21	"		.38
12	" "	22	"		.32
12	" "	23	"		.27
12	" "	24	"		.22
12	" "	25	"		.17
12	" "	26	"		.14
12	" "	27	"		.12
12	" "	28	"		.10
12	" "	29	"		.08
12	" "	30	"		.07
14	Mesh from No.	20	Wire		.60
14	" "	21	"		.48
14	" "	22	"		.38
14	" "	23	"		.32
14	" "	24	"		.27
14	" "	25	"		.22
14	" "	26	"		.17
14	" "	27	"		.15
14	" "	28	"		.13
14	" "	29	"		.12
14	" "	30	"		.11
14	" "	31	"		.10
14	" "	32	"		.09
14	" "	33	"		.08
14	" "	34	"		.07
16	Mesh from No.	22	Wire		.60
16	" "	22 & 23	"		.48
16	" "	23	"		.38
16	" "	24	"		.32
16	" "	25	"		.27
16	" "	26	"		.22
16	" "	27	"		.17
16	" "	28	"		.15
16	" "	29	"		.13
16	" "	30	"		.12
16	" "	31	"		.11
16	" "	32	"		.10
16	" "	33	"		.09
16	" "	34	"		.08
16	" "	35	"		.07
18	Mesh from No.	23	Wire		.60
18	" "	23 & 24	"		.48
18	" "	24	"		.38
18	" "	25	"		.32
18	" "	26	"		.27
18	" "	27	"		.22
18	" "	28	"		.17
18	" "	29	"		.15
18	" "	30	"		.13
18	" "	31	"		.12
18	" "	32	"		.11
18	" "	33	"		.10
18	" "	34	"		.09
18	" "	35	"		.08
18	" "	36	"		.07
20	Mesh from No.	24	Wire		.62
20	" "	25	"		.52
20	" "	26	"		.43
20	" "	27	"		.35
20	" "	28	"		.27
20	" "	29	"		.24
20	" "	30	"		.20
20	" "	31	"		.17
20	" "	32	"		.15
20	" "	33	"		.13
20	" "	34	"		.12
20	" "	35	"		.10
20	" "	36	"		.08
22	Mesh from No.	25	Wire		.65
22	" "	26	"		.55
22	" "	27	"		.46
22	" "	28	"		.38
22	" "	29	"		.30
22	" "	30	"		.26
22	" "	31	"		.22
22	" "	32	"		.19
22	" "	33	"		.17
22	" "	34	"		.15
22	" "	35	"		.13
22	" "	36	"		.12
24	Mesh from No.	26	Wire		.65
24	" "	27	"		.55
24	" "	28	"		.46
24	" "	29	"		.38
24	" "	30	"		.30
24	" "	31	"		.26
24	" "	32	"		.22
24	" "	33	"		.19
24	" "	34	"		.17
24	" "	35	"		.15
24	" "	36	"		.13
30	Mesh from No.	28	Wire		.66
30	" "	29	"		.56
30	" "	30	"		.47
30	" "	31	"		.37
30	" "	32	"		.31
30	" "	33	"		.27
30	" "	34	"		.23
30	" "	35	"		.20
30	" "	36	"		.19
40	Mesh from No.	31	Wire		.68
40	" "	32	"		.57
40	" "	33	"		.48
40	" "	34	"		.44
40	" "	35	"		.40
40	" "	36	"		.36
40	" "	37	"		.32
50	Mesh from No.	34	Wire		.72
50	" "	35	"		.59
50	" "	36	"		.52
50	" "	37	"		.48
50	" "	38	"		.44
60	Mesh from No.	36	Wire		.68
60	" "	37	"		.64
60	" "	38	"		.60
60	" "	39	"		.58
64	Mesh from No.	37	Wire		.75
64	" "	38	"		.70
64	" "	39	"		.65
70	Mesh from No.	38	Wire		.80
70	" "	39	"		.75
74	Mesh from No.	39	Wire		.90
74	" "	40	"		.85
80	Mesh from No.	40	Wire		1.05
80	" "	41	"		1.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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BRASS AND COPPER WIRE CLOTHS.

The old English gauge is used for all brass or copper wire cloth. The mesh in wire cloth is the distance from the center to the center of the wire per lineal inch. No length less than 100 feet shall be considered a roll of any kind, grade or quality of wire cloth.

No.							Price, per sqr. foot.
2	mesh	brass	wire	cloth,	No.	8 wire	$3.50
2	"	"	"	"	"	9 "	3.00
2	"	"	"	"	"	10 "	2.50
2	"	"	"	"	"	11 "	2.00
2	"	"	"	"	"	12 "	1.50
2	"	"	"	"	"	13 "	1.10
2	"	"	"	"	"	14 "	.80
2	"	"	"	"	"	15 "	.60
2	"	"	"	"	"	16 "	.50
3	mesh	"	"	"	"	10 "	3.00
3	"	"	"	"	"	11 "	2.50
3	"	"	"	"	"	12 "	2.00
3	"	"	"	"	"	13 "	1.50
3	"	"	"	"	"	14 "	1.10
3	"	"	"	"	"	15 "	.80
3	"	"	"	"	"	16 "	.60
3	"	"	"	"	"	17 "	.50
3	"	"	"	"	"	18 "	.45
4	mesh	"	"	"	"	12 "	2.50
4	"	"	"	"	"	13 "	2.00
4	"	"	"	"	"	14 "	1.50
4	"	"	"	"	"	15 "	1.10
4	"	"	"	"	"	16 "	.80
4	"	"	"	"	"	17 "	.60
4	"	"	"	"	"	18 "	.50
4	"	"	"	"	"	19 "	.45
5	mesh	"	"	"	"	13 "	2.50
5	"	"	"	"	"	14 "	2.00
5	"	"	"	"	"	15 "	1.50
5	"	"	"	"	"	16 "	1.10
5	"	"	"	"	"	17 "	.80
5	"	"	"	"	"	18 "	.60
5	"	"	"	"	"	19 "	.50
5	"	"	"	"	"	20 "	.45
6	mesh	"	"	"	"	14 "	2.50
6	"	"	"	"	"	15 "	2.00
6	"	"	"	"	"	16 "	1.50
6	"	"	"	"	"	17 "	1.10
6	"	"	"	"	"	18 "	.80
6	"	"	"	"	"	19 "	.60

No.							Price, per sqr. foot.
6	mesh	brass	wire	cloth,	No.	20 wire,	$0.50
6	"	"	"	"	"	21 "	.45
8	mesh	"	"	"	"	16 "	2.50
8	"	"	"	"	"	17 "	2.00
8	"	"	"	"	"	18 "	1.50
8	"	"	"	"	"	19 "	1.10
8	"	"	"	"	"	20 "	.80
8	"	"	"	"	"	21 "	.60
8	"	"	"	"	"	22 "	.50
8	"	"	"	"	"	23 "	.45
8	"	"	"	"	"	24 "	.40
10	mesh	"	"	"	"	18 "	2.00
10	"	"	"	"	"	19 "	1.50
10	"	"	"	"	"	20 "	1.10
10	"	"	"	"	"	21 "	.80
10	"	"	"	"	"	22 "	.60
10	"	"	"	"	"	23 "	.50
10	"	"	"	"	"	24 "	.45
10	"	"	"	"	"	25 "	.40
12	mesh	"	"	"	"	19 "	2.00
12	"	"	"	"	"	20 "	1.50
12	"	"	"	"	"	21 "	1.10
12	"	"	"	"	"	22 "	.80
12	"	"	"	"	"	23 "	.60
12	"	"	"	"	"	24 "	.50
12	"	"	"	"	"	25 "	.45
12	"	"	"	"	"	26 "	.40
14	mesh	"	"	"	"	20 "	2.00
14	"	"	"	"	"	21 "	1.50
14	"	"	"	"	"	22 "	1.10
14	"	"	"	"	"	23 "	.80
14	"	"	"	"	"	24 "	.60
14	"	"	"	"	"	25 "	.50
14	"	"	"	"	"	26 "	.45
14	"	"	"	"	"	27 "	.40
14	"	"	"	"	"	28 "	.35
16	mesh	"	"	"	"	22 "	1.50
16	"	"	"	"	"	23 "	1.10
16	"	"	"	"	"	24 "	.80
16	"	"	"	"	"	25 "	.60

No.							Price, per sqr. foot.
16	mesh	brass	wire	cloth,	No.	26 wire,	$0.50
16	"	"	"	"	"	27 "	.45
16	"	"	"	"	"	28 "	.40
16	"	"	"	"	"	29 "	.35
16	"	"	"	"	"	30 "	.30
18	mesh	"	"	"	"	23 "	1.50
18	"	"	"	"	"	24 "	1.10
18	"	"	"	"	"	25 "	.80
18	"	"	"	"	"	26 "	.60
18	"	"	"	"	"	27 "	.50
18	"	"	"	"	"	28 "	.45
18	"	"	"	"	"	29 "	.40
18	"	"	"	"	"	30 "	.35
18	"	"	"	"	"	31 "	.30
20	mesh	"	"	"	"	24 "	1.50
20	"	"	"	"	"	25 "	1.10
20	"	"	"	"	"	26 "	.80
20	"	"	"	"	"	27 "	.60
20	"	"	"	"	"	28 "	.50
20	"	"	"	"	"	29 "	.45
20	"	"	"	"	"	30 "	.40
20	"	"	"	"	"	31 "	.35
20	"	"	"	"	"	32 "	.30
20	"	"	"	"	"	33 "	.27
20	"	"	"	"	"	34 "	.25
22	mesh	"	"	"	"	27 "	.80
22	"	"	"	"	"	28 "	.60
22	"	"	"	"	"	29 "	.50
22	"	"	"	"	"	30 "	.45
22	"	"	"	"	"	31 "	.40
22	"	"	"	"	"	32 "	.35
22	"	"	"	"	"	33 "	.30
22	"	"	"	"	"	34 "	.27
24	mesh	"	"	"	"	26 "	1.50
24	"	"	"	"	"	27 "	1.10
24	"	"	"	"	"	28 "	.80
24	"	"	"	"	"	29 "	.60
24	"	"	"	"	"	30 "	.50
24	"	"	"	"	"	31 "	.45
24	"	"	"	"	"	32 "	.40

No.							Price, per sqr. foot.
24	mesh	brass	wire	cloth,	No.	33 wire,	$0.35
24	"	"	"	"	"	34 "	.30
24	"	"	"	"	"	35 "	.27
30	mesh	"	"	"	"	28 "	1.15
30	"	"	"	"	"	29 "	.85
30	"	"	"	"	"	30 "	.65
30	"	"	"	"	"	31 "	.52
30	"	"	"	"	"	32 "	.47
30	"	"	"	"	"	33 "	.42
30	"	"	"	"	"	34 "	.37
30	"	"	"	"	"	35 "	.33
30	"	"	"	"	"	36 "	.30
40	mesh	"	"	"	"	32 "	.70
40	"	"	"	"	"	33 "	.55
40	"	"	"	"	"	34 "	.48
50	mesh	"	"	"	"	34 "	.75
50	"	"	"	"	"	35 "	.58
50	"	"	"	"	"	36 "	.50
60	mesh	"	"	"	"	35 "	.78
60	"	"	"	"	"	36 "	.60
60	"	"	"	"	"	37 "	.52
70	mesh	"	"	"	"	37 "	.70
80	"	"	"	"	"	38 "	.90
90	"	"	"	"	"	39 "	1.10
100	"	"	"	"	"	40 "	1.30
110	mesh	plain	brass	wire	cloth		1.35
120	"	"	"	"	"		1.60
130	"	"	"	"	"		1.90
110	"	twilled	"	"	"		1.45
120	"	"	"	"	"		1.70
130	"	"	"	"	"		2.00
140	"	"	"	"	"		2.45
150	"	"	"	"	"		3.00
160	"	"	"	"	"		3.60
170	"	"	"	"	"		4.20
180	"	"	"	"	"		4.80
190	"	"	"	"	"		5.40
200	"	"	"	"	"		6.00

MARKET GRADE OF BRASS AND COPPER CLOTHS.

No.							Price, per sqr. foot.
2	mesh	brass	wire	cloth,	No.	16 wire,	$0.50
3	"	"	"	"	"	17 "	.50
4	"	"	"	"	"	18 "	.50
5	"	"	"	"	"	19 "	.50
6	"	"	"	"	"	20 "	.50
8	"	"	"	"	"	22 "	.50

No.							Price, per sqr. foot.
10	mesh	brass	wire	cloth,	No.	23 wire,	$0.50
12	"	"	"	"	"	24 "	.50
14	"	"	"	"	"	25 "	.50
16	"	"	"	"	"	26 "	.50
18	"	"	"	"	"	27 "	.50
20	"	"	"	"	"	28 "	.50

No.							Price, per sqr. foot.
22	mesh	brass	wire	cloth,	No.	29 wire,	$0.50
24	"	"	"	"	"	30 "	.50
30	"	"	"	"	"	31 "	.52
40	"	"	"	"	"	33 "	.55
50	"	"	"	"	"	35 "	.58
60	"	"	"	"	"	36 "	.60

No.							Price, per sqr. foot.
70	mesh	brass	wire	cloth,	No.	37 wire,	$0.70
80	"	"	"	"	"	38 "	.90
90	"	"	"	"	"	39 "	1.10
100	"	"	"	"	"	40 "	1.30

PERFORATED METAL SHEETS.

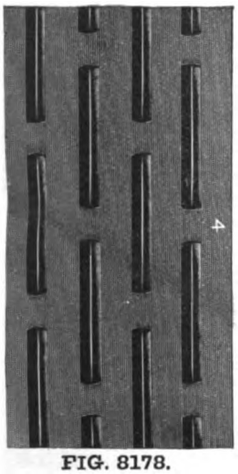


FIG. 8178.

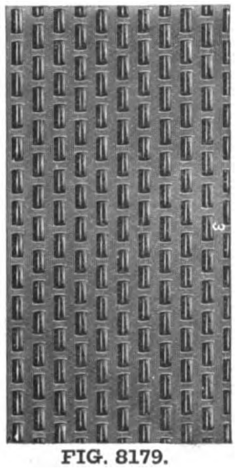


FIG. 8179.

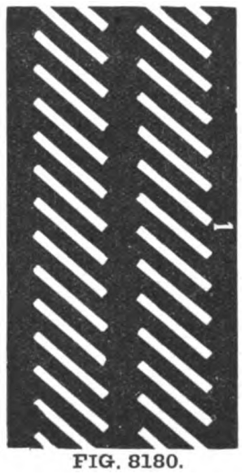


FIG. 8180.

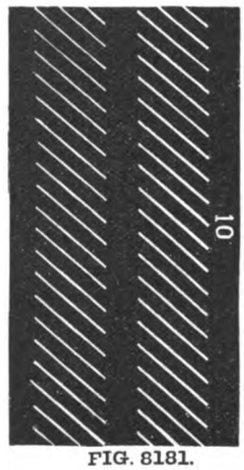


FIG. 8181.

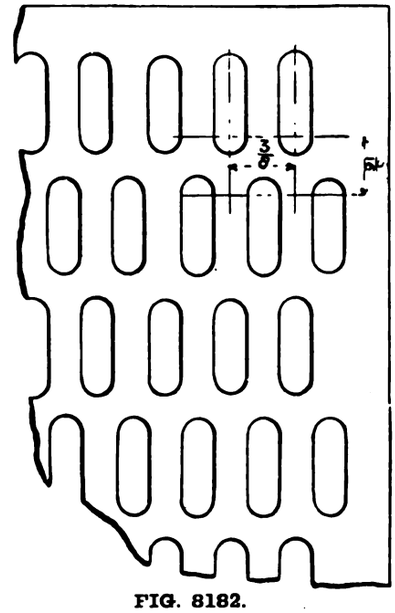


FIG. 8182.

Size opening, $\frac{3}{16} \times \frac{9}{16}$.

The following information is usually necessary, in order to enable us to execute orders promptly:

State exact dimensions of the sheets required, in inches.

State what kind of material is required, whether black or galvanized iron, steel, tin, copper, zinc, brass, bronze, or other alloy.

State the thickness of the iron or steel by Birmingham, English, wire gauge, or Brown & Sharpe, American, wire gauge.

State thickness of copper, brass and bronze by Stubs' gauge, or American gauge.

State thickness of zinc by zinc gauge.

State whether or not a blank margin or selvage edge is required, of what width and on which sides; state all particulars as to size and location of bolt holes in the margin; send sketch if possible.

State whether holes are to be round, square or oblong; give approximately the distance from centers; state whether holes are to be staggered or in line both ways; and specify, in the case of oval holes, the direction in which the holes are to run.

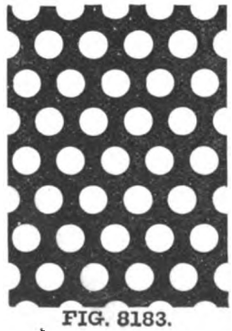
State whether or not the sheets are to be curved; to what diameter and in what direction; and how many sheets go to make up the circumference.

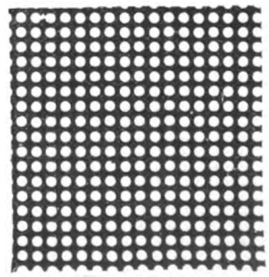
State whether or not the sheets are to be corrugated, and to what depth and pitch.

State for what purpose the plate will be required and the kind of service on which it is to be used.

If possible, send template or drawing, where bolt holes are required, or the sheets are irregular in size; send a sample of any plate which it may be desired to duplicate for perforations and thickness of plate.

PRICES ON APPLICATION.


FIG. 8183.


FIG. 8184.

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STUBS STEEL "BRIGHT."

In 13 inch or 36 inch lengths.

	Per lb.		Per lb.
To No. 5	$0.95	No. 66–68	$4.30
No. 6–15	1.10	No. 69–70	4.70
No. 16–30	1.25	No. 71–73	5.15
No. 31–38	1.35	No. 74	5.60
No. 39–46	1.55	No. 75	5.80
No. 47–50	1.80	No. 76	6.00
No. 51–54	2.10	No. 77	6.45
No. 55–57	2.60	No. 78	6.85
No. 58–60	3.00	No. 79	7.30
No. 61–62	3.40	No. 80	7.75
No. 63–65	3.90		

WEBSTER & HORSFALL'S MUSIC WIRE.

	Per lb.		Per lb.
No. 10–30	$1.00	No. 5	$2.65
No. 9	1.10	No. 4	3.25
No. 8	1.20	No. 3	4.15
No. 6–7	1.25	No. 2	4.70

CRESCENT DRILL RODS.

For drills, taps, reamers, punches, etc.

Nos.	Sizes in decimals of 1 in.	Nearest sizes in fractions of 1 in.	Prices per pound.	Nos.	Sizes in decimals of 1 in.	Nearest sizes in fractions of 1 in.	Prices per pound.
	1.125	1 1/8	$0.40	16	0.175	3/16	$0.83
	1.093	1 3/32	.40	17	0.172	11/64	.83
	1.062	1 1/16	.40	18	0.168		.83
	1.031	1 1/32	.40	19	0.164		.83
	1.	1	.40	20	0.161		.83
	0.969	31/32	.40	21	0.157		.83
	0.937	15/16	.40	22	0.155	5/32	.83
	0.906	29/32	.40	23	0.153		.83
	0.875	7/8	.40	24	0.151		.83
	0.844	27/32	.40	25	0.148		.83
	0.812	13/16	.40	26	0.146		.83
	0.781	25/32	.40	27	0.143		.83
	0.750	3/4	.40	28	0.139	9/64	.83
	0.719	23/32	.40	29	0.134		.83
	0.687	11/16	.40	30	0.127	1/8	.83
	0.656	21/32	.50	31	0.120		.90
	0.625	5/8	.50	32	0.115		.90
	0.594	19/32	.50	33	0.112		.90
	0.562	9/16	.50	34	0.110		.90
	0.531	17/32	.50	35	0.108	7/64	.90
	0.500	1/2	.50	36	0.106		.90
	0.469	15/32	.60	37	0.103		.90
	0.437	7/16	.60	38	0.101		.90
	0.425		.75	39	0.099		1.05
Z	0.413		.75	40	0.097		1.05
Y	0.404	13/32	.75	41	0.095		1.05
X	0.397		.75	42	0.092	3/32	1.05
W	0.386	25/64	.75	43	0.088		1.05
V	0.377	3/8	.75	44	0.085		1.05
U	0.368		.75	45	0.081		1.05
T	0.358	23/64	.75	46	0.079		1.05
S	0.348		.75	47	0.077	5/64	1.20
R	0.339	11/32	.75	48	0.075		1.20
Q	0.332		.75	49	0.072		1.20
P	0.323	21/64	.75	50	0.069		1.20
O	0.316	5/16	.75	51	0.066		1.45
N	0.302		.75	52	0.063	1/16	1.45
M	0.295	19/64	.75	53	0.058		1.45
L	0.290		.75	54	0.055		1.45
K	0.281	9/32	.75	55	0.050		1.80
J	0.277		.75	56	0.045	3/64	1.80
I	0.272		.75	57	0.042		1.80
H	0.266	17/64	.75	58	0.041		2.10
G	0.261		.75	59	0.040		2.10
F	0.257		.75	60	0.039		2.10
E	0.250	1/4	.75	61	0.038		2.40
D	0.246		.75	62	0.037		2.40
C	0.242		.75	63	0.036		2.70
B	0.238		.75	64	0.035		2.70
A	0.234	15/64	.75	65	0.033		2.70
1	0.227		.75	66	0.032		3.00
2	0.219	7/32	.75	67	0.031	1/32	3.00
3	0.212		.75	68	0.030		3.00
4	0.207		.75	69	0.029		3.30
5	0.204		.75	70	0.027		3.30
6	0.201	13/64	.75	71	0.026		3.60
7	0.199		.75	72	0.024		3.60
8	0.197		.75	73	0.023		3.60
9	0.194		.75	74	0.022		3.90
10	0.191		.75	75	0.020		4.05
11	0.188	3/16	.75	76	0.018		4.20
12	0.185		.75	77	0.016	1/64	4.50
13	0.182		.75	78	0.015		4.80
14	0.180		.75	79	0.014		5.10
15	0.178		.75	80	0.013		5.40

Regular lengths, 1 and 3 feet.

Intermediate sizes to order, in quantity not less than 50 lbs. of each size.

WIRE.

IRON AND STEEL WIRE.

GALVANIZED MARKET WIRE.

	Per lb.		Per lb.
Nos. 0 to 9	$0.10	Nos. 15 and 16	$0.14
Nos. 10 and 11	.11	No. 17	.15
No. 12	.11½	No. 18	.16
Nos. 13 and 14	.12½		

Discount, market wire.....per cent.
" galvanized fence wire ...."

STRAIGHTENING AND CUTTING WIRE TO LENGTHS.

	Per lb.		Per lb.
Nos. 00000 to 5	$0.01	Nos. 12 to 16	$0.04
Nos. 6 to 9	.02	Nos. 17 to 20	.05
Nos. 10 and 11	.03		

Cut into lengths under 20 inches .....
" " over 20 " .....

CAST STEEL WIRE.

	Per lb.		Per lb.
Nos. ½ in. to 6	$0.23	No. 14	$0.30
Nos. 7 to 9	.24	No. 15	.32
Nos. 10 and 11	.25	No. 16	.33
No. 12	.26	No. 17	.34
No. 13	.28	No. 18	.36

TINNED STONE WIRE.

	Per lb.		Per lb.
No. 18	$0.18½	No. 28	$0.25
No. 19	.19	No. 29	.26
No. 20	.19	No. 30	.27
No. 21	.20	No. 31	.28
No. 22	.20	No. 32	.32
No. 23	.21	No. 33	.33
No. 24	.21	No. 34	.34
No. 25	.22	No. 35	.40
No. 26	.23	No. 36	.48
No. 27	.24		

Discount, Nos. 18 to 31.....per cent.
" " 32 to 36....."

BRASS AND COPPER WIRE.

Numbered by Stubs' gauge.	Soft and hard high brass.	Spring high brass.	Low brass.	Copper.
All Nos. to No. 16 inc.	$0.22	$0.24	$0.26	$0.30
Nos. 17 and 18	.23	.25	.27	.31
Nos. 19 and 20	.24	.26	.28	.32
No. 21, or .032 diam.	.25	.27	.29	.33
FINE NUMBERS.				
Numbered by London gauge.	Soft and hard high brass.	Spring high brass.	Low brass.	Copper.
No. 22	$0.26	$0.28	$0.30	$0.34
No. 23	.28	.30	.32	.36
No. 24	.30	.32	.34	.38
No. 25	.32	.34	.36	.40
No. 26	.35	.37	.39	.43
No. 27	.38	.40	.42	.46
No. 28	.42	.44	.46	.51
No. 29	.45	.47	.49	.54
No. 30	.48	.50	.52	.62
No. 31	.51	.53	.55	.67
No. 32	.55	.57	.59	.73
No. 33	.59	.61	.63	.82
No. 34	.64	.66	.68	.95
No. 35	.70	.72	.74	1.30
No. 36	.76	.78	.80	1.50
No. 37	1.00	1.02	1.04	1.70
No. 38	1.30	1.32	1.34	2.00
No. 39	2.00	2.02	2.00	3.25
No. 40	2.60	2.62	2.60	5.75

Whitened wire, 3c. per pound advance.

Flat, square and half-round wire, 4c. per pound advance on round wire.

Fancy wire not less than 10c. per pound advance on round wire.

Spooling on 1 pound spools, 12c. per pound extra.

Spooling on 10 lb. spools or more, 2c. per pound extra.

Discount.....per cent.

Special attention given to pure copper wire for electrical purposes, bare or insulated.

IRON AND STEEL WIRE.

The following lists cover all the different grades of wire as enumerated, and are sold at different discounts from our list.

	Per lb.		Per lb.
No. 0000 to 9	$0.10	Nos. 15 and 16	$0.14
Nos. 10 and 11	.11	No. 17	.15
No. 12	.11½	No. 18	.16
Nos. 13 and 14	.12½		

Discount, bright market wire.....per cent.
" " charcoal wire....."
" " bail wire, Nos. 7 to 12....."
" annealed market wire....."
" " fence wire, Nos. 8 and 9....."
" " grape wire, Nos. 10 to 14....."
" coppered market wire....."
" " bail wire, Nos. 7 to 12....."
" " furniture spring wire....."
" annealed Bessemer steel wire....."

ANNEALED STONE OR WEAVING WIRE.

	Per lb.		Per lb.
No. 16	$0.14	No. 27	$0.28
No. 17	.15	No. 28	.29
No. 18	.16	No. 29	.30
No. 19	.19	No. 30	.32
No. 20	.20	No. 31	.33
No. 21	.21	No. 32	.35
No. 22	.22	No. 33	.37
No. 23	.23	No. 34	.40
No. 24	.24	No. 35	.45
No. 25	.25	No. 36	.55
No. 26	.26		

Discount, Nos. 16 to 18.....per cent.
" Nos. 19 to 26....."
" Nos. 27 to 36....."

EXTRA FINE STONE WIRE.

	Per lb.		Per lb.
No. 37	$0.40	No. 43	$0.75
No. 38	.45	No. 44	.85
No. 39	.50	No. 45	1.00
No. 40	.55	No. 46	1.15
No. 41	.60	No. 47	1.40
No. 42	.65		

TINNED WIRE.

	Per lb.		Per lb.
Nos. 0 to 9	$0.15	Nos. 15 and 16	$0.17½
Nos. 10 and 11	.16	No. 17	.18
Nos. 12 to 14	.17	No. 18	.18½

Discount, tinned market wire.....per cent.
" " bail wire....."

TINNED BROOM WIRE.

	Per lb.		Per lb.
Nos. 18 to 20	$0.20	Nos. 23 and 24	$0.22
Nos. 21 and 22	.21		

PHOSPHOR-BRONZE WIRE.

In coils.

Stubs' gauge standard.	Annealed, hard or spring.
Nos. 1 to 16	$0.50 per lb.
Nos. 17 and 18	.51 "
Nos. 19 and 20	.52 "
No. 21	.53 "
No. 22	.54 "
No. 23	.56 "
No. 24	.58 "
No. 25	.60 "
FINE WIRE.	
London gauge standard.	Annealed, hard or spring.
No. 26	$0.60 per lb.
No. 27	.64 "
No. 28	.68 "
No. 29	.72 "
No. 30	.76 "
No. 31	.80 "
No. 32	.85 "
No. 33	.90 "
No. 34	1.05 "
No. 35	1.40 "
No. 36	1.60 "

Flat rolled wire, add to list for spring wire, 10c. per pound.

Square wire, add to list for spring wire, 5c. per pound.

Straightened wire smaller than 14 Stubs, special prices.

Spooling on 1 pound spools, add 12c. per pound.
" 5 " " 5c. "
" 10 " and larger, add 2c. per lb.

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CHARCOAL FURNACE.

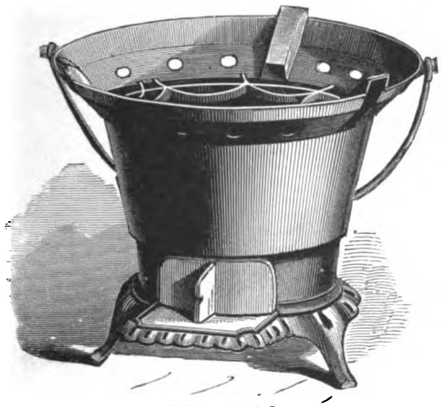


FIG. 8206.

PRICES, FIG. 8206.

No.	2	3	4	5
Diameter on top,	12	13	14	15 in
Each	$1.50	$1.75	$2.25	$2.50

ASHCROFT OIL TESTING MACHINE.

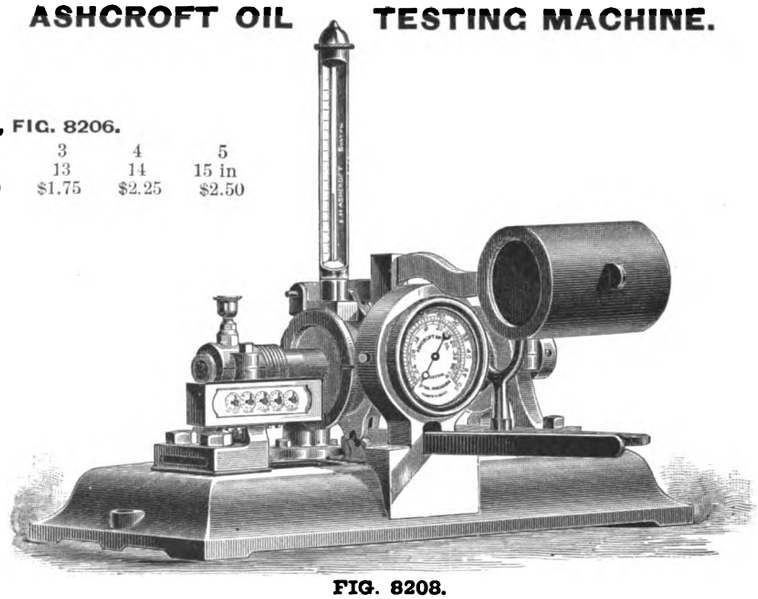


FIG. 8208.

For testing the lubricating properties of oil.

PRICE, $125.00.

SOLDER POTS.



FIG. 8207.

PRICES, FIG. 8207.

No.	Diameter on top. Inches.	Each.
1	5	$0.50
2	6	.65
3	6½	.70
4	8	1.10
5	9	1.30
6	10½	1.75
7	13½	3.50

OILS, PER GALLON.

A Compound cylinder oil	Mason's ex. sperm oil
D Empire cylinder oil, comp'd,	Olive oil
B Railroad valve oil, "	Ex. winter lard oil
C Cylinder oil	Prime lard oil
L " "	Ex. No. 1 lard oil
Amber cylinder oil	No. 1 " "
2d grade gas engine oil	No. 2 " "
H'y mach'y oil, locomotives and steamboats	Neatsfoot oils
H'y neutral spindle oils	Tallow oils
Neutral spindle oils	Sewing machine oils
Paraffine oils	Boiled linseed oil
***Dark winter eng. oil, c'mp'd	Raw " "
** " " " " "	Ex. winter signal oil
Natural W. Va. rock oil	No. 1 " " "
H'y summer black oil	Mineral sperm burning, 300° F.T.,
Winter black oil	Mystic refined headlight, 150° "
Crude and refined cotton seed oils	Amber lubricating oil
Saponified red oils	Champion packing oil ... per lb.
Saponifying wool oil	Ref'd tallow, bbls. and ½ bbls. "
B. W. sperm oil	" " in boxes "
B. W. whale oil	" hard " stearine, bbls "
	" " " ½ bbls. and boxes, "

SOLDERING IRON CAS FURNACE.

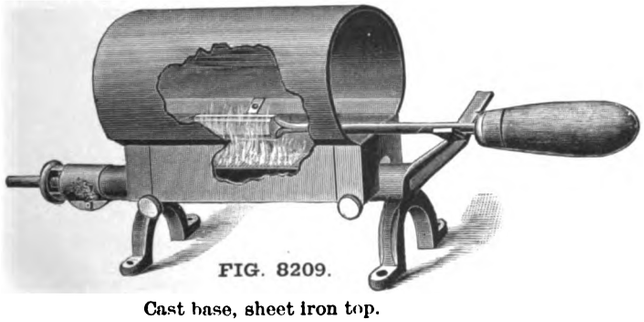


FIG. 8209.

Cast base, sheet iron top.

PRICE, $1.90.

SOLDERING COPPERS.

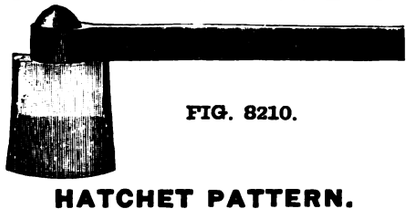


FIG. 8210.

HATCHET PATTERN.

Star brand, 3, 4, 5, 6, 7, 8, 9, 10 lbs., per pair ..... $0.33 per lb.
I X L brand, 3, 4, 5, 6, 7, 8, 9, 10 lbs., per pair ..... .28 "



FIG. 8211.

POINTED PATTERN.

Star brand, 1½ lbs., per pair ..... $0.35 per lb.
" " 2, 2½, 3, 4, 5, 6, 7, 8, 9, 10, 12 lbs., per pair ..... .33 "
I X L brand, 1½ lbs., per pair ..... .30 "
" " 2, 2½, 3, 4, 5, 6, 7, 8, 9, 10, 12 lbs., per pair ..... .28 "



FIG. 8212.

FLAT PATTERN.

Star brand, 3, 4, 5, 6, 7, 8 lbs., per pair, $0.33 per lb.
I X L brand, 3, 4, 5, 6, 7, 8 lbs., per pair, .28 "

PLUMBERS' AND TINNERS' FURNACE.

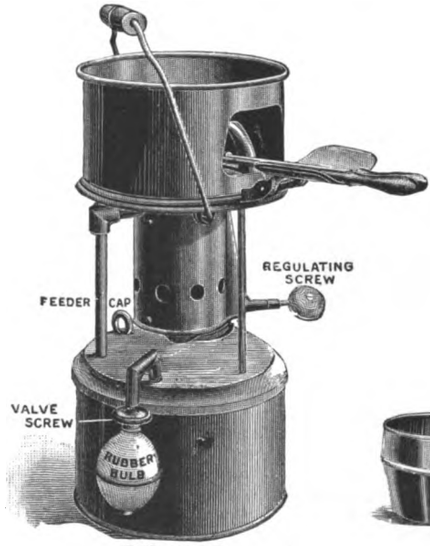


FIG. 8213.

Burns naphtha or gasoline.

PRICE, EACH, $7.00.

PLUMBERS' BLAST FURNACE.

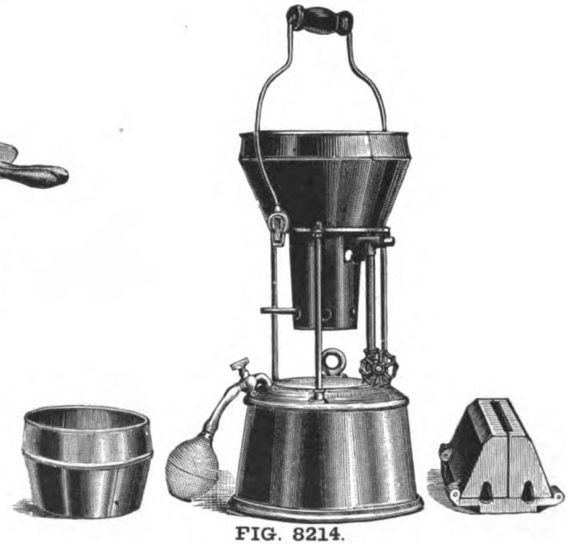


FIG. 8214.

PRICES.

Furnace with two shields, suitable for large or small solder pot ..... each, $6.00
Furnace with two shields and hood for solder coppers, " 7.50

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SHEET IRON FIRE POT.



FIG. 8215.
PRICE, JAPANNED, $4.00.

CAST IRON, BRICK LINED.



FIG. 8216.

WEIGHT, 12 1-2 LBS. PRICE, $4.50.

SOLDERING PAN.

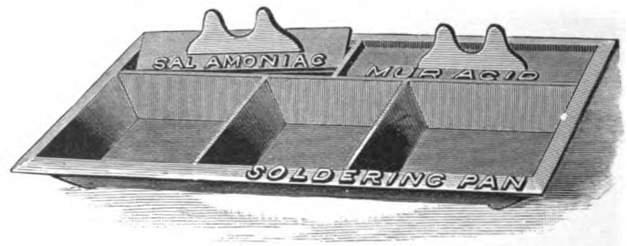


FIG. 8217.

Plain cast iron.....per dozen, $5.00

SOLDER.

Coarse	$0.20 per lb.
Medium	.22 "
Fine	.24 "

SOLDERING FLUID.

In 10 gal. kegs	$1.25 per gal.
In barrels	1.20 "
In smaller packages	1.40 "

LADLES.

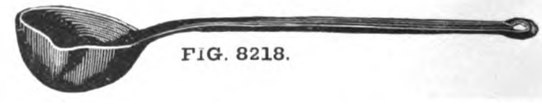


FIG. 8218.

STEEL BOWL, DOUBLE LIPPED.

Inches	2½	3	3½	4	5	6
Per dozen	$2.75	$3.50	$4.00	$4.75	$6.50	$8.00

EXTRA HEAVY STEEL BOWL.

For use in mines and foundries.
6 and 7 made of 3/16, and balance of ¼ in. steel.

Inches	6	7	8	9	10
Per dozen	$10.00	$12.00	$15.00	$20.00	$24.00

SOCKET HANDLES.

Handles riveted to bowl—steel bowl.

Inches	2½	3	3½	4	5	6	7	8	9	10
Per dozen	$2.15	$2.70	$3.10	$3.70	$5.00	$12.00	$14.50	$18.00	$24.00	$28.75

PLUMBERS' CALKING TOOLS.

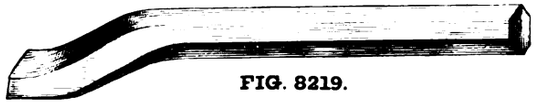


FIG. 8219.



FIG. 8220.



FIG. 8221.

PRICES, EITHER.

Octagon, 1/8, 5/8, ¾ in .....per lb., $0.35

PLAIN STOP TO SOLDER.

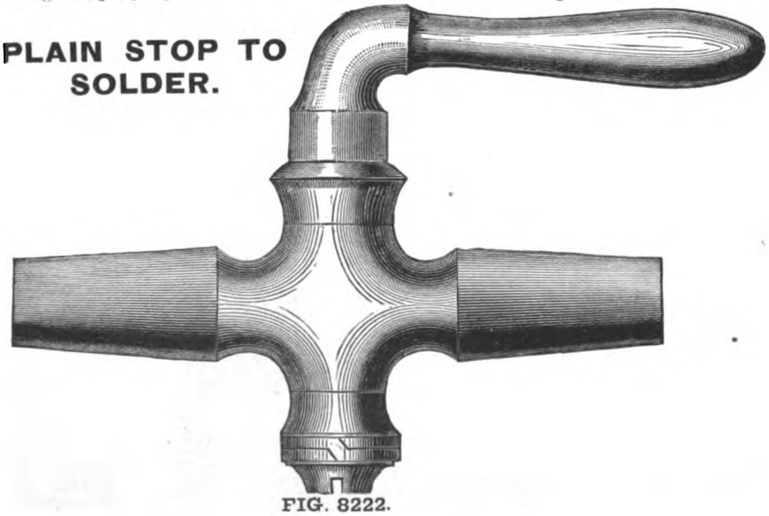


FIG. 8222.

FINISHED AND PLATED.

PRICES.

Size.....Inches.	¼	⅜	½	⅝	¾	1
Finished.....Per doz.,	$10.50	$12.50	$15.50	$18.50	$25.00	$37.00
Nickel-plated ... "	12.50	14.50	18.00	21.00	27.50	40.00
Silver-plated.... "	17.50	20.50	24.50	30.50	40.00	63.00

PLAIN STOP, SCREWED FOR IRON PIPE.

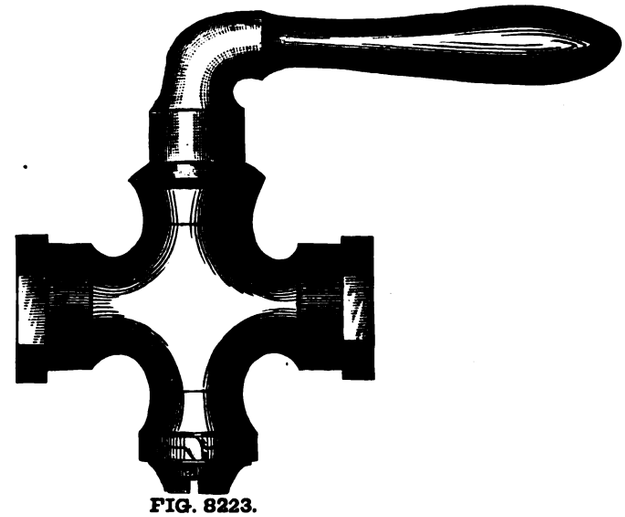


FIG. 8223.

FINISHED AND PLATED.

PRICES.

Size.....Inches,	¼	⅜	½	⅝	¾	1
Finished.....Per doz.,	$11.50	$13.50	$16.50	$20.50	$27.00	$40.00
Nickel-plated ... "	13.50	15.50	19.00	23.00	29.50	43.00
Silver-plated.... "	18.50	21.50	25.50	32.50	42.00	66.00

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PLAIN AND COMPRESSION BIBBS.

PLAIN BIBB, TO SOLDER.

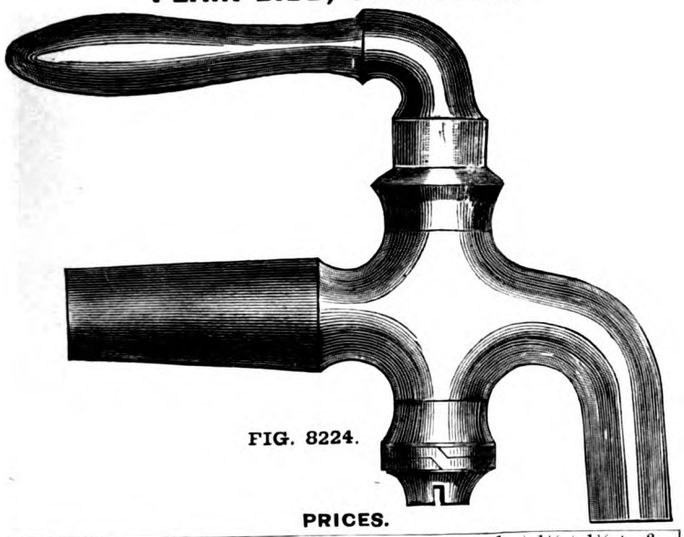


FIG. 8224.

PRICES.

Size.....Inches,	¼	⅜	½	⅝	¾	1	1¼	1½	2
Finished.....Per doz.,	$10.00	$12.00	$15.00	$18.00	$24.00	$36.00	$60.00	$84.00	$170.00
Rough..... "	9.00	11.00	14.00	16.00	21.00	32.00	52.00	72.00	150.00
Nickel-plated..... "	12.00	14.00	17.50	20.50	26.50	39.00	.....	.....	.....
Silver "	17.00	20.00	24.00	30.00	39.00	62.00	.....	.....	.....

PRICES, THREADED FOR HOSE.

Size..... .....Inches,	½	⅝	¾	1	1¼	1½	2
Finished..... .....Per doz.,	$16.00	$19.00	$26.00	$39.00	$64.00	$90.00	$180.00
Rough..... "	15.00	17.00	23.00	35.00	56.00	78.00	160.00
Nickel-plated..... "	18.50	21.50	28.50	42.00	.....	.....	.....
Silver " ..... "	25.00	31.00	41.00	65.00	.....	.....	.....

PLAIN BIBB, SCREWED FOR IRON PIPE.

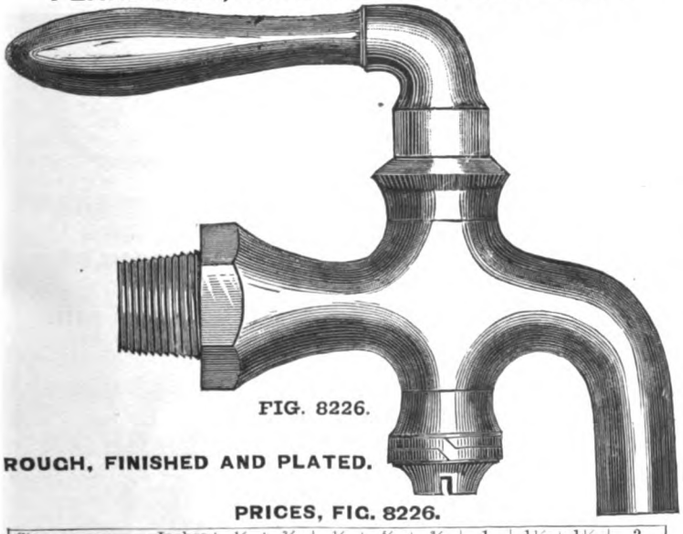


FIG. 8226.

ROUGH, FINISHED AND PLATED.

PRICES, FIG. 8226.

Size.....Inches,	¼	⅜	½	⅝	¾	1	1¼	1½	2
Finished.....Per doz.,	$11.00	$13.00	$16.00	$19.00	$26.00	$39.00	$64.00	$90.00	$180.00
Rough..... "	10.00	12.00	15.00	17.00	23.00	35.00	56.00	78.00	160.00
Nickel-plated.... "	13.00	15.00	18.50	21.50	28.50	42.00	.....	.....	.....
Silver " .... "	18.00	21.00	25.00	31.00	41.00	65.00	....	.....	.....

PRICES, THREADED FOR HOSE.

Finished.....Per doz.,	$17.00	$20.00	$28.00	$42.00	$68.00	$96.00	$190.00
Rough..... "	16.00	18.00	25.00	38.00	60.00	84.00	170.00
Nickel-plated..... "	19.50	22.50	30.50	45.00	.....	.....	.....
Silver " ..... "	26.00	32.00	43.00	68.00	.....	.....	.....

PRICES, FIG. 8227.

Size.....Inches,	½	⅝	¾	1
Finished.....Per doz.,	$24.00	$28.00	$40.00	$53.00
Nickel-plated..... "	27.50	31.50	44.00	57.00
Silver " ..... "	36.00	43.00	58.00	81.00

PRICES, THREADED FOR HOSE.

Finished.....Per doz.,	$25.00	$29.00	$42.00	$56.00
Nickel-plated..... "	28.50	32.50	46.00	60.00
Silver " ..... "	37.00	44.00	60.00	84.00

PRICES, FIG. 8228.

Size.....Inches,	½	⅝	¾	1
Finished.....Per doz.,	$18.00	$21.00	$28.00	$51.00
Nickel-plated..... "	21.50	24.50	32.00	55.00
Silver " ..... "	30.00	36.00	46.00	79.00

PRICES, THREADED FOR HOSE.

Finished.....Per doz.,	$19.00	$22.00	$30.00	$54.00
Nickel-plated..... "	22.50	25.50	34.00	58.00
Silver " ..... "	31.00	37.00	48.00	82.00

PLAIN BIBB, SCREWED FOR WOOD.

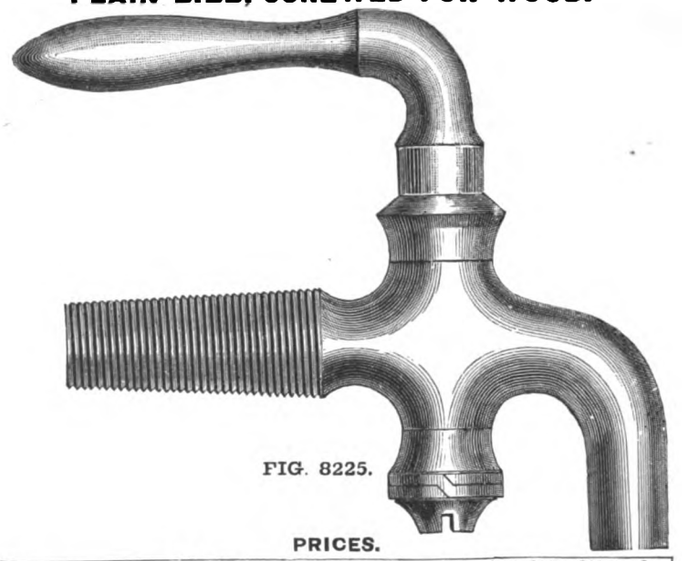


FIG. 8225.

PRICES.

Sizes.....Inches,	¼	⅜	½	⅝	¾	1	1¼	1½	2
Finished.....	$11.00	$13.50	$17.00	$20.00	$27.00	$41.00	$68.00	$94.00	$195.00
Rough.....	10.00	12.50	16.00	18.00	24.00	37.00	60.00	82.00	175.00
Nickel-plated.....	13.00	15.50	19.50	22.50	29.50	44.00	.....	.....	.....
Silver "	18.00	21.50	26.00	32.00	42.00	67.00	.....	.....	.....

PLAIN BIBB, FLANGE AND THIMBLE.

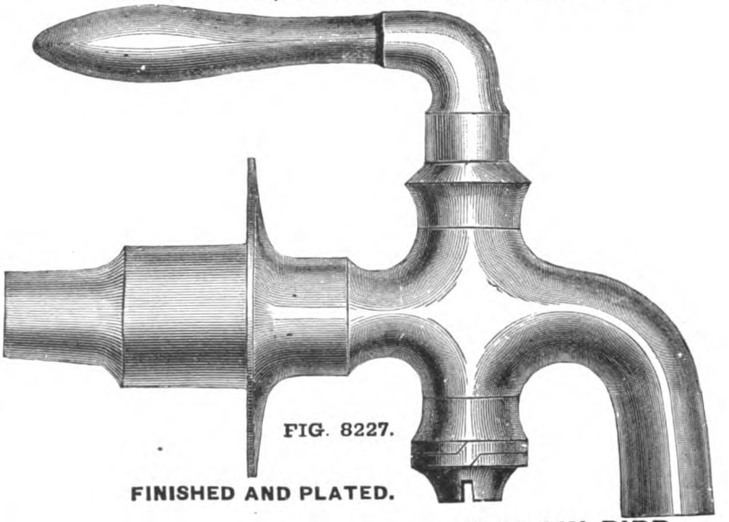


FIG. 8227.

FINISHED AND PLATED.

COMPRESSION PLAIN BIBB, FLANGE AND THIMBLE.

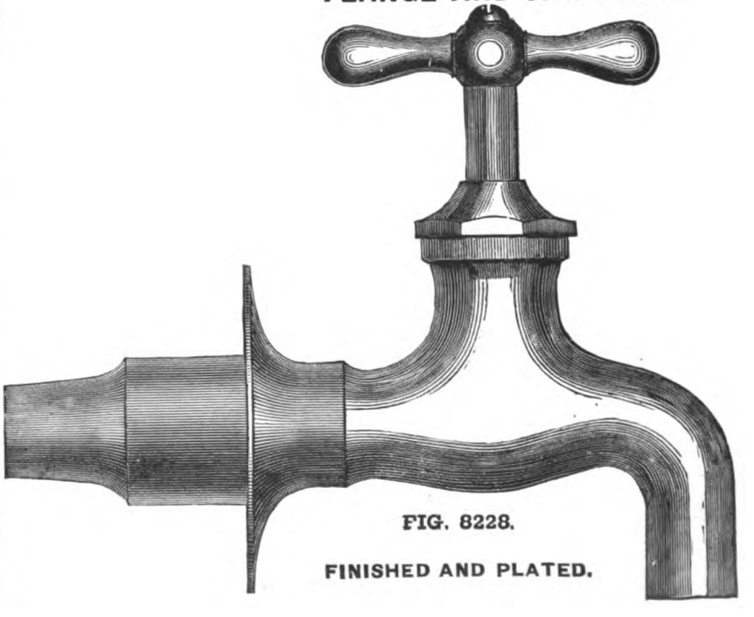


FIG. 8228.

FINISHED AND PLATED.

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COMPRESSION AND SELF-CLOSING BIBBS.

PLAIN COMPRESSION, TO SOLDER.

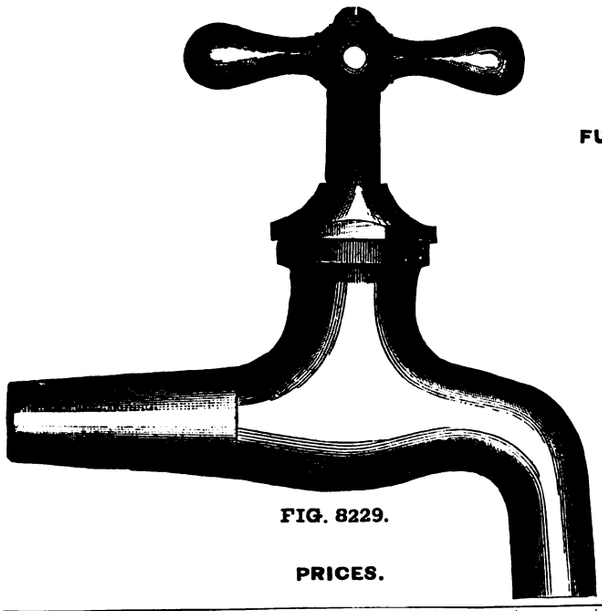


FIG. 8229.

PRICES.

Size ..... Inches,	3/8	1/2	5/8	3/4	1
Finished..... Per doz.	$9.00	$10.00	$12.00	$18.00	$34.00
Rough..... "	8.50	9.50	11.00	17.00	30.00
Nickel-plated ..... "	11.00	12.50	14.50	20.50	37.00
Silver-plated... ... "	17.00	19.00	24.00	33.00	60.00

PRICES, FIG. 8229, THREADED FOR HOSE.

Finished..... Per doz.	$11.00	$13.00	$20.00	$37.00
Rough..... "	10.50	12.00	19.00	33.00
Nickel-plated..... "	13.50	15.50	22.50	40.00
Silver-plated..... "	20.00	25.00	35.00	63.00

THESE BIBBS ARE FURNISHED IN ROUGH, FINISHED AND PLATED.

PLAIN COMPRESSION, SCREWED FOR IRON PIPE.

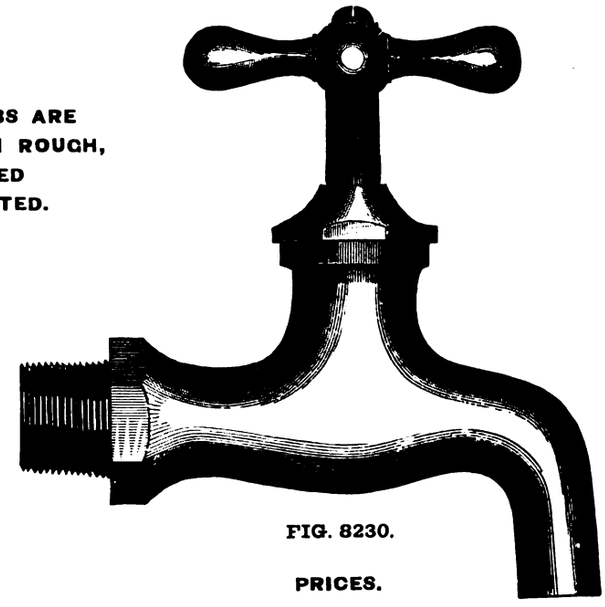


FIG. 8230.

PRICES.

Size..... Inches,	3/8	1/2	5/8	3/4	1
Finished..... Per doz.	$10.00	$11.00	$13.00	$20.00	$37.00
Rough..... "	9.50	10.50	12.00	19.00	33.00
Nickel-plated..... "	12.00	13.50	15.50	22.50	40.00
Silver-plated..... "	18.00	20.00	25.00	35.00	63.00

PRICES, THREADED FOR HOSE.

Size..... Inches,	1/2	5/8	3/4	1
Finished..... Per doz.	$12.00	$14.00	$22.00	$40.00
Rough..... "	11.50	13.00	21.00	36.00
Nickel-plated... "	14.50	16.50	24.50	43.00
Silver-plated .. "	21.00	26.00	37.00	66.00

SELF-CLOSING BIBBS.

FOR LEAD PIPE.

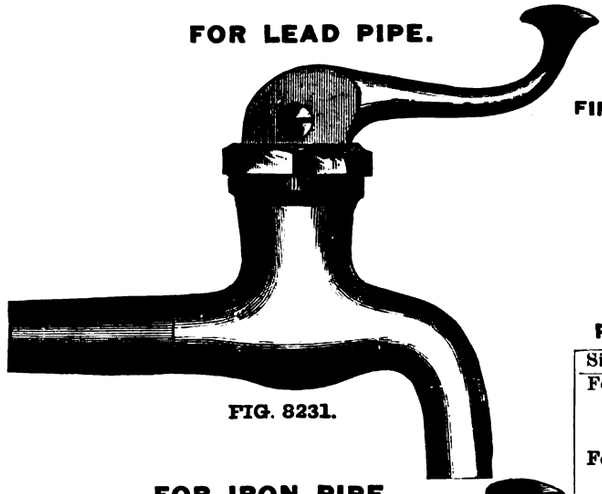


FIG. 8231.

FINISHED AND PLATED.

SCREW SHANK AND SHOULDER FOR IRON PIPE.

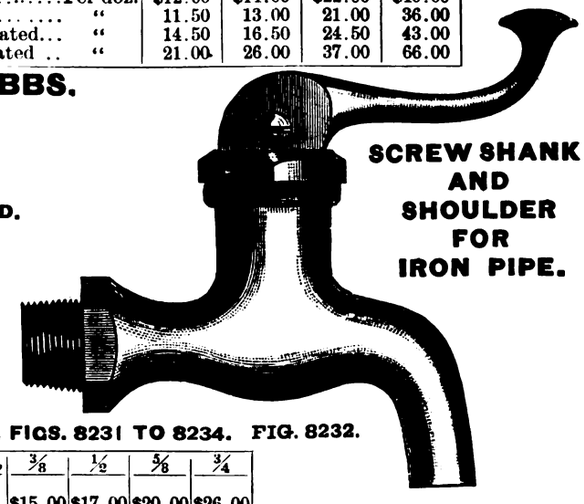


FIG. 8232.

PRICES, PER DOZEN, FIGS. 8231 TO 8234.

Size..... Inches,	3/8	1/2	5/8	3/4
For lead pipe,				
Finished.....	$15.00	$17.00	$20.00	$26.00
Nickel-plated.	17.00	19.50	22.50	28.50
Silver-plated.....	23.00	26.00	32.00	41.00
For iron pipe,				
Finished.....	16.00	18.00	21.00	28.00
Nickel-plated.....	18.00	20.50	23.50	30.50
Silver-plated..	24.00	27.00	33.00	43.00
No shoulder, finished.....	16.00	18.00	21.00	28.00
" nickel-plated.	18.00	20.00	23.50	30.50
" silver-plated.	24.00	27.00	33.00	43.00
Flange and thimble,				
Finished.....	22 00	26.00	30.00	42.00
Nickel-plated.....	24.00	28.50	32.50	44.50
Silver-plated..	30.00	35.00	42.00	57.00

FOR IRON PIPE, NO SHOULDER.

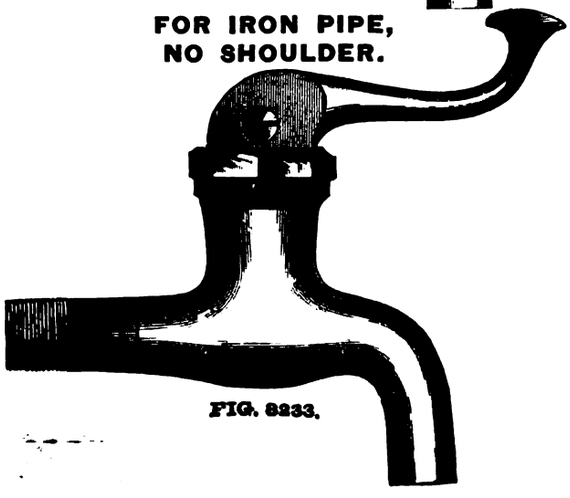


FIG. 8233.

FLANGE AND THIMBLE.

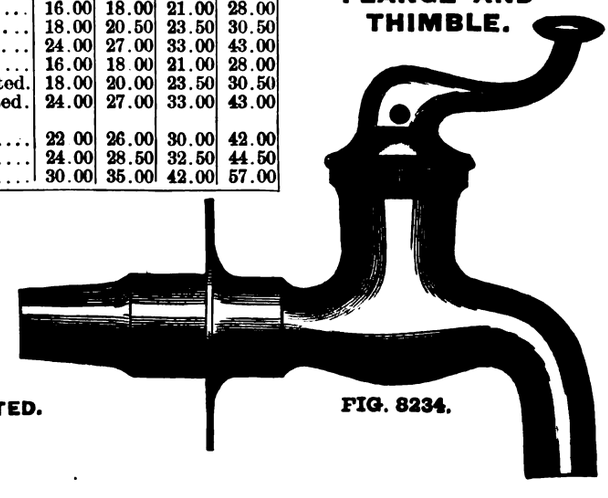


FIG. 8234.

FINISHED AND PLATED.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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ROUGH T HANDLE STOPS.

FOR IRON AND LEAD PIPE.

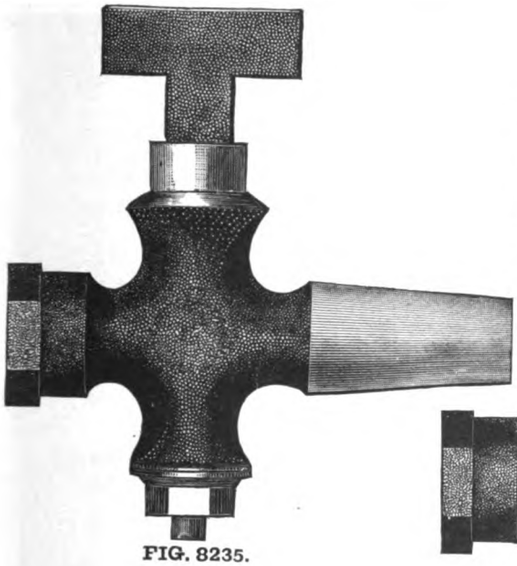


FIG. 8235.

SCREWED FOR IRON PIPE.

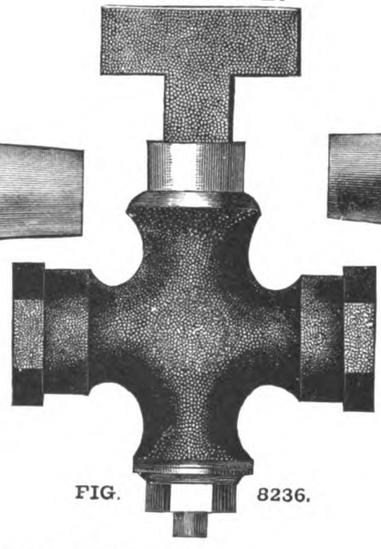


FIG. 8236.

TO SOLDER.

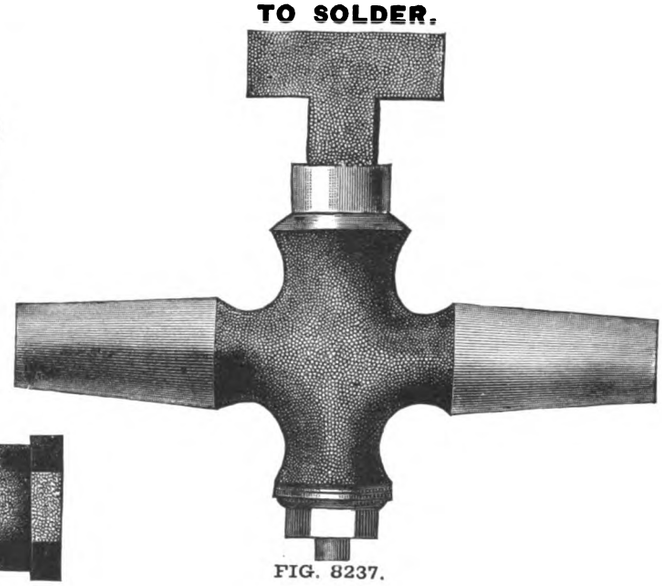


FIG. 8237.

PRICES, FIGS. 8235 TO 8237.

Size.....Inches.	¼	⅜	½	⅝	¾	1	1¼	1½	2
To solder.....Per doz.	$7.00	$9.00	$12.00	$15.00	$19.00	$28.00	$46.00	$64.00	$110.00
For L. P. and I. P. "	7.50	9.50	12.50	16.00	20.00	29.50	48.00	67.00	115.00
For iron pipe..... "	8.00	10.00	13.00	17.00	21.00	31.00	50.00	70.00	120.00

PRICES, WITH WASTES.

Size.....Inches.	⅜	½	⅝	¾	1	1¼
To solder.....Per doz.	$10.00	$13.00	$16.00	$20.50	$30.00	$49.00
For L. P. and I. P..... "	10.50	13.50	17.00	21.50	31.50	51.00
For iron pipe..... "	11.00	14.00	18.00	22.50	33.00	53.00

ROUGH LEVER HANDLE STOPS.

FOR IRON AND LEAD PIPE.

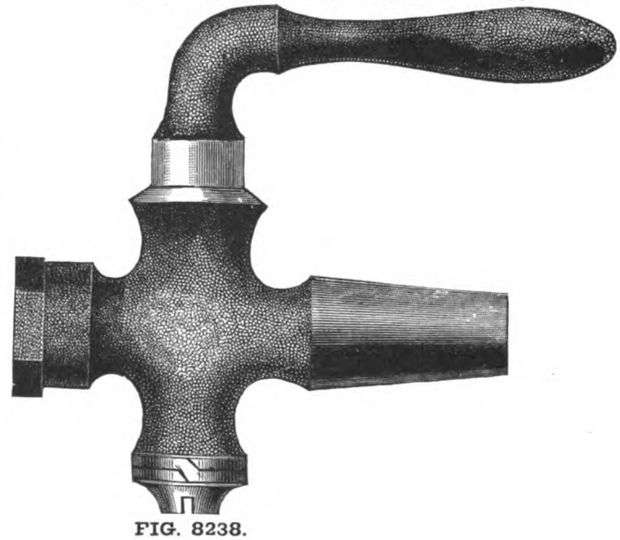


FIG. 8238.

ROUGH LEVER HANDLE STOPS.

TO SOLDER.

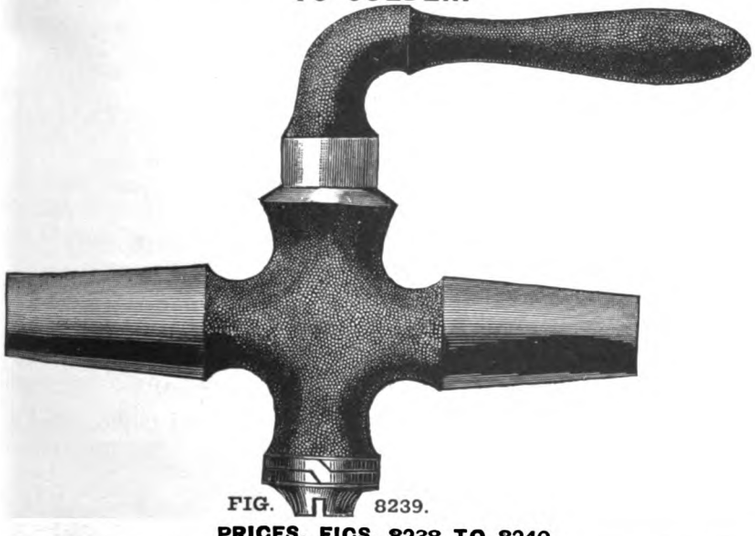


FIG. 8239.

PRICES, FIGS. 8238 TO 8240.

Size.....Inches.	¼	⅜	½	⅝	¾	1	1¼	1½	2
To solder.....Per doz.	$7.00	$9.00	$12.00	$15.00	$19.00	$28.00	$46.00	$64.00	$110.00
For L. P. and I. P. "	7.50	9.50	12.50	16.00	20.00	29.50	48.00	67.00	115.00
For iron pipe..... "	8.00	10.00	13.00	17.00	21.00	31.00	50.00	70.00	120.00

PRICES, WITH WASTES.

Size.....Inches.	⅜	½	⅝	¾	1	1¼
To solder.....Per doz.	$10.00	$13.00	$16.00	$20.50	$30.00	$49.00
For L. P. and I. P..... "	10.50	13.50	17.00	21.50	31.50	51.00
For iron pipe..... "	11.00	14.00	18.00	22.50	33.00	53.00

ROUGH LEVER HANDLE STOPS.

SCREWED, FOR IRON PIPE.

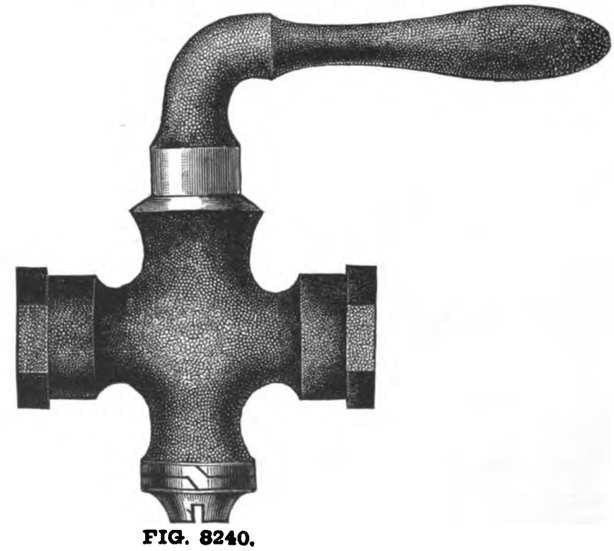


FIG. 8240.

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STOVE PIPE FORMERS.



FIG. 8241.

No. 1. Stove pipe former, 2 in. rolls, 30 in. long.....$19.00
No. 2. " " " 1¾ " " 30 " " 18.00
No. 1. Tin " " 1½ " " 20 " " 10.00
No. 2. " " " 1½ " " 16 " " 9.00
No. 5. " " " 1 " steel rolls, 12 in. long... 12.00

GRANNIS SLIP ROLL FORMERS.

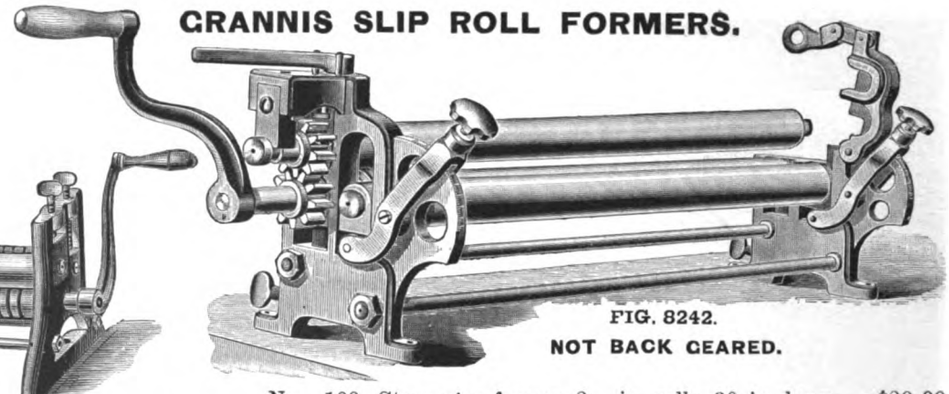


FIG. 8242.
NOT BACK GEARED.

No. 100. Stove pipe former, 2 in. rolls, 30 in. long....$20.00
No. 200. " " " 1¾ " " 30 " " 19.00
No. 0100. " " " 2 " " 37 " " ... 26.00
No. 01. " " " 2 " " 30 " " back geared, 35.00
No. 101. Tin " " 1½ " " 20 " " 11.00
No. 102. " " " 1½ " " 16 " " 10.00

TIN PIPE FORMERS.

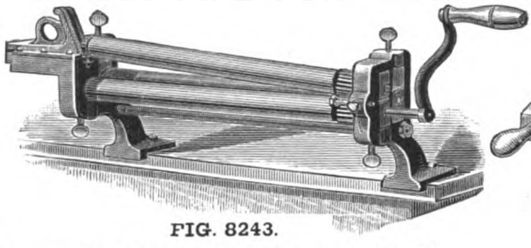


FIG. 8243.

No. 3. Tin pipe former, 1 in. steel rolls, 14 in. long.....$20.00
No. 4. Tin pipe former, 1 in. steel rolls, 20 in. long.....$30.00

SLIP ROLL FORMERS.

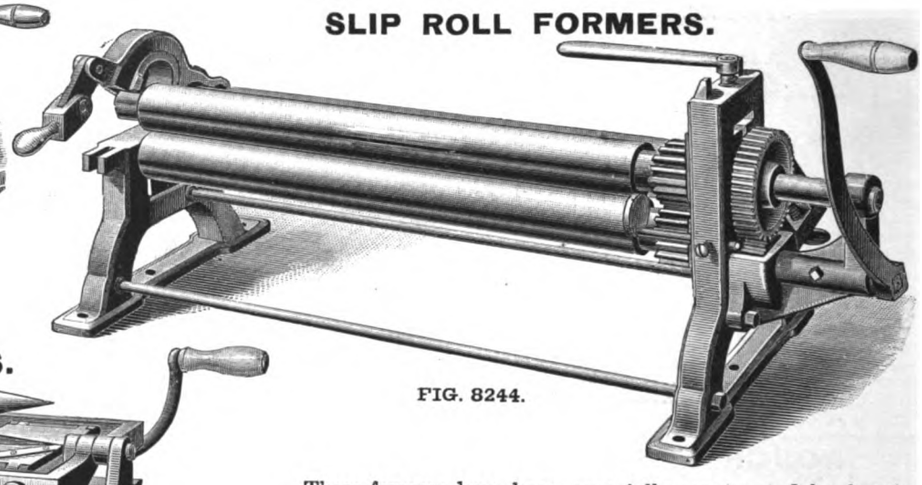


FIG. 8244.

These formers have been especially constructed for forming tubing for hydraulic mining or water works, where the pressure demands extra heavy iron.

No. 00 is made in the same manner, except it has not the slip roll.

No. 0000 will form No. 14 iron ; weight, 750 lbs.
No. 000 " " No. 14 " " 500 "
No. 00 " " No. 16 " " 425 "
No. 0000. Back geared, 3 to 1, 4 in. slip rolls, 48 in. long, $175.00
No. 000. " " 2 " 1, 3 " " " 37 " " 100.00
No. 00. " " 3 " 1, 3 " rolls, 37 " " 85.00

TUBE FORMERS.

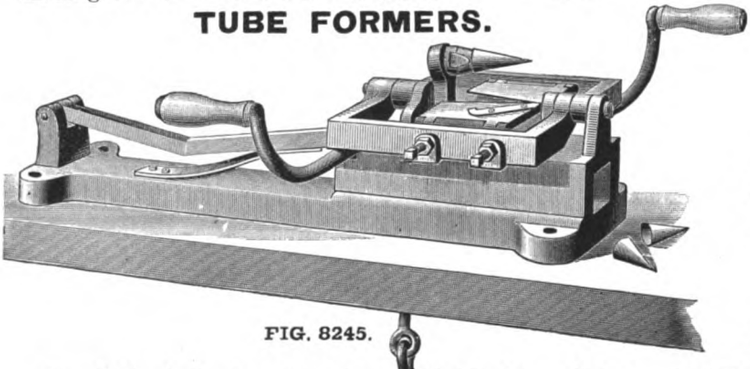


FIG. 8245.

Stow's No. 4, for tapering tubes 2½ in. long, **PRICE**....$25.00

TUBE FORMERS.

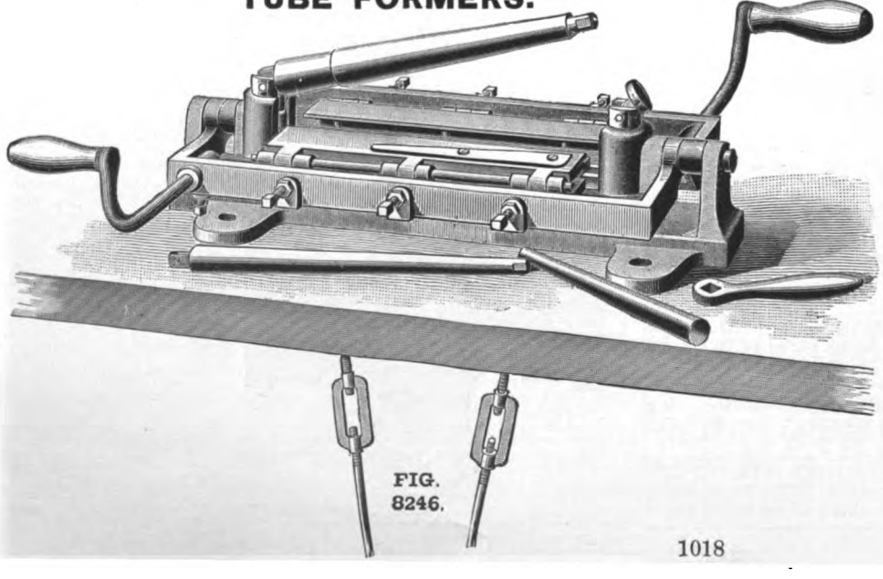


FIG. 8246.

PRICES, FIG. 8246.

Where no size rod is specified in the order, 1 inch rod will be sent with each No. 000, 00, 0 and 1.

A large variety of rods and beds for special work at extra prices.

No. 000. To form speaking tubes 24 in. long, $60.00
No. 00. To form tubes 20 in. long..... 45.00
No. 0. " " " 15 " " 30.00
No. 1. For candle moulds or ladle handles, 11 in. long, $25.00
No. 2. For tea kettle spouts, etc., 8 in. long, $20.00
No. 3. For rattle, box handles, 5 in. long, $20.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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TINSMITHS' TOOLS AND MACHINES.

VAN BRAMER'S WIRE CUTTER AND BAIL FORMER.

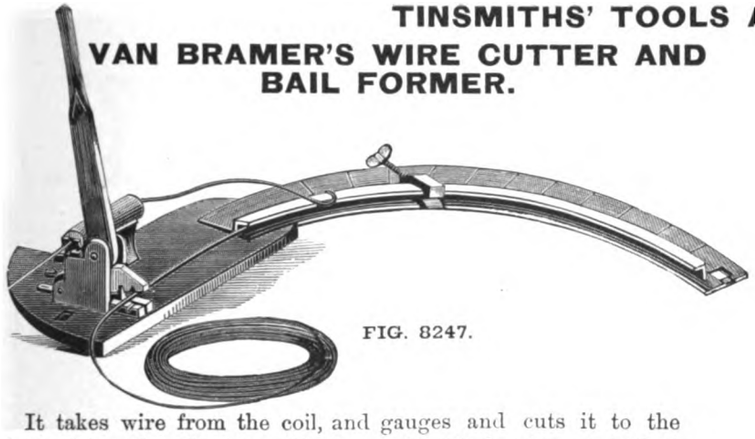


FIG. 8247.

It takes wire from the coil, and gauges and cuts it to the desired length. It cuts easily one-quarter inch wire, as well as all smaller sizes. **PRICE, $10.00.**

SMITH'S OVAL HANDLE FORMER.

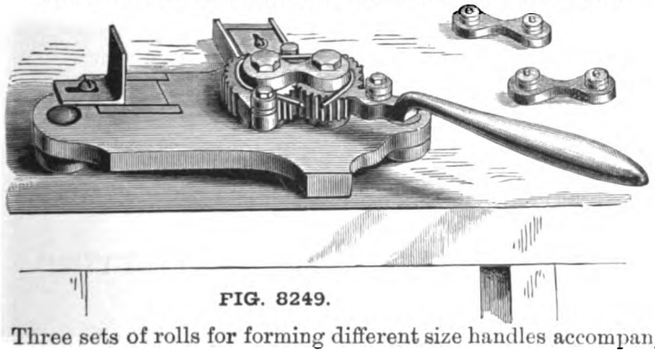


FIG. 8249.

Three sets of rolls for forming different size handles accompany each machine. **PRICE, $6.00.**

WIRE RING FORMER.

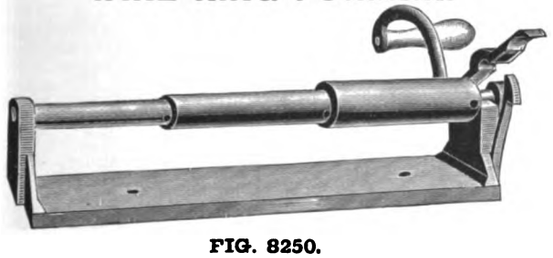


FIG. 8250.

Ring former or winder. **PRICE, $3.00.**

PRICES, FIG. 8251.

No. 2. Iron bottom sheet iron folder, 30 inches..... $7.00
No. 3. Iron bottom sheet iron folder, 39 inches..... 12.00

WOOD BOTTOM SHEET IRON FOLDER.

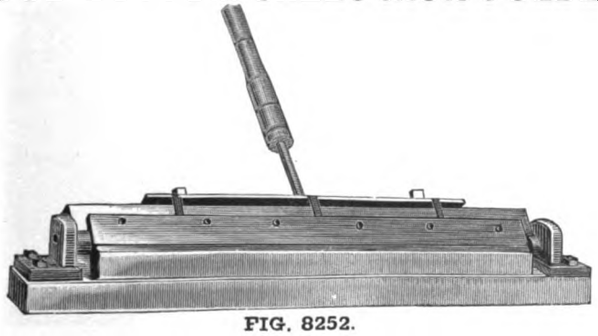


FIG. 8252.

PRICES, FIG. 8252.

No. 0. Wood bottom sheet iron folder, 48 inches.....$20.00
No. 1. Wood bottom sheet iron folder, 30 inches..... 10.00

The No. 0 wood bottom folder can be constructed to turn locks 1½ inches wide at an extra cost of $5.00.

PRICES, FIG. 8254.

No. 0. 42 inches. $20.00
No. 1. 30 " 12.00

SPAULDING'S TUBE FORMERS.

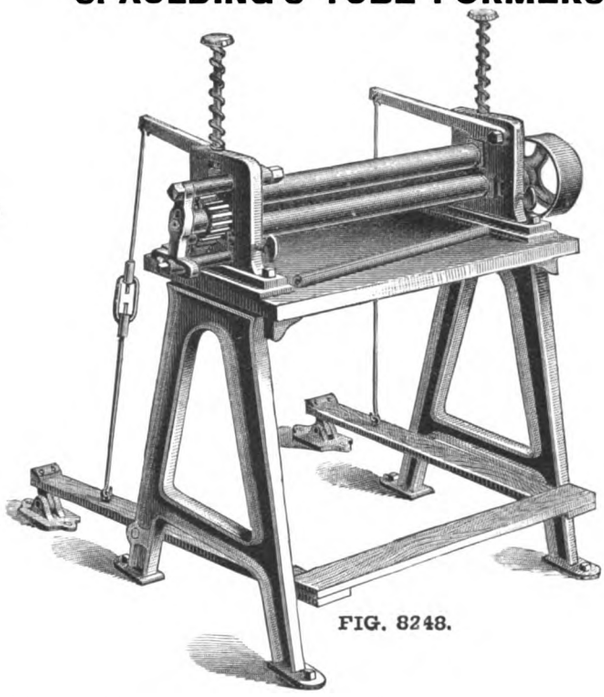


FIG. 8248.

The machine represented in the above cut can be used only with power. It is so constructed that the same machine will form tubes or cylinders 24 inches long and of diameters ¾ to 1¾ inches, and any intermediate size.

PRICE, with one forming roll, **$75.00.**

IRON BOTTOM SHEET IRON FOLDER.



FIG. 8251.

WRIGHT'S SHEET IRON FOLDER, NO. 12.



FIG. 8253.

PRICE, 30 INCH, $16.00.

WRIGHT'S SHEET IRON FOLDER.



FIG. 8254.

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STOW'S SHEET IRON FOLDERS.

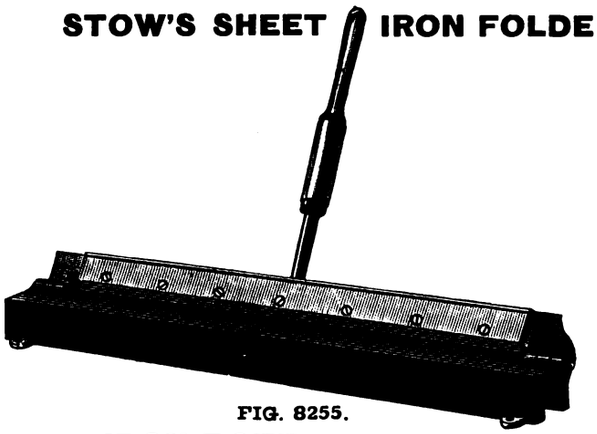


FIG. 8255.

IRON BOTTOM CUTTER BEADER, ENCLOSED RODS.

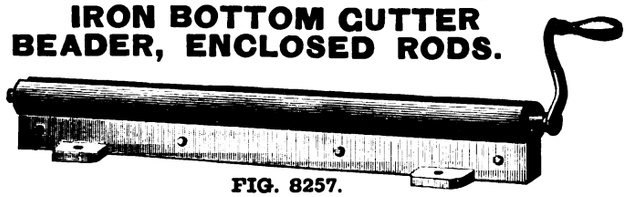


FIG. 8257.

PRICES.

No. A1.	60 inches	$20.00	No. 1.	20 inches	$4.00
No. 01.	42 inches	9.00	No. 2.	15 inches	3.50
No. 02.	30 inches	6.00			

POWER SQUARING SHEARS, BACK GEARED, WITH HOLD-DOWN ATTACHMENT.

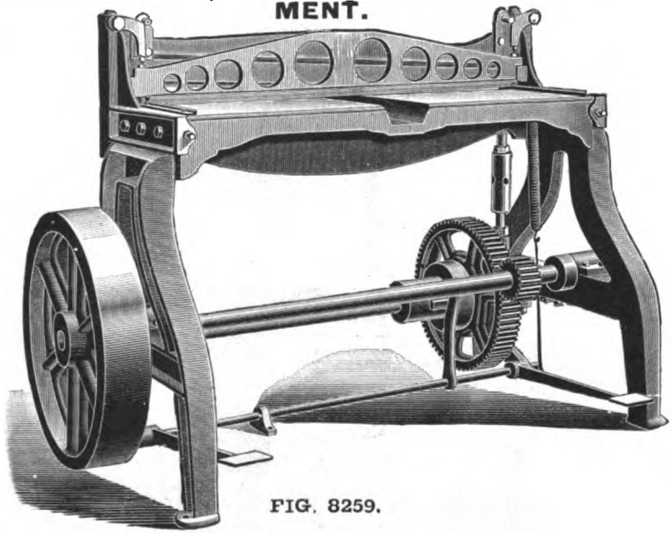


FIG. 8259.

POWER SQUARING SHEARS, NOT BACK GEARED AND WITHOUT HOLDING-DOWN ATTACHMENT.

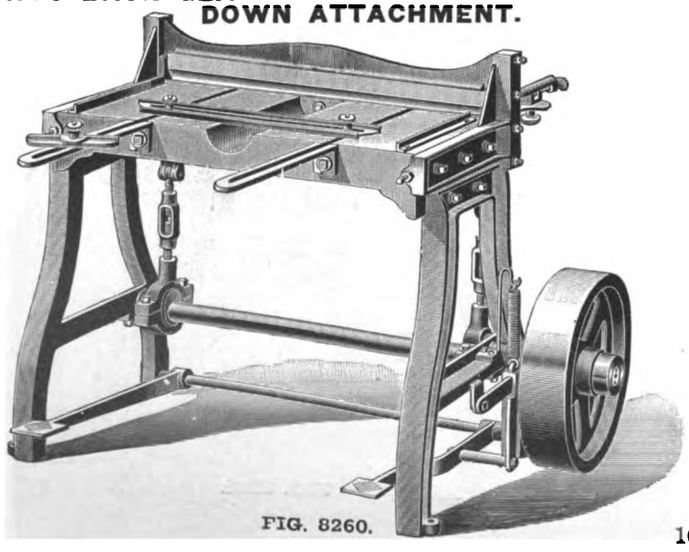


FIG. 8260.

STEEL CUTTER RODS.

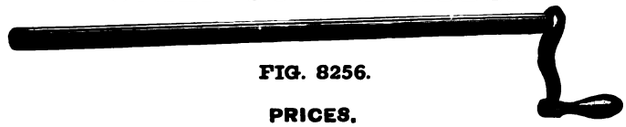


FIG. 8256.

PRICES.

No. A1.	5/8 to 1 inch diameter, 60 inches long	$8.00
No. 01.	1/2 to 7/8 inch diameter, 42 inches long	4.50
No. 02.	1/2 to 3/4 inch diameter, 30 inches long	3.00
No. 1.	5/8 to 5/8 inch diameter, 20 inches long	2.00
No. 2.	3/8 to 5/8 inch diameter, 15 inches long	1.75

PRICES, FIG. 8255.

Will turn edges from 1/8 to 3/8 of an inch in width.

No. 25 is constructed on the same principle as the other machines, but is extra heavy, and will turn edges on iron No. 20 gauge, from 1/4 to 2 1/4 inches in width, and at any angle.

No. 10.	30 inches	$10.00	No. 25.	42 inches	$80.00
No. 15.	42 inches	18.00	No. 30.	48 inches	100.00
No. 20.	60 inches	25.00			

STOW'S CUTTER BEADERS.

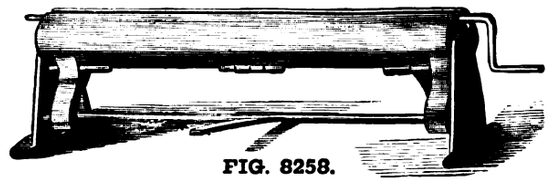


FIG. 8258.

No. 00.	Cast steel rod, 72 inches long, 7/8 or 1 inch diameter	$35.00
No. 0.	Cast steel rod, 30 inches long, 1/2 or 3/4 inch diameter	10.00
No. 1.	Cast steel rod, 20 inches long, 3/8 to 5/8 inch diameter	5.50
No. 2.	Cast steel rod, 15 inches long, 1/8 to 1/2 inch diameter	4.50

Can furnish 5/8 x 60 inches.

SQUARING SHEARS FOR CUTTING SHEET METAL.



FIG. 8261.

PRICES, FIG. 8259.

No. 020.	Will cut No. 16 iron, 20 inches long	$146.00
No. 025.	Will cut No. 16 iron, 25 inches long	166.00
No. 030.	Will cut No. 16 iron, 30 inches long	210.00
No. 040.	Will cut No. 16 iron, 40 inches long	250.00
No. 050.	Will cut No. 16 iron, 50 inches long	300.00
No. 060.	Will cut No. 16 iron, 60 inches long	350.00
No. 072.	Will cut No. 16 iron, 72 inches long	450.00
No. 084.	Will cut No. 16 iron, 84 inches long	600.00

Without hold-down attachment, $10.00 less.

PRICES, FIG. 8260.

No. AX20.	Will cut No. 18 iron, 20 inches long	$90.00
No. AX25.	Will cut No. 18 iron, 25 inches long	110.00
No. AX30.	Will cut No. 18 iron, 30 inches long	150.00
No. AX40.	Will cut No. 18 iron, 40 inches long	200.00
No. AX50.	Will cut No. 18 iron, 50 inches long	250.00
No. AX60.	Will cut No. 18 iron, 60 inches long	300.00
No. AX72.	Will cut No. 18 iron, 72 inches long	400.00

PRICES, FIG. 8261.

No. 120.	Will cut tin, 22 inches long	$38.00
No. 125.	Will cut tin, 25 inches long	48.00
No. 130.	Will cut No. 18 iron, 30 inches long	54.00
No. 140.	Will cut No. 18 iron, 42 inches long	155.00

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SQUARING SHEARS, WITH HOLD-DOWN ATTACHMENT.



FIG. 8262.

PRICES, FIG. 8262.

No. 200,	will cut tin,	22	inches	long				$40.00
" 250,	" "	25	"	"				50.00
" 300,	" "	No. 18	iron,	30	inches	long		55.00
" 400,	" "	"	18	"	42	"	"	160.00
" 500,	" "	"	18	"	50	"	"	210.00
" 600,	" "	"	18	"	60	"	"	250.00

Shears can be furnished with end shelves or side extension tables, at an extra expense of $3.00 each for Nos. 200 and 250, and $5.00 each for the larger sizes.

PRICES, FIG. 8263.

These machines are arranged with gauges for cutting sheet metal of any length into strips from 5/8 of an inch to 9 inches in width. Sheet iron 30½ inches wide may be cross cut at any part desired. They will cut No. 18 iron.

No. 75, slitting or squaring shears, weight, 750 lbs.....$110.00
" 175, " " " " for power, weight, 950 lbs., 165.00

PRICES, FIG. 8264.

This shear will cut sheet metal as thick as No. 12 gauge. The blades are 9 inches long. The length of reach on to a sheet of thick metal is 15½ inches; on to a sheet of thin metal, 19 inches.

To cut heavy iron, or thicker than No. 18, the stay bolt should always be in its place; when cutting No. 18 iron, or thinner, it may be removed to give it more reach. It has a compound lever attachment to be used to increase its power when required; this should not be used when the stay bolt is removed.

No. 9, combined bench and slitting shear, weight, 600 lbs..... $150.00

DESCRIPTION, FIG. 8266.

This shear will cut any square or bevel under 20 inches, and can be changed instantly so as to cut circles.

Each machine includes a rim gauge for cutting rims or cover hoops, bevel or straight.

PRICES, FIG. 8265.

No. 1, with squaring attachment, weight, 70 lbs..... $43.00
" 2, " " " " 80 " 48.00

PRICES, FIG. 8266.

No. 1, cuts 14 inch circles..... $33.00
" 2, " 20 " " 43.00
" 3, for both hand and power, cuts 40 inch circles, weight, 225 lbs..... 75.00

CONTINUOUS CUTTING SQUARING SHEARS.



FIG. 8263.

COMBINED BENCH AND SLITTING SHEARS.



FIG. 8264.

ROTARY SHEARS.

SQUARING ATTACHMENT FOR FIG. 8266.

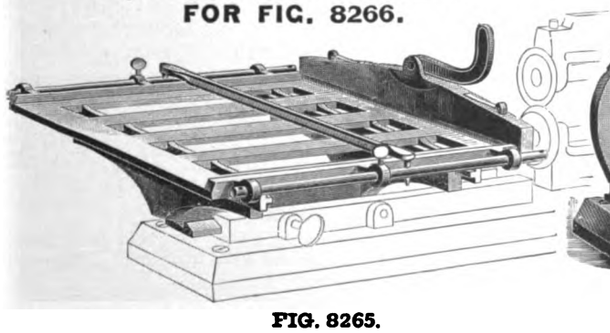


FIG. 8265.

WAUCH'S BEVEL SQUARE AND CIRCULAR.

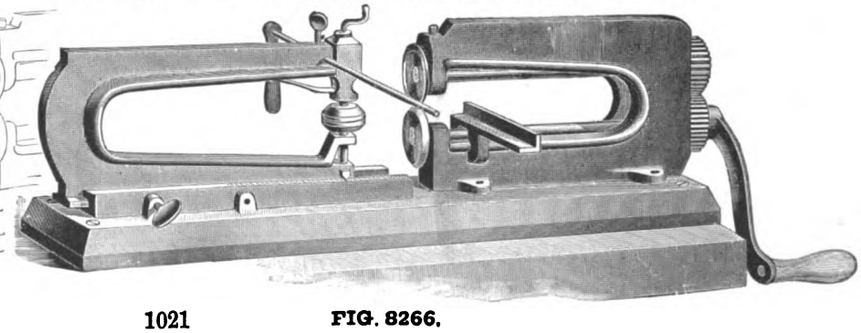


FIG. 8266.

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FLANDERS' CIRCULAR SHEARS.
FOR CUTTING AND BENDING.

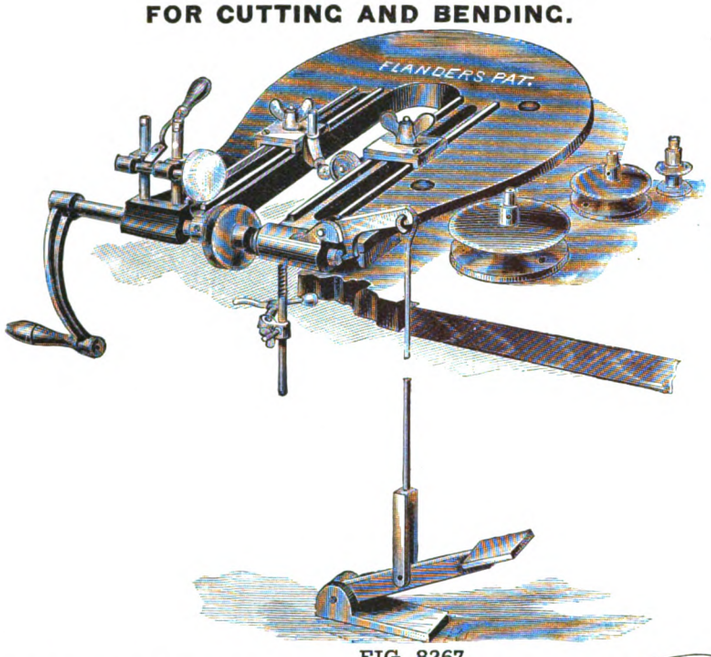


FIG. 8267.

NEWTON'S CIRCULAR SHEARS.

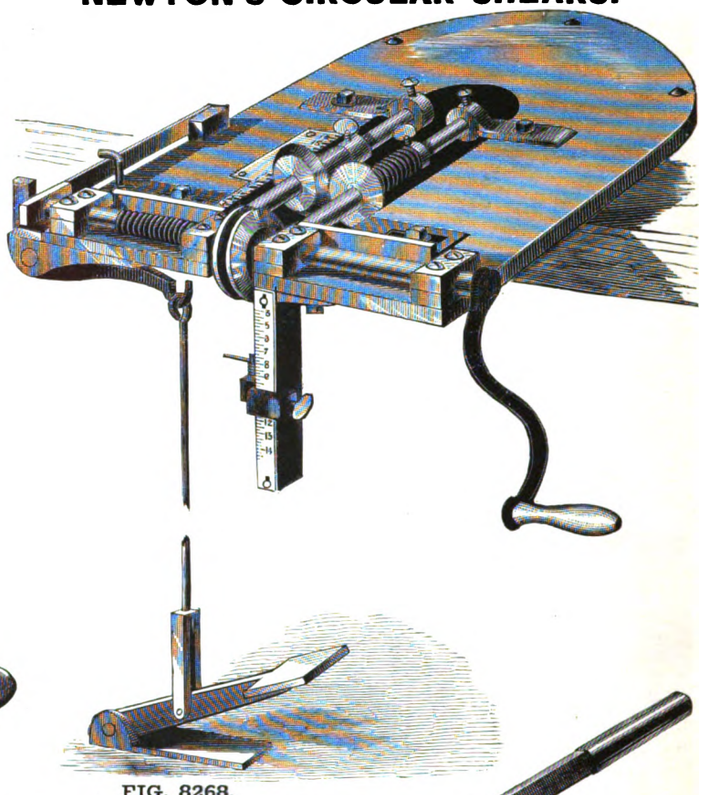


FIG. 8268.

LEVER SHEARS, WITH GAUGE.



FIG. 8269.

COMBINED SHEARS AND PUNCHES.

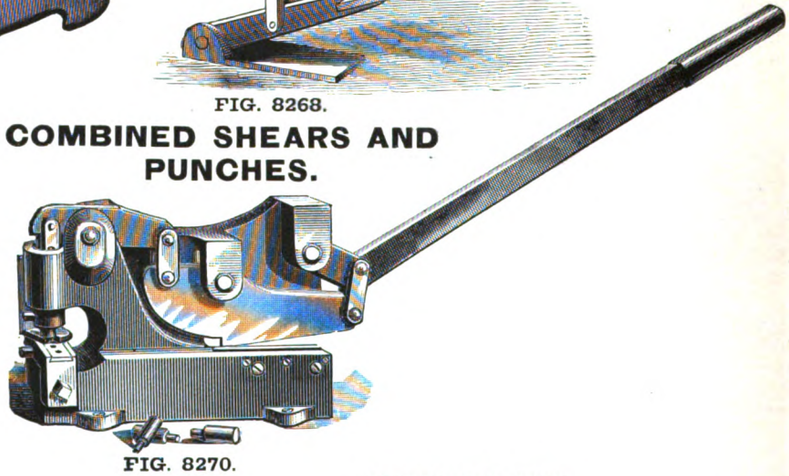


FIG. 8270.

SAMSON PUNCH.

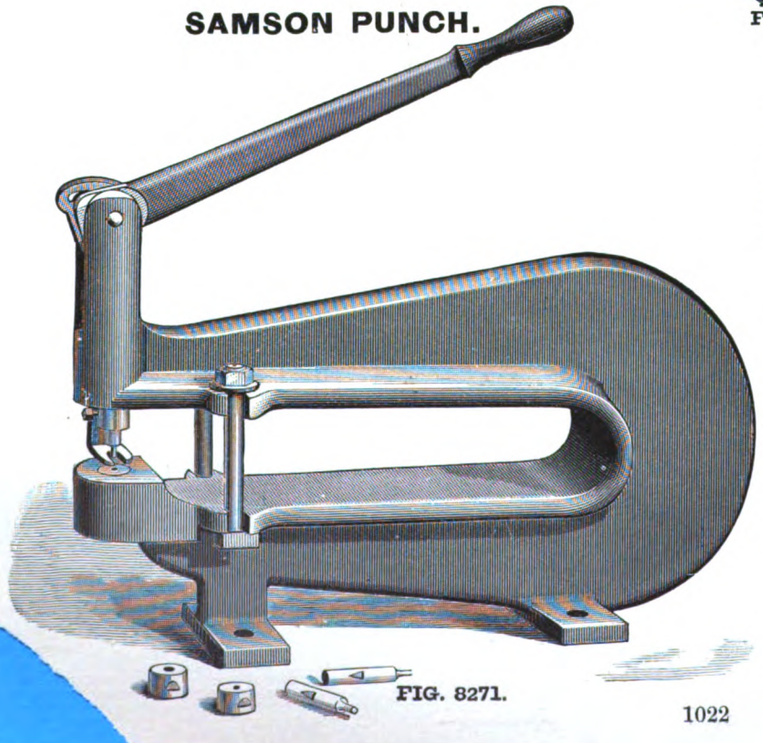


FIG. 8271.

PRICES, FIG. 8267.

With four pairs of disks—one pair each of 1⅞, 3, 4⅞ and 7⅝ inches in diameter.

No. 0 will cut circles from 4 to 30 inches in diameter. No. 1 will cut circles from 2½ to 23 inches in diameter.

No. 0. Operated by steam or hand power, with one pair 10¼ inch disks and one pair cutters on iron frame.....$150.00
No. 1. Operated by hand, for tin, etc., with four pairs disks, one pair cutters and edge turner..... 30.00
No. 1. Without edge turner..... 25.00

PRICES, FIG. 8268.

With disks—one pair each of 2⅜ and 5⅞ inches in diameter.
Will cut circles from 3 to 14 inches in diameter from tin.....$22.00

PRICES, FIG. 8269.

No. 1. Lever shears, cut 4½ inches, each.....$12.00
No. 1½. " " 6 " " 13.00
No. 2. " " 8 " " 15.00

PRICES, FIG. 8270.

These machines are suitable for both cutting and punching metal. They may be used on Nos. 14 and 16 iron. Four punches are put up with No. 1, viz.: 1/8, 3/16, 1/4, 5/16. Five punches are put up with No. 2, viz.: 1/8, 3/16, 1/4, 5/16, 3/8.

No. 1.....$16.00 No. 2.....$20.00
Extra punches, each, 75c. Extra dies, each, $1.25.

PRICES, FIG. 8271.

It will punch No. 9 iron with "stay bolts," and No. 12 without "stay bolts." Each machine is furnished with three sets of dies and punches, viz.: 1/8, 3/16, 1/4 inch.

Improved Samson punch, weight, 95 lbs.....$20.00

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PRICES, FIG. 8272.

This brake will bend No. 20 iron perfectly straight and square its entire length without springing. Seven formers are furnished with each machine, to be attached to the brake for making circular bends, as follows: one each, 3, 2½, 2, 1¾, 1½, 1¼, 1 inch.

No. 36.	Clamp 37½	inches	$70.00
No. 42.	" 44	"	90.00
No. 50.	" 52	"	115.00
No. 72.	" 74	"	175.00
No. 96.	" 98	"	275.00

HARE'S FOUR-LEAF CORNICE BRAKE.

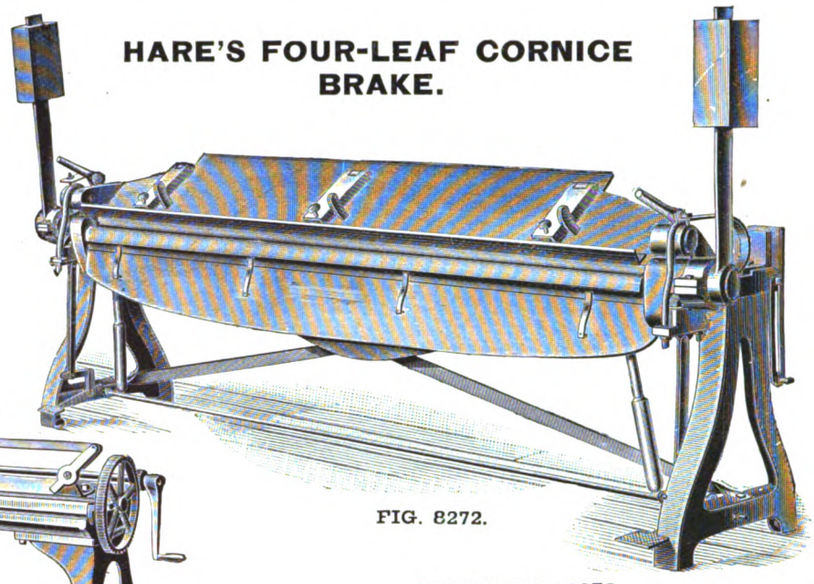


FIG. 8272.

CULLEN'S SHEET METAL BEADING MACHINES.

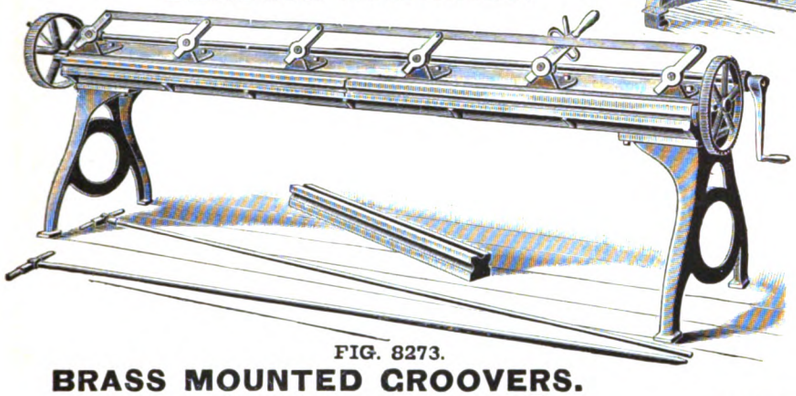


FIG. 8273.

PRICES, FIG. 8273.

This machine is designed for working a round bead on edge of tin, iron, copper or zinc sheets, or for forming tubing of same material. It will form any size of bead or tube, from ⅝ to 1¼ inches in diameter in lengths of 8 feet. The ⅝ bead can be worked on sheets of 26 gauge, ⅞ bead 24 gauge, and 1¼ in 22 gauge and lighter thicknesses. Three rods are sent with machine.

PRICE, $175.00.

BRASS MOUNTED GROOVERS.

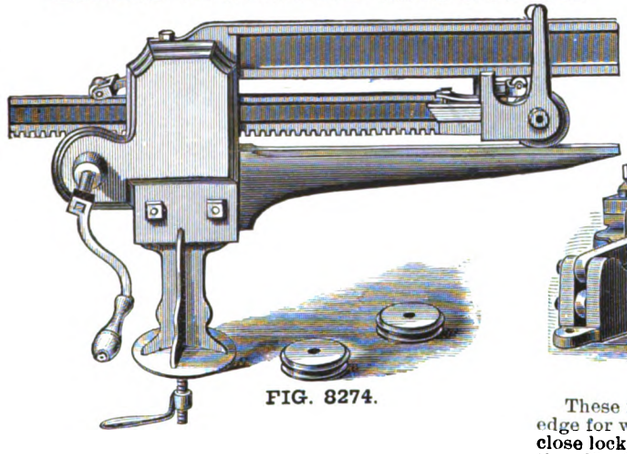


FIG. 8274.

PRICES.

No. 1. For heavy work, 20 inches with stand,	$13.50
No. 2. For common work, 17 inches with stand	11.00
Groover ratchet, with brass mounting	3.25

STOW'S ADJUSTABLE BAR TIN FOLDERS.

WILL TURN LOCKS FROM 3-32 TO 1 INCH IN WIDTH.



FIG. 8275.

These machines will form square joints or angles, turn narrow or wide locks, turn a round edge for wiring and form these locks on medium plate with ease. They will also form open or close locks as desired. Nos. 52, 54 and 56 will bend any sheet metal of a thickness not thicker than No. 22 wire gauge. When sent from factory these machines are adjusted properly for common and IX tin plate or other sheet metal of same thickness. If thicker stock is to be used the machine must be adjusted according to the thickness, for which convenient and necessary means are provided; otherwise any of the machines may be broken.

We also make special folders for forming any width locks, on light or heavy plate, of any length desired.

PRICES.

No.	Size.	Will turn locks.	Prices
50	17 in. for tin.	3/32 to 1/8 in.	$25.00
52	20 in.	3/32 to 1 in.	30.00
54	30 in.	3/32 to 1 in.	40.00
56	42 in.	1/16 to 1¼ in.	80.00

BICELOW'S GROOVERS.

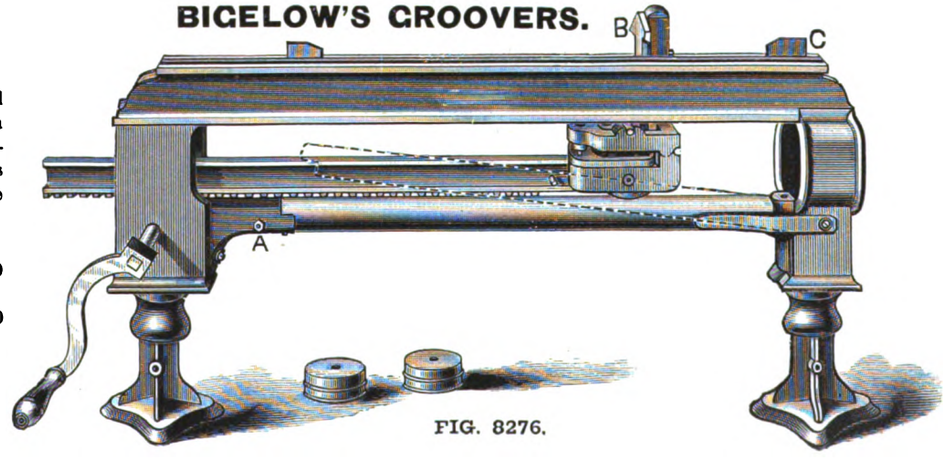


FIG. 8276.

PRICES, FIG. 8276.

This machine is adapted to both grooving and flattening the seam at one operation. In addition to grooving and finishing stove pipe nicely, all articles made of tin plate can be grooved in this machine by simply changing the rolls, and these rolls can be adapted to all kinds of work.

No. 1. For tin and sheet iron, 30 inches, complete, with standards	$40.00
No. 2. For tin and sheet iron, 36 inches, complete, with standards	50.00

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STOW'S ENCASED TURNERS.

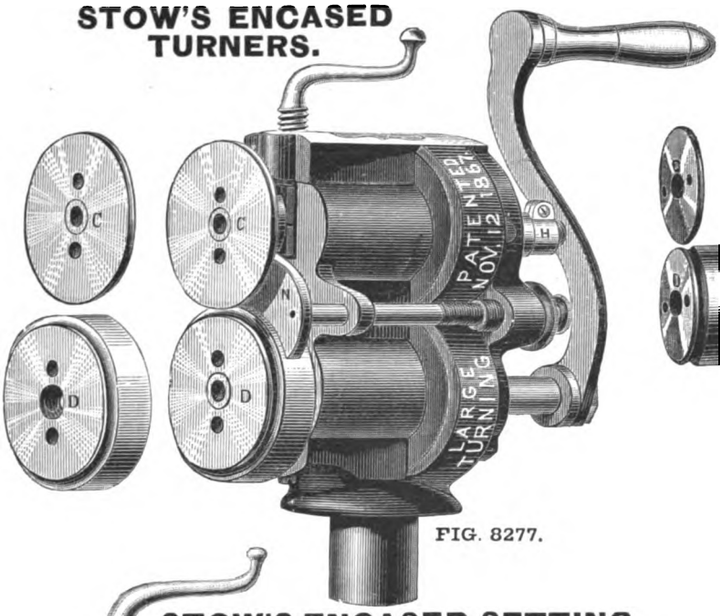


FIG. 8277.

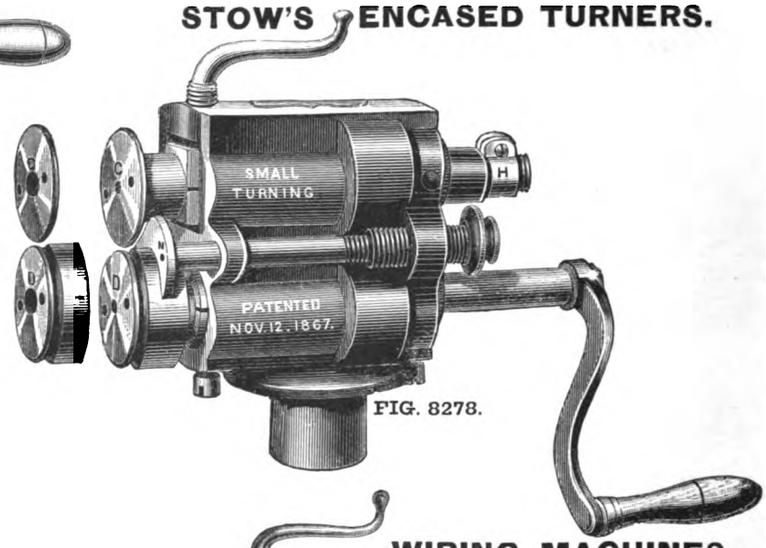


FIG. 8278.

STOW'S ENCASED SETTING DOWN MACHINES.

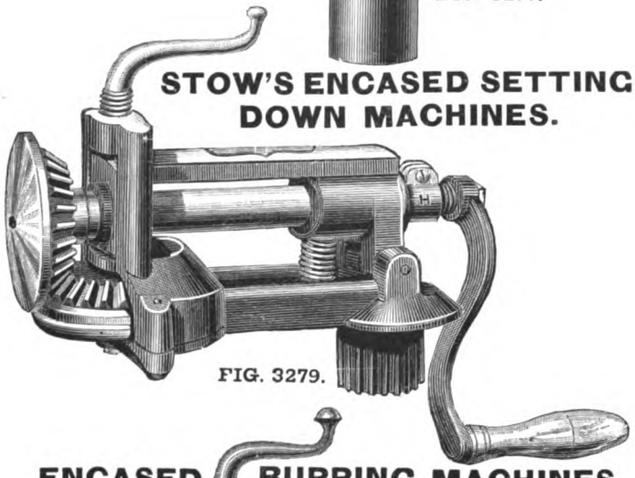


FIG. 3279.

WIRING MACHINES.

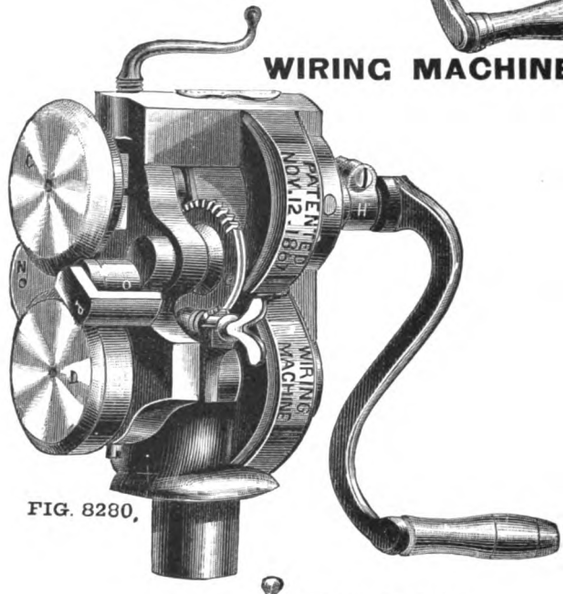


FIG. 8280.

ENCASED BURRING MACHINES.

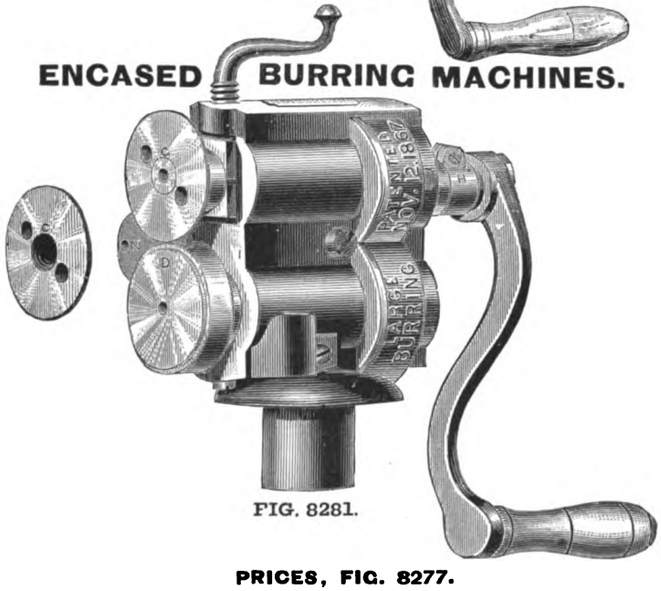


FIG. 8281.

ENCASED BURRING MACHINES.

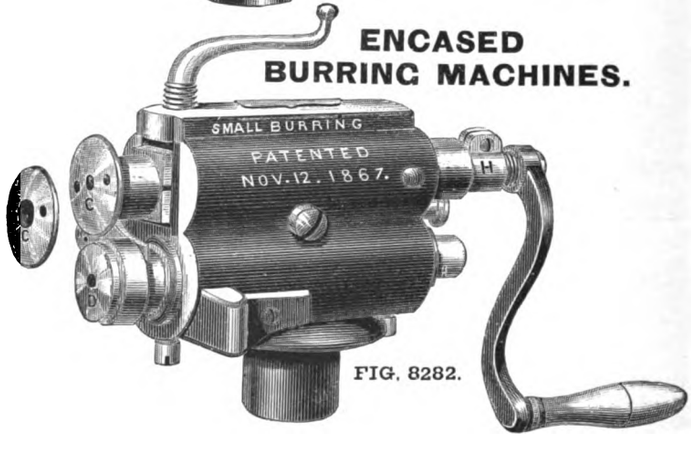


FIG. 8282.

PRICES, FIG. 8277.
WITH ADJUSTABLE BOXES AND EXTRA FACES.

Large turning, with extra upper and lower face, with standard....	$11.50
" " " " " " " " without standard	10.75

PRICES, FIG. 8279.

Encased setting down machine, with standard.....	$9.75
" " " " without standard.....	9.00
Extra heavy setting down machine, for seams $\frac{3}{16}$ inch wide, with standard.....	11.00

The extra setting down machine is the same as the regular one, except the rolls are made so as to admit a wider seam.

PRICES, FIG. 8281.

Encased large burr, with extra upper face, with standard.....	$10.50
" " " " " " " without standard.....	9.75

PRICES, FIG. 8278.
WITH ADJUSTABLE BOXES AND EXTRA FACES.

Small turning, with extra upper and lower face, with standard....	$11.25
" " " " " " " " without standard.	10.50
Extra small turning machine, same size faces as small burr, with standard.....	12.00

PRICES, FIG. 8280.

Encased wiring machine, with standard.....	$14.00
" " " without standard.....	13.25

Extra faces for encased wiring machines are only furnished with the arbor or shaft.

PRICES, FIG. 8282.

Encased small burr, with extra upper face, with standard.....	$10.00
" " " " " " " without standard.....	9.25

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STOVE PIPE CRIMPER AND BEADER.

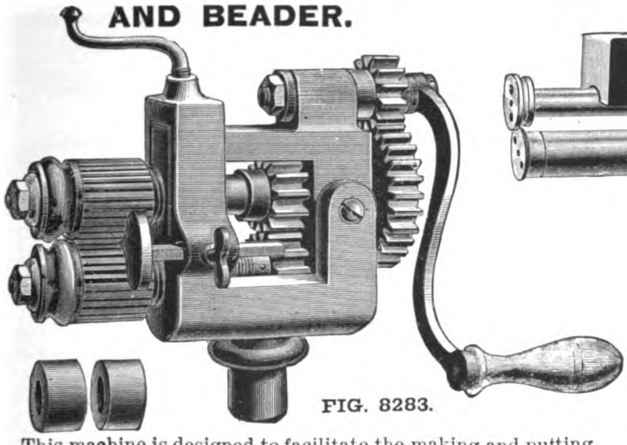


FIG. 8283.

This machine is designed to facilitate the making and putting together of metal pipe of different diameters. It crimps and turns in the edges of stove and conductor pipe, so that the lengths are put together easily. It is also provided with beading rolls, which bead the pipe at the same time it is corrugated. It has steel rolls.

PRICE, WITH STANDARD, $12.00.

CRIMPING MACHINES.

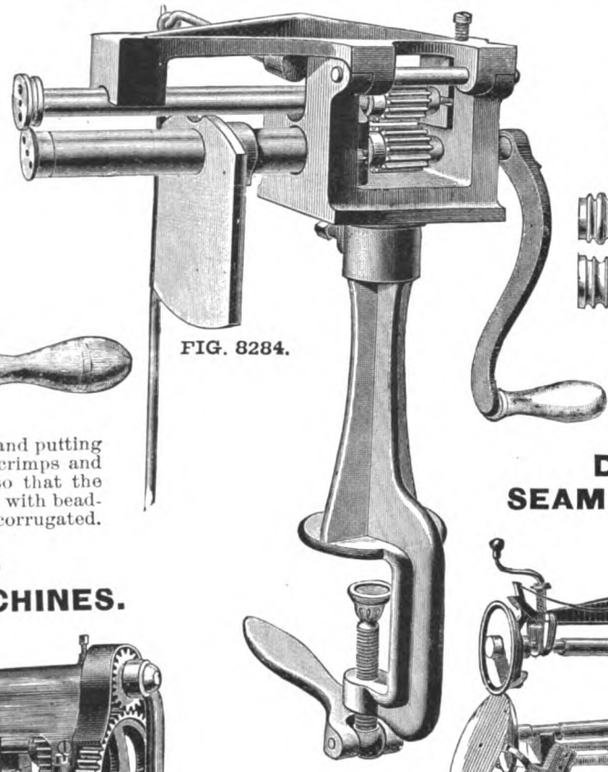


FIG. 8284.

BEADING MACHINES.

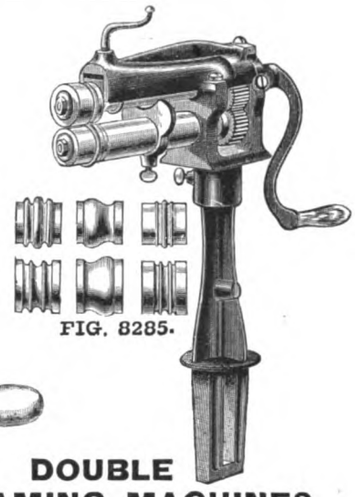


FIG. 8285.

DOUBLE SEAMING MACHINES.

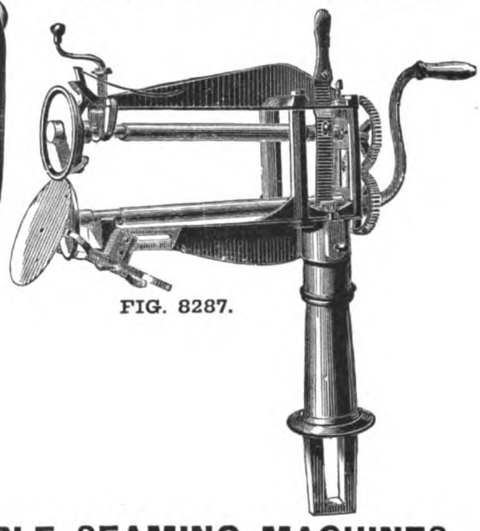
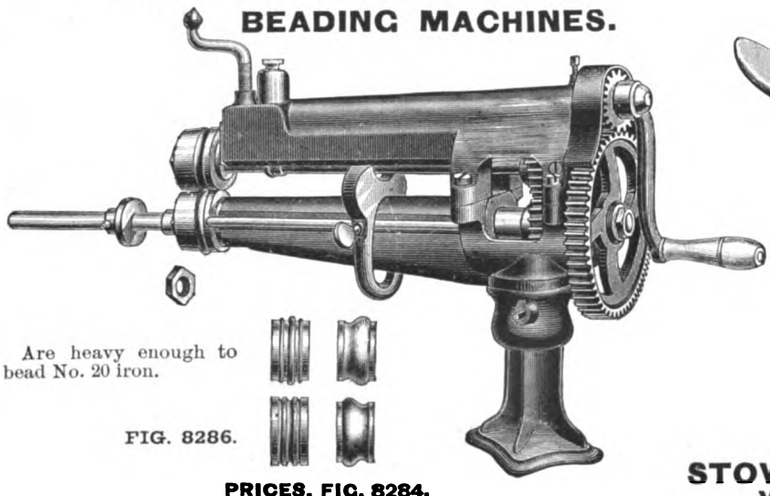


FIG. 8287.

BEADING MACHINES.



Are heavy enough to bead No. 20 iron.

FIG. 8286.

PRICES, FIG. 8284.

No. 1 will put bottoms on all cylinders of a diameter not less than 2½ inches, and in length not exceeding 7½ inches. No. 2 can be used for cylinders of a diameter not less than 1½ inches and not longer than 6 inches.

No. 1. Crimping, for putting tops and bottoms on boxes, cans, cups, etc., with standard $18.00

No. 2. Crimping, for similar purposes, with standard..... 15.00

PRICES, FIG. 8285.

No. 4. Stow's 6 inch, with four pairs rollers and rotary stand.....$19.75
Size of beads as follows: O. G., ¾ inch; triple, ⅝ inch; triple coffee pot, ½ inch; single, $\frac{3}{16}$ inch.

No. 5. Stow's 4 inch, for tin, with five pairs rollers and rotary stand.....$16.75
Size of beads as follows: astral, ⅝ inch; O. G., ⅞ inch; triple coffee pot, $\frac{5}{16}$ inch; triple coffee pot, fine, ⅜ inch; single bead, ⅛ inch.

PRICES, FIG. 8286.

No. 1. 13 inches, with 3 pairs rollers and rotary stand.....$32.25
No. 2. 10 " " 3 " " " " " 31.25
Size of beads for Nos. 1 and 2 are as follows: O. G. bead, 1 inch; triple bead, 1 inch; single bead, ⅜ inch.
No. 3. 7½ inches, with 3 pairs rollers and rotary stand.....$26.25
Size of beads for No. 3 are: O. G. bead, ⅞ inch; triple bead, ⅞ inch; single bead, $\frac{5}{16}$ inch.

PRICES, FIG. 8287.

No. 1. Moore's, for heavy metal, with standard.....$21.00
No. 2. Moore's, for common work, with standard 19.00
No. 3. Moore's, for coffee pots and small work, with standard.. 16.00

PRICES, FIG. 8288.

The setting down attached to this machine will set down any work that can be double seamed on the machine. It is also intended to be used on work that does not require to be double seamed, and to a large extent will take the place of the setting down in the set of machines.

Disks of extra size or shape can be furnished to order to fit the machine.

No. 5. Price $28.00
No. 10. " 24.00
No. 15. " for very heavy work, 20 inches high 50.00

STOW'S DOUBLE SEAMING MACHINES, WITH SETTING DOWN ATTACHMENT.



FIG. 8288.

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BURTON'S DOUBLE SEAMING MACHINE WIRE DISKS.

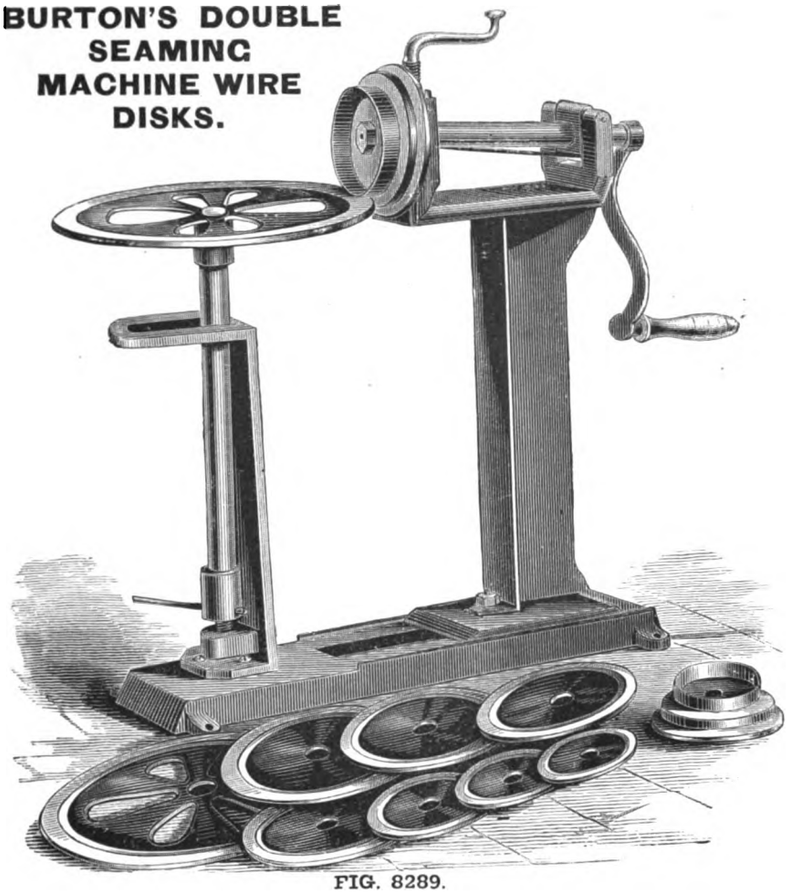


FIG. 8289.

A deflector for stiffening bottoms and full sets of disks for straight or flaring work accompany each machine.

PRICE, COMPLETE, $24.00.

POLISHED CAST IRON BENCH PLATES.

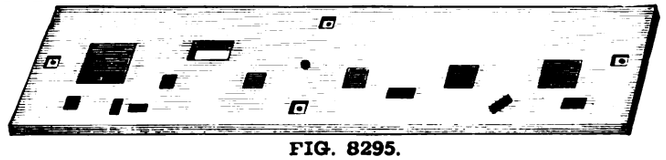


FIG. 8295.

IMPROVED BENCH PLATE, POLISHED SURFACE.

PRICES, EACH, FIG. 8295.

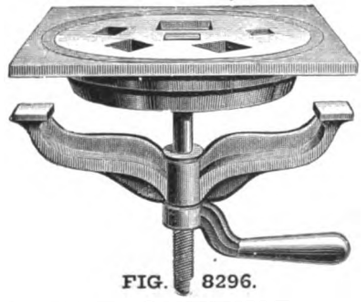


FIG. 8296.

No. 0, 48 x 12 in., weighs 94 lbs..... $9.00
" 1, 37 x 8 " 5.00
" 2, 30 x 8 " 3.00

PRICES, EACH, FIG. 8296.

This new and improved bench plate is so made that it can be readily inserted in any bench of ordinary thickness, and revolves so that different tools may be used in the same position.

No. 3, 9 x 9 inches.....each, $3.50

DOUBLE CUTTING SHEARS.

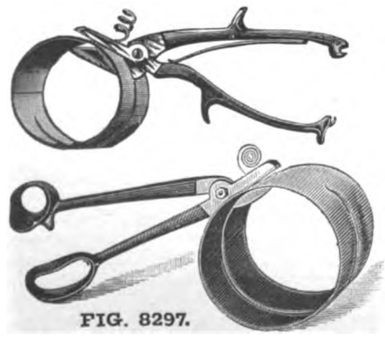


FIG. 8297.

DESCRIPTION, FIG. 8297. FOR CUTTING PIPE IN SETTING UP STOVES AND FURNACES.

These shears are designed especially for cutting any kind of metal cylinders. The method of cutting avoids waste and leaves the edges and corners perfectly smooth. The blade is pointed and is readily inserted in the metal at the point desired to begin the cutting. They are adapted to cutting off bottoms of pails, cans, etc., and are equally well adapted to cutting round or square work, and are indispensable in general repairing.

No. 1, small, for tin.....each, $2.25
" 2, medium, for tin and iron.....each, 3.00

PRICE, FIG. 8299.

Planishing.....per lb., $1.00

TINNERS' SHEARS OR SNIPS.

CIRCULAR HAND.

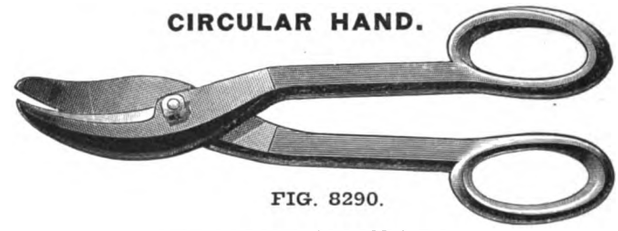


FIG. 8290.

STRAIGHT HANDLES.

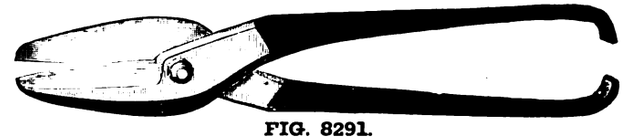


FIG. 8291.

PRICES, EACH.

No. 7.	Fig. 8290.....	$3.50	To cut 4 inches.	Fig. 8291.....	$2.50
" 8.	"	3.00	" 3½ "	"	2.00
" 9.	"	2.50	" 3 "	"	1.50
" 10.	"	2.25	" 2½ "	"	1.40

GERMAN PATTERN, LEFT HAND.



FIG. 8292.

PRICES.

German pattern snips are the same as the others, except the bow handles are larger and heavier.

No. 1, hand, cut 4½ inches.....each, $3.00
" 2, " " 4 " ..... " 2.50
" 3, " " 3½ " ..... " 2.00
" 4, " " 3¼ " ..... " 1.75
" 5, " " 3 " ..... " 1.50
" 6, " " 2½ " ..... " 1.40

BENCH SHEARS.



FIG. 8293.

PRICES, EACH.

No. 00,	bench, cut 12 inches.....	$13.50
" 0,	" " 10½ "	12.00
" 1,	" " 9 "	8.00
" 2,	" " 8⅝ "	7.00
" 3,	" " 8⅜ "	6.00
" 4,	" " 8 "	5.00
" 5,	" " 7 "	4.00
" 6,	" " 6 "	3.50
Elbow bench.....		5.25
" "	extra heavy, cut 6 inches.....	12.00

HAWK'S BILL CIRCULAR SHEARS.



FIG. 8294.

PRICE, EACH, $3.00.

RAISING HAMMERS.

NO. 1. NO. 2. NO. 4.



FIG. 8298.

PRICES, EACH, FIG. 8298.

No. 1, raising hammer..... $2.25 No. 3, raising hammer..... $1.25
" 2, " " ..... 1.75 " 4, " " ..... .75
Handles, per dozen, extra, $1.25.

PLANISHING HAMMERS.



FIG. 8299.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK

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RIVETING HAMMERS.

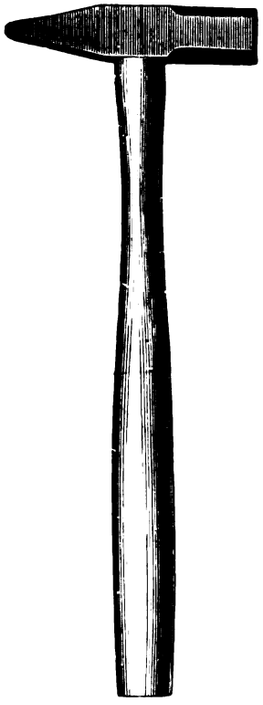


FIG. 8300.

SETTING HAMMERS.

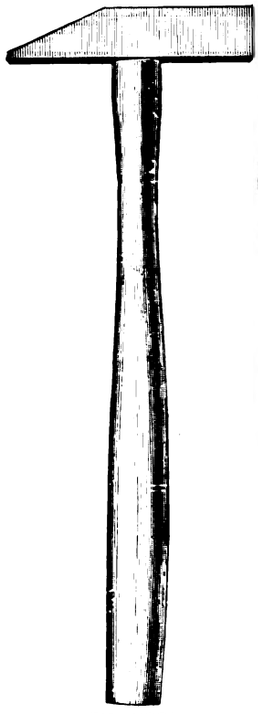


FIG. 8301.

PRICES, HANDLED, FIG. 8300.

No. 0.	Heavy work, bright, 1½ inch, per dozen	.....	$15.50
No. 1.	Sheet iron, " 1⅛ " "	.....	9.75
No. 2.	Tin, etc., " 1 " "	.....	8.31
No. 3.	" " " ⅞ " "	.....	6.75
No. 4.	" " " ¾ " "	.....	5.31
No. 5.	" " " ⅝ " "	.....	4.75

PRICES, FIG. 8301.

No. 1.	Setting, bright, 1⅛ inch, per dozen	.....	$9.75
No. 2.	" " 1 " "	.....	8.31
No. 3.	" " ⅞ " "	.....	6.75
No. 4.	" " ¾ " "	.....	5.31
No. 5.	" " ⅝ " "	.....	4.75

STOW'S UNIVERSAL STAKE HOLDER.

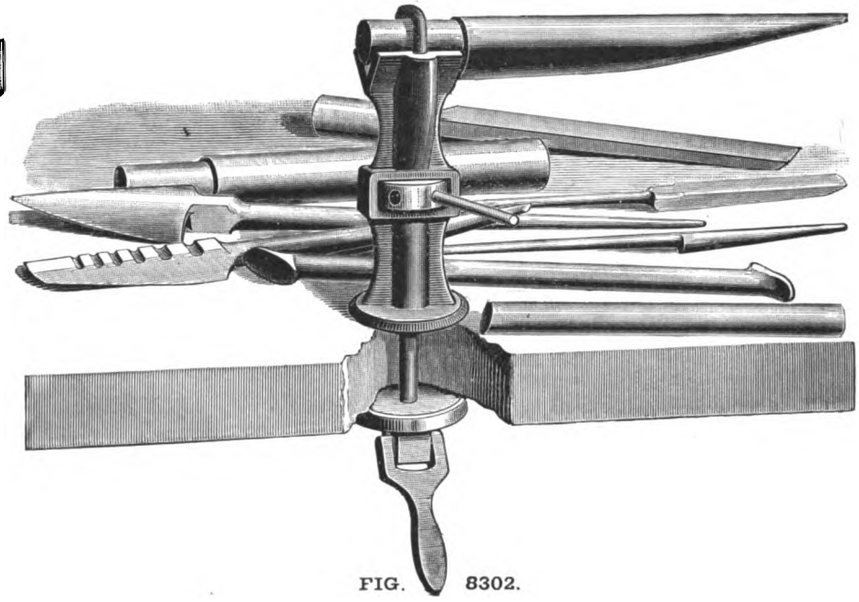


FIG. 8302.

When ordering these stakes other than in full sets, be careful to mention "for use in Stow's Stake Holder," to avoid confusion with our regular stakes. The set is made up as follows:

Stake holder	$5.00	Conductor for stake holder	$5.00
Beakhorn for stake holder	12.00	Candle mould for stake holder	2.25
Blowhorn for stake holder	4.00	Needle case for stake holder	1.75
Creasing and horn for stake holder	4.00	Full set as above, complete, with stake holder	41.00
Double seaming for stake holder	7.00		

TINNERS' STAKES, WROUGHT IRON, STEEL FACES, BEAK HORN STAKES.

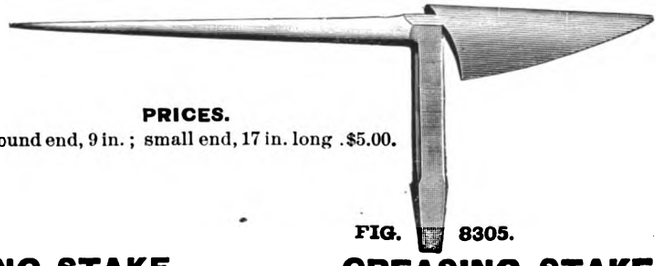


PRICES.

No. 1, 45 lbs	$15.00
No. 2, 40 "	13.25
No. 4, 30 "	10.00

FIG. 8303.

BLOW HORN STAKES.

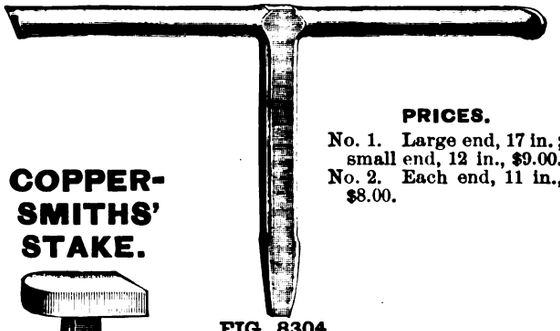


PRICES.

Round end, 9 in.; small end, 17 in. long .$5.00.

FIG. 8305.

DOUBLE SEAMING STAKES.



PRICES.

No. 1. Large end, 17 in.; small end, 12 in., $9.00.
No. 2. Each end, 11 in., $8.00.

FIG. 8304.

COPPER-SMITHS' STAKE.

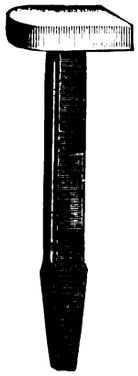


FIG. 8306.

Square, 2⅝ x 4½.

PRICE, $3.50.

BEVEL EDGE SQUARE STAKES.

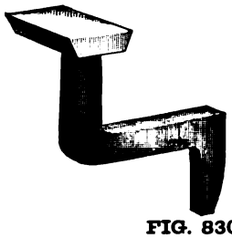


FIG. 8307.

No. 1. Face, 3 x 5 inches, $6.00
No. 2. " 2½ x 4½ " 5.00

CREASING STAKE, WITH HORN.

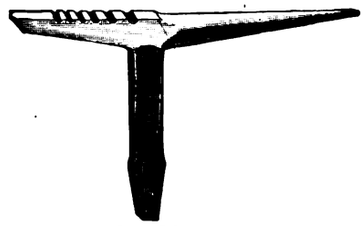


FIG. 8308.

Round end, 9½ inches.
Flat " 6½ "

PRICE, $4.50.

CREASING STAKE.

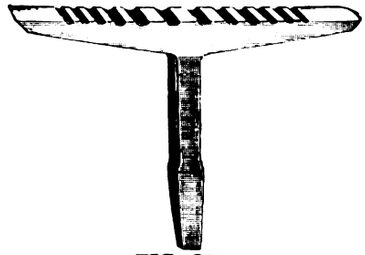


FIG. 8309.

Top, 14½ inches long.

PRICE, $4.00.

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TINSMITHS' TOOLS AND MACHINES.

STAKES, WROUGHT IRON, WITH STEEL FACES.

SQUARE.

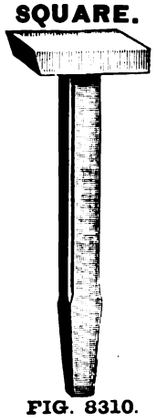


FIG. 8310.

CANDLE MOULD STAKE.

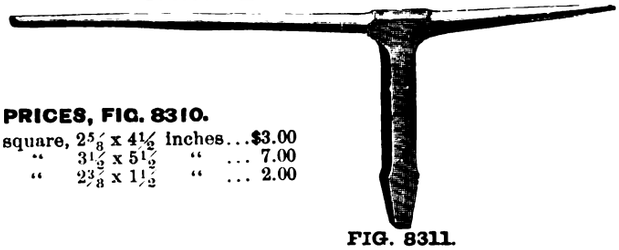


FIG. 8311.

PRICES, FIG. 8310.

Common square,	$2\frac{5}{8}$ x $4\frac{1}{2}$	inches	$3.00
Large "	$3\frac{1}{2}$ x $5\frac{1}{2}$	"	7.00
Small "	$2\frac{3}{8}$ x $1\frac{1}{2}$	"	2.00

PRICE.

Small end, 18 inches; horn, $8\frac{1}{2}$ inches.....$2.75

NEEDLECASE STAKE.

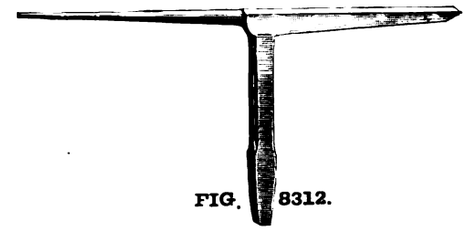


FIG. 8312.

PRICE.

Flat end, 8 inches; small end, $10\frac{1}{2}$ inches.....$2.75

BOTTOM STAKE.



HATCHET STAKES.



FIG. 8313.

PRICES, FIG. 8313.

No. 1.	Blade, 16	in. long	$5.00
No. 2.	" $14\frac{1}{2}$	"	4.25
No. 3.	" 13	"	3.50
No. 4.	" 11	"	2.75
No. 5.	" 9	"	2.25
No. 6.	" 7	"	1.75

PRICES, FIG. 8314.

No. 1.	Bottom width, $1\frac{3}{4}$	in.,	$1.00
No. 2.	"	$1\frac{1}{2}$ in.,	.80
No. 3.	"	$1\frac{1}{4}$ in.,	.75
No. 4.	"	1 in.,	.50

FIG. 8314.

ROUND HEAD STAKE.



FIG. 8316. PRICE, $1.25.

MANDREL STAKES, CAST IRON, POLISHED FACES.



FIG. 8315.

PRICES, EACH.

No. 00.	Mandrel, 5 feet long to the standard	$10.00
No. 0.	Mandrel, 3 feet 4 inches long to the standard	6.00
No. 1.	Mandrel, 2 feet 10 inches long to the standard	5.00
No. 2.	Mandrel, 2 feet 6 inches long to the standard	4.00
No. 3.	Mandrel, 2 feet 3 inches long to the standard	3.00

CONDUCTOR STAKES. C. I. P. FACES.

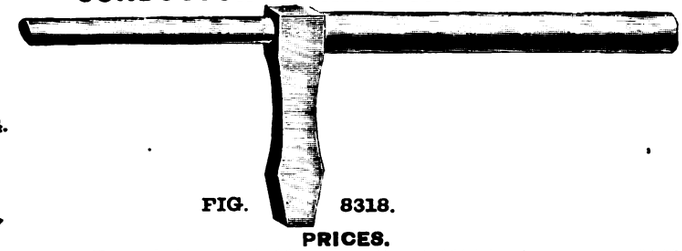


FIG. 8318.

PRICES.

No. 1.	Turned; large end, 15 in.; small end, $11\frac{1}{2}$	in. long	$4.00
No. 2.	" " " 14 in.; " " 10	in. "	3.00
Same, wrought iron, steel faces each end,		14 in. "	6.00

HOLLOW MANDREL STAKE, WROUGHT AND CAST IRON.

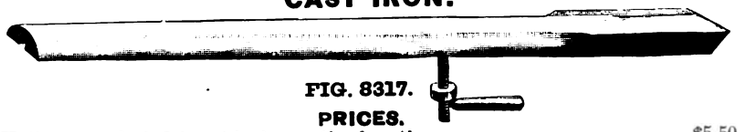


FIG. 8317.

PRICES.

Hollow mandrel, 3 feet 4 inches entire length.. .....$5.50
Extra hollow mandrel, 4 feet entire length; round part, $11\frac{3}{4}$ inches diameter; flat part, 15 inches wide; weight, 300 lbs.....25.00

WROUGHT AND CAST IRON DOUBLE SEAMING STAKE, WITH 4 HEADS.

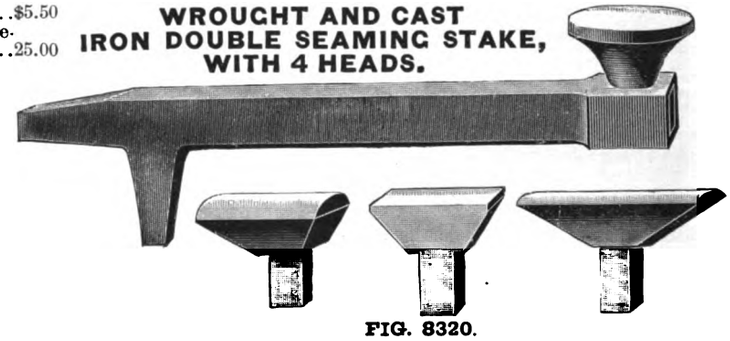
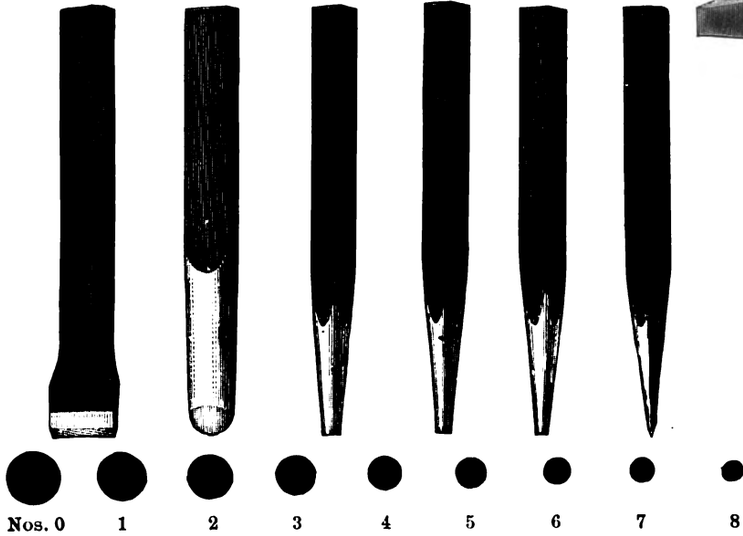


FIG. 8320.

PRICE, EACH, $9.00.

SOLID PUNCHES.



Nos. 0 1 2 3 4 5 6 7 8

FIG. 8319.

Nos. 1 to 8 indicate exact size at ends.

PRICES, SOLID PUNCHES.

Set solid punches—4 punches, 2 chisels..	per set,	$0.72
Square, cast steel, Nos. 0, 1, 2, 3, 4, 5, 6, 7, 8, and prick	each,	12
Solid punches, assorted	per dozen,	1.44

HOLLOW PUNCHES. WROUGHT SHANKS.

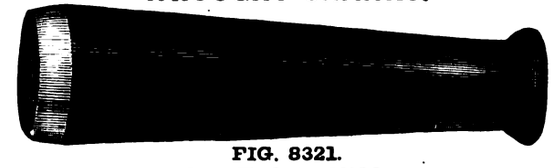


FIG. 8321.

CAST SHANKS.

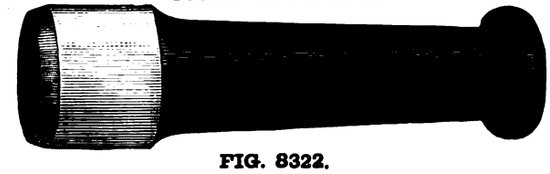


FIG. 8322.

PRICES, FIGS. 8321 AND 8322.

All sizes to and including $1\frac{3}{4}$ inch diameter, round, per inch	$1.00
All sizes above $1\frac{3}{4}$ inch diameter, wrought shank	1.25
All sizes above $1\frac{3}{4}$ inch diameter, cast shank	1.00
Oval, per inch	1.50

SPECIAL HOLLOW PUNCHES.

We make all sizes, shapes and kinds for cutting sheet metal, straw board, paper, etc. Prices for same will be given on receipt of a sample to be cut.

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TINSMITHS' TOOLS AND MACHINES.

SOLID CAST STEEL CHISELS, RIVET SETS, ETC.

PRICES, FIG. 8323.

Wire	¼	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	1¾	2 inches.
Each	8	9	10	11	12	13	14	15	17	19	20	24	29 cents.

Circular chisels.....per inch, $0.25

PRICES, FIG. 8324. POLISHED AND BLUED.

Full size of holes.

Nos.	00	0	1	2	3	4	5	6	7	8
For iron rivets	14	10 and 12	8	6	4 and 5	2½ and 3	1¾ and 2	1½	1¼ lbs.	10 & 12 oz.
For copper rivets, Nos.		5	6	7	8	9	10 and 11	12	13	14

Nos.	00 and 0	1 and 2	3 and 4	5 and 6	7 and 8
Each	$0.75	$0.63	$0.50	$0.37	$0.32

WIRE CHISEL.



FIG. 8323.

LANTERN CHISEL.



FIG. 8325. PRICE, 12c.

RIVET SET AND HEADER.



FIG. 8324.

HAND CROOVER.



FIG. 8326.

PRICES, FIG. 8326.

Nos.	00 and 0	1 and 2	3 and 4	5 and 6	7 and 8
Each,	$0.75	$0.63	$0.50	$0.37	$0.25

COMMON ROOFING TONGS.

CLAMP ROOFING TONGS.

REESE'S ROOFING TONGS.

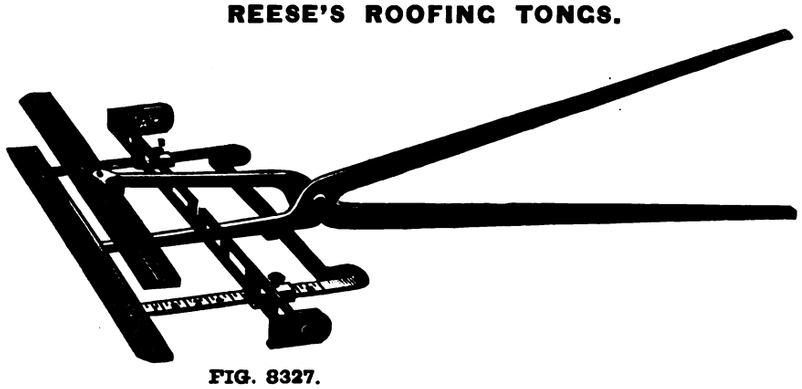


FIG. 8327.



FIG. 8328.



FIG. 8329.

WITH ADJUSTABLE AND REMOVABLE GAUGE.

These tongs will turn any edge from ½ to 10 inches by simply adjusting the thumb screw and sliding the gauge to the desired position. They are adapted to edging and bending all kinds of ordinary sheet metal. They are simple in construction, strong, light and durable. Can be used on No. 22 iron. **PRICE, $6.00.**

PRICES, FIGS. 8328 TO 8330.

The clamp tongs are used on the roof for drawing together the two layers of tin before cleating it.

The improved roofing tongs are so made that a single pair may be easily adjusted to turn five different widths of locks, viz., from ½ to 1½ inches.

Improved roofing tongs, steel.....per pair, $4.00
Common roofing tongs, steel, sizes, ½, ¾, 1, 1¼, 1½, 1¾ inches.....per set of 2 pairs, 6.00
Clamp roofing tongs.....per pair, 2.25

IMPROVED ROOFING TONGS.

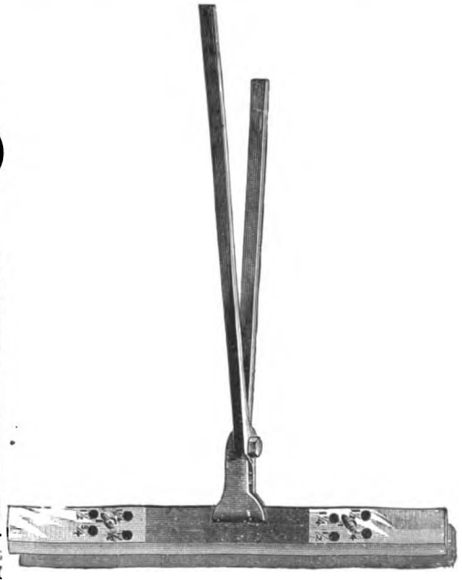


FIG. 8330.

ROLLED FORCED STEEL BALLS.

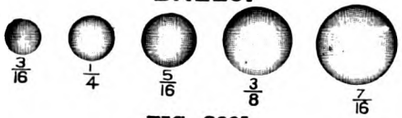


FIG. 8331.

Diameter.	Tool steel, tempered.	Diameter.	Tool steel tempered.
3/16 inch.	$..... Bicycle sizes.	7/8 inch.	$.....
1/4 "	.....	15/16 "	.....
5/16 "	.....	1 "	.....
3/8 "	.....	1 1/8 "	.....
7/16 "	.....	1 1/4 "	.....
1/2 "	.....	1 3/8 "	.....
9/16 "	.....	1 1/2 "	.....
5/8 "	.....	1 5/8 "	.....
11/16 "	.....	1 3/4 "	.....
3/4 "	.....	1 7/8 "	.....
13/16 "	.....	2 "	.....

These balls are practically perfect spheres.

For price list of rough ground balls, not burnished, varying not to exceed 1-100 of an inch, 20 per cent. less.

MACHINE HANDLE FORGINGS.

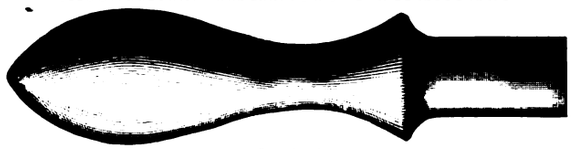


FIG. 8332.

No. 00	No. 0	No. 1	No. 2
Length, 2 in.	Length, 2½ in.	Length, 3 in.	Length, 3½ in.
Price, 5c. each.	Price, 5½c. ea.	Price, 6c. ea.	Price, 8c. ea.

We make these handles perfectly round, and very smooth. They are easily finished by file and emery and do not require any turning.

Being made of steel, they have no sand seams nor imperfections so often seen in the usual turned handle.

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LETTER PRESSES AND TABLE.

SCREW LETTER PRESSES.

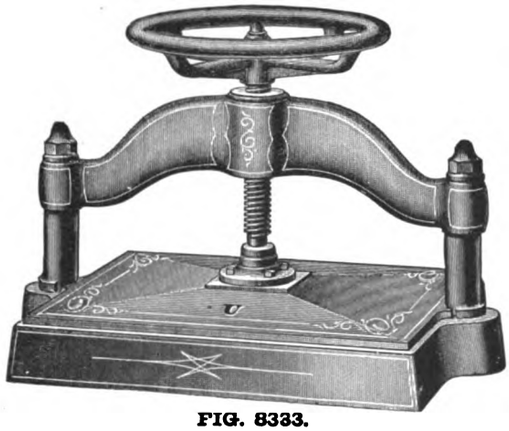


FIG. 8333.

PRICES, FIG. 8333.

In plain black.

No. 1. Size of follower, 15 x 20 in. $19.00
No. 2. Size of follower, 16 x 20 in. 20.00
No. 3. Size of follower, 18 x 22 in. 24.00

In black and bronze.

No. 1 ..... $20.00
No. 2 ..... 21.00
No. 3 ..... 25.00

In black, carmine and bronze, with polished brass or nickel-plated pillars and nuts.

No. 1 ..... $31.50
No. 2 ..... 32.50
No. 3 ..... 36.50

BRICK TROWELS.

LONDON PATTERN, SINGLE FERRULE.

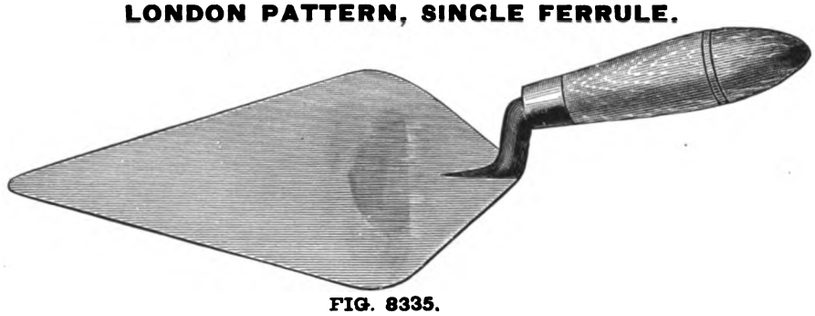


FIG. 8335.

PRICES.

7½ in., per doz.,	$7.50	10 in., per doz.,	$10.00	12½ in., per doz.,	$12.75
8 " "	8.00	10½ " "	10.50	13 " "	13.50
8½ " "	8.50	11 " "	11.00	13½ " "	14.25
9 " "	9.00	11½ " "	11.50	14 " "	15.00
9½ " "	9.50	12 " "	12.00		

Double ferrule, London, $1.00 per dozen advance on list of single ferrule.

BRICKLAYERS' POINTING TROWELS.

PRICE, $6.00 PER DOZEN.

The above in half-dozen boxes.

RICHARDSONS' PLASTERING TROWELS.

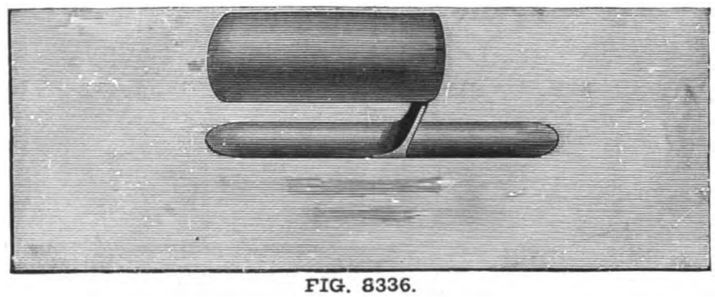


FIG. 8336.

This handle is fastened on feathered or flanged shank, and will not come loose.

PRICES.

No. 1 extra. Richardsons' plastering trowels.

10½ in., per dozen	$13.75	11½ in., per dozen	$16.75
11 " "	15.25	12 " "	18.25

POINTING TROWEL, SOLID SHANK.

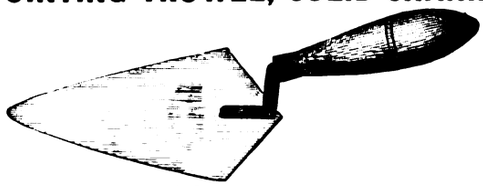


FIG. 8337.

PRICES.

4 in., per dozen,	$4.25	5 in., per dozen,	$4.75	6 in., per dozen,	$5.25
4½ " "	4.50	5½ " "	5.00		

COPY PRESS STAND.



FIG. 8334.

Hard oil finish, finely polished.

Inside measurement of drawers, 12½ x 19 x 2¼ in.

No. 4. Walnut or cherry, price $12.50
No. 4½. Oak, price 11.25

On orders for No. 4, walnut will be sent unless cherry is specified.

BOSTON PATTERN.

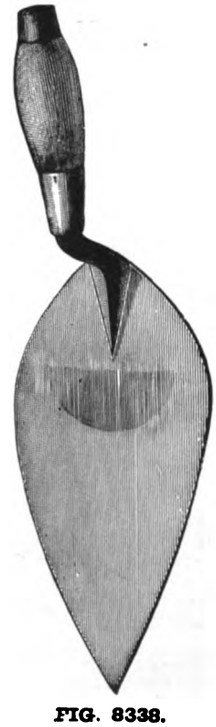


FIG. 8338.

PRICES.

6 in., per doz.,	$5.50	8½ in., per doz.,	$8.00
6½ " "	6.00	9 " "	8.50
7 " "	6.50	9½ " "	9.00
7½ " "	7.00	10 " "	9.50
8 " "	7.50	10½ " "	10.00

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ANCHORS, CALKING TOOLS, ETC.

ANCHORS.

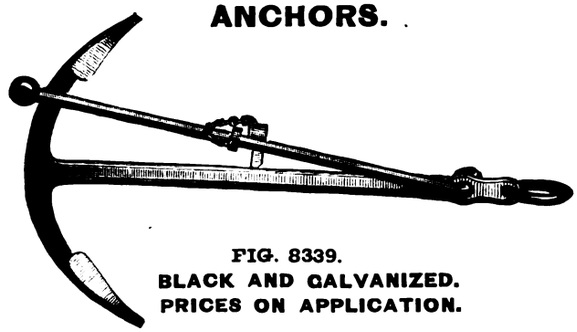


FIG. 8339.
BLACK AND GALVANIZED.
PRICES ON APPLICATION.

CALKING IRONS.



FIG. 8340.

PRICES.

No. of crease	0	1	2	3
Prices, per dozen	$4.50	$4.65	$4.75	$4.85

BENT OR SINGLE CROOK. SHARP. REEFING OR CLEARING. SPIKE. DOUBLE CROOK. DUMB OR DECK.



FIG. 8343.
PRICES, PER DOZEN, $5.50.

CAST IRON CLEATS.

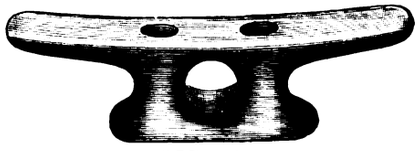


FIG. 8345.
PRICES.

Sizes, inches long	5	7	8½
Price, 9 cents per pound. Galvanized, 12 cents per pound.			
Sizes, inches long	10½ 13 15 18 24 28 32 36 40		
Price, 6 cents per pound. Galvanized, 9 cents per pound.			

PRICES, FIG. 8348.

Outside diameter. Inches.	Light. Per dozen.	Heavy. Per dozen.	Navy pattern. Extra heavy. Per dozen.	Lip or saddle. Per dozen.
¾	$0.25	....	....	....
⅞	.30	....	....	....
1	.35	....	....	....
1⅛	.38	....	....	....
1¼	.40	....	....	....
1⅜	.40	....	....	....
1½	.45	....	....	....
1¾	.50	....	....	....
2	.60	$0.70	$1.15	....
2¼	.70	.85	1.35	$1.35
2½	.80	1.25	1.80	1.60
2¾	.95	1.60	2.00	1.80
3	1.10	1.70	2.35	2.25
3¼	1.35	1.90	2.70	2.70
3½	1.70	2.15	3.00	3.50
3¾	2.12	2.80	3.60	....
4	....	3.25	4.00	4.00
4¼	....	3.60	4.50	....
4½	....	4.30	5.65	....
4¾	....	5.40	6.10	....
5	....	6.30	6.55	....

CLINCH RINGS.

NO. 1. STRAIGHT HOLE.



FIG. 8341.

⅜ inch hole	per lb. $0.50		
⅞ inch hole	" .40		
½ inch hole	" .35		

NO. 2. COUNTERSUNK HOLE.

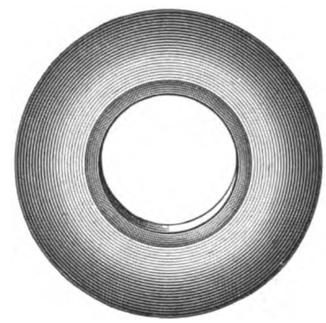


FIG. 8342.

⅜ inch hole	per lb. $0.25		
⅝ inch hole	" .25		

11/16 ¾ 13/16 ⅞ 15/16 1 1 1/16 1⅛ 1 3/16 1¼ 1⅜ 1½ inch hole.
Price, 17 cents per pound. Galvanized, 4 cents per pound extra.

CALKING MALLETS.

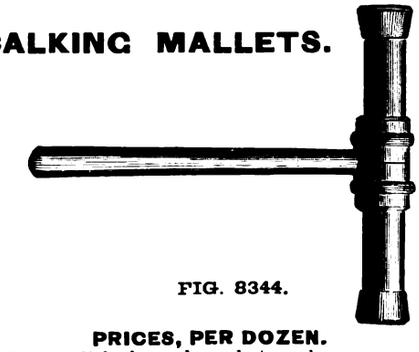


FIG. 8344.

PRICES, PER DOZEN.

No. 0. Steel rings, polished wood, made to order	$32.00
No. 1. Steel rings, polished wood, made to order	25.00
No. 2. Steel rings, varnished wood, regular	24.00
No. 3. Steel rings, varnished wood, second quality	21.00
No. 4. Iron rings, polished wood, extra	24.00
No. 5. Iron rings, polished wood	22.50
No. 6. Iron rings, varnished wood, regular	20.00
No. 7. Iron rings, varnished wood, second quality	18.00
No. 8. Iron rings, polished wood, white oak	15.00

CAST IRON CHOCKS.

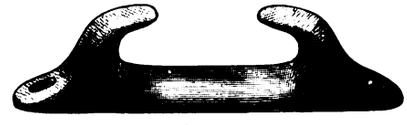


FIG. 8346.

Sizes, inches long	4	4¼	5	5½	6	6½	7¼	8½
Price, 9 cents per pound. Galvanized, 12 cents per pound.								
Sizes, inches long	10½	11½	13	14	15	18	20	24	30
Price, 6 cents per pound. Galvanized, 9 cents per pound.									

BRASS THIMBLES.

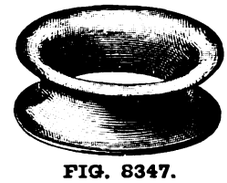


FIG. 8347.

Outside diameter, inches	¾	1	1¼	1½	1¾	2
Price, per dozen	$0.65	$0.70	$0.75	$1.00	$1.25	$1.50

2¼ to 5 inches inclusive, 70 cents per pound.

GALVANIZED IRON THIMBLES.



FIG. 8348.
PRICES TO THE LEFT.

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STANDARD HOIST HOOKS, CORDAGE AND WIRE ROPE.

STRAIGHT SHANK.



FIG. 8349.

EYE SHANK.

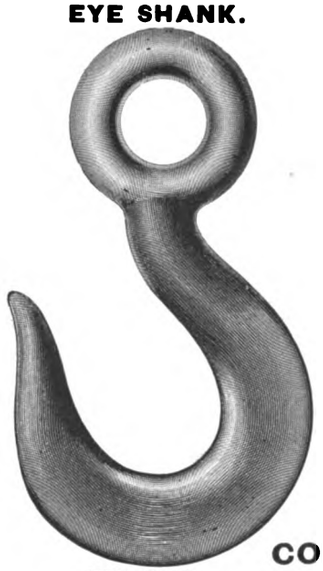


FIG. 8350.

DROP FORGED FORM BAR STEEL.

PRICES, FIG. 8349.

No.	Diameter and length of shank.	Length and width over all.	Guaranteed capacity.	Prices per 100.
000	3/8 x 1 1/4 inch.	4 x 2 1/8 inch.	500 lbs.	$17.00
00	1/2 x 1 1/2 "	5 x 2 3/4 "	750 "	20.00
0	5/8 x 1 1/2 "	6 x 3 1/4 "	1,000 "	25.00
1	3/4 x 1 5/8 "	6 5/8 x 3 3/4 "	1,500 "	30.00
2	7/8 x 2 3/8 "	7 1/2 x 4 "	2,000 "	37.00
3	1 x 3 "	8 7/8 x 4 3/4 "	3,000 "	50.00
4	1 1/8 x 3 "	9 1/2 x 5 1/2 "	4,000 "	75.00
6	1 1/4 x 3 1/2 "	10 3/4 x 6 "	6,000 "	125.00
8	1 3/8 x 4 "	12 x 7 "	8,000 "	200.00
10	1 1/2 x 4 1/2 "	13 1/2 x 7 3/4 "	10,000 "	300.00

PRICES, FIG. 8350.

No.	Diameter of hole in eye.	Length and width over all.	Guaranteed capacity.	Prices per 100.
000	3/8 inch.	3 5/8 x 2 1/8 inch.	500 lbs.	$25.00
00	5/8 "	4 5/8 x 2 7/8 "	750 "	30.00
0	3/4 "	5 3/8 x 3 3/8 "	1,000 "	35.00
1	1 "	6 1/2 x 3 5/8 "	1,500 "	40.00

BASE.

Manilla rope	c.	lb. basis.
Sisal rope	c.	" "
Tarred sisal lath yarn	c.	" "
American and Russian hemp tarred rope, ratline, etc	c.	" "
Tarred hemp spun yarn	c.	" "
Marline, houseline, hambroline and rounding	c.	" "

CORDAGE.

ROPE.

1 1/4 in. cir. or 7/16 in. dia. and up.		basis.
12-thd. or 3/8 in. diam.	c.	above "
6-thd. and 9-thd. or 1/4 and 5/16 in. dia.	c.	" "
Fine 6-thd. or 3/16 in. dia.	c.	" "
Patent stretched tarred	c.	below "
Oil-well ropes and drilling cables	c.	above "
Artesian well ropes	c.	" "

DIFFERENCES.

Transmission rope, selected stock	c.	above basis.
4-str. ropes, 2 in. cir. or 5/8 in. dia. and smaller	c.	" "
Tallow-laid rope	c.	" "
All rope unoiled	c.	extra.

LATH YARN.

Fine, tarred, single,	c.	above med. & coarse.
Ex. fine " "	c.	" " "

CALVANIZED IRON WIRE ROPE.

FOR SHIPS' RIGGING AND GUYS FOR DERRICKS.

CHARCOAL ROPE.

Circumference in inches.	Price per pound—7 wires per strand.	Price per pound—12 wires per strand.	Weight per fathom in pounds.	Cir. of new manilla rope of equal strength.	Breaking strain in tons of 2,000 lbs.
5 1/8	11 1/2	12	26 1/2	11	43
5 1/4	11 1/2	12	24 1/2	10 1/2	40
5	11 1/2	12 1/2	22	10	35
4 3/4	11 1/2	12 1/2	21	9 1/2	33
4 1/2	11 1/2	12 1/2	19	9	30
4 1/4	11 1/2	12 1/2	16 1/2	8 1/2	26
4	11 1/2	12 1/2	14 1/4	8	23
3 3/4	11 1/2	12 1/2	12 3/4	7 1/2	20
3 1/2	11 3/4	13	10 3/4	6 1/2	16
3 1/4	12	13	9 1/2	6	14
3	12	13	8	5 3/4	12
2 3/4	12	.....	6 3/4	5 1/4	10
2 1/2	12 1/2	.....	5 1/2	5	9
2 1/4	13	.....	4 1/2	4 3/4	8
2	14	.....	3 1/2	4 1/2	7
1 3/4	15 1/4	.....	2 1/2	3 3/4	5
1 1/2	17	.....	2	3	3 1/2
1 1/4	18 1/2	.....	1 3/4	2 1/2	2 1/2
1 1/8	19	.....	1 1/4	2 1/2	2 1/4
1	19 1/2	.....	7/8	2 1/4	2
7/8	25	.....	3/4	1 3/4	1
3/4	31	.....	1/2	1 1/2	3/4
5/8	38	.....	3/8	1 1/4	3/8
1/2	48	.....	1/4	1 1/8	3/8

COTTON ROPE FOR POWER TRANSMISSION.

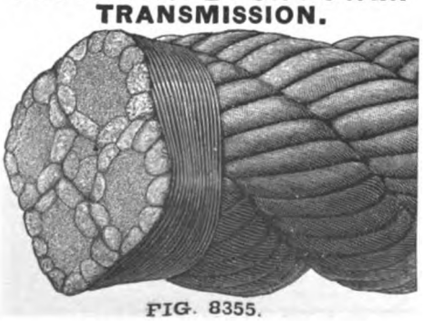


FIG. 8355.

PRICES ON APPLICATION.

WIRE ROPE.

STANDARD HOISTING ROPE.

WITH 19 WIRES TO THE STRAND.

IRON.

Trade number.	Price per foot in cents.	Diameter.	Circumference in inches.	Weight per foot in pounds of rope with hemp cen.	Breaking strain in tons of 2,000 lbs.	Proper working load in tons of 2,000 lbs.	Circumference of new manilla rope of equal strength.	Min. size of drum or sheave in feet.
1	122	2 1/4	6 3/4	8.00	74	15	14	13
2	96	2	6	6.30	65	13	13	12
3	84	1 3/4	5 1/2	5.25	54	11	12	10
4	68	1 5/8	5	4.10	44	9	11	8 1/2
5	62	1 1/2	4 3/4	3.65	39	8	10	7 1/2
5 1/2	52	1 3/8	4 3/8	3.00	33	6 1/2	9 1/2	7
6	44	1 1/4	4	2.50	27	5 1/2	8 1/2	6 1/2
7	36	1 1/8	3 1/2	2.00	20	4	7 1/2	6
8	29	1	3 1/8	1.58	16	3	6 1/2	5 1/4
9	23	7/8	2 3/4	1.20	11.50	2 1/2	5 1/2	4 1/2
10	18	3/4	2 1/4	0.88	8.64	1 3/4	4 3/4	4
10 1/4	15	5/8	2	0.60	5.13	1 1/4	3 3/4	3 1/2
10 1/2	12 1/2	9/16	1 5/8	0.44	4.27	3/4	3 1/2	2 3/4
10 3/4	10	1/2	1 1/2	0.35	3.48	1/2	3	2 1/4
10a	9 1/2	7/16	1 3/8	0.29	3.00	3/8	2 3/4	2
10 7/8	9	3/8	1 1/4	0.26	2.50	1/4	2 1/2	1 1/2

Tiller rope, 3/4-in. diam., 26c. per foot; 5/8-in. diam., 20c. per foot; 1/2-in. diam., 15c. per foot; 3/8-in. diam., 11c. per foot.

CAST STEEL.

1	152	2 1/4	6 3/4	8.00	155	31	....	8 1/2
2	120	2	6	6.30	125	25	....	8
3	100	1 3/4	5 1/2	5.25	106	21	....	7 1/4
4	80	1 5/8	5	4.10	86	17	15	6 1/4
5	71	1 1/2	4 3/4	3.65	77	15	14	5 3/4
5 1/2	60	1 3/8	4 3/8	3.00	63	12	13	5 1/2
6	50	1 1/4	4	2.50	52	10	12	5
7	41	1 1/8	3 1/2	2.00	42	8	11	4 1/2
8	34	1	3 1/8	1.58	33	6	9 1/2	4
9	27	7/8	2 3/4	1.20	25	5	8 1/2	3 1/2
10	21	3/4	2 1/4	0.88	18	3 1/2	7	3
10 1/4	17	5/8	2	0.60	12	2 1/2	5 3/4	2 1/4
10 1/2	15	9/16	1 5/8	0.44	9	1 1/2	5	1 3/4
10 3/4	13	1/2	1 1/2	0.35	7	1	4 1/2	1 1/2
10a	12 1/2	7/16	1 3/8	0.29	5 1/2	3/4	3 3/4	1 1/4
10 7/8	12	3/8	1 1/4	0.26	4 1/2	1/2	3 1/2	1

Bessemer and Siemens-Martin steel ropes at same prices as iron ropes.

Note.—When made with wire center, the price per foot is 10 per cent. extra.

TRANSMISSION AND STANDING ROPE.

WITH 7 WIRES TO THE STRAND.

IRON.

Trade number.	Price per foot in cents.	Diameter.	Circumference in inches.	Weight per foot in pounds of rope with hemp cen.	Breaking strain in tons of 2,000 lbs.	Proper working load in tons of 2,000 lbs.	Circumference of new manilla rope of equal strength.	Min. size of drum or sheave in feet.
11	57	1 1/2	4 5/8	3.37	36	9	10	13
12	48	1 3/8	4 1/4	2.77	30	7 1/2	9	12
13	41	1 1/4	3 3/4	2.28	25	6 1/4	8 1/2	10 3/4
14	33	1 1/8	3 3/8	1.82	20	5	7 1/2	9 1/2
15	27	1	3	1.50	16	4	6 1/2	8 1/2
16	21	7/8	2 5/8	1.12	12.3	3	5 3/4	7 1/2
17	16	3/4	2 3/8	0.88	8.8	2 1/4	4 3/4	6 3/4
18	14	11/16	2 1/8	0.70	7.6	2	4 1/2	6
19	12	5/8	1 7/8	0.57	5.8	1 1/2	4	5 1/4
20	9	9/16	1 5/8	0.41	4.1	1	3 1/4	4 1/2
21	7 1/2	1/2	1 3/8	0.31	2.83	3/4	2 3/4	4
22	6 1/2	7/16	1 1/4	0.23	2.13	1/2	2 1/2	3 1/4
23	5 1/2	3/8	1 1/8	0.19	1.65	....	2 1/4	2 3/4
24	4 1/2	5/16	1	0.16	1.38	....	2	2 1/2
25	3 1/2	9/32	7/8	0.125	1.03	....	1 3/4	2 1/4

CAST STEEL.

11	70	1 1/2	4 5/8	3.37	62	13	13	8 1/2
12	60	1 3/8	4 1/4	2.77	52	10	12	8
13	50	1 1/4	3 3/4	2.28	44	9	11	7 1/4
14	40	1 1/8	3 3/8	1.82	36	7 1/2	10	6 1/4
15	32	1	3	1.50	30	6	9	5 3/4
16	25	7/8	2 5/8	1.12	22	4 1/2	8	5
17	19	3/4	2 3/8	0.88	17	3 1/2	7	4 1/2
18	16	11/16	2 1/8	0.70	14	3	6	4
19	14	5/8	1 7/8	0.57	11	2 1/4	5 1/2	3 1/2
20	11	9/16	1 5/8	0.41	8	1 3/4	4 3/4	3
21	9	1/2	1 3/8	0.31	6	1 1/2	4	2 1/2
22	7 1/2	7/16	1 1/4	0.23	4 1/2	1 1/4	3 1/2	2 1/4
23	6	3/8	1 1/8	0.19	4	1	3 1/4	2
24	5	5/16	1	0.16	3	3/4	2 3/4	1 3/4
25	4	9/32	7/8	0.125	2	1/2	2 1/4	1 1/2

Bessemer and Siemens-Martin steel ropes at same prices as iron ropes.

Note.—When made with wire center, the price per foot is 10 per cent. extra.

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WIRE ROPE FIXTURES.

OPEN THIMBLES.



FIG. 8358.

PRICES, FIG. 8358.

Outside diameter, from edge to edge, ¾, ⅞, 1, 1¼ inches.

PRICES, PER DOZ.

Japanned.....$0.24 Galvanized.....$0.28

Outside diameter, from edge to edge, 1⅜, 1½, 1¾, 2, 2¼, 2½, 2¾, 3, 3¼, 3½, 3¾, 4, 4½, 5, 5½, 6 inches.

PRICES, PER LB.

Japanned.....$0.17 Galvanized.....$0.21

HEAVY GALVANIZED OVAL THIMBLES.

Width of score.	Circumference of rope.	Prices, each.
⅛ in.	¾ in.	$0.10
⅜ "	1 "	.10
½ "	1½ "	.12
⅝ "	2 "	.14
¾ "	2½ "	.15
⅞ "	2¾ "	.16
1 "	3 "	.19
1⅛ "	3½ "	.22
1¼ "	3¾ "	.28
1⅜ "	4 "	.33
1½ "	4½ "	.38
1⅝ "	5 "	.45

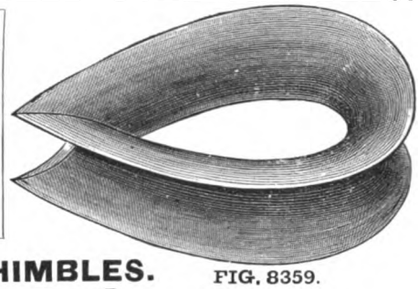


FIG. 8359.

WROUGHT IRON TACKLE HOOKS AND THIMBLES.

For size, measure diameter of iron in the middle of bend.

Sizes.....inch, ¼ 5/16 ⅜ 7/16 ½ 9/16

PRICES, PER DOZEN.

Japanned.....$1.50 Galvanized.....$1.75

Sizes.....inch, ⅝ ¾ ⅞ 1 1⅛ 1¼ 1⅜ 1½ 1⅝ 1¾ 2 2¼ 2½

PRICES, PER LB.

Japanned.....15 cents. Galvanized.....19 cents.

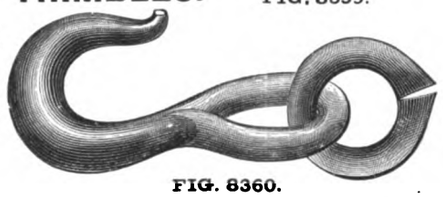


FIG. 8360.

WIRE ROPE FASTENINGS.

MADE FROM BEST CHARCOAL IRON.

CLOSED SOCKETS.



FIG. 8362.

For steel rope.			Iron or Bess.		For steel rope.			Iron or Bess.	
Dia.	Loose	Fast'd	Loose	Fast'd	Dia.	Loose	Fast'd	Loose	Fast'd
2¼	$19.00	$22.00	$14.75	$17.75	1⅛	$4.30	$5.80	$3.00	$4.50
2	16.50	19.00	12.00	14.50	1	3.50	5.00	2.50	4.00
1¾	14.25	16.50	10.00	12.25	⅞	3.00	4.30	2.00	3.30
1⅝	12.00	14.00	8.00	10.00	¾	2.50	3.70	1.60	2.80
1½	10.00	12.00	6.00	8.00	⅝	2.00	3.00	1.35	2.35
1⅜	8.00	9.75	4.30	6.05	½	1.60	2.40	1.10	1.90
1¼	6.00	7.50	3.50	5.00	⅜	1.50	2.10	1.00	1.60

OPEN SOCKETS.



FIG. 8363.

For steel rope.			Iron or Bess.		For steel rope.			Iron or Bess.	
Dia.	Loose	Fast'd	Loose	Fast'd	Dia.	Loose	Fast'd	Loose	Fast'd
2¼	$22.00	$25.00	$16.50	$19.50	1⅛	$5.30	$6.80	$3.75	$5.25
2	19.00	21.50	14.00	16.50	1	4.25	5.75	3.20	4.70
1¾	16.50	18.75	11.75	14.00	⅞	3.75	5.05	2.70	4.00
1⅝	14.00	16.00	9.50	11.50	¾	3.20	4.40	2.25	3.45
1½	11.75	13.75	7.25	9.25	⅝	2.70	3.70	2.00	3.00
1⅜	9.50	11.25	5.30	7.05	½	2.25	3.05	1.75	2.55
1¼	7.25	8.75	4.25	5.75	⅜	2.00	2.60	1.60	2.20

SWIVEL HOOKS.



FIG. 8364.

For steel rope.			Iron or Bess.		For steel rope.			Iron or Bess.	
Dia.	Loose	Fast'd	Loose	Fast'd	Dia.	Loose	Fast'd	Loose	Fast'd
1¼	$13.00	$15.00	$9.00	$11.00	⅞	$5.50	$6.80	$4.50	$5.80
1⅛	11.00	12.75	7.30	9.05	¾	5.00	6.20	4.10	5.30
1	8.50	10.00	6.00	7.50	⅝	4.50	5.50	3.85	4.85
⅞	6.75	8.25	5.45	6.95	½	4.00	4.80	3.50	4.30
¾	6.00	7.50	5.00	6.50	⅜	3.50	4.10	3.00	3.60

TURNBUCKLE, WITH SOCKET.



FIG. 8365.

Prices, according to size and weight.

HOOK AND SOCKET.



FIG. 8366.

For steel rope.			Iron or Bess.		For steel rope.			Iron or Bess.	
Dia.	Loose	Fast'd	Loose	Fast'd	Dia.	Loose	Fast'd	Loose	Fast'd
1¼	$8.25	$9.60	$5.75	$7.10	¾	$4.05	$5.15	$3.05	$4.15
1⅛	6.75	8.15	5.00	6.45	⅝	3.50	4.50	2.70	3.65
1	5.50	6.75	4.25	5.50	½	3.00	3.75	2.50	3.25
⅞	4.75	6.00	3.65	4.90	⅜	2.50	3.25	2.00	2.75

SISTER HOOKS AND THIMBLE.

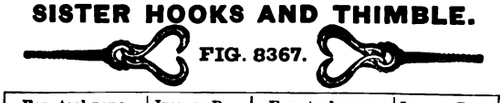


FIG. 8367.

For steel rope.			Iron or Bess.		For steel rope.			Iron or Bess	
Dia.	Loose	Fast'd	Loose	Fast'd	Dia.	Loose	Fast'd	Loose	Fast'd
1¼	.....	$7.00	.....	$6.00	¾	.....	$3.75	.....	$3.00
1⅛	.....	5.75	.....	4.75	⅝	.....	3.25	.....	2.60
1	.....	5.00	.....	4.00	½	.....	2.75	.....	2.15
⅞	.....	4.25	.....	3.50	⅜	.....	2.25	.....	1.60

MATCH OR SISTER HOOKS AND THIMBLES.

WROUGHT IRON.

PRICES, FIG. 8361.

For size, measure diameter of iron in the middle of bend, with hooks closed.

PRICES, PER DOZEN.

Sizes.....In. ¼ 5/16 ⅜ 7/16 ½ 9/16

Japanned.....$2.00 Galvanized.....$2.50

PRICES, PER POUND.

Sizes...In. ⅝ ¾ ⅞ 1 1⅛ 1¼ 1⅜ 1½ 1⅝ 1¾ 2

Japanned... 18 cents. Galvanized....22 cents.

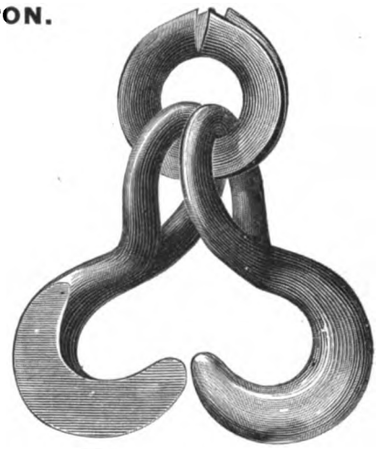


FIG. 8361. OPENED.

HOOK AND THIMBLE.



FIG. 8368.

For steel rope.			Iron or Bess.		For steel rope.			Iron or Bess.	
Dia.	Loose	Fast'd	Loose	Fast'd	Dia.	Loose	Fast'd	Loose	Fast'd
1¼	.....	$7.00	.....	$6.00	¾	.....	$3.75	.....	$3.00
1⅛	.....	5.75	.....	4.75	⅝	.....	3.25	.....	2.60
1	.....	5.00	.....	4.00	½	.....	2.75	.....	2.25
⅞	.....	4.25	.....	3.50	⅜	.....	2.25	.....	1.85

OVAL AND ROUND THIMBLES, SPLICED IN.

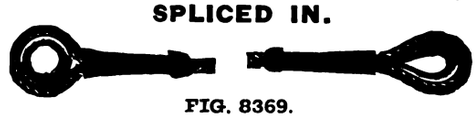


FIG. 8369.

For steel rope.	Iron or Bess.	For steel rope.	Iron or Bess.
Dia.	Fast'd	Dia.	Fastened.
1¼	$4.75	$4.00	¾	$2.10	$1.75
1⅛	3.50	3.00	⅝	1.80	1.50
1	3.00	2.50	½	1.60	1.30
⅞	2.50	2.10	⅜	1.40	1.10

THE "CROSBY" WIRE ROPE CLIP.

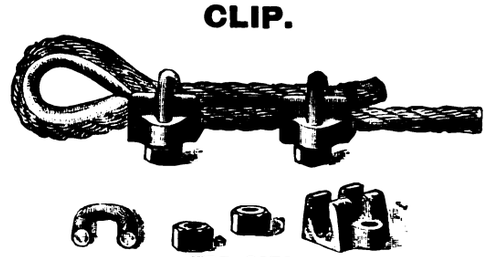


FIG. 8370.

A light, durable and convenient wire rope fastening. Easily applied.

¼ in. diam. rope,	$0.25	⅞ in. diam. rope,	$0.45
5/16 " " "	.25	1 " " "	.50
⅜ " " "	.25	1⅛ " " "	.50
7/16 " " "	.30	1¼ " " "	.50
½ " " "	.35	1⅜ " " "	.55
⅝ " " "	.40	1½ " " "	.60

PATENT WIRE ROPE CLAMPS.



FIG. 8371.

CLAMP SHOWING ROPE SECURED.	SECTIONAL VIEW OF CLAMP.
For 1¼ in. circ. rope	$0.95
" 1⅜ " " "	1.10
" 1¾ " " "	1.15
" 2 " " "	1.15
" 2¼ " " "	1.30
" 2½ " " "	1.45
" 2¾ " " "	1.60
" 3 " " "	1.75
" 3¼ " " "	1.90
" 3½ " " "	2.05
" 3¾ " " "	2.15
" 4 " " "	2.25

These clamps are easily put on, and can be removed or shifted with a wrench by simply loosening the nuts on the bolts.

WHEELS FOR TRANSMISSION OF POWER BY WIRE ROPE.

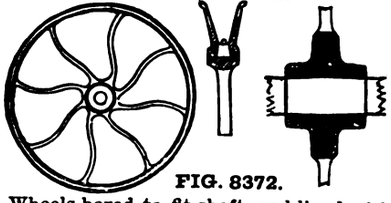


FIG. 8372.

Wheels bored to fit shaft, and lined with patent rubber.

1½ ft. diam...	$7.00	7 ft. diam....	$80.00
2 " " ...	8.00	8 " "	110.00
3 " " ...	20.00	9 " in halves	190.00
4 " " ...	28.00	10 " "	210.00
5 " " ...	40.00	11 " "	.....
6 " " ...	65.00	12 " "	.....

Special prices for larger wheels.

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SOLID IRON SHEAVES.
FOR ELEVATORS AND DERRICKS.

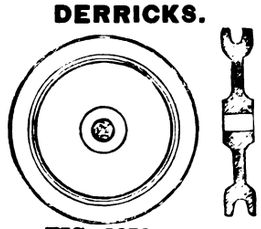


FIG. 8373.

Diameter.	Each.	Diameter.	Each.
30 in.	$.....	18 in.	$.....
28 "	.....	16 "	.....
26 "	.....	14 "	.....
24 "	.....	12 "	.....
22 "	.....	10 "	.....
20 "	.....	8 "	.....

HEAVY WOOD-LINED IRON HOISTING WHEELS.

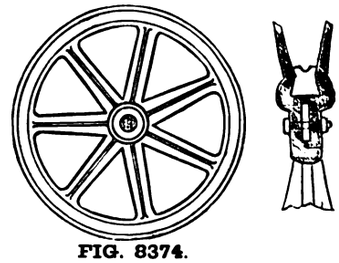


FIG. 8374.

Diameter.	Weight.	Prices, bored to fit shaft.
6 feet.	1,300 lbs.	$.....
5 "	975 "	.....
4 "	700 "	.....
3 "	470 "	.....

Special prices for larger wheels, with wrought or cast iron arms.

HEAVY IRON HOISTING WHEELS.

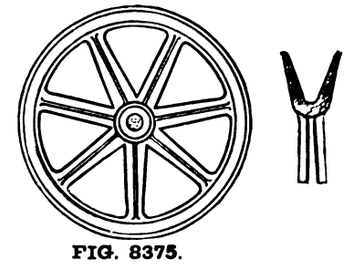


FIG. 8375.

Diameter.	Weight.	Prices, bored to fit shaft.
6 feet.	1,100 lbs.	$.....
5 "	886 "	.....
4 "	622 "	.....
3 "	367 "	.....

Special prices for larger wheels, with either cast or wrought iron arms.

SINGLE, OR 1 SHEAVE.



FIG. 8377.

WROUGHT IRON PULLEY BLOCKS FOR WIRE ROPE.

Heavy wrought iron frames and swivel hooks. Heavy cast sheaves bored, with steel pins, for wire rope up to ¾ inch diameter.

The extended strap, as shown on the one sheave block, is supplied, when required, for use as a becket on either block.

Three and four fold blocks and extra heavy blocks for loads up to 50 tons made to order.

PRICES, FIGS. 8377 AND 8378.

Diameter of sheave. Inches.	Single block, common bushed. Each.	Double block, common bushed. Each.	Sheave only, common bushed. Each.
10	$6.80	$10.00	$1.60
12	9.00	12.50	2.00
14	11.00	15.50	2.25
18	12.50	20.00	3.50
20	18.00	29.00	5.50

Graphite bushed sheaves.....$2.00 each sheave extra for bushing.
Metaline " " ..... 2.35 " " " " " "

LIGHT-ARMED SUPPORTING WHEELS.

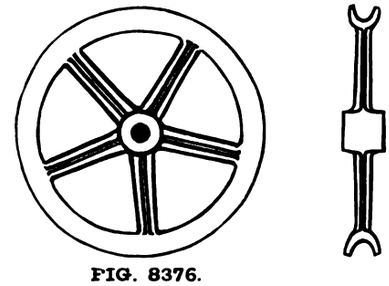


FIG. 8376.

Diameter.	Weight.	Prices, each.
12 inches.	22 lbs.	$2.50
14 "	27 "	2.80
16 "	38 "	3.40
18 "	46 "	3.60
20 "	55 "	4.40
22 "	85 "	5.80
24 "	88 "	6.00
26 "	133 "	8.00
28 "	147 "	9.00
30 "	170 "	11.00

Wheels bored to fit shaft, and furnished with set screws.

DOUBLE, OR 2 SHEAVE.



FIG. 8378.

STEEL BLOCKS FOR WIRE ROPE, WITH STIFF SWIVEL HOOKS.

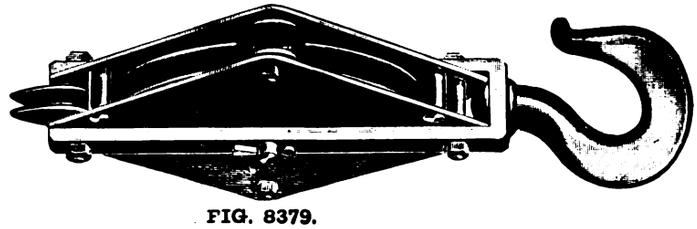


FIG. 8379.

PRICES, FIG. 8379.

IRON BUSHED.
JAPANNED SHELLS, STRAPS AND SHEAVES.

Size sheave.	Rope.	Single.	Double.	Triple.
10 inches.	⅜ and ½ inch.	$13.00	$19.00	$28.00
12 "	½ and ⅝ "	15.00	22.00	31.00
14 "	⅝ and ¾ "	17.00	25.00	36.00
16 "	¾ and ⅞ "	30.00	39.00	46.00
18 "	⅞ and 1 "	34.00	44.00	53.00

METALINE BUSHED.
GALVANIZED SHELLS, ROLLS, SHEAVES AND PINS.

Size sheave.	Rope.	Single.	Double.	Triple.
10 inches.	⅜ and ½ inch.	$17.00	$26.00	$37.00
12 "	½ and ⅝ "	19.00	29.00	41.00
14 "	⅝ and ¾ "	21.00	32.00	45.00
16 "	¾ and ⅞ "	36.00	50.00	62.00
18 "	⅞ and 1 "	40.00	56.00	68.00

SINGLE BLOCKS, WITH SHACKLES.

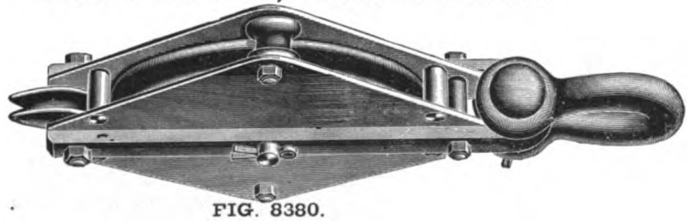


FIG. 8380.

TRIPLE BLOCKS, WITH SHACKLES.

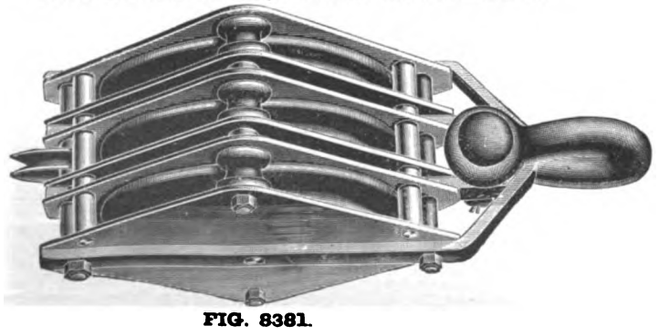


FIG. 8381.

PRICES, FIGS. 8380 AND 8381.

Size sheave. Inches.	Rope. Inch.	IRON BUSHED. Japanned shells, straps and sheaves. Single.	Double.	Triple.	METALINE BUSHED. Galvanized shells, rolls, sheaves and pins. Single.	Double.	Triple.
10	⅜ and ½	$13.00	$19.00	$28.00	$17.00	$26.00	$37.00
12	½ and ⅝	15.00	22.00	31.00	19.00	29.00	41.00
14	⅝ and ¾	17.00	25.00	36.00	21.00	32.00	45.00
16	¾ and ⅞	30.00	39.00	46.00	36.00	50.00	62.00
18	⅞ and 1	34.00	44.00	53.00	40.00	56.00	68.00

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IRON AND STEEL PULLEY BLOCKS.

PRICES, SHEAVES FOR FIGS. 8379 TO 8381.

IRON BUSHED.

Diameter.	Thickness.	Pin.	Prices.
8 inch.	1¼ inch.	¾ inch.	$2.00
10 "	1½ "	¾ "	2.40
12 "	1⅝ "	⅞ "	3.00
14 "	1¾ "	1 "	3.75
16 "	1¾ "	1 "	4.75
18 "	1⅞ "	1⅛ "	6.00
20 "	1⅞ "	1⅛ "	7.50
22 "	2 "	1¼ "	9.00
24 "	2 "	1¼ "	10.00
GALVANIZED METALINE BUSHED.			
8 inch.	1¼ inch.	¾ inch.	$3.50
10 "	1½ "	¾ "	4.00
12 "	1⅝ "	⅞ "	4.75
14 "	1¾ "	1 "	5 50
16 "	1¾ "	1 "	6.75
18 "	1⅞ "	1⅛ "	8 00
20 "	1⅞ "	1⅛ "	10.00
22 "	2 "	1¼ "	12.00
24 "	2 "	1¼ "	13.50

MALLEABLE IRON BLOCKS FOR WIRE ROPE.

PRICES, FIGS. 8383 AND 8384.

Shell.	Sheave.	For rope.	Style.	Prices.	No.
14 in.	10 x 1½	⅜ and ½	Single.	$9.50	55
			Double.	17.50	57
			Triple.	25.50	59
16 "	11 x 1¾	½ " ⅝	Single.	12.50	61
			Double.	23.00	63
			Triple.	31.00	65
18 "	13 x 2	¾ " ⅞	Single.	15.00	67
			Double.	29.00	69
			Triple.	41.50	71

These blocks are all fitted with our self-lubricating bushings, and, while very strong, are made with special reference to lightness, for ease in handling.

SINGLE. DOUBLE.

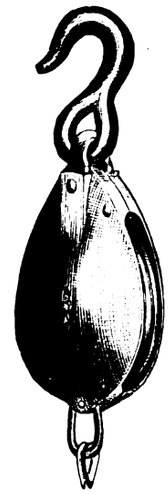


FIG. 8383.



FIG. 8384.

WROUGHT IRON CIN BLOCKS FOR WIRE ROPE.

SINGLE.



FIG. 8385.

DOUBLE.

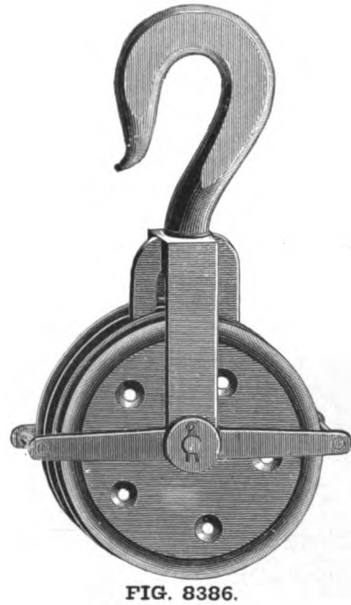


FIG. 8386.

PRICES.

Diameter of sheave.	Diameter of rope.	Single.		Double.	
		Prices.	Trade No.	Prices.	Trade No.
10 inches.	⅜ and ½	$11.00	73	$18.00	75
12 "	½ " ⅝	12.50	77	20.00	79
14 "	⅝ " ¾	15.00	81	23.00	83
16 "	⅝ " ¾	18.00	85	27.00	87
18 "	¾ " ⅞	23.00	89	32.00	91
20 "	⅞ " 1	28.00	93	38.00	95

These sheaves are all fitted with self-lubricating brass bushings.

STEEL SNATCH BLOCK FOR WIRE ROPE.

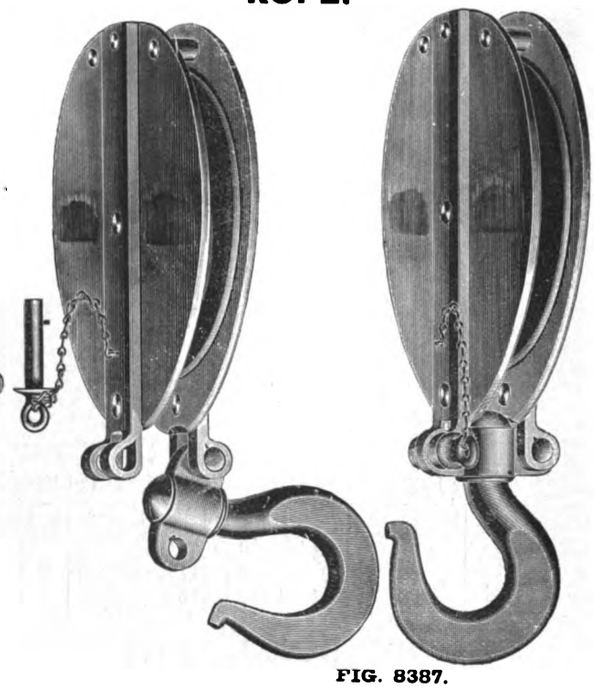


FIG. 8387.

OPEN. CLOSED.

PRICES, FIG. 8387.

IRON BUSHED.

JAPANNED SHELLS, STRAPS AND SHEAVES.

Size sheave.	Rope.	Prices.
10 inches.	⅜ and ½ in.	$21.00
12 "	½ " ⅝ "	26.00
14 "	⅝ " ¾ "	31.00
16 "	¾ " ⅞ "	34.00
18 "	⅞ " 1 "	44.00

METALINE BUSHED.

GALVANIZED SHELLS, SHEAVES AND PINS.

Size sheave.	Rope	Prices.
10 inches.	⅜ and ½ in.	$25.00
12 "	½ " ⅝ "	30.00
14 "	⅝ " ¾ "	35.00
16 "	¾ " ⅞ "	40.00
18 "	⅞ " 1 "	50.00

WROUGHT IRON SNATCH BLOCKS, LINK PATTERN.

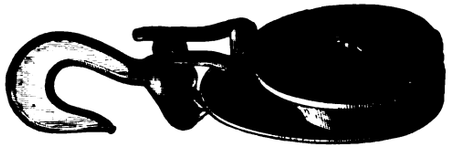


FIG. 8388.

PRICES.

Shell.	For rope.	Iron bushed.	Metaline bushed.	Shell.	For rope.	Iron bushed.	Metaline bushed.
Inches.	Inches.	Each.	Each.	Inches.	Inches.	Each.	Each.
7	⅞	$5.25	$6.50	14	1¾	$14.00	$16.25
8	1	6.35	7.65	16	2	19.00	21.75
9	1⅛	7.50	9.00	18	2¼	25.00	28.00
10	1¼	9.00	10.50	20	2½	36.00	39.50
12	1½	11.00	13.00				

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GIN BLOCKS.

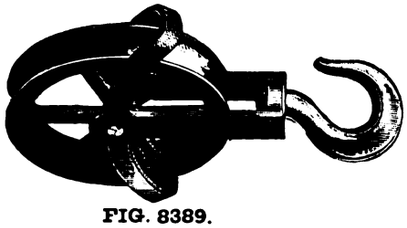


FIG. 8389.

Diameter of sheave.	Rope diameter.	Prices, each.	Extra sheaves, each.
6 in.	1 in.	$2.55	$0.60
7 "	1⅛ "	3.15	.75
8 "	1⅛ "	3.90	.90
9 "	1⅛ "	4.00	1.10
10 "	1⅛ "	4.30	1.20
11 "	1⅛ "	4.60	1.35
12 "	1⅛ "	5.30	1.60
14 "	1⅜ "	6.00	2.15
16 "	1½ "	7.70	3.15
18 "	1½ "	8.85	3.45
20 "	1½ "	10.50	4.15
22 "	1½ "	12.00	4.90

PULLEY BLOCKS.

The frame is wrought iron in all sizes except 6 and 7 inch, which are malleable iron. Wrought iron hooks, sheaves bored and pins turned.

CRANE PULLEY BLOCKS.

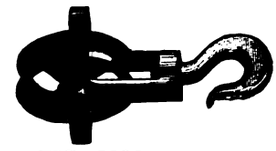


FIG. 8390.

Diam. of sheave.	Takes chain, diam.	Approximate weight.	Test load.	Prices, each.
4¾ in.	3/16 in.	4¼ lbs.	¾ tons.	$1.85
5 "	¼ "	6 "	1 "	2.30
6 "	5/16 "	9 "	1½ "	2.75
7 "	⅜ "	13 "	2 "	3.50
8 "	7/16 "	23 "	3 "	5.50
9 "	½ "	30 "	4 "	7.00
10 "	9/16 "	56 "	5 "	20.00
11 "	⅝ "	72 "	6 "	26.00
12 "	11/16 "	90 "	8 "	32.00
14 "	¾ "	121 "	10 "	43.00
15 "	13/16 "	184 "	12 "	55.00
16 "	⅞ "	207 "	13 "	66.00

WROUGHT IRON DOCK BLOCKS.

PRICES, FIG. 8391.



FIG. 8391.

Diam. of sheave.	Width of mortise.	For rope diam.	Prices, roller bushed, each.	Prices, metaline bushed, each.
10 in.	1⅝ in.	1¼ in.	$17.50	$18.50
12 "	1⅞ "	1½ "	20.00	21.00

WOOD SHELL DOCK BLOCKS.

PRICES, FIG. 8392.

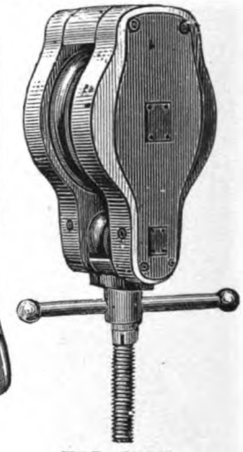


FIG. 8392.

Length.	Mortise.	For rope diam.	Sheave.	Roller bushed, each.	Metaline bushed, each.
10 in.	1½ in.	1 in.	6 in.	$9.00	$9.50
12 "	1⅝ "	1⅛ "	7½ "	10.00	11.00
14 "	1¾ "	1¼ "	8½ "	11.00	12.00
16 "	2 "	1½ "	9½ "	14.00	15 00
20 "	2¼ "	2 "	11 "	22.00	23.00

BALL AND SOCKET DOCK BLOCKS.

Malleable iron rim, wrought iron straps.

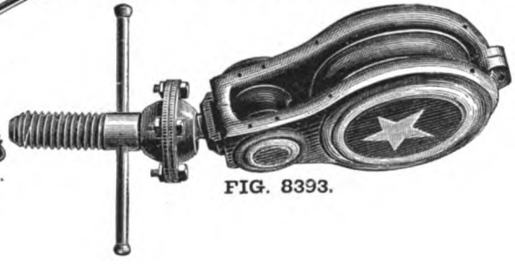


FIG. 8393.

Same with wood shell.

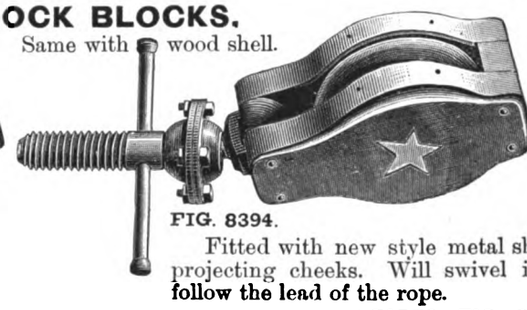


FIG. 8394.

Fitted with new style metal sheave with lignumvitæ projecting cheeks. Will swivel in any direction, and follow the lead of the rope.

PRICES, METALINE BUSHED, SELF-LUBRICATING.

Size sheave.	For diam. rope.	Size block.	Prices.	Size sheave.	For diam. rope.	Size block.	Prices.
6½x1⅜x¾	1⅛	8½ in.	$9.50	9½x2 x⅞	1½	12½ in.	$18.00
8 x1¾x¾	1¼	10 "	12.50	11½x2 x⅞	1½	14 "	23.00
9 x1¾x¾	1¼	11½ "	15.00	13½x2¼x1	1¾	16½ "	29.00

PRICES, FIG. 8394.

Dimensions. Size sheave.	For diam. rope.	Size block.	Metaline bushed, self-lubricating. Prices.	Roller bushed. Prices.
6½ x 1⅜ x ¾	1⅛	10 in.	$8.25	$7.50
8 x 1⅝ x ¾	1¼	12 "	12.00	11.00
9½ x 1¾ x ¾	1⅜	14 "	15.00	14.00
10 x 1⅞ x ⅞	1½	15 "	17.00	16.00
11¼ x 1⅞ x ⅞	1½	16 "	19.00	18.00
12 x 2 x 1	1½	18 "	24.00	22.00

WOOD SHELL SNATCH BLOCKS.

BURR PATTERN.

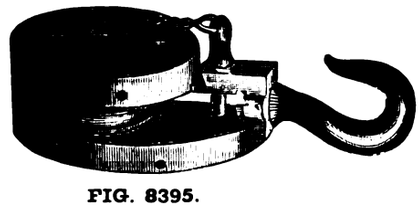


FIG. 8395.

LINK PATTERN.

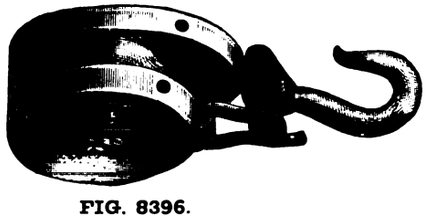


FIG. 8396.

PRICES, EITHER.

Shell.	For rope.	Common or iron bushed, each.	Metaline bushed, each.	Patent or roller bushed, each.	Shell.	For rope.	Common or iron bushed, each.	Metaline bushed, each.	Patent or roller bushed, each.
6 in.	⅞ in.	$4.00	$5.25	$4.65	14 in.	1¾ in.	$13.00	$16.50	$15.00
7 "	⅞ "	4.75	6.00	5.50	16 "	2 "	17.00	22.00	20.00
8 "	1 "	5.75	7.25	6.60	18 "	2¼ "	25.00	31.00	28.50
9 "	1⅛ "	6.75	8.50	7.75	20 "	2½ "	38.00	46.00	43.00
10 "	1¼ "	8.50	11.00	10.00	22 "	3 "	55.00	68.00	63.00
12 "	1½ "	10.00	13.00	11.50	24 "	3½ "	70.00	86.00	78.00

PRODUCERS' PATTERN DOCK BLOCKS.

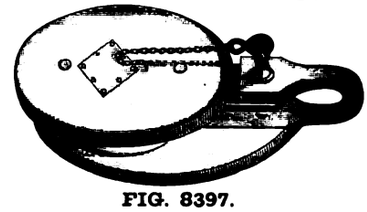


FIG. 8397.

Iron patent and metaline bushed, 16, 18 and 20 inch diameter.

PRICES ON APPLICATION.

DETACHED HOOK.



FIG. 8398.

PRICES ON APPLICATION.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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WROUGHT IRON AND STEEL PULLEY BLOCKS.

NO. 1, SNATCH, SELF-ACTING.



FIG. 8399.

NO. 2, SNATCH.



FIG. 8400.

NO. 3.



FIG. 8401.

NO. 4.



FIG. 8402.

NO. 5.

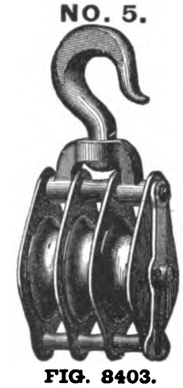


FIG. 8403.

NO. 6.

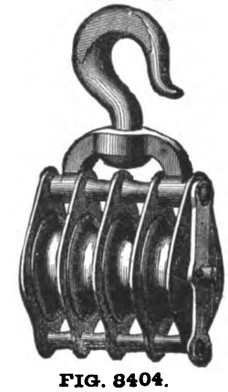


FIG. 8404.

NO. 8.

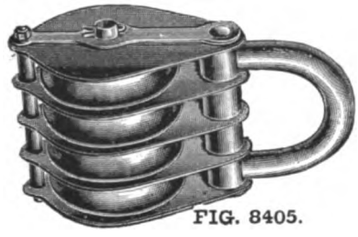


FIG. 8405.

NO. 7.

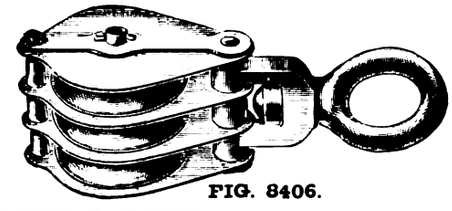


FIG. 8406.

PRICES.

Rope size.....inch,	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2
Chain size.....inch,				3/16	1/4	5/16	3/8	7/16	1/2	5/8	11/16	3/4	13/16	7/8	15/16
Dimensions.															
Length of shell.....inches,	4 3/4	6	7 1/2	8 1/2	9 1/2	10 1/2	12	13	14 1/2	17	19	21	23	25	28
Diameter of sheave ..... "	2 1/2	3 1/2	4	4 3/4	5	6	7	8	9	10	11	12	14	15	16
Diameter of mortise..... "	3/4	7/8	1	1 1/4	1 3/8	1 1/2	1 3/4	2	2 3/8	2 3/4	3 1/4	3 1/2	3 3/4	4 1/4	4 1/2
Prices.															
Snatch, No. 1.....	$2.70	$2.75	$3.00	$3.60	$4.80	$5.50	$6.90	$8.80	$13.20	$27.40	$33.20				
" No. 2	3.80	3.85	4.40	5.25	6.35	7.45	8.80	11.60	16.50	23.20	31.20				
Single, No. 3, with hook.....	$1.65	$2.10	$2.25	$3.05	$3.65	$4.35	$5.50	$7.25	$11.60	$17.60	$26.40				
Double, No. 4, "	2.20	2.90	3.40	4.20	5.50	6.65	9.25	13.00	18.50	29.60	53.00				
Triple, No. 5, "	2.75	3.45	4.35	5.50	7.50	9.25	12.70	18.50							
" as No. 7, with ring.....	....	....	....	....	....	....	....	....	24.60	42.40	69.50				
" as No. 8, with shackle.....	....	....	....	....	....	....	....	....	24.60	28.90	47.60				
Fourfold, No. 6, with hook...	3.60	4.35	5.20	7.50	9.55	12.10	17.85								
" as No. 7, with ring.....	....	....	....	....	....	....	....	26.00	37.50	70.50	105.00				
" as No. 8, with shackle...	....	....	....	....	....	....	....	26.00	37.50	43.50	64.00				
Iron sheaves, plain.....	.15	.20	.30	.50	.70	.85	1.40	1.80	2.35	3.30	4.50				
" " roller bushed.....	.55	.75	.85	1.10	1.35	2.00	2.75	3.75	5.00						
Brass sheaves, plain	.55	.85	1.25	2.10	2.75	3.45	4.70	6.90	10.30	17.50	21.00				

N. B.—The 2 3/4 inch and larger are quoted for only upon request.

The single and double blocks for 2 1/4 and 2 1/2 inch rope have swivel rings instead of hooks. Blocks, if required with roller bushed or all brass sheaves, will be charged the extra price for said sheaves minus the price of common sheaves. On the larger blocks we generally supply the upper one of a pair with a shackle and the lower one with a swivel ring, but they may be ordered with shackle or ring, as desired. Becket or chain eye supplied to one block of every pair.

WIDE MORTISE, MALLEABLE IRON TACKLE BLOCKS, WITH STIFF SWIVEL HOOKS.

PRICES, FIGS. 8407 AND 8408.

PLAIN BUSHED.

Shell.	For rope.	Sheave.	Prices, single.	Double.
6 inches.	7/8 inch.	3 1/2 x 1	$2.00	$3.25
8 "	1 "	5 x 1 1/4	2.75	4.75
9 "	1 1/8 "	5 1/2 x 1 5/8	3.50	6.00
10 "	1 1/4 "	6 x 1 5/8	4.50	7.50
12 "	1 1/2 "	7 1/2 x 1 3/4	6.50	11.00
14 "	1 3/4 "	9 x 1 7/8	9.00	15.00
16 "	1 7/8 "	10 x 2	13.00	22.00

SELF-LUBRICATING BRASS BUSHED.

Shell.	For rope.	Sheave.	Prices, single.	Double.
6 inches.	7/8 inch.	3 1/2 x 1	$2.85	$5.00
8 "	1 "	5 x 1 1/4	3.80	6.85
9 "	1 1/8 "	5 1/2 x 1 5/8	4.65	8.30
10 "	1 1/4 "	6 x 1 5/8	5.80	10.00
12 "	1 1/2 "	7 1/2 x 1 3/4	8.00	14.25
14 "	1 3/4 "	9 x 1 7/8	11.00	18.50
16 "	1 7/8 "	10 x 2	15.00	26.00

SINGLE.



FIG. 8407.

DOUBLE.



FIG. 8408.

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MALLEABLE IRON TACKLE BLOCKS, WITH LOOSE SIDE HOOKS.


SINGLE, WITH BECKET.

FIG. 8409.

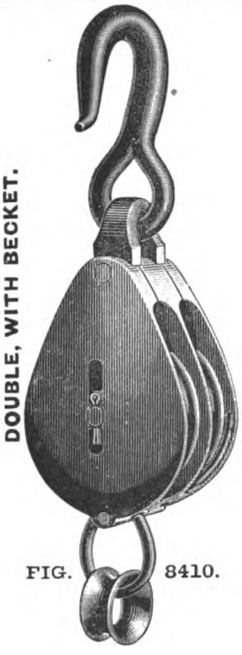

DOUBLE, WITH BECKET.

FIG. 8410.

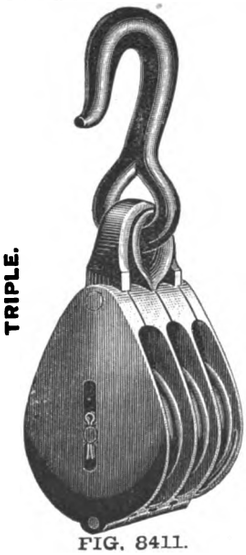

TRIPLE.

FIG. 8411.

PRICES, FIGS. 8409 TO 8411.

PLAIN BUSHED.

Sheave. Inches.	For rope. Inches.	Shell. Inches.	Single. Each.	Double. Each.	Triple. Each.
2¼ x 11/16	½	4	$0.90	$1.75	$2.50
2¾ x ⅞	⅝	5	1.00	1.90	2.75
3½ x 1	¾	6	1.25	2.25	3.25
4¼ x 1⅛	⅞	7	1.50	2.70	4.00
5 x 1¼	1	8	1.85	3.20	4.75
5½ x 1 5/16	1 1/16	9	2.40	4.00	5.50
6¼ x 1⅜	1⅛	10	3.10	5.10	7.00
7½ x 1½	1¼	12	5.00	8.25	11.75
8½ x 1⅝	1⅜	14	7.50	11.75	16.50

PATENT OR ROLLER BUSHED.

Sheave. Inches.	For rope. Inches.	Shell. Inches.	Single. Each.	Double. Each.	Triple. Each.
2¾ x ⅞	⅝	5	$1.50	$2.90	$4.25
3½ x 1	¾	6	1.75	3.25	4.75
4¼ x 1⅛	⅞	7	2.10	3.85	5.80
5 x 1¼	1	8	2.55	4.60	6.85
5½ x 1 5/16	1 1/16	9	3.20	5.60	7.90
6¼ x 1⅜	1⅛	10	4.05	7.00	9.85
7½ x 1½	1¼	12	6.00	10.35	14.90
8½ x 1⅝	1⅜	14	8.75	14.25	20.25

SELF-LUBRICATING BRASS BUSHED.

Sheave. Inches.	For rope. Inches.	Shell. Inches.	Single. Each.	Double. Each.	Triple. Each.
2¼ x 11/16	½	4	$1.65	$3.25	$4.75
2¾ x ⅞	⅝	5	1.80	3.50	5.15
3½ x 1	¾	6	2.10	4.00	5.80
4¼ x 1⅛	⅞	7	2.45	4.60	6.85
5 x 1¼	1	8	2.90	5.30	7.90
5½ x 1 5/16	1 1/16	9	3.55	6.30	9.00
6¼ x 1⅜	1⅛	10	4.40	7.70	11.00
7½ x 1½	1¼	12	6.45	11.15	16.00
8½ x 1⅝	1⅜	14	9.10	15.00	21.30

The blocks, from 4 inches to 9 inches, inclusive, are the same score as wide mortise wooden blocks, and will take the same size of rope.

Plain, roller-brushed, or self-lubricating sheaves are interchangeable.

WIDE MORTISE HEAVY PURCHASE BLOCKS, WITH RINGS, HOOKS OR SHACKLES.

DOUBLE.



FIG. 8412.

DOUBLE.

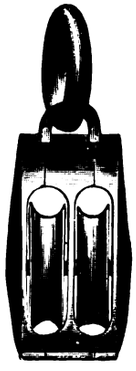


FIG. 8413.

PRICES, FIGS. 8412 AND 8413.

Shell. Inches.	For rope. Inches.	Sheave.	Style.	Plain bushed.	Self-lubricating brass bushed.
12	1½	7½ x 1¾	Single.	$6.25	$7.85
			Double.	10.25	13.50
			Triple.	15.00	20.00
14	1¾	9 x 1⅞	Single.	9.00	10.80
			Double.	15.00	18.50
			Triple.	20.00	25.50
16	2	10 x 2¼	Single.	13.00	15.00
			Double.	21.00	25.00
			Triple.	32.00	38.00

DOUBLE LASHING SHACKLE.

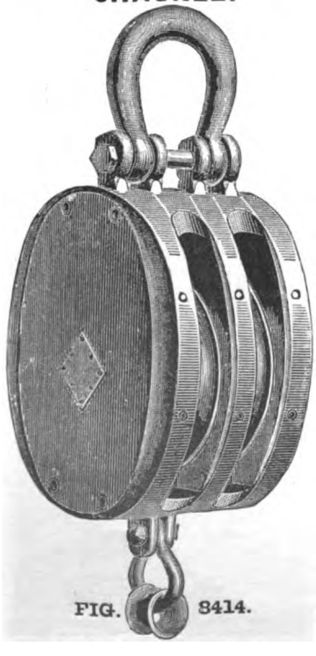


FIG. 8414.

TRIPLE LASHING SHACKLE.

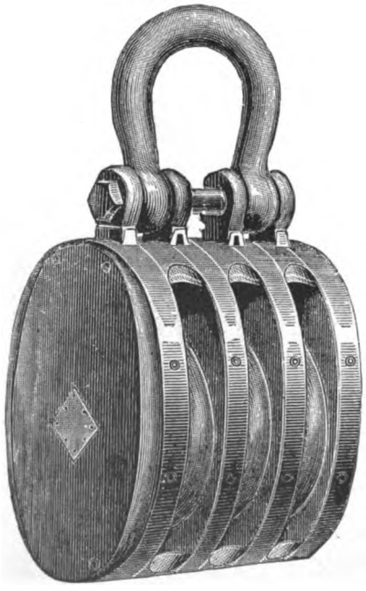


FIG. 8415.

PRICES, FIGS. 8414 AND 8415.

EXTRA HEAVY, THICK MORTISE WOOD TACKLE BLOCKS. CHEEKS EDGE BOLTED.

Dimensions.			Common or iron bushed.			Patent or roller bushed.		
Sheave.	For rope.	Shell. Inches.	Single.	Double.	Triple.	Single.	Double.	Triple.
12 x 2⅜ x 1	2¼	18	$15.00	$29.00	$42.00	$18.00	$35.00	$52.00
14 x 2⅞ x 1¼	2½	20	21.00	37.00	54.00	25.00	45.00	65.00
15 x 3⅜ x 1¼	3	22	26.00	48.00	70.00	....	....	....
16 x 3⅞ x 1½	3½	24	32.00	56.00	84.00	....	....	....

Dimensions.			Self-lubricating or metaline bushed.		
Sheave.	For rope.	Shell. Inches.	Single.	Double.	Triple.
12 x 2⅜ x 1	2¼	18	$23.00	$44.00	$63.00
14 x 2⅞ x 1¼	2½	20	32.00	54.00	77.00
15 x 3⅜ x 1¼	3	22	38.00	70.00	100.00
16 x 3⅞ x 1½	3½	24	46.00	85.00	125.00

Above with rings, shackles or hooks furnished to order.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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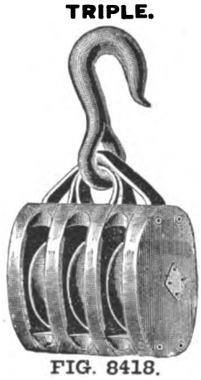
INSIDE IRON STRAPPED WOOD TACKLE BLOCKS.

WITH LOOSE SIDE OR FRONT HOOKS.

SINGLE. DOUBLE. TRIPLE.


FIG. 8416.

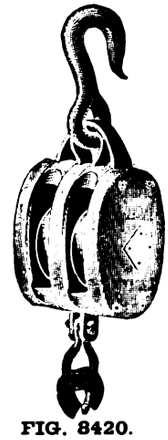

FIG. 8417.

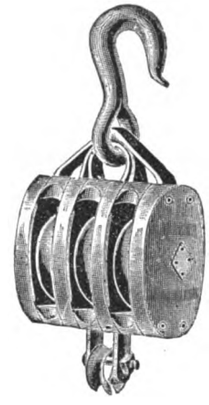

FIG. 8418.

WITH LOOSE SIDE OR FRONT HOOKS AND BECKETS.

SINGLE. DOUBLE. TRIPLE.


FIG. 8419.


FIG. 8420.


FIG. 8421.

WITH STIFF SWIVEL HOOKS AND BASKETS.

SINGLE. DOUBLE. TRIPLE.

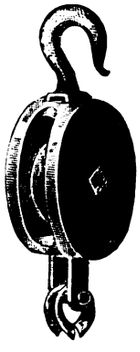
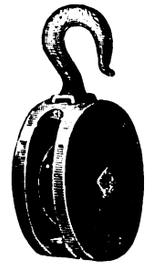

FIG. 8422.

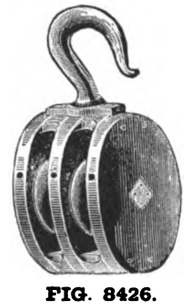

FIG. 8423.

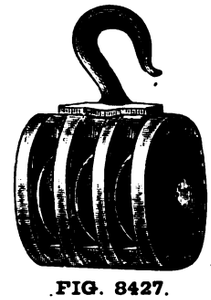

FIG. 8424.

WITH STIFF SWIVEL HOOKS.

SINGLE. DOUBLE. TRIPLE.


FIG. 8425.


FIG. 8426.

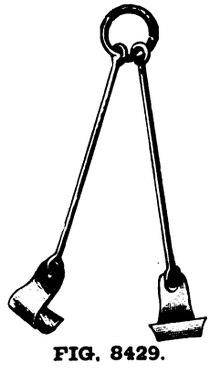

FIG. 8427.

PRICES, EITHER, FIGS. 8416 TO 8427.

Sheave. Inches.	For rope. Inches.	Shell. Inches.	IRON BUSHED. Single. Each.	IRON BUSHED. Double. Each.	IRON BUSHED. Triple. Each.	ROLLER BUSHED. Single. Each.	ROLLER BUSHED. Double. Each.	ROLLER BUSHED. Triple. Each.	NET. EXTRA GALVANIZING STRAPS. Single. Each.	NET. EXTRA GALVANIZING STRAPS. Double. Each.	NET. EXTRA GALVANIZING STRAPS. Triple. Each.	METALINE BUSHED. Single. Each.	METALINE BUSHED. Double. Each.	METALINE BUSHED. Triple. Each.
1¾ x ½	5/16	3	$0.70	$1.30	$1.75	$1.10	$2.00	$2.90	$0.04	$0.06	$0.10			
2 x 5/8	3/8	3½	.75	1.45	2.00	1.15	2.20	3.15	.04	.06	.10			
2¼ x 5/8	½	4	.85	1.60	2.15	1.20	2.25	3.25	.05	.07	.11	$1.50	$2.90	$4.15
3 x 13/16	5/8	5	.90	1.75	2.25	1.25	2.35	3.50	.06	.08	.12	1.75	3.35	4.75
3½ x 1	¾	6	1.10	2.00	2.90	1.50	2.85	4.40	.10	.12	.15	2.20	4.00	5.80
4¼ x 1	7/8	7	1.30	2.40	3.50	1.70	3.35	5.00	.12	.15	.18	2.50	4.50	6.70
4¾ x 1¼	1	8	1.65	2.85	4.25	2.25	4.15	6.00	.16	.21	.30	3.25	5.70	8.50
5½ x 1⅛	1	9	1.85	3.40	4.75	2.50	4.70	7.25	.22	.28	.38	3.70	6.75	10.00
6½ x 1¼	1⅛	10	2.75	4.50	6.25	3.50	6.00	8.50	.28	.38	.50	4.75	8.50	12.50
7 x 1¼	1⅛	11	4.45	7.50	10.65	5.30	9.20	13.20	.35	.45	.60	6.75	12.50	18.50
8 x 1⅜	1¼	12	4.45	7.50	10.65	5.30	9.20	13.20	.35	.45	.60	6.75	12.50	18.50
9 x 1⅜	1¼	13	7.00	10.50	15.00	8.15	12.80	18.45	.55	.75	1.00	9.75	17.00	25.00
9½ x 1½	1⅜	14	7.00	10.50	15.00	8.15	12.80	18.45	.55	.75	1.00	9.75	17.00	25.00
10 x 1⅝	1½	15	8.00	13.00	18.00	9.25	15.50	21.75	.75	.95	1.25	11.00	19.50	28.50
10½ x 1¾	1⅝	16	10.00	15.00	22.00	11.50	18.00	26.50	.85	1.20	1.50			

BARREL OR CAN HOOKS.


FIG. 8428.


FIG. 8429.

PRICES.

Sizes.....inches, 3/8, ½, 5/8, ¾, 7/8
Price.....14 cents per lb.
Galvanized.....17 " "

3/8 inch are used for kegs; ½ inch are used for barrels; 5/8 inch are used for tierces; ¾ inch are used for hogsheads.

PROPER WORKING LOAD FOR A SET OF "REGULAR OR LIGHT LIST" IRON-STRAPPED BLOCKS.

4	inch	single	and	double,	or	two	double....	200	lbs.
5	"	"	"	"	"	"	...	300	"
6	"	"	"	"	"	"	....	400	"
7	"	"	"	"	"	"	...	600	"
8	"	"	"	"	"	"	....	1,500	"
9	"	"	"	"	"	"	....	2,000	"
10	"	"	"	"	"	"	....	4,000	"
12	"	"	"	"	"	"	...10,000		"
14	"	"	"	"	"	"	..	16,000	"

"HEAVY TACKLE LIST."

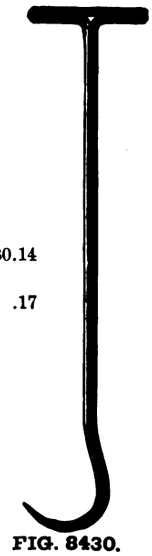
8	inch	single	and	double,	or	two	double...	2,500	lbs.
10	"	"	"	"	"	"	...	8,000	"
12	"	"	"	"	"	"	...	14,000	"
14	"	"	"	"	"	"	...	25,000	"
16	"	"	"	"	"	"	...	36,000	"
18	"	"	"	"	"	"	..	60,000	"
20	"	"	"	"	"	"	...100,000		"

For two triple blocks of any size, add about one-quarter to the above weights.

CHAIN HOOKS.

PRICES, FIG. 8430.

½ inch Iron, black, per lb., $0.14
Galvanized Iron, per lb..... .17


FIG. 8430.

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INSIDE IRON-STRAPPED WOOD TACKLE BLOCKS, LOOSE SWIVEL BLOCKS.

SINGLE.



FIG. 8431.

DOUBLE.



FIG. 8432.

TRIPLE.



FIG. 8433.

SINGLE AND BECKET.



FIG. 8434.

DOUBLE AND BECKET.

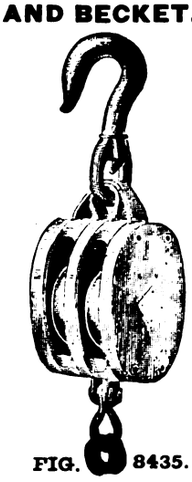


FIG. 8435.

TRIPLE AND BECKET.

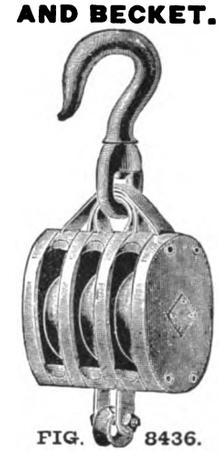


FIG. 8436.

PRICES, EITHER, FIGS. 8431 TO 8436.

Sheave. Inches.	For rope. Inches.	Shell. Inches.	IRON BUSHED. Single. Each.	IRON BUSHED. Double. Each.	IRON BUSHED. Triple. Each.	ROLLER BUSHED. Single. Each.	ROLLER BUSHED. Double. Each.	ROLLER BUSHED. Triple. Each.	EXTRA NET GALVANIZING STRAPS. Single. Each.	EXTRA NET GALVANIZING STRAPS. Double. Each.	EXTRA NET GALVANIZING STRAPS. Triple. Each.	METALINE BUSHED. Single. Each.	METALINE BUSHED. Double. Each.	METALINE BUSHED. Triple. Each.
1¾ x ½	5/16	3	$1.20	$1.80	$2.25	$1.60	$2.50	$3.40	$0.04	$0.06	$0.10	....	....	....
2 x ⅝	3/8	3½	1.25	1.95	2.50	1.65	2.70	3.65	.04	.06	.10	....	....	....
2¼ x ⅝	1/2	4	1.35	2.10	2.65	1.70	2.75	3.75	.05	.07	.11	$2.00	$3.40	$4.65
3 x 1 3/16	5/8	5	1.40	2.25	2.75	1.75	2.85	4.00	.06	.08	.12	2.25	3.85	5.25
3½ x 1	3/4	6	1.60	2.50	3.50	2.00	3.35	5.00	.10	.12	.15	2.70	4.50	6.40
4½ x 1	7/8	7	1.80	3.00	4.25	2.20	3.95	5.75	.12	.15	.18	3.00	5.10	7.45
4¾ x 1 1/8	1	8	2.25	3.60	5.15	2.85	4.90	6.90	.16	.21	.30	3.85	6.45	9.40
5½ x 1 1/8	1	9	2.60	4.30	5.95	3.25	5.60	8.45	.22	.28	.38	4.45	7.65	11.20
6½ x 1¼	1 1/8	10	3.65	5.70	8.00	4.40	7.20	10.25	.28	.38	.50	5.65	9.70	14.25
7 x 1¼	1 1/8	11	5.65	9.25	13.15	6.50	10.95	15.70	.35	.45	.60	7.95	14.25	21.00
8 x 1⅜	1¼	12	5.65	9.25	13.15	6.50	10.95	15.70	.35	.45	.60	7.95	14.25	21.00
9 x 1⅜	1¼	13	9.50	13.50	18.50	10.65	15.80	21.95	.55	.75	1.00	12.25	20.00	28.50
9½ x 1½	1⅜	14	9.50	13.50	18.50	10.65	15.80	21.95	.55	.75	1.00	12.25	20.00	28.50
10 x 1⅝	1½	15	11.00	16.50	....	12.25	19.00	....	.75	.95	1.25	14.00	23.00	....
10½ x 1¾	1⅝	16	13.50	....	....	15.00	....	....	.85	1.20	1.50	....	....	....

THICK MORTISE, HEAVY TACKLE BLOCKS, CHEEKS EDGE BOLTED.

EXTRA HEAVY INSIDE IRON STRAPS AND HOOKS.

SINGLE.

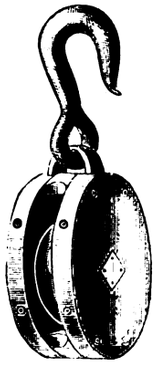


FIG. 8437.

DOUBLE.

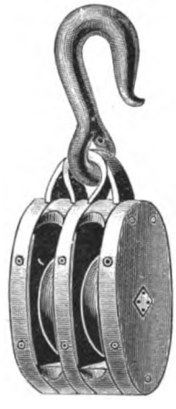


FIG. 8438.

TRIPLE.

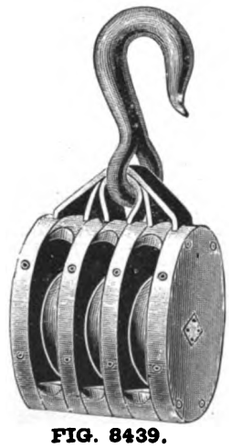


FIG. 8439.

SINGLE AND BECKET.

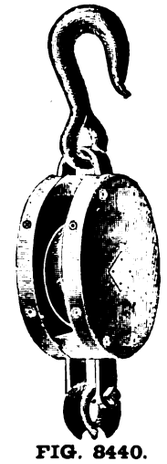


FIG. 8440.

DOUBLE AND BECKET.



FIG. 8441.

TRIPLE AND BECKET.



FIG. 8442.

PRICES, EITHER FIGS. 8437 TO 8442.

Sheave.	For rope. Inches.	Shell. Inches.	IRON BUSHED. Single. Each.	IRON BUSHED. Double. Each.	IRON BUSHED. Triple. Each.	ROLLER BUSHED. Single. Each.	ROLLER BUSHED. Double. Each.	ROLLER BUSHED. Triple. Each.	METALINE BUSHED. Single. Each.	METALINE BUSHED. Double. Each.	METALINE BUSHED. Triple. Each.
4¼ x 1⅛ x ½	1	7	$2.25	$4.00	$5.50	$3.00	$5.50	$7.75	$4.50	$8.00	$11.50
4¾ x 1⅜ x ⅝	1⅛	8	2.75	4.50	6.30	3.50	6.00	8.55	5.00	9.00	13.00
5⅜ x 1⅜ x ⅝	1⅛	9	3.15	5.25	7.25	4.00	6.95	9.80	5.75	10.50	15.00
6¼ x 1½ x ¾	1¼	10	4.00	6.50	8.50	5.25	9.00	12.25	7.25	13.50	19.00
7 x 1½ x ¾	1¼	11	5.25	8.50	12.50	6.50	11.00	16.25	9.25	17.00	25.00
8 x 1⅝ x ¾	1½	12	5.25	8.50	12.50	6.50	11.00	16.25	9.25	17.00	25.00
9 x 1¾ x ⅞	1½	13	8.00	13.00	17.00	9.75	16.50	22.25	13.00	23.50	33.00
9½ x 1⅞ x ⅞	1¾	14	8.00	13.00	17.00	9.75	16.50	22.25	13.00	23.50	33.00
10 x 1⅞ x 1	1¾	15	9.00	15.00	20.00	11.00	19.00	26.00	15.00	26.50	37.00
10½ x 2⅛ x 1	2	16	11.50	18.00	28.00	14.00	23.00	35.50	18.00	32.00	48.00

ABOVE WITH RINGS, SHACKLES OR SWIVEL HOOKS FURNISHED TO ORDER.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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COAL AND CARGO HOISTING BLOCKS.

PRICES, FIG. 8443.

Shell.....inches,	10	12	14	15	16	18	20
For rope..... "	1⅛	1¼	1⅜	1½	1½	1½	2
Price, each.....	$6.00	$8.50	$11.00	$13.00	$15.00	$20.00	$25.00

PRICES, FIG. 8444.

9½ inch sheave.....$15.00 each.
12 " " ..... 18.00 "
13½ " " ..... 20.00 "

This block has a 6-inch bearing, consisting of an outer box 3 inches long on each side of the block for the spindle to revolve in, said spindle being made fast in the sheave, and turning in the boxes at their outer ends. These boxes are provided with a self-lubricant, and at any time can be easily overhauled and the lubricant replenished. The boxes are made tight, preventing any water or dust from entering them.

METALINE BUSHED. **SELF-LUBRICATING BOXES.**

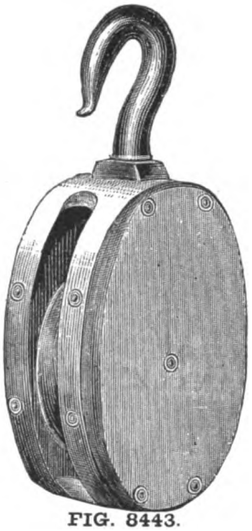


FIG. 8443.

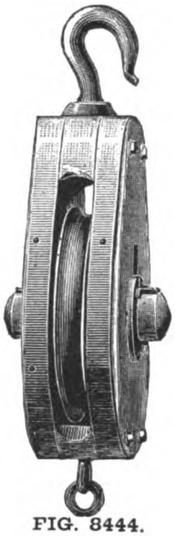


FIG. 8444.

OPEN IRON SHEAVES FOR BLOCKS.

IRON OR WOOD.

IRON BUSHED. **ROLLER BUSHED.**

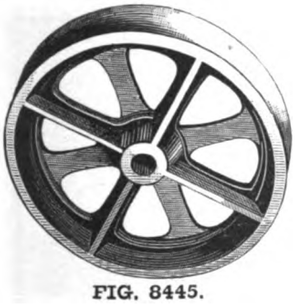


FIG. 8445.

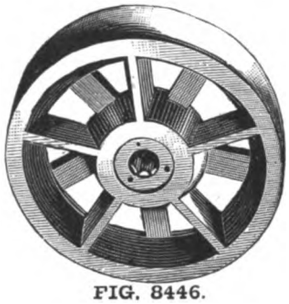


FIG. 8446.

PRICES.

Size of sheave.	Hole for pin, full size.	For block.	Common bushed.	Patent rollers.	Metaline.
Inches.	Inches.	Inches.	Each.	Each.	Each.
1¾ x ½	⅜	3	$0.09	$0.40	
2 x ⅝	⅜	3½	.10	.42	$0.60
2¼ x ⅝	⅜	4	.12	.45	.70
2¾ x ¾	⅜	4½	.15	.50	.80
3 x 13/16	⅜	5	.20	.55	.90
3½ x 1	½	6	.25	.65	1.40
4¼ x 1	½	7	.30	.75	1.50
4¾ x 1⅛	⅝	8	.35	1.00	1.85
5½ x 1⅛	⅝	9	.45	1.10	1.95
6½ x 1¼	¾	10	.55	1.35	2.40
7 x 1¼	¾	11	.70	1.65	2.60
8 x 1⅜	¾	12	.90	1.90	2.95
9 x 1⅜	¾	13	1.20	2.40	3.05
9½ x 1½	¾	14	1.40	2.65	3.35
10 x 1⅝	⅞	15	1.50	2.85	3.80
10½ x 1¾	⅞	16	1.70	3.20	4.25

PRICES, FIGS. 8449 TO 8451.

Dimensions.		Iron bushed.			Roller bushed.		
Shell.	Mortise.	Single.	Double.	Triple.	Single.	Double.	Triple.
Inches.	Inches.	Each.	Each.	Each.	Each.	Each.	Each.
2	...	$0.22	$0.40	$0.56			
2½	...	.25	.45	.65			
3	9/16	.28	.48	.72	$0.54	$1.08	$1.54
3½	9/16	.31	.56	.80	.67	1.23	1.75
4	11/16	.36	.66	.90	.77	1.41	1.92
4½	⅞	.41	.74	1.02	.87	1.58	2.16
5	⅞	.45	.82	1.12	.96	1.76	2.40
6	1	.54	.99	1.35	1.08	2.07	2.97
7	1⅛	.72	1.33	1.84	1.28	2.45	3.52
8	1¼	.96	1.76	2.40	1.75	3.34	4.77
9	1¼	1.26	2.34	3.24	2.05	3.92	5.61
10	1⅜	1.80	3.30	4.50	2.98	5.66	8.04
12	1½	2.16	3.96	5.40	3.46	6.56	9.30
14	1⅝	3.30	6.50	9.00	5.02	9.94	14.16

LIGNUMVITÆ SHEAVES FOR BLOCKS.

IRON OR WOOD.

IRON BUSHED. **ROLLER BUSHED.**

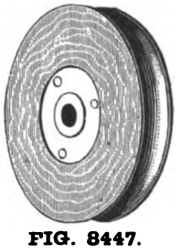


FIG. 8447.

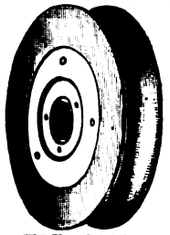


FIG. 8448.

PRICES.

Size of sheave.	Hole for pin, full size.	For block.	Common bushed.	Patent rollers.	Metaline.
Inches.	Inches.	Inches.	Each.	Each.	Each.
1¾ x ½	⅜	3	$0.09	$0.40	
2 x ⅝	⅜	3½	.10	.42	$0.60
2¼ x ⅝	⅜	4	.12	.45	.70
2¾ x ¾	⅜	4½	.15	.50	.80
3 x 13/16	⅜	5	.20	.55	.90
3½ x 1	½	6	.25	.65	1.40
4¼ x 1	½	7	.30	.75	1.50
4¾ x 1⅛	⅝	8	.35	1.00	1.85
5½ x 1⅛	⅝	9	.45	1.10	1.95
6½ x 1¼	¾	10	.55	1.35	2.40
7 x 1¼	¾	11	.70	1.65	2.60
8 x 1⅜	¾	12	.90	1.90	2.95
9 x 1⅜	¾	13	1.20	2.40	3.05
9½ x 1½	¾	14	1.40	2.65	3.35
10 x 1⅝	⅞	15	1.50	2.85	3.80
10½ x 1¾	⅞	16	1.70	3.20	4.25

LIGNUMVITÆ AND IRON SHEAVES.

FOR THICK MORTISE BLOCKS.

For block.....inches	8	9	10	11	12	13	14	15	16
Diam. of sheave, "	4¾	5⅜	6¼	7	8	9	9½	10	10½
Iron bushed....each	$0.40	$0.50	$0.65	$0.85	$1.05	$1.35	$1.50	$1.70	$2.00
Roller bushed... "	1.15	1.25	1.60	1.80	2.10	2.65	2.85	3.15	3.50
Metaline bushed "	2.00	2.10	2.75	2.95	3.25	3.60	3.75	4.10	5.50

BLOCKS FOR ROPE STRAPS, SHELLS RIVETED.

SINGLE. **DOUBLE.** **TRIPLE.**



FIG. 8449.



FIG. 8450.



FIG. 8451.

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WESTON'S DIFFERENTIAL PULLEY BLOCKS.

DIRECT.



FIG. 8452.

They hold the load at any point and cannot run down. Lifting and lowering effected by pulling opposite chains.

PRICES, FIG. 8452.

With these blocks one man can lift 1,000 lbs.

Capacity tons.	Blocks, per set, boxed.	Hoist, feet. See note.*	Extra chain, per foot.	Size of iron in chain, inch.	Weight complete, lbs.
1/8	$10.00	5	$0.35	3/16	11
1/4	13.00	6	.36	7/32	22
1/2	15.00	7	.38	1/4	30
1	20.00	8	.40	9/32	51
1 1/2	25.00	8 1/2	.42	5/16	81
2	30.00	9	.44	3/8	122
3	40.00	9 1/2	.48	7/16	173

*Note.—Figures denote approximate height which blocks, with regular lengths of chain, will hoist from level on which operator stands.

Extra lengths of chains. Allow about 4 feet of chain for each foot of extra hoist.

DOUBLE SCREW HOISTS.

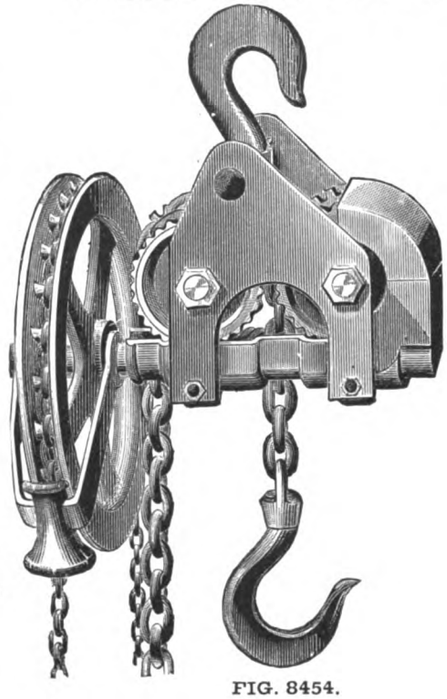


FIG. 8454.

DOUBLE CHAIN SCREW HOISTS.

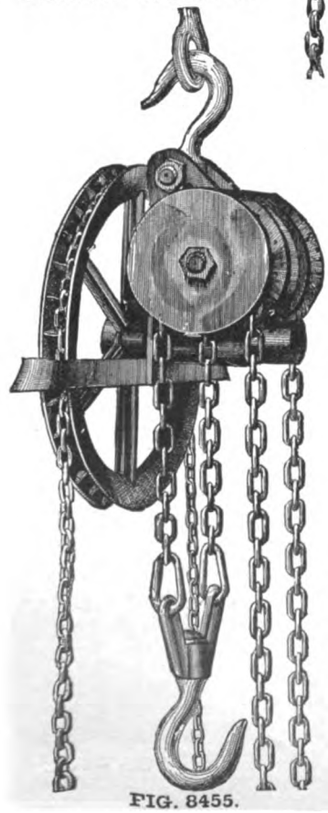


FIG. 8455.

PRICES.

Weight.	Lift.	To raise.	Prices.	Extra lift, per foot.
25 lb.	8 ft.	500 lb.	$22.50	$0.65
35 "	8 "	1,000 "	25.00	.75
50 "	8 "	2,000 "	30.00	.95
80 "	8 "	3,000 "	40.00	1.10
100 "	9 "	4,000 "	60.00	1.25
120 "	10 "	6,000 "	75.00	1.50
140 "	10 "	8,000 "	95.00	1.85
180 "	12 "	10,000 "	122.50	2.25
240 "	12 "	12,000 "	150.00	2.85
340 "	12 "	16,000 "	225.00	3.35
450 "	12 "	20,000 "	300.00	4.25

PRICES, FIG. 8455.

Weight of machine.	Lift.	To raise.	Prices.	Extra lift, per foot.
35 lb.	8 ft.	500 lb.	$22.50	$1.00
52 "	8 "	1,000 "	25.00	1.20
65 "	8 "	2,000 "	30.00	1.50
76 "	8 "	3,000 "	40.00	1.75
140 "	9 "	4,000 "	55.00	2.00
226 "	10 "	6,000 "	75.00	2.20
258 "	10 "	8,000 "	95.00	2.40
625 "	12 "	10,000 "	140.00	3.00
750 "	12 "	12,000 "	180.00	3.75
875 "	12 "	16,000 "	260.00	4.75
925 "	12 "	20,000 "	340.00	6.00

In ordering chains allow 4 feet of chain to each foot of lift. With these hoists a man can lift from 250 to 15,000 lbs.

GEARED.

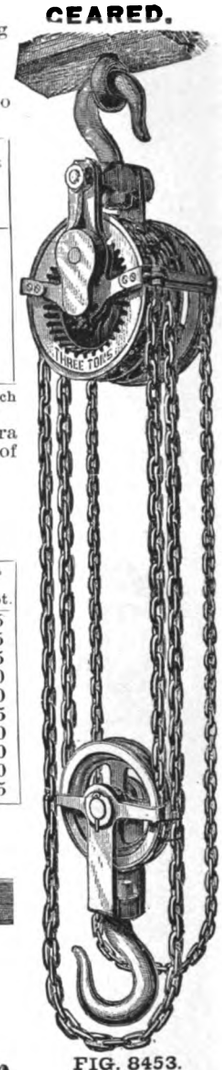


FIG. 8453.

PRICES, FIG. 8453.

With these blocks one man can lift from 2,000 to 5,000 lbs.

Capacity tons.	Blocks, per set, boxed.	Hoist, feet. See note.*	Extra main chain, per foot.	Size of iron in main chain, inch.	Size of iron in hand chain, inch.	Weight complete, lbs.
1	$35.00	8	$0.40	9/32	3/16	62
2	45.00	9	.44	5/16	3/16	109
3	60.00	10	.48	7/16	1/4	159
4	80.00	11	.54	1/2	1/4	257
5	110.00	12	.60	9/16	1/4	324
6	150.00	13	.70	5/8	1/4	499
8	210.00	14	.85	11/16	9/32	735
10	270.00	16	1.00	13/16	9/32	1,054

Extra length of chains. For each foot of extra hoist allow 2½ feet of main chain, and 2 feet of hand chain.

Extra hand chain, 38 cents per foot.

PRICES, FIGS. 8456 AND 8457.

Lift.	Class.	Capacity.	Weight.	Prices.	Extra lift, per foot.
8.0	Direct	500	25 lb.	$22.50	$1.25
8.0	"	1,000	40 "	25.00	1.25
8.0	"	2,000	55 "	30.00	1.25
10.0	Geared	4,000	90 "	55.00	1.50
10.0	"	6,000	125 "	75.00	1.50
10.0	"	8,000	160 "	95.00	1.75
12.0	"	10,000	245 "	125.00	2.00
12.0	"	12,000	350 "	150.00	2.50
12.0	"	16,000	450 "	230.00	3.00
12.0	"	20,000	550 "	300.00	3.25

DIRECT. GEARED.

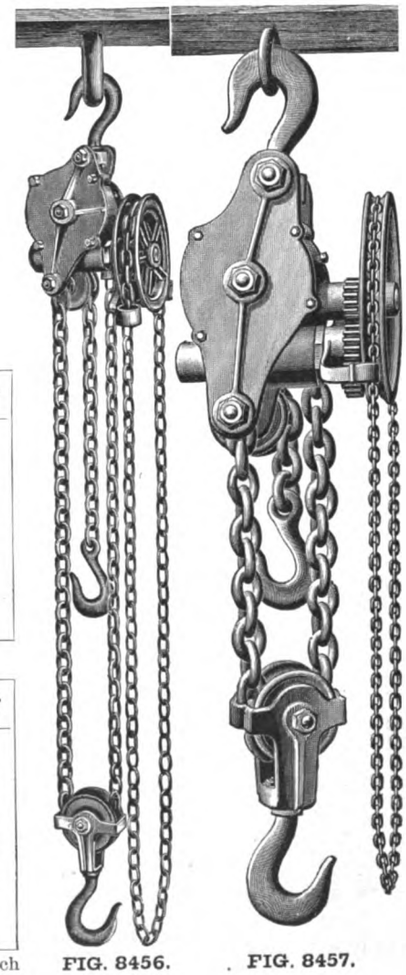


FIG. 8456. FIG. 8457.

QUICK LIFT SCREW HOISTS.

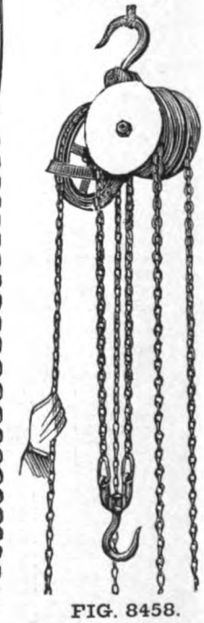


FIG. 8458.

Lift 8 feet each.

PRICES.

1,000 lbs.....	$25.00
2,000 "	30.00
3,000 "	40.00

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PULLEY BLOCKS.—CONTINUED.

TRIPLEX SPUR GEAR BLOCKS.



FIG. 8459.

PRICES, FIG. 8459.

Capacity, tons.	Prices, complete, boxed.	Regular hoist, feet.	Prices, extra hoist, per foot.	Weight, complete, lbs.
½	$30.00	8	$1.25	55
1	40.00	8	1.50	90
1½	50.00	8	1.75	120
2	60.00	9	2.00	150

Regular hoist means approximate height which blocks, with regular lengths of chain, will hoist from level on which operator stands.

PRICES, FIG. 8461.

To raise, lbs.	Prices.	To raise, lbs.	Prices.
500	$26.35	4,000	$64.86
1,000	29.41	6,000	87.86
2,000	35.25	8,000	110.25
3,000	46.41		

MOORE'S ANTI-FRICTION DIFFERENTIAL BLOCKS.

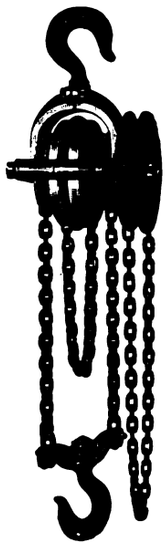


FIG. 8460.

PRICES, FIG. 8460.

Capacity, tons.	Prices, complete, with chains.	Extra main chain, per foot.	Extra hand chain, per foot.	Height of hoist, feet.*
1	$30.00	$0.44	$0.40	8
2	50.00	.52	.40	9
3	70.00	.60	.40	10
4	95.00	.70	.40	11

* Figures in fifth column denote approximate height which blocks, with regular lengths of chain, will hoist from level on which operator stands.

For every additional foot of hoist desired, 2 feet extra of both main and hand chain will be necessary.

PRICES, FIG. 8462.

ONE SPEED LIFT.

Capacity, tons.	Prices.	Lift, feet.	Extra lift, per foot.	Weight, complete, lbs.	Shortest distance from hook to hook, in.
¼	$22.50	8	$0.80	27	18
½	25.00	8	.90	47	19
1	30.00	8	1.00	73	20
2	50.00	9	1.40	147	27
3	70.00	10	1.70	193	28
4	95.00	10	2.10	236	36
5	125.00	12	2.60	308	38
6	160.00	12	3.20	350	42
8	225.00	12	3.90	675	45
10	300.00	12	4.75	825	51

All sizes above ½ ton have steel gears.

TWO SPEED LIFT.

Capacity, tons.	Prices.	Lift, feet.	Extra lift, per foot.	Weight complete, lbs.	Shortest distance from hook to hook, in.
5	$145.00	12	$2.60	335	38
6	180.00	12	3.20	380	42
8	250.00	12	3.90	705	45
10	330.00	12	4.75	860	51

BATT'S DIFFERENTIAL PULLEY BLOCKS.

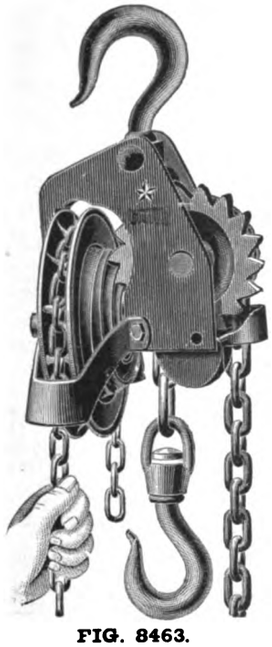


FIG. 8463.

EXTRA LENGTH OF LIFT FOR HOISTS.

In ordering extra lift allow two feet of hand chain and two feet of lift chain to each foot of lift, and state clearly whether so many feet of extra lift are wanted, or so many running feet of extra chain.

PRICES, FIG. 8463.

Weight, lbs.	Lift, feet.	To raise, lbs.	Prices.	Extra lift, incl'g both chains, per foot.	Weight, lbs.	Lift, feet.	To raise, lbs.	Prices.	Extra lift, incl'g both chains, per foot.
25	8	500	$18.00	$0.60	120	10	6,000	$60.00	$1.75
35	8	1,000	21.00	.75	140	10	8,000	80.00	2.00
50	8	2,000	25.00	1.00	180	12	12,000	125.00	3.00
80	8	3,000	30.00	1.25	240	12	16,000	175.00	4.00
100	9	4,000	45.00	1.50	340	12	20,000	225.00	5.00

PRICES, FIG. 8464.

The lift chain having a hook on each end, no lowering is required for a fresh load, as the wheel lifts in revolving either way, and it can be made for any height of lift. A very effective strap brake is supplied when required, which is of advantage in frequent lowering. Size, 1,000 lbs. Lifts 12 feet.

Price, with hand rope and load chain, without brake, $22.00 ; with brake, $27.00
" " chain " " " 25.00 " 30.00

Extra lift, including rope for hand, 50c. per foot.
" " chain " 75c. "

TEAL'S HOISTS.

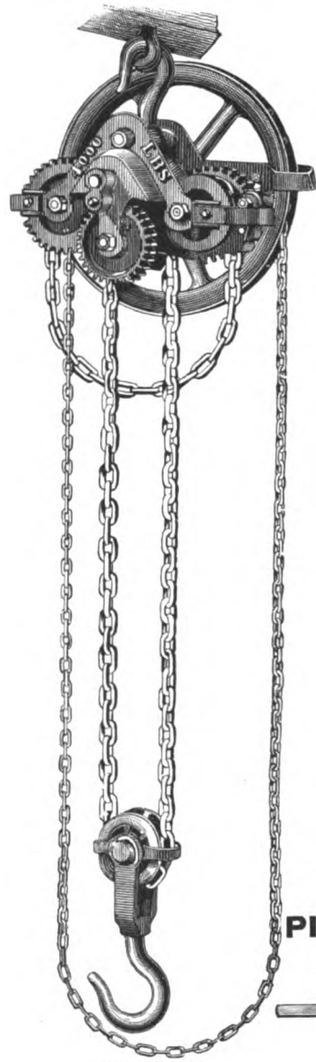


FIG. 8462.

DOUBLE HOOK SCREW HOISTS.



FIG. 8461.

PICKERING'S HOIST WHEELS.

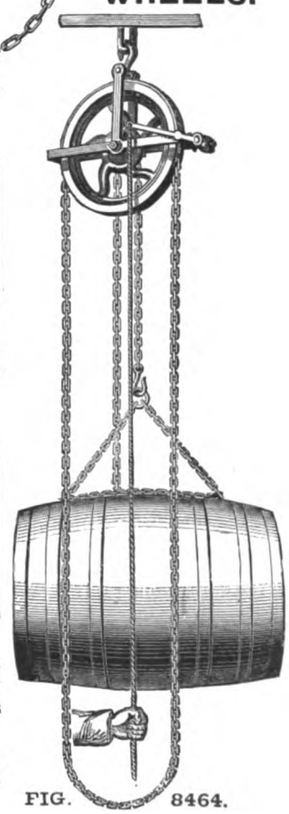


FIG. 8464.

This cut shows the brake.

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EADES' DIFFERENTIAL PULLEY BLOCKS.

STANDARD.

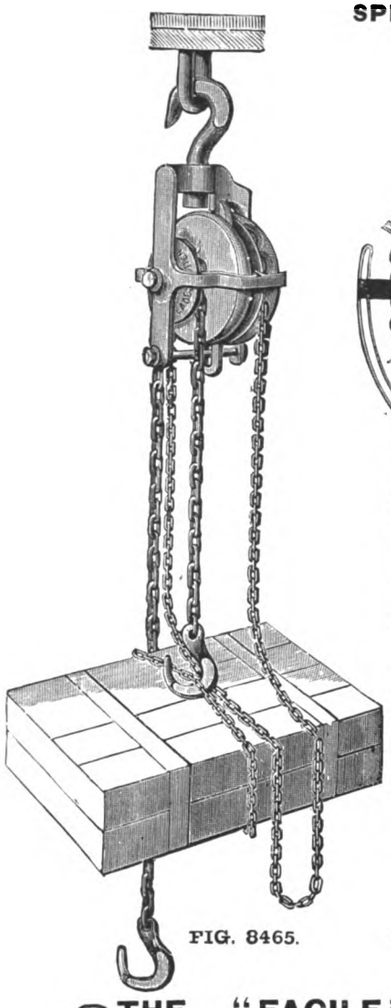


FIG. 8465.

GEARED WITH SPROCKET WHEEL.

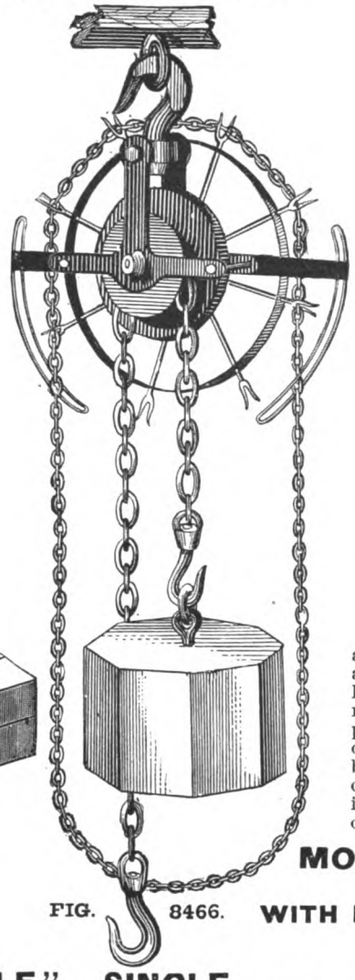


FIG. 8466.

PRICES, FIG. 8465.

Capacity.	Prices, complete.	Regular chain, will lift.	Extra chain, per foot lift.	Weight, complete.
¼ ton.	$13.00	7 feet.	$0.90	23 lbs.
½ "	15.00	7 "	1.10	28 "
1 "	20.00	8 "	1.40	45 "
1½ "	25.00	9 "	1.55	70 "
2 "	30.00	10 "	1.70	103 "
3 "	40.00	10 "	1.90	163 "
4 "	60.00	11 "	2.10	210 "

PRICES, FIG. 8466.

Capacity.	Prices, complete.	Regular chain will lift.	Extra chain, per foot lift.	Diam. of sprocket wheel.
3 tons.	$60.00	10 feet.	$1.90	2½ feet.
4 "	80.00	11 "	2.10	2¾ "
5 "	110.00	12 "	2.30	3 "
6 "	150.00	13 "	2.50	3¼ "
8 "	210.00	14 "	2.90	3½ "
10 "	275.00	16 "	3.25	3½ "

The price for extra chain includes one foot of lift chain and two feet of endless hand chain.

Very easy to work. One man can lift a ton. They sustain the load and cannot slip. The lifting chain has a hook at each end, and no lowering is required for a fresh load. The hand chain is independent of the lift chain, and can be worked at an angle, thus enabling the workman to stand from under the load. Having two chains there is less wear upon the links and sheaves, and consequently they last much longer than the ordinary differential pulley.

THE "FACILE" SINGLE CHAIN PULLEY BLOCK.



FIG. 8467.

This block is self-sustaining like the other differential pulley blocks, the load remaining suspended when the hand chain is "let go."

Lowering is effected by gently pulling the hand chain the reverse way, when the load will run down quickly, or it can be stopped at any point.

There is no bottom block, and the hook can be run up close to the top frame, making a very convenient block where the head room is small.

It has an endless hand chain independent of the load chain, and always remains the one length.

PRICES, FIG. 8467.

Capacity, tons.	Price, complete.	Regular chain in block will lift, feet.	Weight, each block, complete, lbs.
¼	$20.00	8	30
½	25.00	8	48
1	30.00	8	72
1½	40.00	9	108
2	53.00	10	156

PRICE OF EXTRA CHAIN.

Capacity, tons.	Each foot extra lift, including both chains.	Each foot, load chain.	Each foot, hand chain.
¼	$0.85	$0.35	$0.25
½	.90	.40	.25
1	1.20	.50	.35
1½	1.30	.60	.35
2	1.40	.70	.35

The length of chain required is one foot of load chain and two feet hand chain for each foot of extra lift.

It is not always necessary to have the hand chain as long as the load chain.

DESCRIPTION, FIGS. 8469 AND 8470.

Will hold the load at any point by means of an automatic brake. In lowering, the speed is regulated by a slight pull on the brake rope only, which releases the brake. The lowering can be stopped by pulling the brake rope hard or by letting go entirely.

MOORE'S HAND HOISTS, WITH LOCK BRAKES.

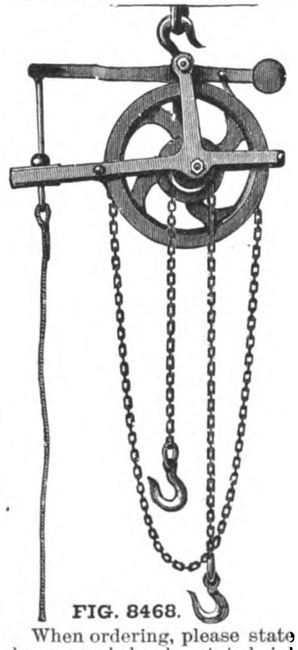


FIG. 8468.

When ordering, please state height from floor to the hook on which the hoist is to be suspended; also state height from floor on which the operator stands to the hook on which the hoist is to be suspended. The hand chain frequently need not be as long as the lifting chain. In hoisting out of a cellar, the operator often stands on a floor above, and in that case the hand chain need not reach down into the cellar.

If desired to lengthen the lifting chain only, add one foot of extra chain for every additional foot in height. To lengthen both hand chain and lifting chain, add three feet of extra chain for every additional foot in height.

PRICES.

No. 6. 600 lbs.; complete, with chains for 11 feet hoist; weight, 72 lbs $25.00
No. 12. 1,200 " " " " " 11 " " " 92 " 30.00
No. 20. 2,000 " " " " " 11 " " " 170 " 40.00

EXTRA CHAIN, PER FOOT, 25 CENTS.

ENERGY PORTABLE HOISTS.

NO. 1. **NOS. 2 AND 3.**

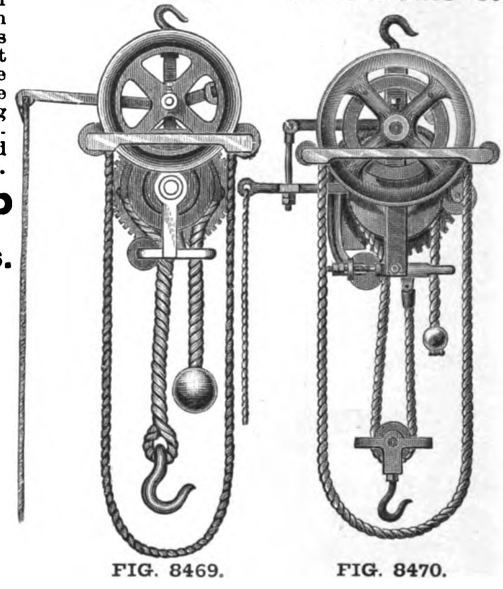


FIG. 8469. FIG. 8470.

PRICES.

Size .....No.	1	2	3
Capacity .....500 lbs.		1,000 lbs.	2,000 lbs.
Distance between hooks.	20 in.	26 in.	30 in.
Size of load rope.....	⅞ in.	⅞ in.	1 in.
Size of hand rope.....	¾ in.	¾ in.	1⅛ in.
Weight, minus rope.....	32 lbs.	36 lbs.	55 lbs.
Regular lift.....	8 ft.	9 ft.	10 ft.
Price, complete.....$15.00		$20.00	$25.00
Extra lift, per foot ....16 cents.		20 cents.	24 cents.
Price, without rope.....$14.00		$18.75	$23.50

PRICES, FIG. 8468.

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SELF-SUSTAINING ROPE PULLEY BLOCKS.



FIG. 8471.

The eccentric brake is put in action by pulling the hand rope to the right or left, which will hold the weight firmly at any point. To lower, pull down an inch; this will release the brake.

PRICES, FIG. 8471. ROPE EXTRA.

Sheave, size	2½ in.	3½ in.	4 in.	4¾ in.	5 in.	6 in. diam.
Each sheave will lift	1 cwt.	3 cwt.	5 cwt.	7 cwt.	10 cwt.	12 cwt.
Use rope	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in. diam.
1 set, 1 and 1 sheave	$5.10	$6.00	$6.90	$8.70	$10.50	$12.00 per set.
1 " 1 " 2 "	5.70	7.20	7.80	9.90	11.60	14.40 "
1 " 2 " 2 "	6.30	8.10	9.00	11.40	15.00	16.50 "
1 " 2 " 3 "	7.20	8.70	10.20	12.60	16.50	18.60 "
1 " 3 " 3 "	7.80	9.00	11.10	13.80	17.70	20.40 "
1 " 3 " 4 "	8.40	9.90	12.00	15.60	20.40	24.00 "
1 " 4 " 4 "	9.00	10.50	12.90	18.00	22.80	27.00 "

HOIST WHEELS.

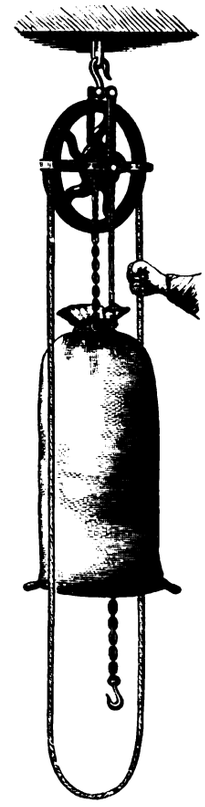


FIG. 8472.

PRICES, FIG. 8472.

Wheel in frame, $16.00; with brake, $5.00 extra. Rope and chain extra. Price of chain and hook, add 50 cents for each foot of lift, measuring from top hook to floor.

SURE-GRIP STEEL TACKLE BLOCKS.

NOS. 4 1-2, 5 1-2 AND 6 1-2.

NOS. 3, 4, 5 AND 6.



FIG. 8473.

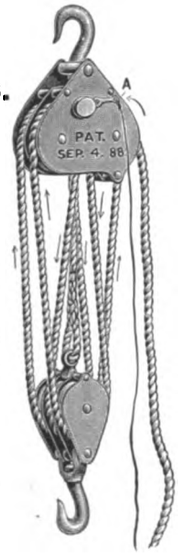


FIG. 8474.

PRICES, FIGS. 8473 AND 8474.

INCLUDING LOWER BLOCKS, ROPE EXTRA.

No. 3.—To be used with ⅜ inch rope.
One man can lift.....300 lbs.
Capacity.....600 " $3.00

No. 4.—To be used with ½ inch rope.
One man can lift.....350 lbs.
Capacity.....1,000 " 5.50

No. 5.—To be used with ⅝ inch rope.
One man can lift.....400 lbs.
Capacity.....1,800 " 7.00

No. 6.—To be used with ¾ inch rope.
One man can lift.....450 lbs.
Capacity.....2,500 " 8.50

No. 4½.—To be used with ½ inch rope.
One man can lift.....600 lbs.
Capacity.....3,000 " 10 00

No. 5½.—To be used with ⅝ inch rope.
One man can lift.....700 lbs.
Capacity.....3,500 " 12.00

No. 6½.—To be used with ¾ inch rope.
One man can lift.....850 lbs.
Capacity.....5,000 " 14.00

LANE'S AUTOMATIC LOCK STEEL CASE BLOCKS.

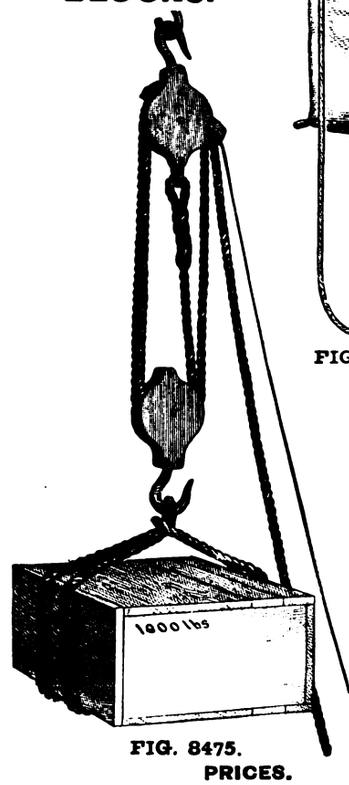


FIG. 8475.

PRICES.

No.	No. of sheaves.	Size rope.	Lbs. one man can hoist.	Lbs. capacity.	Prices, with rope for 10 feet hoist.	Without rope.
9	2 and 1	⅝	350	1,000	$6.50	$5.70
10	2 and 2	⅝	500	1,500	7.00	6.00
11	3 and 2	⅝	625	2,000	8.00	6.80
12	3 and 3	⅝	750	3,000	9.00	7.60
13	4 and 3	⅝	900	3,500	10.00	8.35
9	2 and 1	¾	350	1,250	7.80	6.50
10	2 and 2	¾	500	1,800	8.65	7.00
11	3 and 2	¾	625	2,500	10.00	8.00
12	3 and 3	¾	750	3,700	11.25	9.00
13	4 and 3	¾	900	4,000	12.50	10.00

COMBINED HOIST AND TROLLEY.

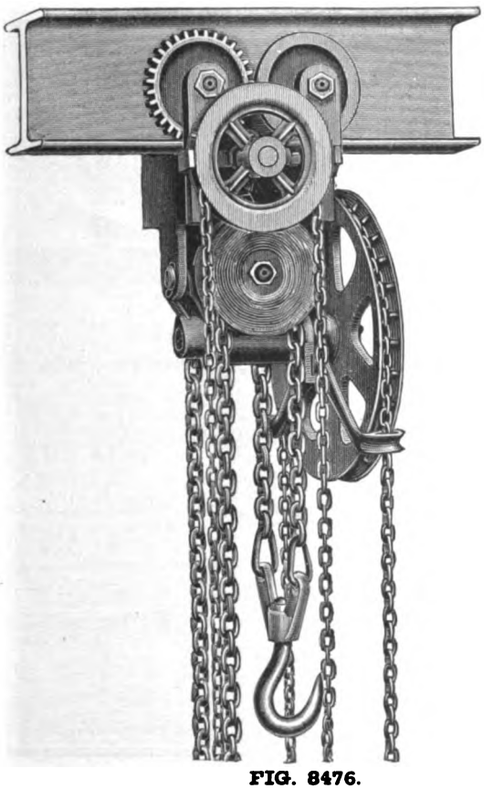


FIG. 8476.

PLAIN TROLLEYS.

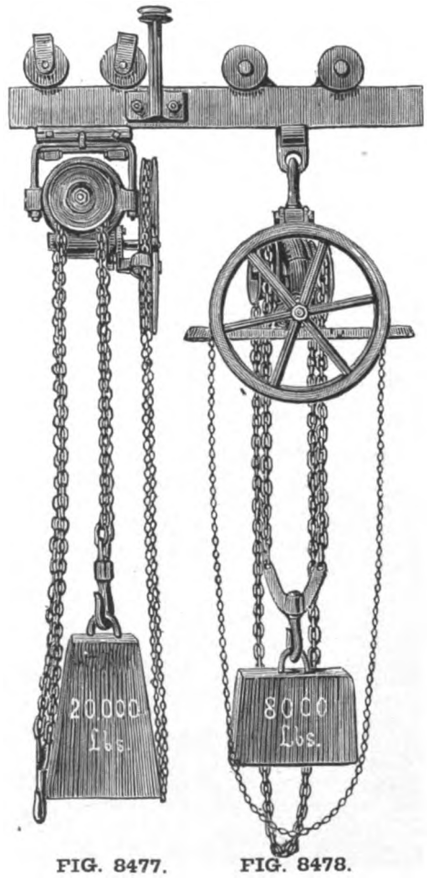


FIG. 8477. FIG. 8478.

PRICES, FIG. 8476.

Capacity, 2,000 lbs., lift, 8 feet..... $140.00
" 3,000 " " 8 " 150.00
" 4,000 " " 9 " 165.00
" 6,000 " " 10 " 192.00
" 8,000 " " 10 " 226.00
" 10,000 " " 12 " 271.00

This hoist is made to run on lower flange of I beam. A similar hoist is made to run on top of beam or on plain rail.

PRICES, TROLLEYS ONLY. FIGS. 8477 AND 8478.

Plain.....6 x 1 ..... $10.00
" .....4 x ¾ 8.66
" .....3 x ½ 6.70

FOR PRICES, HOISTS, SEE FIG. 8455.

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OVERHEAD TRAVELERS, TURNTABLES AND SWITCHES.

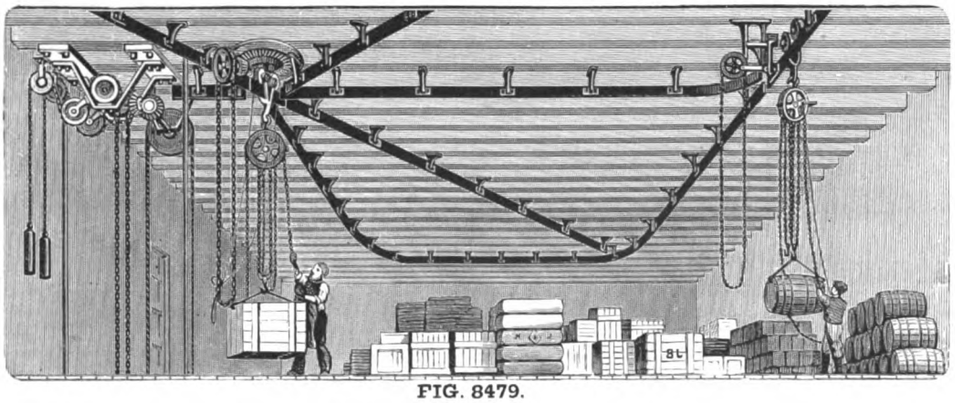


FIG. 8479.

HAND TRAVELING CRANES.

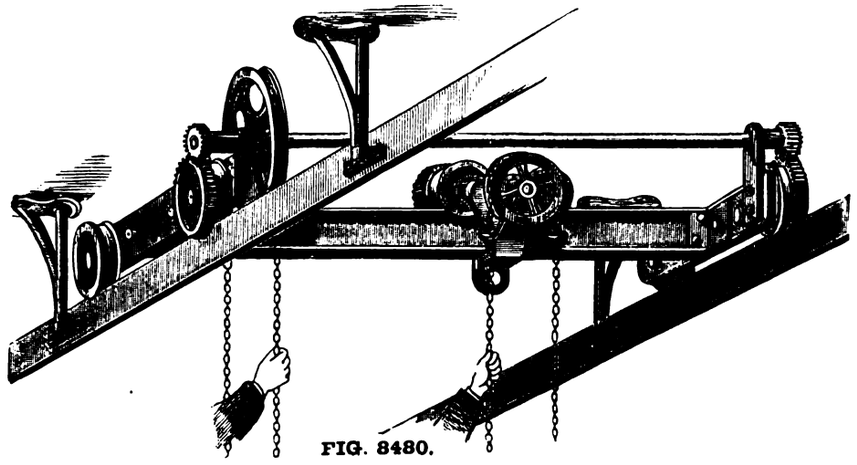


FIG. 8480.

With longitudinal or transverse hand movements, and can be used with any style of chain or rope hoists.

Prices on application stating full particulars of the requirements.

GEARED TRAVELER.



FIG. 8481.

DESCRIPTION, FIG. 8481.

The above device will recommend itself to any one accustomed to the use of overhead rail or tramway. The ordinary truck, when constructed of one or more wheels, and run by pushing or pulling the load at lower end of cage or sling, is very liable to lurch or jump, especially if running around a curve, often causing breakage of chain or rope, as may be in use, besides being a source of great annoyance to persons that may be on the floor over the truck.

The geared truck obviates all of the above trouble.

One man can run the heaviest load required with ease on a straight rail or round a curve, stopping and starting at any desired point, the truck running with perfect smoothness and disturbing no one.

DESCRIPTION, FIG. 8483.

The combined hoist and traveler is especially adapted to use where it can remain as a fixture on the rail. The distance from bottom of rail to load is considerably lessened.

In cases where steadiness of movement is required, this geared traveler is indispensable.

One man can raise and move the load, no matter how heavy, without perceptible jar.

These machines are also made to run on I beams.

PRICES.

Capacity.	Rail.	Price.
500 lbs., 1,000 "	3 x ½ rail	$24.00
2,000 " 3,000 " 4,000 "	4 x ¾ rail	24.00
6,000 " 8,000 " 10,000 "	6 x 1 rail	28.00

PRICES.

Rail fitted and bolted to hangers. Capacity.	Size of rail.	Per foot.	Hangers and bolts, five feet apart. Drop.	Prices, each.
500 lbs.	3 x ½	$0.45	7½ in.	$1.75
1,000 "	3 x ½	.45	9 "	2.00
2,000 "	4 x ¾	.68	12 "	2.50
3,000 "	4 x ¾	.68	16 "	2.80
4,000 "	4 x ¾	.68	18 "	3.00
6,000 "	6 x 1	1.25	24 "	3.10
8,000 "	6 x 1	1.25	30 "	3.50
10,000 "	6 x 1	1.25	36 "	3.90

Hangers may be cast or wrought iron, as preferred.

TURNTABLES AND SWITCHES.

For rail 3 x ½ turntable	$80.00
" " 4 x ¾ "	107.00
" " 6 x 1 "	134.00

Each for four connections.

Switches	$42.00
"	54.00
"	72.00

Two rail connections.

COMBINED HOIST AND TRAVELER, GEARED.

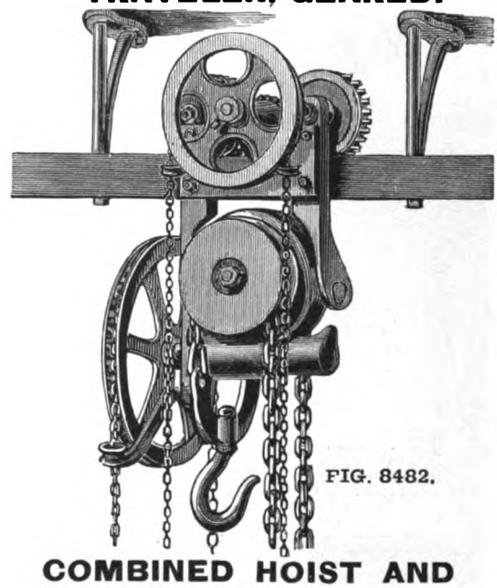


FIG. 8482.

COMBINED HOIST AND TRAVELER, PLAIN.

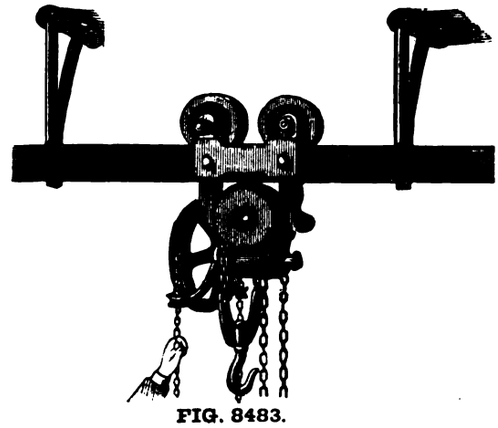


FIG. 8483.

PRICES.

Capacity.	Rail.	Plain. Fig. 8483.	Geared. Fig. 8482.
500 lbs.	3 x ½	$32.00	$50.00
1,000 "	3 x ½	34.50	52.50
2,000 "	4 x ¾	44.00	61.00
3,000 "	4 x ¾	52.00	71.00
4,000 "	4 x ¾	67.00	86.00
6,000 "	6 x 1	88.50	110.00
8,000 "	6 x 1	105.50	130.00

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OVERHEAD TRACKS, SWITCHES, ETC.

LONG LEVER SWITCHES.

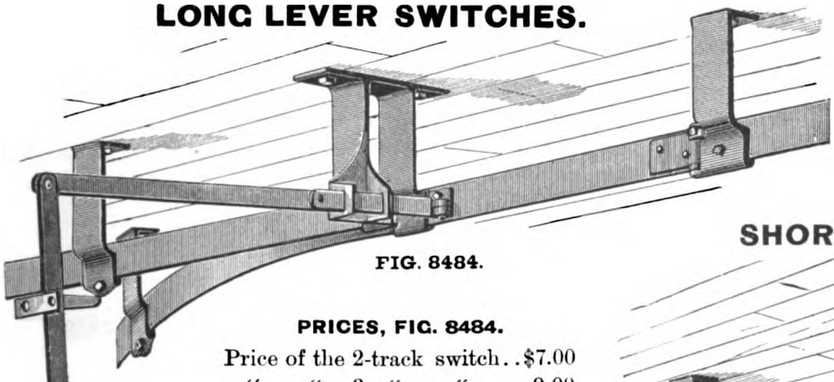


FIG. 8484.

These switches move the track only. There is no lost or side movement. The lever is connected with the slide which moves the track. This extension can be made any length according to the distance the main track is wanted from the wall. The lever is pivoted; it has a snap and positive lock.

PRICES, FIG. 8484.

Price of the 2-track switch	$7.00
" " 3 " "	9.00
" " 4 " "	11.00

PRICES, FIG. 8485.

Price of the 2-track switch	$6.00
" " 3 " "	8.00
" " 4 " "	10.00

The above prices include the hinge hanger and hinge track.

SHORT LEVER SWITCHES.

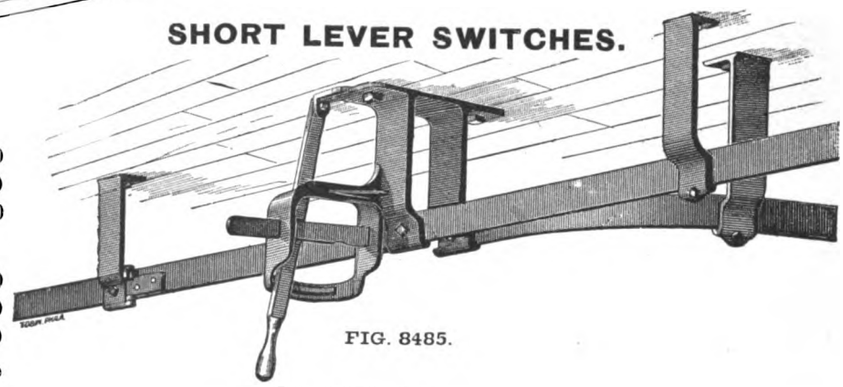


FIG. 8485.

HANGERS.

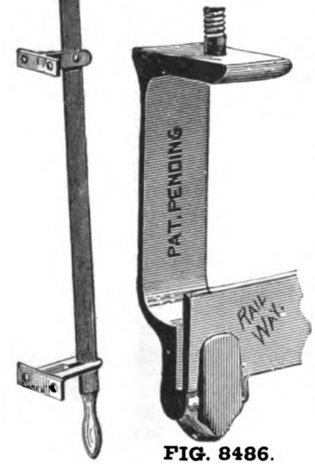


FIG. 8486.

With this hanger the track is not required to be drilled, as it is held in position by a clamp bolt, thereby saving the cost of drilling. It affords a cheap and simple manner of erecting the tracking. Any carpenter or mechanic can erect the track by simply putting the clamp bolt in the hole under the track and screwing up the nut on the back.

PRICES, FIG. 8486.

No. 1,	8½ inches	long	prices,	$0.45 each.
" 2,	10½ "	"	"	.50 "
" 3,	10¼ "	"	"	.55 "
" 4,	18 "	"	"	.75 "
" 5,	22 "	"	"	1.00 "
" 6,	3 feet	long	"	1.40 "
" 7,	3 "	"	"	1.40 "
" 8,	4 "	"	"	1.75 "
" 9,	5 "	"	"	2.25 "
" 10,	6 "	"	"	2.75 "

CHAIN SHIFTING HANGERS.

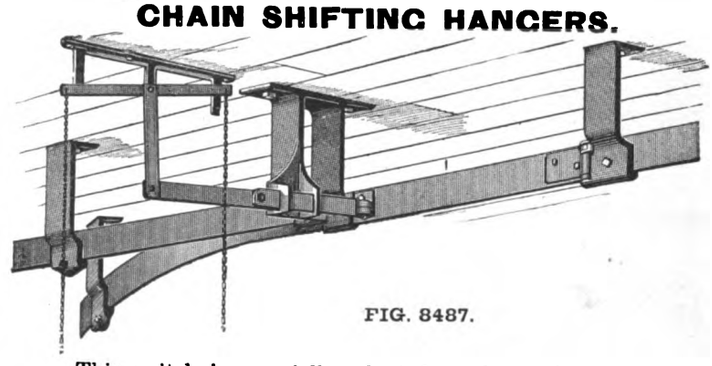


FIG. 8487.

This switch is especially adapted to places where there are no posts or walls to which to fasten the handle, also for cross-over switches. This switch has a snap and positive lock, and is operated with a chain at each end of the lever which is fastened to the ceiling.

DOCK STEAM CAPSTANS.

PRICES, FIG. 8488.
WITH NON-REVERSING ENGINES.

Capstan.	With double steam cylinders.	Approximate weight.	Prices.
No. A	4 x 4 inch.	1,125 lbs.	$310.00
" B	4 x 6 "	1,700 "	360.00
" C	4 x 6 "	2,400 "	410.00
" D	5 x 7 "	3,200 "	500.00
" E	6 x 8 "	4,200 "	550.00
" F	7 x 8 "	5,000 "	675.00
" F	8 x 8 "	5,200 "	725.00

For capstans with 4 x 4 and 4 x 6 reversing engines, add $40.00 to list for each size.

For capstans with 5 x 7, 6 x 8, 7 x 8 and 8 x 8 reversing engines, add $65.00 to list for each size.

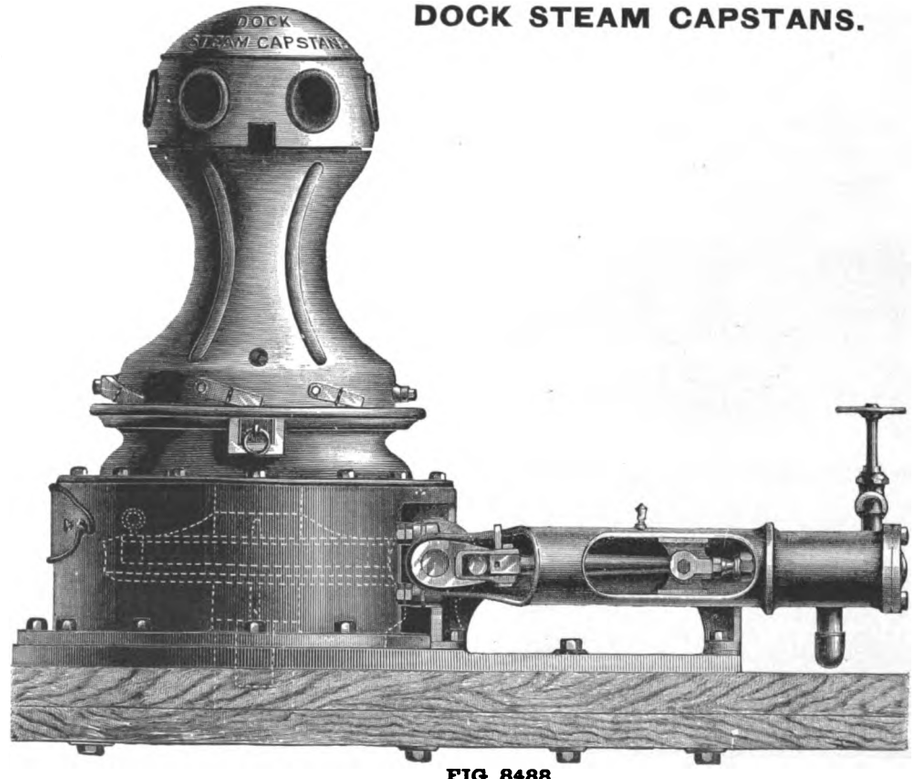


FIG. 8488.

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CAPSTANS.

CRANK.

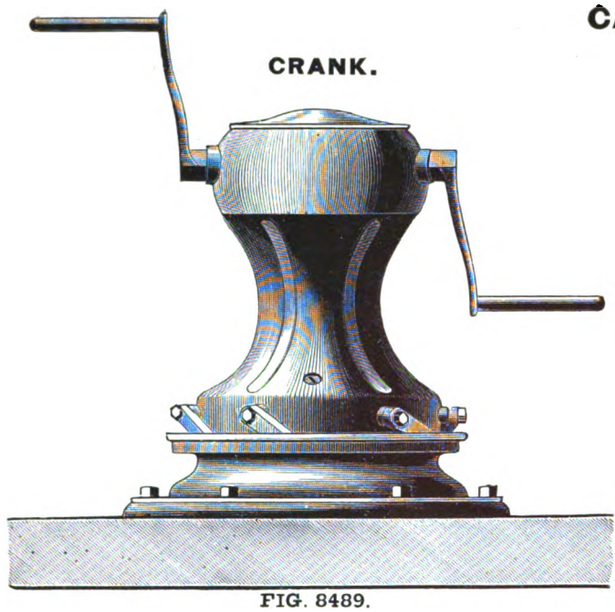


FIG. 8489.

Number.	Diameter of barrel.	Diameter of base.	Height.	Weight.	Size of ropes.	Prices.
0	7 in.	19 in.	21 in.	230 lbs.	3½ in.	$ .....
A	8 "	23 "	27 "	400 "	4 "	.....
B	8½ "	24½ "	31 "	600 "	4½ "	.....
C	9½ "	29½ "	34 "	800 "	5 "	.....
D	10½ "	32 "	36½ "	1,050 "	6 "	.....
E	11½ "	34 "	38½ "	1,300 "	7 "	.....
F	12½ "	37½ "	42 "	1,650 "	9 "	.....

POWER.

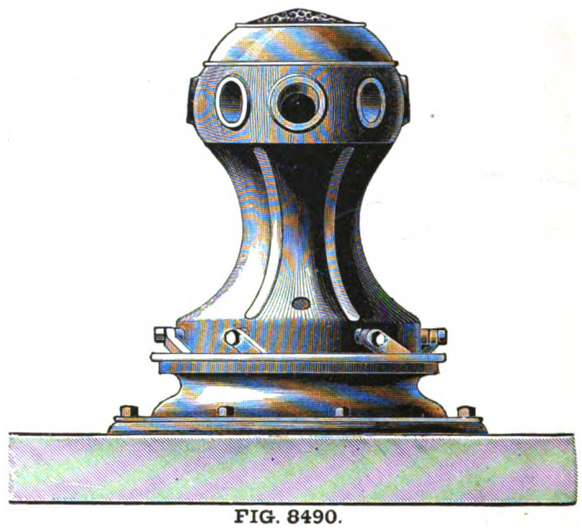


FIG. 8490.

Number.	Diameter of barrel.	Diameter of base.	Height.	Weight.	Size of ropes.	Prices.
0	7 in.	19 in.	20½ in.	240 lbs.	3½ in.	$ .....
A	8 "	23 "	27½ "	420 "	4 "	.....
B	8½ "	24½ "	31½ "	560 "	4½ "	.....
C	9½ "	29½ "	34½ "	850 "	5 "	.....
D	10½ "	32 "	37½ "	1,090 "	6 "	.....
E	11½ "	34 "	39½ "	1,300 "	7½ "	.....
F	12½ "	37½ "	43½ "	1,650 "	9 "	.....

CARGO WINCHES.

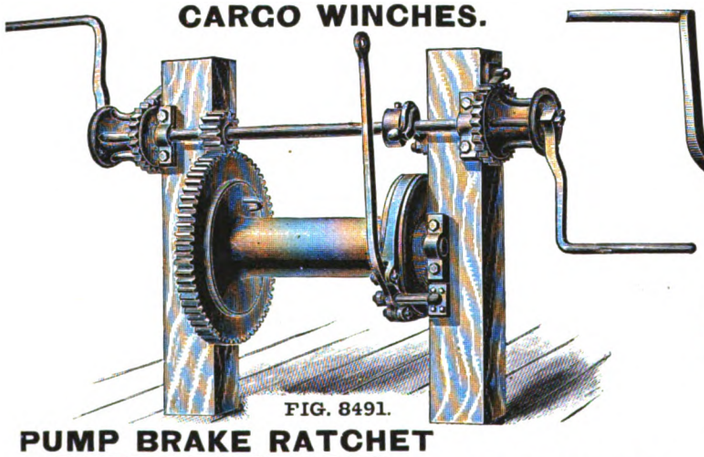


FIG. 8491.

PUMP BRAKE RATCHET GYPSEY WINDLASS.

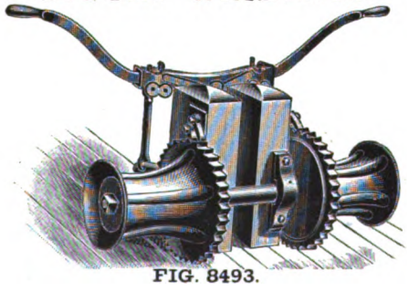


FIG. 8493.

PRICES, FIG. 8491.

Without gypsey ends, irons only.....$30.00
With two gypsey ends, irons only..... 35.00
With four gypsey ends, irons only..... 40.00

BARGE AND LIGHTER WINCHES.

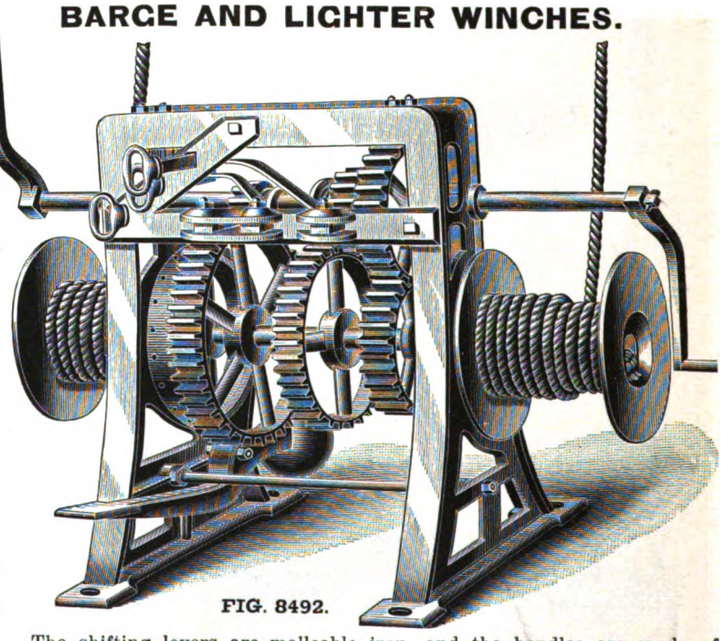


FIG. 8492.

The shifting levers are malleable iron, and the handles are made of wrought iron. It is geared 4½ to 1, 2½ to 1 and 1 to 1. Two men will lift, over a single purchase, twenty-two hundred pounds, twelve hundred pounds, and five hundred pounds respectively.

WEIGHT, 1,300 LBS. PRICE, $100.00.

RATCHET GYPSEY WINDLASS.

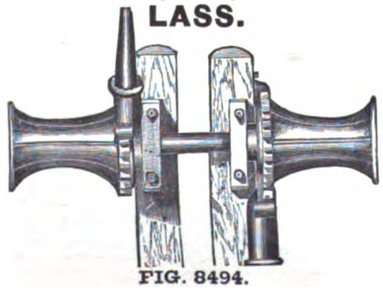


FIG. 8494.

PRICES, FIG. 8493.

Size.	Chain.	Diam. of head on outside end.	Length of head.	Diam. at middle.	Width of bitts outside.	Prices.
A	⅜	8¼	8½	5½	12	$30.00
B	½	10	10	7	14	38.00
C	⅝	12	12	7¼	15	48 00
D	11/16	13	13	7½	16	56.00
E	¾	13½	14½	8	17	65.00
F	13/16	14½	16½	8½	18	76.00
G	⅞	15½	18	9¼	19	85.00
H	1	16	20	10	20	125.00

PRICES, FIG. 8494.

Size.	Chain.	Diam. of head on outside end.	Length of head.	Diam. at middle.	Width of bitts outside.	Prices.
0		4½	5	2½	8	$8.50
1		5½	6	3	9	9.50
2		6	6½	3½	10	10.50
3		7	7½	4½	11	12.50
A	⅜	8¼	8½	5½	12	16.00
B	½	10	10	7	14	20.00
C	⅝	12	12	7¼	15	26.00
D	11/16	13	13	7½	16	32.00
E	¾	13½	14½	8	17	34.00
F	13/16	14½	16½	8½	18	43.00
G	⅞	15½	18	9¼	19	55.00
H	1	16	20	10	20	70.00

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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TREBLE PURCHASE HOISTING CRABS FOR MANILLA AND WIRE ROPE.

Will lift direct from the barrel the load as indicated, and is tested by dead weights to 25 per cent. above this load. The power is increased in proportion to the number of sheaves used in the pulley blocks; thus a pair of blocks 2 and 3 sheaves will increase it 5 times, making the number 406 a 30 ton crab, etc.

The side frames are wrought iron plate with cast iron bosses. The shafts are wrought iron, turned where the gearing is keyed on, and also where they run in the bearings. All the bearings are brass bushed. They are supplied with screw brake fitted to the second motion shaft.

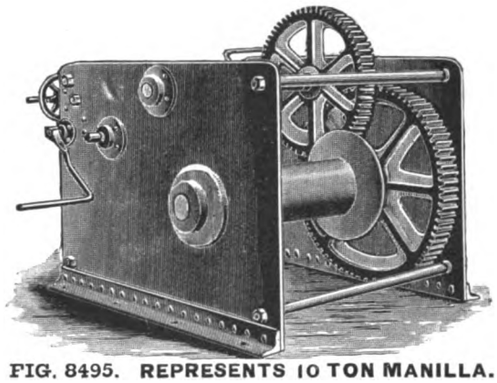


FIG. 8495. REPRESENTS 10 TON MANILLA.

PRICES, FIG. 8495.

FOR MANILLA ROPE CRABS.

Size No.	406	408	410	415	
Lifts direct from barrel	6	8	10	15	tons.
Size of barrel	36 x 9	39 x 10	42 x 12	42 x 15	inches.
Approximate weight	1¼	1½	2¼	3½	tons.
Price, with screw brake and brass bushing,	$560.00	$675.00	$860.00	$1,275.00	each.

FOR WIRE ROPE CRABS.

Similar to above cut but with larger barrels.

Size No.	503	504	505	508	
Lifts direct from barrel	3	4	5	8	tons.
Diameter of barrel	20	22	25	30	inches.
Length of barrel	21	22	24	27	"
Circumference of wire rope recommended,	3	3½	4	5	"
Length taken in one lap	110	120	130	140	feet.
Approximate weight	1¼	1½	2¼	3½	tons.
Price, with screw brake and brass bushing,	$560.00	$675.00	$860.00	$1,275.00	each.

DESCRIPTION, FIGS. 8496 AND 8497.

SINGLE PURCHASE CARGO WINCHES OR HOISTING CRABS.

These crabs are constructed to lift direct from the barrel the load plainly indicated on the side frames. The power is increased by the number of pulleys used in the blocks. Sides are tied together by wrought stretcher rods with solid collars inside of the frames and nuts outside. The barrel shafts are wrought iron. The barrel, brake wheel and ratchet are cast in one piece and secured to the main spur wheel by joggles fitting between the arms of the wheel. The crank shaft can be thrown out of gear when lowering with the brake, so the handles will not fly around. Can be lowered with either the brake or handles.

PRICES, FIG. 8496.

Size No.	101	102	103	104	
Lifts with a 2 and 3 sheave pulley block	2	3	4	5	tons.
Lifts direct from barrel	8	12	16	20	cwt.
Size of barrel	12 x 4½	14 x 4½	16 x 4½	18 x 4½	inches.
Approximate weight	250	280	340	365	lbs.
Prices, with lever brake	$30.00	$32.00	$37.00	$42.00	each.
Extras, if ordered. Screw brake	3.50	3.50	3.50	3.50	"
Extras, if ordered. Brass bushing	6.50	6.50	7.00	7.50	"

PRICES, FIG. 8497.

Size No	131	132	133	134	
Capacity and dimensions as above	2	3	4	5	tons.
Prices, with lever brake	$43.00	$45.00	$52.00	$57.00	each.
Extras, if ordered. Screw brake	3.50	3.50	3.50	3.50	"
Extras, if ordered. Brass bushing	6.50	6.50	7.00	7.50	"

DESCRIPTION, FIG. 8498.

These hoists are simple and durable; they are noiseless in working, and require but one lever for throwing the wheels in and out of gear, and putting on the brake.

This lever is worked either at the machine, or on any floor, by means of ropes extending to any part of the building. We have them in use where the lever is weighted, so that on letting go the rope, the lever will fall and stop the machine.

These machines are specially adapted for fast hoisting and lowering. Any number of drums can be worked off the same shaft.

The size of drum can be altered to suit requirements.

The size of belt pulley is regulated by the required speed of hoisting, consequently we do not include it in our prices; we give the size advisable for the load and recommend as large a diameter as possible to give ample power of belt. These machines are constructed with combined frictional and spur gear for heavy and slow hoisting, when required.

PRICES.

No. of pattern.	Pitch diameter of friction wheels. Inches.	Drum. Diameter x length.	Hoisting capacity. Lbs.	Size of belt pulley advisable.	Prices, without pulley or woodwork.
101	20 to 5	5 x 11	400	24 x 4	$.....
102	24 to 6	8 x 23	600	26 x 6	.....
103	33¾ to 7¾	10 x 24	1,200	30 x 8	.....
104	38¼ to 8¼	12 x 24	1,500	34 x 8	.....
105	42¾ to 10⅜	15 x 24	2,000	36 x 10	.....

SINGLE PURCHASE, CAST IRON SIDES, WITH STRAP BRAKE AND LEVER.

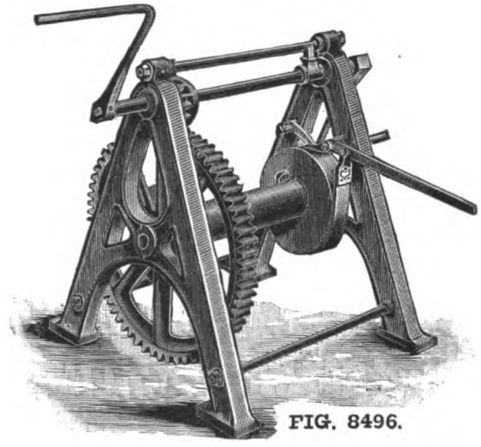


FIG. 8496.

SINGLE PURCHASE, WROUGHT IRON SIDES, SHOWING SCREW BRAKE.

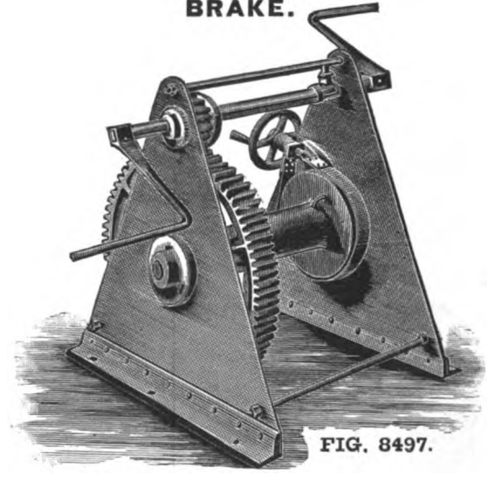


FIG. 8497.

POWER HOISTS FOR WAREHOUSES, FACTORIES, ETC.

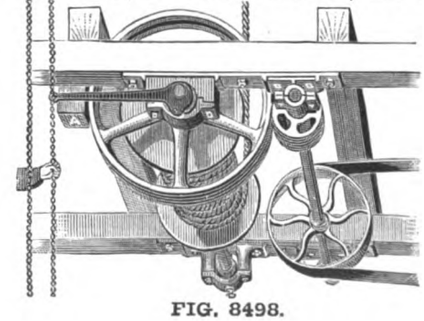


FIG. 8498.

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DOUBLE PURCHASE WINCHES OR HOISTING CRABS.

CAST IRON SIDES, SHOWING SCREW BRAKE.

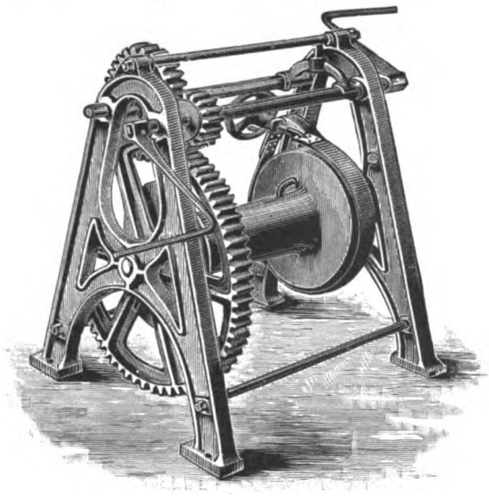


FIG. 8499.

DOUBLE PURCHASE, WROUGHT IRON SIDES, WITH STRAP BRAKE AND LEVER.

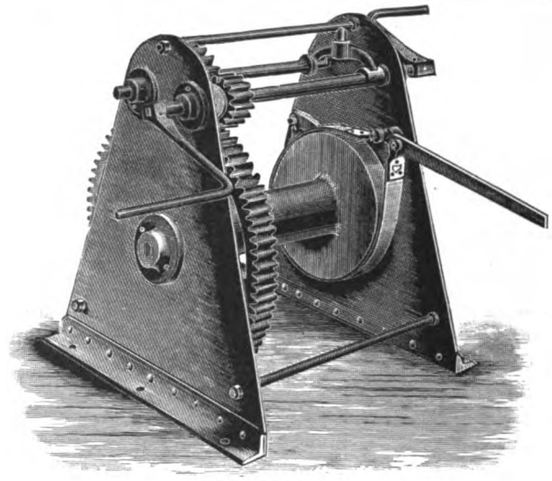


FIG. 8500.

PRICES, FIG. 8499.

Lifts with a two and three sheave pulley block	4	5	6	7	8	10	12	15	20 tons.
Lifts direct from barrel	16	20	25	30	35	40	50	60	80 cwt.
Size of barrels	16 x 4½	18 x 4½	19 x 5	20 x 5	21 x 6	21 x 6	22 x 7	26 x 8	32 x 8 inches.
Approximate weight	365	420	535	615	650	760	1,120	1,700	2,460 lbs.
Prices, with lever brake	$40.00	$46.00	$59.00	$64.00	$69.00	$75.00	$82.00	$104.00	$180.00 each.
Extras, if ordered. Screw brake	5.00	5.00	5.00	5.00	5.00	10.00	10.00	10.00	10.00 "
Extras, if ordered. Brass bushing	8.50	9.00	9.50	10.00	10.50	11.00	12.00	15.00	19.00 "

PRICES, FIG. 8500.

Capacity and dimensions as above	4	5	6	7	8	10	12	15	20 tons.
Prices, with lever brake	$58.00	$64.00	$78.00	$83.00	$89.00	$95.00	$103.00	$125.00	$200.00 each.
Extras, if ordered. Screw brake	5.00	5.00	5.00	5.00	5.00	10.00	10.00	10.00	10.00 "
Extras, if ordered. Brass bushing	8.50	9.00	9.50	10.00	10.50	11.00	12.00	15.00	19.00 "

The double purchase crab is arranged with two speeds, and can be worked either single or double purchase. The crank shaft can be thrown out of gear when lowering with the break, so the handles will not fly around. Lowering can be done either with the handles or with the brake. The power is increased or diminished by the number of pulleys used in the blocks.

WIRE ROPE HOISTING CRABS.

These crabs are constructed similar to those shown, Figs. 8499 and 8500, but with barrel of larger diameter. The capacity as stated is the "lift" direct from the barrel, but the power is increased in proportion to the number of sheaves in the pulley blocks used with the crabs.

PRICES, FIG. 8499.

Lifts direct from barrel	8	12	18	25	30	40	cwt.
Size of barrel	13x7½	14x10	15x11	16x12½	18x14	20x15	in.
Circum. of wire rope recommended.	1¼	1½	1¾	2	2¼	2½	"
Length taken in one lap	60	70	75	80	90	100	ft.
Approximate weight	400	550	670	1,100	1,670	2,350	lbs.
Prices, with lever brake	$40.00	$59.00	$69.00	$82.00	$104.00	$180.00	ea.
Extras, if ordered. Screw brake	5.00	5.00	5.00	10.00	10.00	10.00	"
Extras, if ordered. Brass bushing,	8.50	9.50	10.50	12.00	15.00	19.00	"

PRICES, FIG. 8500.

Lifts direct from barrel	8	12	18	25	30	40	cwt.
Size of barrel	13x7½	14x10	15x11	16x12½	18x14	20x15	in.
Circum. of wire rope recommended.	1¼	1½	1¾	2	2¼	2½	"
Length taken in one lap	60	70	75	80	90	100	ft.
Approximate weight	400	550	670	1,100	1,670	2,350	lbs.
Prices, with lever brake	$58.00	$78.00	$89.00	$103.00	$125.00	$200.00	ea.
Extras, if ordered. Screw brake	5.00	5.00	5.00	10.00	10.00	10.00	"
Extras, if ordered. Brass bushing,	8.50	9.50	10.50	12.50	15.00	19.00	"

HATCHWAY HOIST, WITH LENGTHENED SHAFT.

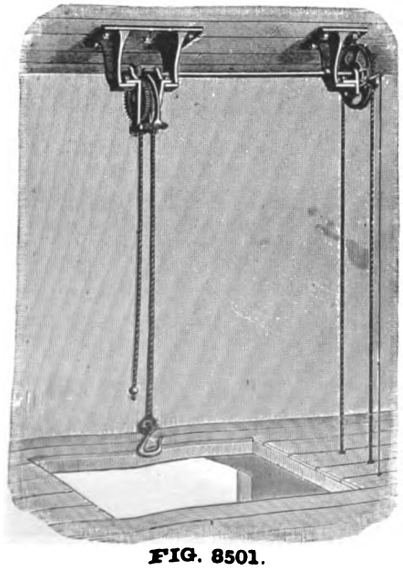


FIG. 8501.

They will lift to their full capacity with perfect safety to the operator.

Diameter of hand wheel, 20 inches.

Size of rope, ⅞ inch.

No.	Lift. Feet.	To raise. Lbs.	Prices.	Extra lift, per ft.
6	16	500	$30.00	$0.20
7	16	1,000	35.00	.28

In ordering, state distance from center of hatchway to hand rope.

Extra lift includes all ropes.

OUT-RIGGER HOIST.

These hoists are protected from the weather, being inside of building. The only part exposed is the rope with hook. The hand rope can be made any length and can be used from first floor when desired. When ordering, state length of rope required, also distance from floor to beam on which hoist is bolted, as we furnish hand rope for a height of ten feet. Also give distance from hoist to wheel on end of beam outside of building.

Diameter of hand wheel, 20 inches.

Size of rope, ⅞ inch.

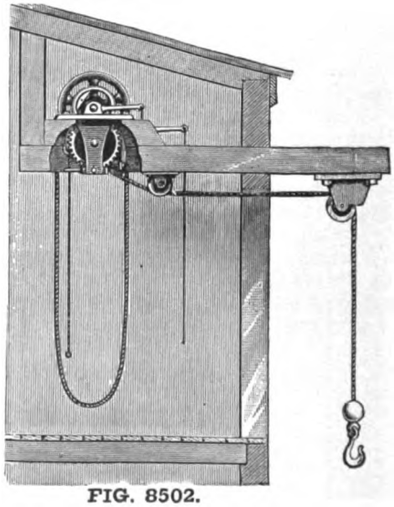


FIG. 8502.

No.	Lift. Feet.	To raise. Lbs.	Price.	Extra lift, per foot.
8	16	500	$25.00	$0.20
9	16	1,000	30.00	.28

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CRABS AND WINCHES.

SAFETY CRABS.

NOS. 25 & 23.

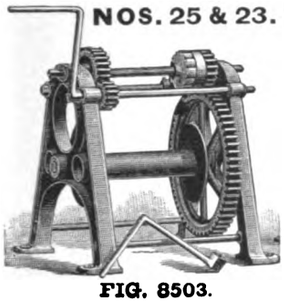


FIG. 8503.

NO. 22.



FIG. 8504.

NO. 21.

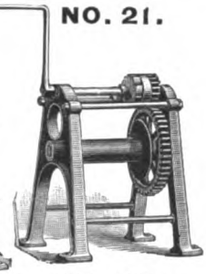


FIG. 8505.

WINCHES.

FOR SINGLE SHEAR POLE.

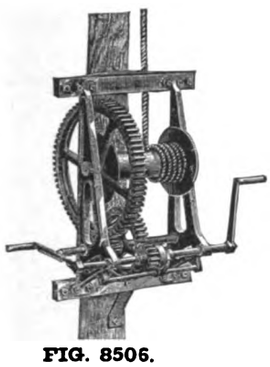


FIG. 8506.

FOR DOUBLE SHEAR POLES.

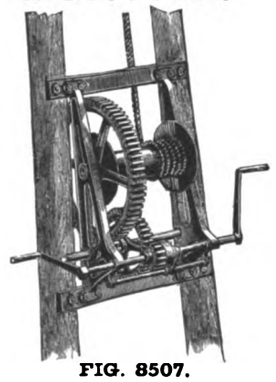


FIG. 8507.

DESCRIPTION.

Winches are furnished for double and single pole, at same prices. Always shipped for use with double poles, unless otherwise ordered.

The handles of these crabs and winches cannot fly back. The load is always self-sustained by the automatic action of the patent safety brake, so that the handles may at any time be "let go," in which case the load will remain suspended and will not run down.

If rapid lowering under control of brake is desired, any of our crabs or winches can be furnished with a supplemental strap brake in addition to safety brake.

PRICES, FIGS. 8503 TO 8507.

No. of crab.	No. of winch.	Regular size of barrel. Diameter.	Regular size of barrel. Length.	Capacity. Direct on barrel.	Capacity. With single block.	Changes of speed.	Prices, irons only. With regular length of barrel.	Prices, irons only. Extra for each 6 ins. of barrel.
21	31	4½ in.	12 in.	½ ton.	1 ton.	One.	$35.00	$5.00
22	32	5 "	16 "	1 "	2 "	Two.	45.00	6.00
23	33	6 "	20 "	1½ "	3 "	Two.	65.00	7.50
25	35	7 "	24 "	2½ "	5 "	Two.	100.00	10.00

PORTABLE CARGO WINCH.

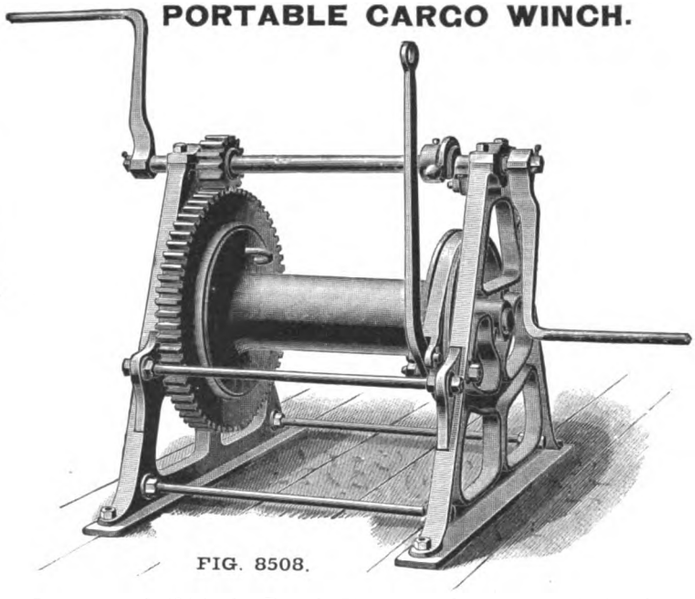


FIG. 8508.

It is geared 4¾ to 1. Barrel, 7¼ inches diameter, 21 inches long. Weight, without outside heads, 600 pounds.

PRICES.

Price	$50.00
" with two gipsey heads	55.00
" " four " "	60.00

LIGHT SWING CRANES.

DESCRIPTION, FIG. 8510.

With double lift and automatic safety brake.

Hand ropes are spliced, or endless, unless otherwise ordered, and of proper length for use with machines of regular "height of hoist." Two iron "guide eyes" go with each rope; extra guide eyes, 50 cents per pair.

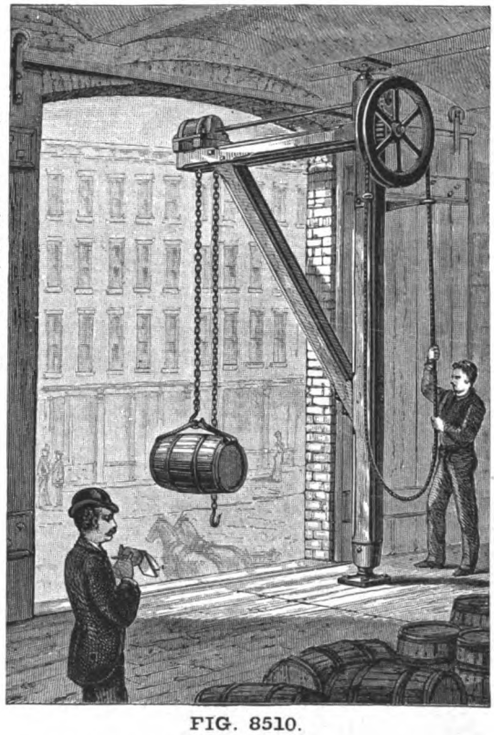


FIG. 8510.

PRICES, FIG. 8510.

No.	Capacity.	For hoist of..... or less.	For radius of..... or less.	Prices, complete, except hand rope or chain.	For each additional foot of hoist.	Hand rope or chain. Price extra for hoists given. Rope.	Chain.
2	1,000 lbs.	14 feet.	10 feet.	$90.00	$0.50	$2.75	$4.25
3	1,500 "	16 "	12 "	110.00	.60	3.00	4.75
4	2,000 "	18 "	14 "	130.00	.65	3.25	5.25

Extra radius, under 20 feet..... per foot, $1.00

Above prices include the "double lift," top and bottom steps, and other iron work; everything except the wooden frames.

SWING CRANE, WITH TRAVELING HOIST.

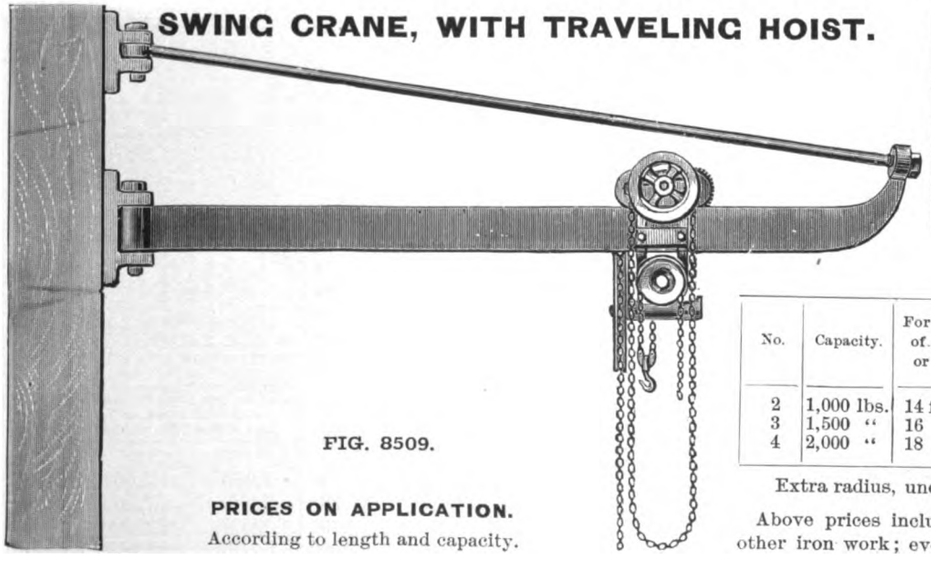


FIG. 8509.

PRICES ON APPLICATION.

According to length and capacity.

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5 TON WINCH, SINGLE DRUM, SINGLE PURCHASE.

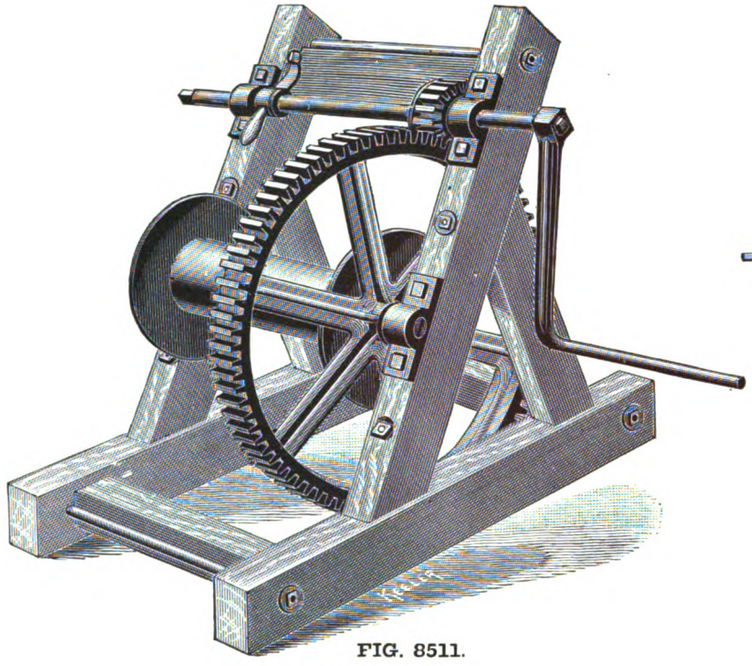


FIG. 8511.

5 TON WINCH, SINGLE DRUM, SINGLE PURCHASE.

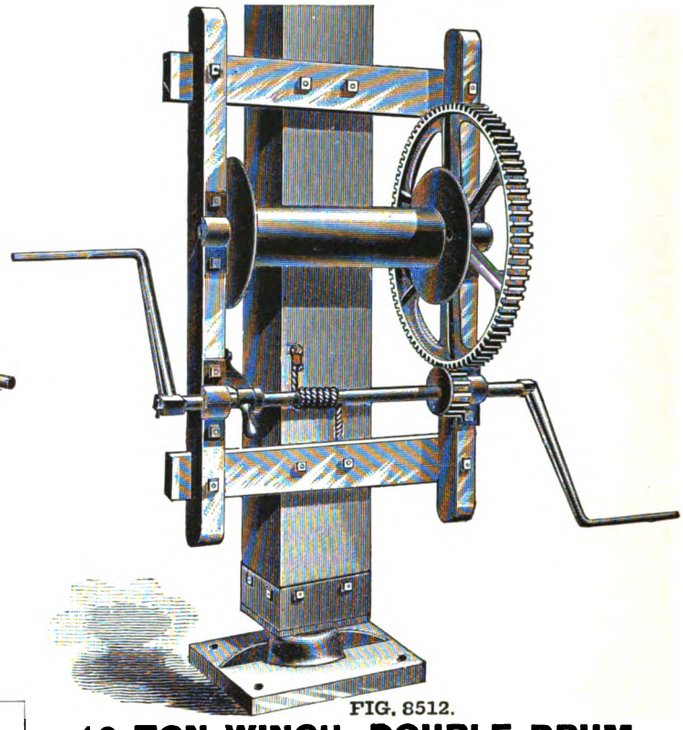


FIG. 8512.

PRICES.

Size.	Kind of rope.	Diam. of drum.	Length of drum between flanges.	Load for two men, single line.	Load for two men, single block.	Prices, Fig. 8511.	Prices, Fig. 8512.
A	Manilla.	6	21	1,700	3,400	$35.00	$30.00
B	"	6	26	1,700	3,400	37.00	32.00
C	"	6	30	1,700	3,400	38.00	33.00
D	Wire.	9	16	1,200	2,400	35.00	30.00
E	"	9	21	1,200	2,400	37.00	32.00

All prices on this page cover iron work only.

10 TON WINCH, DOUBLE DRUM, DOUBLE PURCHASE.

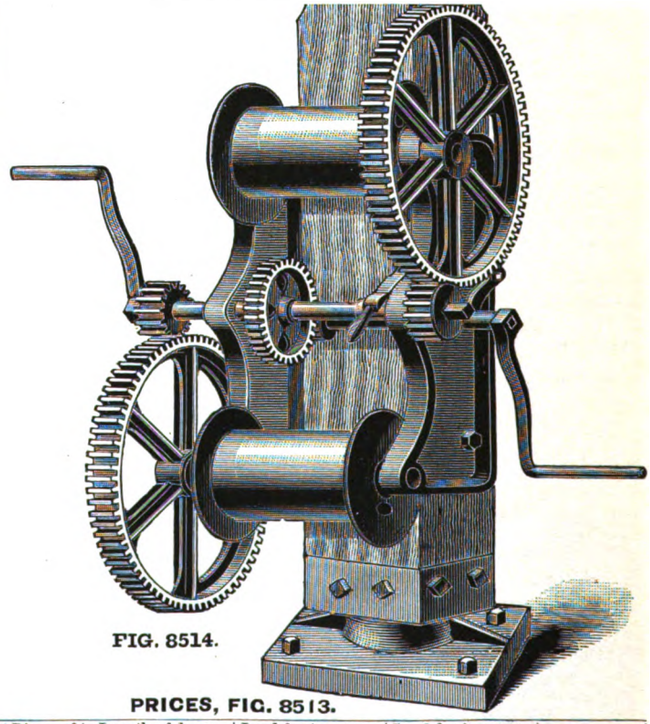


FIG. 8514.

5 TON WINCH, DOUBLE DRUM, SINGLE PURCHASE.

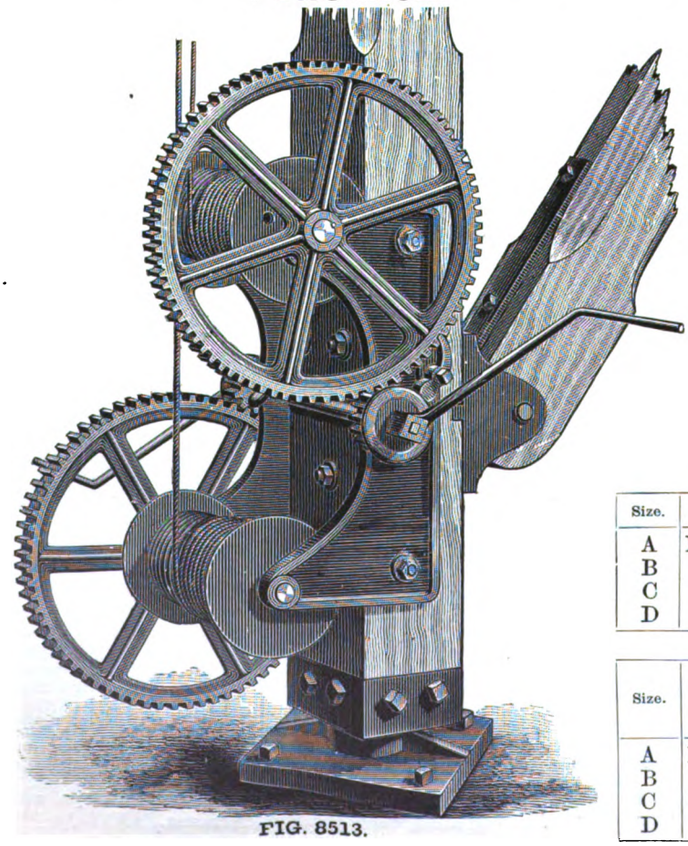


FIG. 8513.

PRICES, FIG. 8513.

Size.	Kind of rope.	Diam. of rope.	Length of drum between flanges.	Load for two men, on single line.	Load for two men, with single block.	Prices.
A	Manilla.	6	21	1,700	3,400	$50.00
B	"	6	26	1,700	3,400	53.00
C	Wire.	9	16	1,200	2,400	50.00
D	"	9	21	1,200	2,400	53.00

PRICES, FIG. 8514.

Size.	Kind of rope.	Diam. of drum.	Length of drum between flanges.	Load for two men, with single block.		Load for two men, with single and double block, or four men with single block.		Prices.
				Fast speed.	Slow speed.	Fast speed.	Slow speed.	
A	Manilla.	6	21	3,400	7,500	7,000	17,500	$65.00
B	"	6	26	3,400	7,500	7,000	17,500	68.00
C	Wire.	9	16	2,400	5,000	5,000	12,000	65.00
D	"	9	21	2,400	5,000	5,000	12,000	68.00

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DERRICK FIXTURES.

MAST-HEAD JOINTS.



FIG. 8515.

GAFF JOINTS.

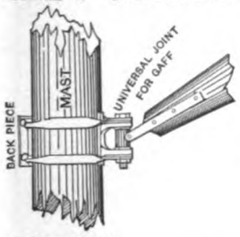


FIG. 8516.

GAFF BANDS.



FIG. 8517.

MAST AND GAFF.

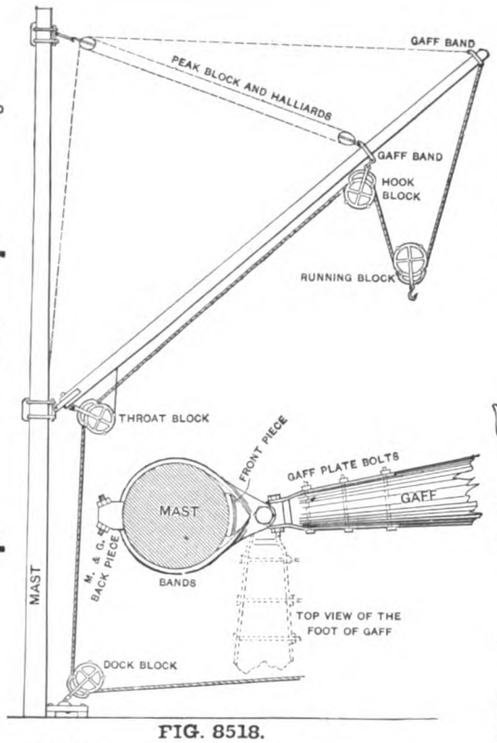


FIG. 8518.

PRICES.

Fittings for handling one-ton tubs, mast-head joint with straps to fit a mast 12 or 13 inches diameter at the top, and clevis for attaching the "peak blocks."	$19.00
Universal joint for foot of the gaff, with straps to fit a mast 16 to 17 inches in diameter, and plates and bolts for fastening the foot of the gaff.	19.00
One pair—two blocks—peak blocks, but not including rope..	8.50

HEAVY FITTINGS TO HANDLE FIVE-TON LOADS.

Mast-head joint as above, but heavy....	$45.00
Gaff joint " "	45.00
Peak blocks " "	10.50

BLOCKS FOR HANDLING LOADS NOT EXCEEDING 2,000 LBS. WITH MANILLA ROPE.

Hook block, sheave	16	in. diam.,	$24.00
Throat " "	16	" "	24.00
Running " "	16	" "	24.00
" " "	10	" "	20.00
Bolt dock block "	16	" "	33.00
Screw " " "	16	" "	33.00

DESCRIPTION, FIG. 8521.

This illustrates a steam crane designed for use on railroad track, and is provided with machinery for hoisting, revolving, altering radius of jib and traveling by its own power. All these motions are performed by a pair of direct-acting engines, one on each side, connected to same crank shaft.

PRICES, FIG. 8521.

Pattern number.	Cylinder. Bore.	Cylinder. Stroke.	Durable hoisting capacity with 2 parts of chain.	Radius of jib.	Estimated shipping weights.	Prices. To hoist and revolve with fixed jib.	For altering radius of jib by steam.	For traveling by steam.	Set of rail clamps.	Complete with all movements.
34½	5½	7	4,000	14	18,000					
36	6	8	8,000	15	20,000					
38	7	8	12,000	16	22,000					
40	8	10	16,000	20	26,500					

TUB HOOKS.

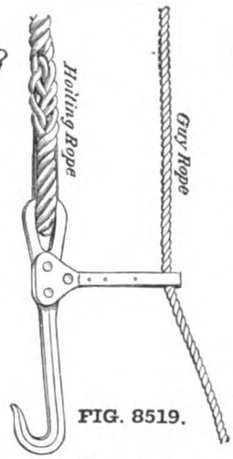


FIG. 8519.

PRICES.

For ⅛ to ¼ ton tub.....	$3.50
For ⅓ to ½ ton tub.....	4.50

PNEUMATIC HOISTS.

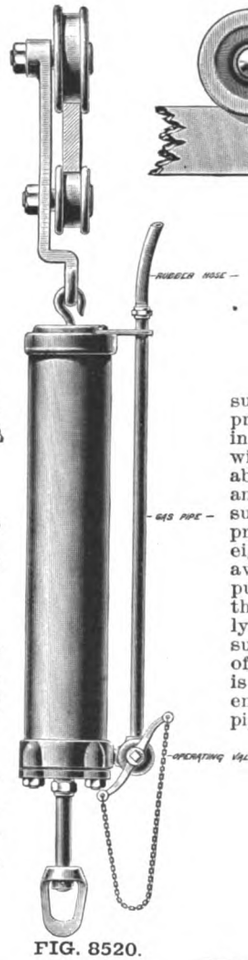
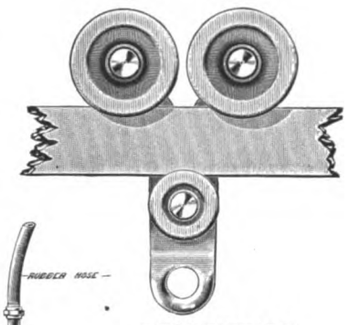


FIG. 8520.



DESCRIPTION, FIG. 8520.

The power should be supplied by an air compressor, one of which 6 in. to 8 in. in diameter, with a storage tank of about 3 ft. in diameter, and 5 ft. long, which will supply sufficient compressed air for twelve to eighteen hoists having average use. For special purposes, such as where the hoist is used constantly, a less number can be supplied by a compressor of the above size. Hose is attached to the upper end of the wrought-iron pipe, the length of the hose depending upon the floor area which it is desired the hoist should cover.

PRICES, FIG. 8520.

The lifting capacity of the hoists is as follows, with eighty lbs. air pressure:

3	in. diam.,	450	lbs.,	prices.....	
4	" "	800	"	"	
6	" "	1,800	"	"	
8	" "	3,200	"	"	

CAFF BANDS.

Gaff band, 4½ inches diameter.....	$5.00
" 5½ " "	7.25
" 6½ " "	10.50

Straps for a different size mast will be charged extra. If no directions are given the standard size will be sent, and for the gaff bands, where one is ordered, the 5½ in. will be sent. If two are ordered, 4½ and 5½.

LOCOMOTIVE STEAM CRANES.

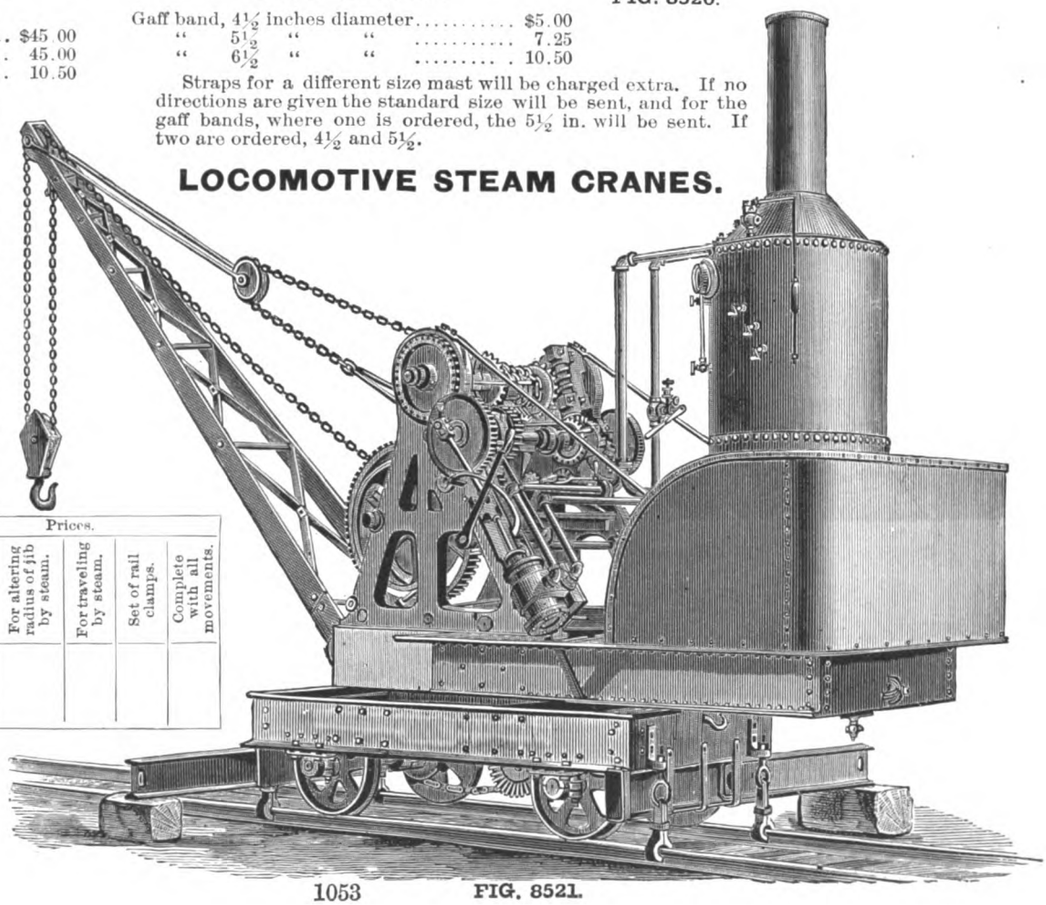


FIG. 8521.

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PORTABLE HAND CRANE.

FOR RAILWAYS OR FOR ROADS.

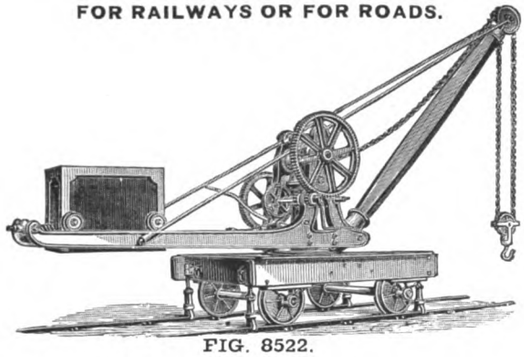


FIG. 8522.

This crane is tested to twenty-five per cent. above the maximum load. The carriage frame is oak, with wood flooring and cast iron bed plate, mounted on four cast iron wheels with flanges for rails or flat for roads. Wrought iron axles running in cast iron brackets. A set of four clips supplied when ordered for railways, to secure same to the rails when lifting. Center column and frame sides are cast iron, bored and turned to fit column swivel and stretchers. Single and double purchase gear, cast iron spur wheels and barrel, wrought iron shafts, strap brake, hand lever, ratchet and pawl stop, jib of pitch pine with cast iron cap at top for pulley, and cast iron socket at bottom with an adjustable conical roller bearing.

This roller works on a cast iron turned roller path which is loose on the bed plate. Two cast iron tail pieces on which runs the cast iron balance box operated by a screw and handle. Pulley block with sufficient chain to reach the ground. A slewing gear is supplied with the three ton and larger sizes, not shown in the illustration, but omitted in the one and two tons as being unnecessary. Balance weights for the box not included in the price. This crane is not made narrower than for 4 feet 8½ inches gauge, but can be made wider for extra price.

The wheels on the one and two ton sizes for rails and on all sizes for roads are outside the carriage frame in all cases.

SWING TRAVELING CRANE.

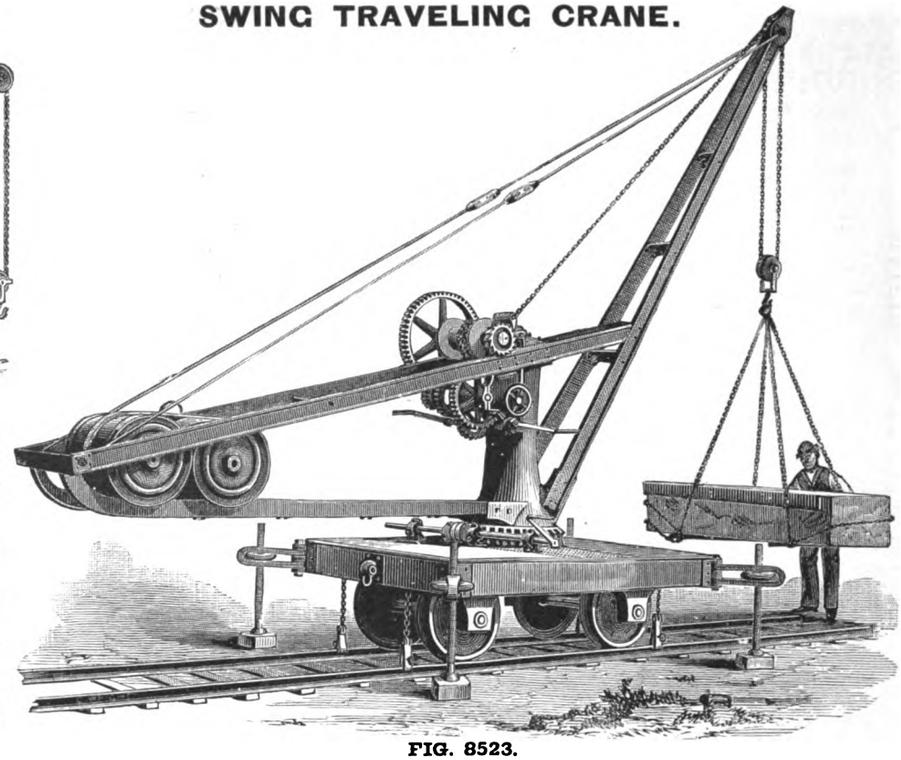


FIG. 8523.

The above cut illustrates our improved portable or traveling crane. It is intended for lifting and moving heavy articles, is useful in mining, quarrying and manufacturing operations; or for loading railway cars and canal boats.

To counterbalance weights lifted by this machine, it is provided with two rollers, which can be adjusted to the proper distance on projecting track at the rear of the crane, as shown in cut.

The hoisting arrangement has two cranks, which can be worked by two or four men, and is geared for great lifting power. The swing of the crane is effected and controlled by spur gearing shown in cut, so that weights remain under full control even when track is slightly inclined or out of level.

The car can be built for any gauge of track or width of tramway. Parties ordering will please state particulars of work to be done and heaviest weight required to be raised.

Prices on application, depending upon the capacity, etc.

PRICES, FIG. 8522.

Maximum load to lift.....tons	1	2	3	4	5	7	10
Radius.....feet	10	12	12	12	14	14	14
Height over all.....feet	13½	14½	14½	15	16½	17	17
Size of barrel.....inches	12 x 4½	16 x 6	18 x 7	21 x 8	22 x 9	24 x 9	25 x 9
Price for 4 feet 8½ inch gauge or for roads.....	$660.00	$840.00	$1,270.00	$1,570.00	$1,830.00		
Approximate weight.....tons	2	3	5	6½	9	12	15

If required with wrought iron tubular jib instead of pitch pine, or with wrought iron carriage, the price will be extra.

STEAM REVOLVING CRANE.

HORIZONTAL PATTERN.

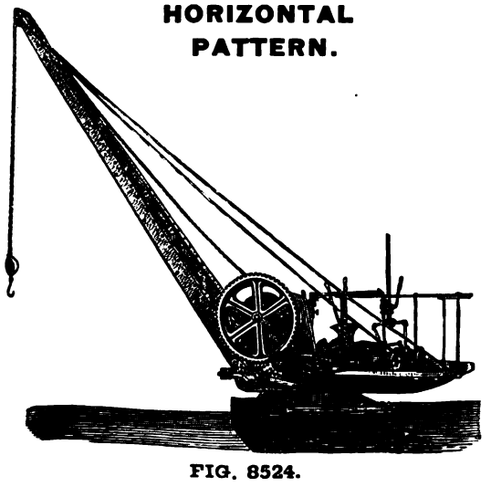


FIG. 8524.

DESCRIPTION AND PRICES, FIG. 8524.

This crane has two motions—that of hoisting and revolving. It revolves around a heavy steel post, the lower end of which is firmly secured in the base; the strain on the post is tensile, the thrust being against a brass washer and collar at the top of post.

The revolving part of the crane is supported by wheels, resting on a circular track, and the motion in either direction is given by means of a double-cone friction-clutch.

It has double engine, fitted with link motion and also a lowering brake, so that the load can be lowered either by reversing the engine or by the brake. The jib is of wrought iron.

The platform extends back of the machine on which weights can be placed to partly counterbalance the load.

This crane can be constructed with the boiler on the revolving base, in which case it forms a useful counter-balance to the load.

It can also be fitted with wheels to suit railroad track.

Cylinder. Diameter x stroke.	Power of crane with single part of chain.	Radius of jib.	Estimated shipping weights.	Prices, without boiler.
6 x 8	4,000 lbs.	15 feet.	10,000 lbs.	$.....
7 x 8	6,000 "	16 "	12,000 "	.....

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80 TON HAND GANTRY AND TRANSFER TABLE.

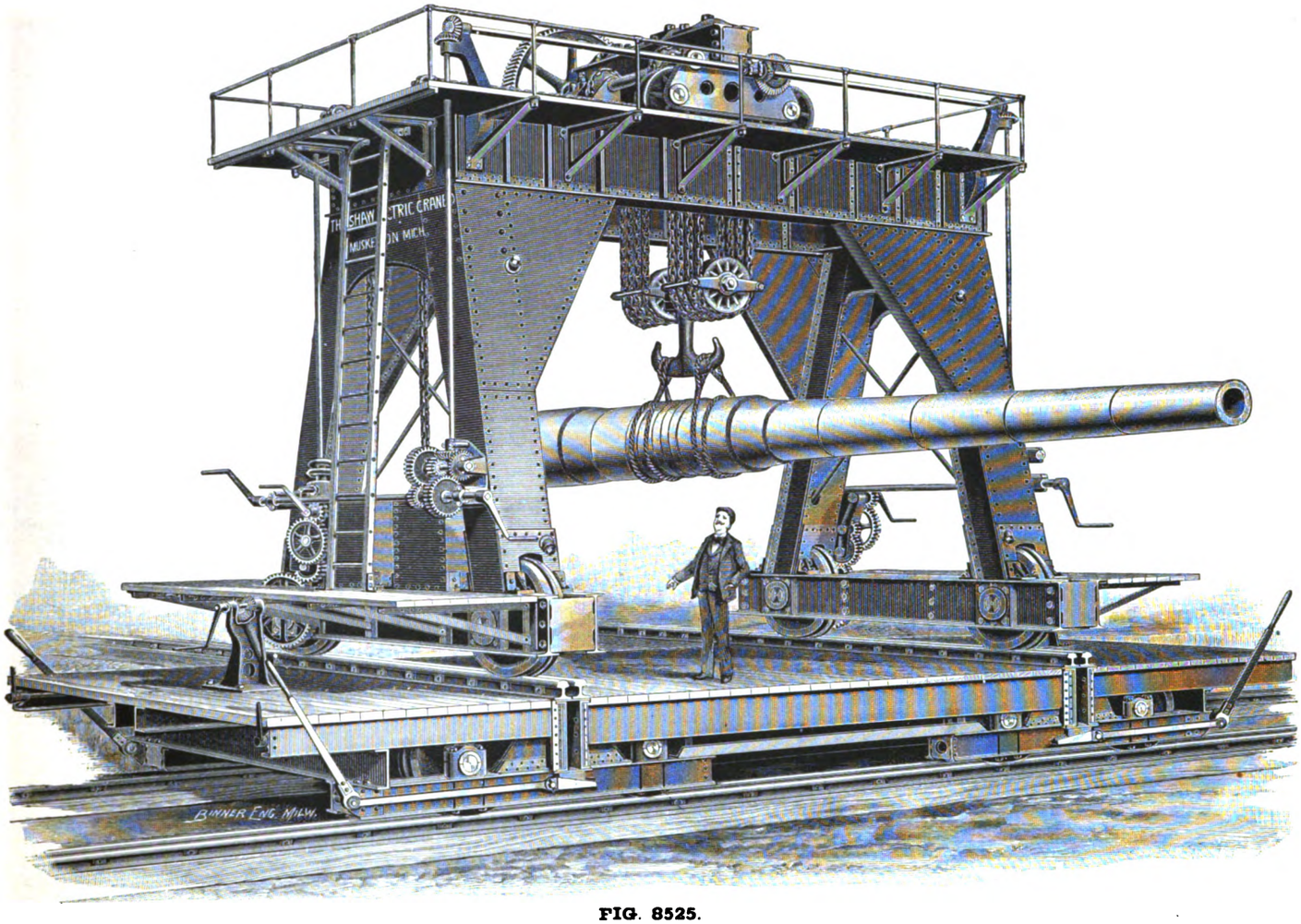


FIG. 8525.

BUILT FOR THE UNITED STATES GOVERNMENT PROVING GROUND AT SANDY HOOK, N. J.

This crane, which is believed to be the largest hand crane ever constructed, was designed for the handling of heavy ordnance at the Government Proving Ground at Sandy Hook, where it is now in use.

The framing is of steel, and consists of two plate girders securely fastened together by steel end frames and resting on legs or A frames at either end. The whole is carried on four 42 inch, double tread, chilled truck wheels.

The trolley rests on top of the girders and carries the main hoisting gearing. It is provided with powerful automatic brakes which sustain the load at all times except when it is being lowered by turning backward on the hand cranks.

The "fall" consists of sixteen parts of $1\frac{3}{16}$ pitch chain, both ends of which wind over pocketed chain wheels and lead thence to chain boxes located between the legs of the gantry.

The hoisting cranks are arranged to employ the united efforts of twelve men for handling the heavier loads, and the hoisting train is provided with one change of gearing ratio for the rapid handling of lighter weights.

The transfer table travels transversely across the rear of the "traverses," and is used for moving the gantry from one to another. It is proportioned to carry the gantry when sustaining the maximum load of eighty tons. It is supported on eight 42 inch, double tread, chilled wheels, which are so arranged as to ensure an equal distribution of the load on all. Steel wedges are provided for chucking the table when running the loaded gantry on or off, and also latches for locking the table opposite the side tracks.

All gears are cut from solid blanks and the bevels are planed.

All chain sheaves are turned and all truck wheels are ground perfectly true. All the larger shafts are made from open hearth steel forgings; the main hoisting gear is of gun iron, and all pinions of steel.

Cranes of this type may be made of any capacity and span to be operated by hand, steam or electricity, and for outdoor use are frequently more convenient than "travelers," as they do not require elevated tracks, but run on rails laid on the ground.

We will be pleased to submit estimates promptly on receipt of inquiry accompanied by statement of capacity, span, height of hoist and whether operated by hand, steam or electricity.

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ELECTRIC BOOM JIB CRANE, WITH HOISTING AND RACKING MOVEMENTS.

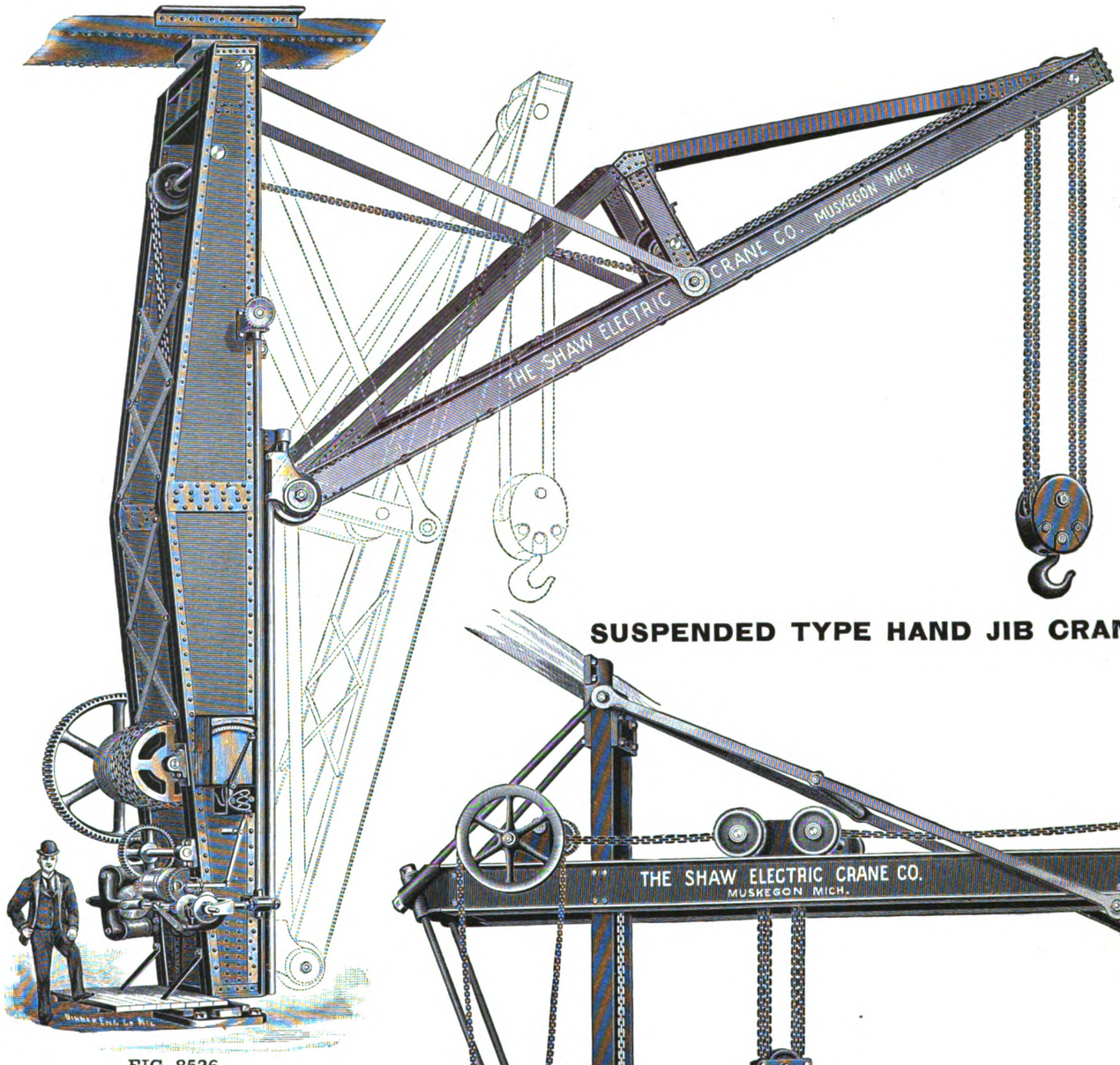


FIG. 8526.

In the crane shown in Fig. 8526, but one motor is used for both hoisting and racking, the latter movement being driven by friction gearing. The hoisting train may be disconnected from the motor, when desired, and is provided with our patent automatic duplex brakes, so that absolute control is had over the position of the load at all times, and "racing" or accidental dropping of same is impossible. All gears, except that on the hoisting drum shaft and the pinion meshing therein, are cut. All pinions are of steel.

For many classes of service it would be desirable to add rotating gear and to use independent motors for the various movements. This would somewhat increase the cost of the machine, but would greatly increase its efficiency.

This type of crane is applicable only when the height of mast may be somewhat greater than the maximum radius of the load. It gives a considerable greater average clearance under the boom than it had under the struts in the ordinary jib crane, besides permitting the greatest possible hoist for a given height of mast.

We build these cranes of any desired capacity and dimensions, for any class of service, and will submit estimates promptly on receipt of inquiry accompanied by statement of capacity, height of mast, maximum radius of load, character of service and class of power used to operate it.

SUSPENDED TYPE HAND JIB CRANE.

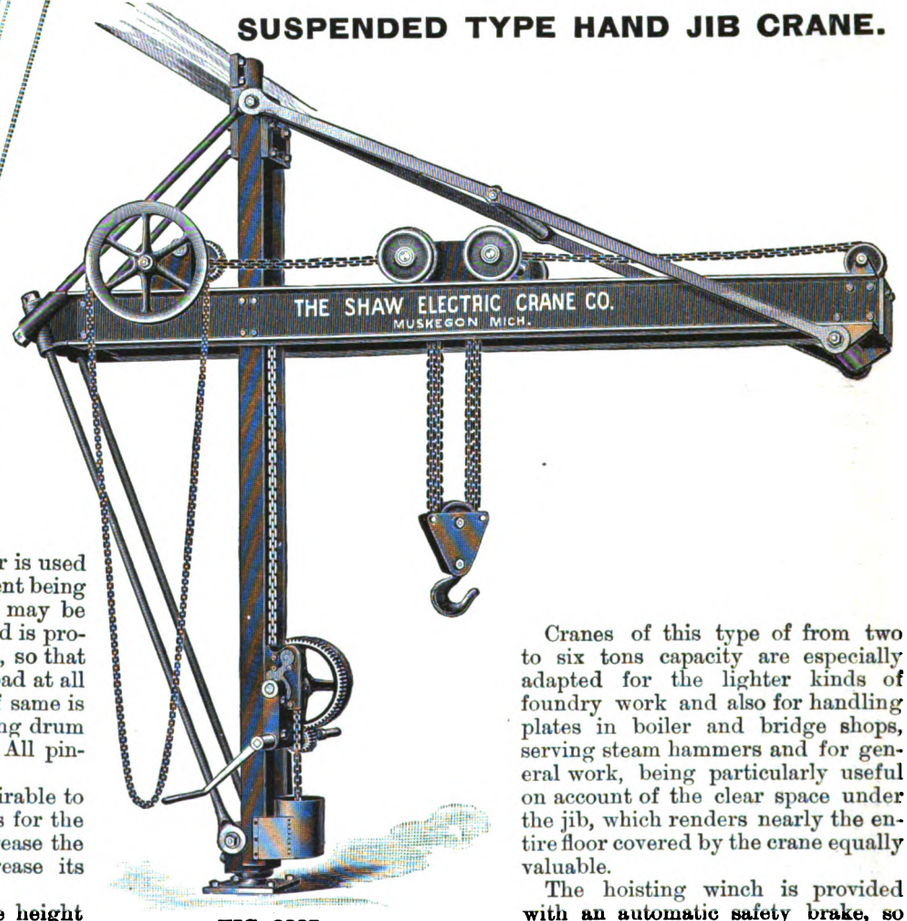


FIG. 8527.

Cranes of this type of from two to six tons capacity are especially adapted for the lighter kinds of foundry work and also for handling plates in boiler and bridge shops, serving steam hammers and for general work, being particularly useful on account of the clear space under the jib, which renders nearly the entire floor covered by the crane equally valuable.

The hoisting winch is provided with an automatic safety brake, so that the load always remains suspended unless lowered by turning the hoisting cranks, so that accidental running down of the load is impossible.

The hoisting chains are of extra quality and are tested before shipment.

We build these cranes of any required capacity and radius, and will submit estimates promptly on receipt of inquiry accompanied by statement of capacity required, radius of load and height of mast.

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UNDERBRACED HAND JIB CRANE.

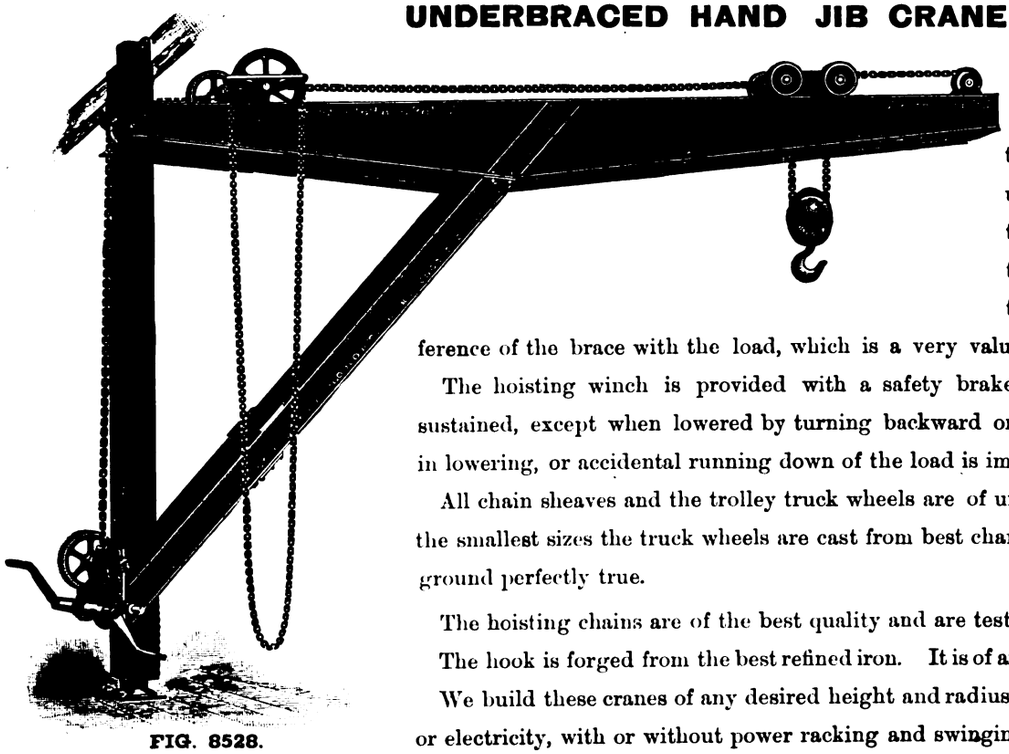


FIG. 8528.

The distance from the mast to the intersection of the brace with the jib is usually from two-thirds to three-fourths the maximum radius of the load. In this crane it is not greater than one-half the radius. This decreases the interference of the brace with the load, which is a very valuable feature for many classes of work.

The hoisting winch is provided with a safety brake, by which the load is automatically sustained, except when lowered by turning backward on the hoisting cranks, so that "racing" in lowering, or accidental running down of the load is impossible.

All chain sheaves and the trolley truck wheels are of unusually large diameter. On all except the smallest sizes the truck wheels are cast from best charcoal iron, and the faces are chilled and ground perfectly true.

The hoisting chains are of the best quality and are tested before shipment.

The hook is forged from the best refined iron. It is of ample strength and large throat capacity.

We build these cranes of any desired height and radius, to be operated by hand, power, steam, or electricity, with or without power racking and swinging gear, and for all classes of service.

We will submit estimates promptly on receipt of inquiry accompanied by statement of capacity, maximum radius of load, height of mast, method of operation and character of service.

PILLAR CRANE.

This crane, which is carried entirely by its foundation, being independent of any top support, is built of any desired capacity from two tons and upward, and of any desired radius.

The foundation may be of timber or masonry, or it may consist of an iron cylinder, to be filled with earth.

These cranes are carefully constructed of the best materials. The hoisting winch is provided with automatic safety brakes, which sustain the load at all times, except when lowered by turning backward on the hand cranks.

The five ton has two, and the ten ton three, hoisting speeds. The chain sheaves are of large size. The hook is forged from best refined iron. The chain is of the best quality, and is fully tested before shipment.

The standard sizes of this crane which we aim to carry in stock are of 5 and 10 tons capacity, 15 feet radius to center of load, and 15 feet from ground line to center of sheave in end of boom. Cranes of other sizes will be built to order.

They may be constructed to be operated by hand, steam or electricity.

Estimates will be submitted promptly on receipt of inquiry accompanied by statement of lifting capacity, radius and method of operation.

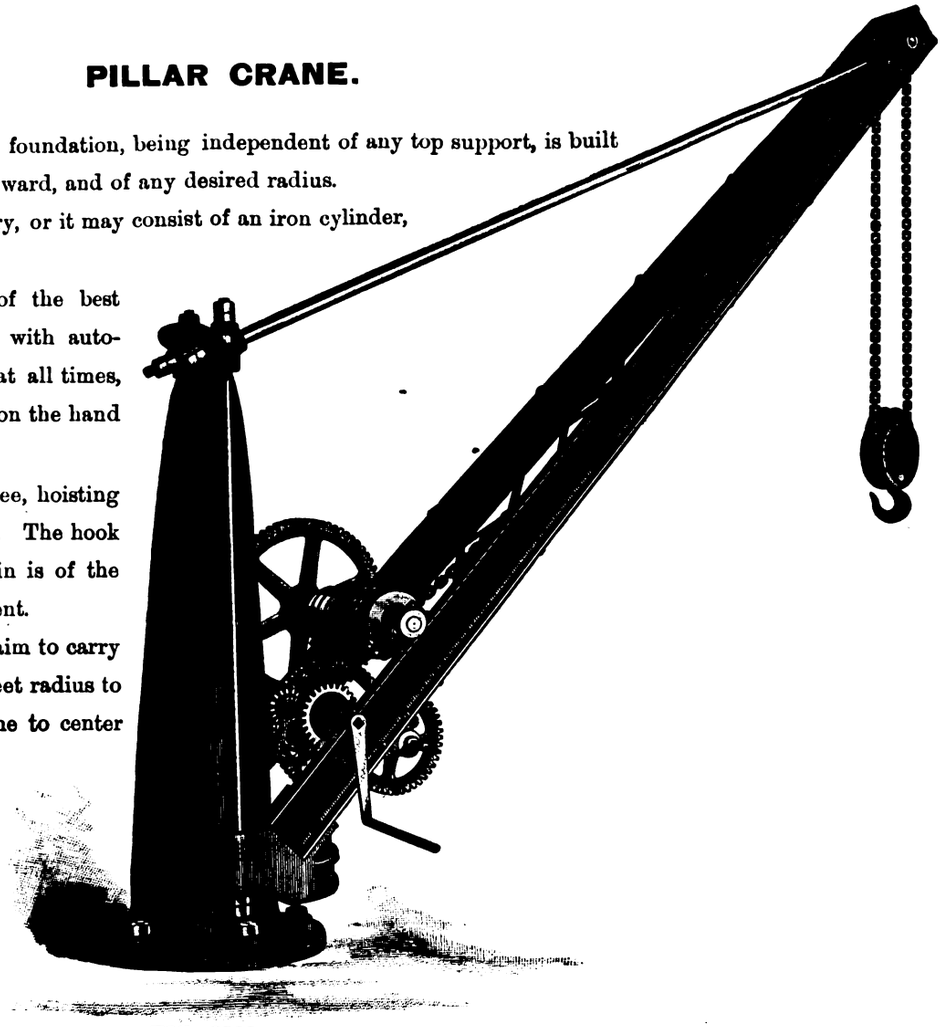


FIG. 8529.

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HAND TRAVELING CRANE, OPERATED BY CHAINS AT END OF BRIDGE.

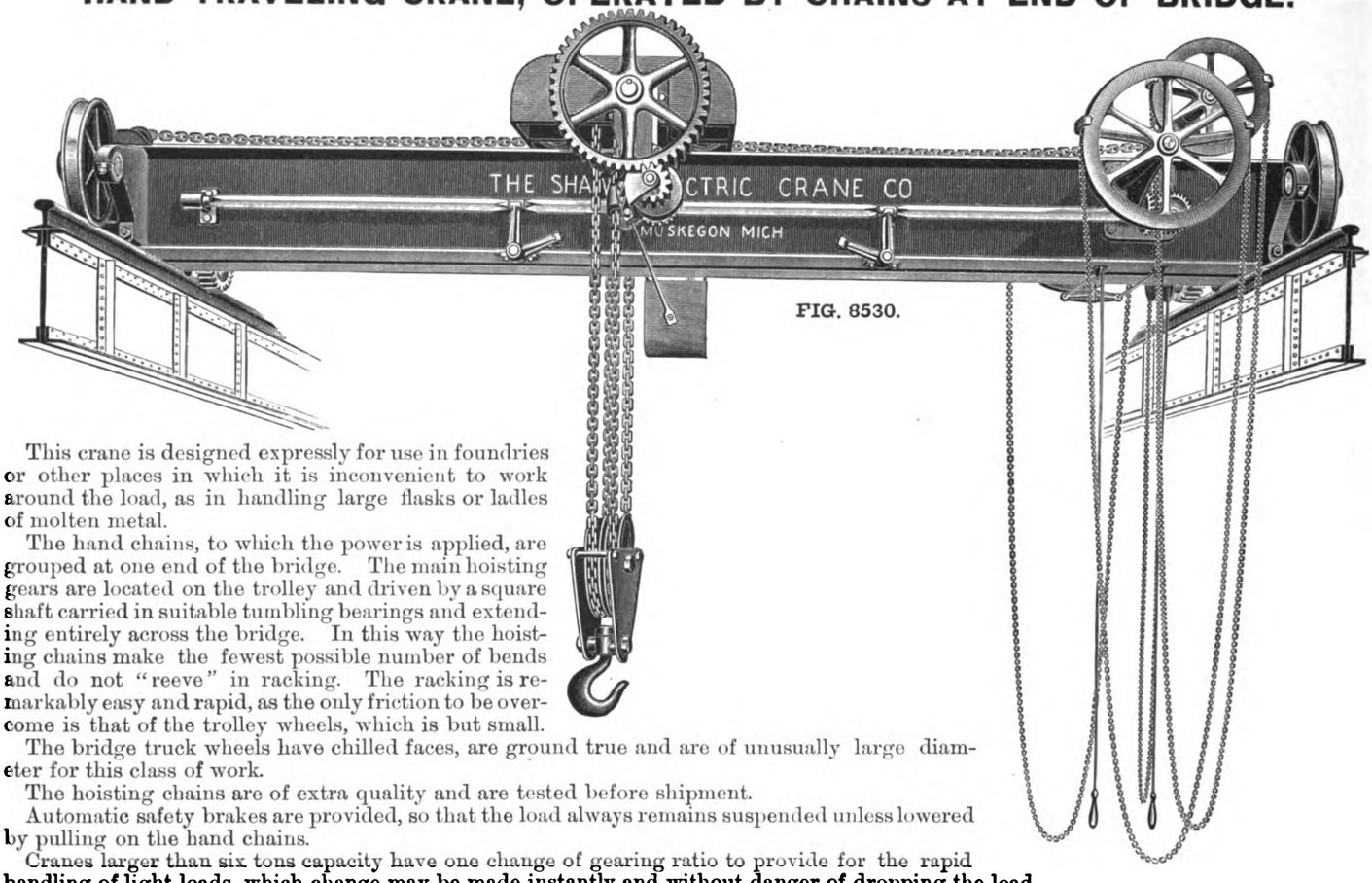


FIG. 8530.

This crane is designed expressly for use in foundries or other places in which it is inconvenient to work around the load, as in handling large flasks or ladles of molten metal.

The hand chains, to which the power is applied, are grouped at one end of the bridge. The main hoisting gears are located on the trolley and driven by a square shaft carried in suitable tumbling bearings and extending entirely across the bridge. In this way the hoisting chains make the fewest possible number of bends and do not "reeve" in racking. The racking is remarkably easy and rapid, as the only friction to be overcome is that of the trolley wheels, which is but small.

The bridge truck wheels have chilled faces, are ground true and are of unusually large diameter for this class of work.

The hoisting chains are of extra quality and are tested before shipment.

Automatic safety brakes are provided, so that the load always remains suspended unless lowered by pulling on the hand chains.

Cranes larger than six tons capacity have one change of gearing ratio to provide for the rapid handling of light loads, which change may be made instantly and without danger of dropping the load.

These cranes are made entirely of iron and steel and are constructed in a manner superior to that usual for hand cranes.

We build these cranes of any required capacity and span, and will be pleased to submit estimates promptly upon receipt of inquiry accompanied by statement of capacity, span and height of hoist, or distance from floor to lowest point in ceiling or lower chord of roof truss.

HAND TRAVELING CRANE, OPERATED FROM TROLLEY.



FIG. 8531.

This crane will be found very convenient for handling work of medium weight in machine shops, rolling-mills and other places in which power cannot conveniently be used, or in which the work is not sufficient in quantity to warrant the expense of a crane operated by other than manual power.

The trolley runs upon tracks on top of the bridge girders, and the sides are extended down so as to carry all the hoisting gearing beneath. It also carries four large chain wheels, over which run the hand chains, two of which, one on each side, are for hoisting. The other two are for operating the trolley and bridge traverse movements.

The hoisting chains hang from the center of the trolley directly under the center line of the bridge.

All truck wheels have chilled faces, are ground true and are unusually large for this class of work.

The hoisting chains are of extra quality and are tested before shipment.

Automatic safety brakes are provided, so that the load always remains suspended unless lowered by pulling on the hand chain, so that accidental running down is impossible.

Cranes of more than six tons capacity have a change of gearing ratio to provide for the rapid handling of light loads, which change may be made instantly and without danger of dropping the load.

The girders are made of I beams or are "built up," as may be best in each particular case. Usually the longer spans require riveted girders.

We build these cranes of any required capacity and span, and will submit estimates promptly upon receipt of inquiry accompanied by statement of capacity required, span and height of hoist or distance from floor to lowest point in ceiling or lower chord of roof truss.

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HAND TRAVELING CRANES.

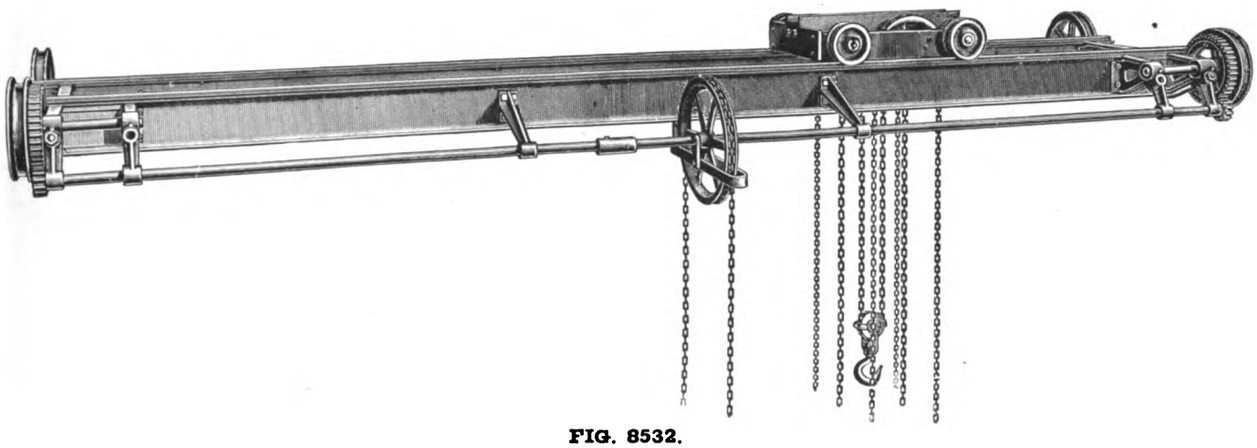


FIG. 8532.

Bridge of crane is built of two steel I beams, of proper depth and width to give ample strength and prevent undue deflection when the load is in the center. Truck brackets are cast iron, with wrought tie-rod extending from outside of the wheel bearing on one side to outside of the wheel bearing on the opposite side and under the beams, bringing the tensile strain on the wrought iron and the compression strain on the cast iron, the two beams being held apart by cast iron separators.

Truck wheels have roller bearings and are connected across the span of the bridge by a shaft, causing both wheels to revolve at the same speed, and the crane to travel straight on the runways.

The hand wheel for moving crane can be placed anywhere in its length desired.

Trolley runs on track on upper flange of crane beams. Wheels have plain bearings. Hoist is mounted in the trolley, not hung below it, thus saving all the head room possible. If so ordered, trolley will be made with eye-bolt on which to hang hoist, in which case there will be a reduction in the price as quoted. Hand wheel and gearing for driving trolley are mounted on the trolley itself.

Hoist is the well-known Teal machine. In the two-speed sizes, the speeds are changed in all cases by a plain clutch, operated by a hand cord. The load is held at any point, and lowered by pulling backward on the hand chain.

Prices quoted are for travel of crane at one speed, raking of trolley at one speed and hoisting at one speed; also, extra for hoisting at two speeds. If desired, these cranes are built with two speeds for travel of bridge, but the single speeds on bridge and trolley are all that are necessary, unless in some special cases. The two speeds for hoisting are always desirable, especially in the sizes above three tons, and effect a great saving of time in overhauling the empty hook or handling light loads of one-third to one-quarter the full capacity of the crane. As probably the greater number of loads handled on a five-ton crane, for example, are of one ton or less, this is a valuable feature.

Capacity.	Span.	Prices.	Extra for two-speed hoist.	Lift.	Extra lift per foot.	Shortest distance from hook to top of trolley.	Shortest distance from runway to top of trolley.
2 tons.	14 feet and under.	$260.00	$20.00	15 feet.	$1.85	27 inches.	14½ inches.
2 "	15 " to 18 feet.	275.00	20.00	15 "	1.85	27 "	15½ "
2 "	19 " " 22 "	325.00	20.00	15 "	1.85	27 "	16½ "
2 "	23 " " 30 "	400.00	20.00	15 "	1.85	27 "	18½ "
3 "	15 " and under.	290.00	20.00	15 "	2.00	28 "	16 "
3 "	16 " to 18 feet.	325.00	20.00	15 "	2.00	28 "	17 "
3 "	19 " " 26 "	425.00	20.00	15 "	2.00	28 "	19 "
3 "	27 " " 30 "	485.00	20.00	15 "	2.00	28 "	21 "
4 "	15 " and under.	350.00	22.50	15 "	2.15	30 "	17½ "
4 "	16 " to 22 feet.	425.00	22.50	15 "	2.15	30 "	19½ "
4 "	23 " " 30 "	490.00	22.50	15 "	2.15	30 "	21½ "
5 "	14 " and under.	370.00	25.00	15 "	2.25	31 "	17¾ "
5 "	15 " to 20 feet.	450.00	25.00	15 "	2.25	31 "	19¾ "
5 "	21 " " 27 "	525.00	25.00	15 "	2.25	31 "	21¾ "
5 "	28 " " 30 "	600.00	25.00	15 "	2.25	31 "	24¾ "
6 "	13 " and under.	380.00	25.00	15 "	2.35	32 "	18 "
6 "	14 " to 18 feet.	460.00	25.00	15 "	2.35	32 "	20 "
6 "	19 " " 25 "	530.00	25.00	15 "	2.35	32 "	22 "
6 "	26 " " 30 "	640.00	25.00	15 "	2.35	32 "	25 "

In ordering or in writing for quotations the following data should be given:

Span—Center to center of track if already up, or over all if not.

Capacity—Give greatest load to be lifted.

Speed—Number of different speeds wanted.

Clear space—From floor to lowest point to be cleared overhead.

Whenever possible, send a blue print or rough sketch of the building or location in which the crane is to be placed.

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SHAW HIGH SPEED ELECTRIC CRANES.

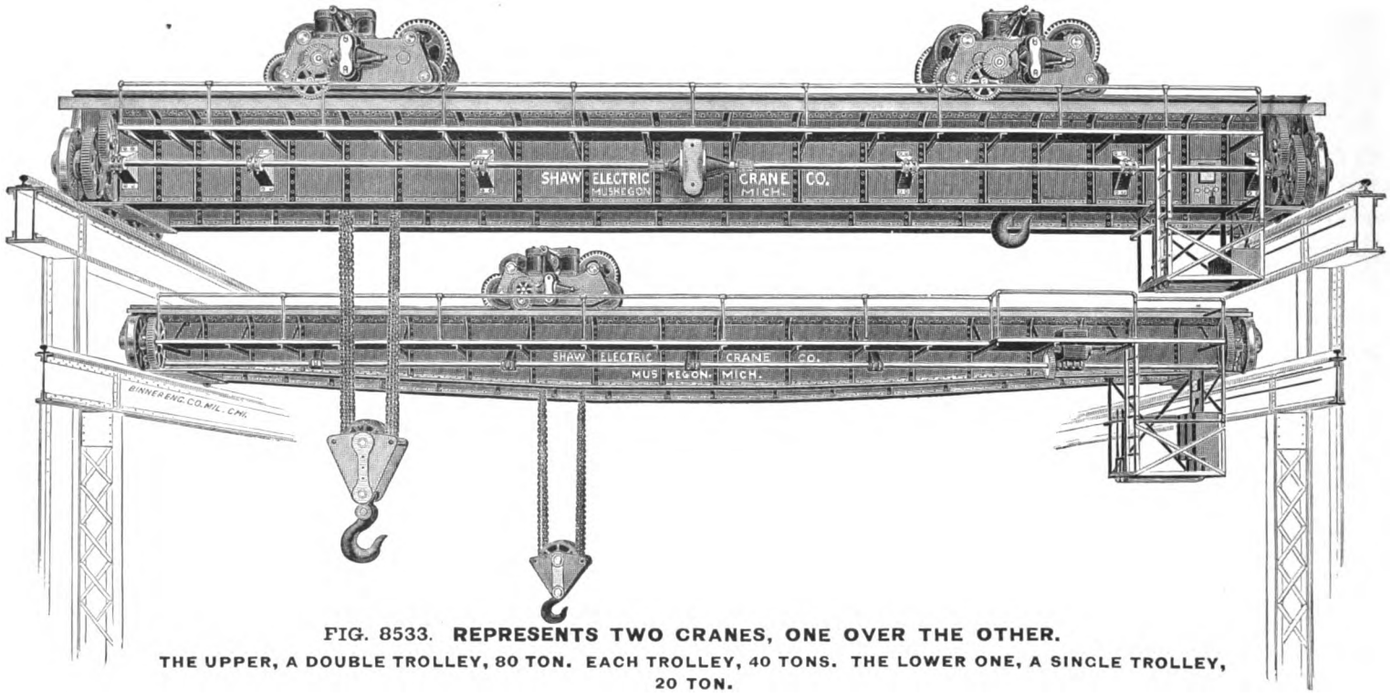


FIG. 8533. **REPRESENTS TWO CRANES, ONE OVER THE OTHER.**
THE UPPER, A DOUBLE TROLLEY, 80 TON. EACH TROLLEY, 40 TONS. THE LOWER ONE, A SINGLE TROLLEY, 20 TON.

Our cranes are believed to be the highest speed cranes now on the market, having for the smaller sizes hoisting speeds variable from zero to 50 or 60 feet, and for the heavier cranes from zero to 30 or 40 feet per minute. The bridge speeds are variable from zero to a maximum of 200 or 250 feet per minute for the larger, and 300 to 500 feet for the smaller cranes. The corresponding maximum trolley speeds are 100 to 200 feet per minute.

These cranes are operated by three independent electric motors, one for actuating the hoisting mechanism, one for moving the crane up and down the shop, and one for traversing the trolley backward and forward on the bridge. They are frequently made with two trolleys on one bridge, an arrangement especially adapted for handling locomotives or any long work which it is inconvenient or dangerous to sling by its center. In this case each trolley carries independent motors for the hoist and traverse movements, and is absolutely independent of the other, although they may be run in unison, when desired.

All the movements of either the single or double trolley cranes may be in operation at the same time ; each is independent of all the others, and may be run at will at any desired speed not greater than its maximum. This last very valuable feature, which is possessed by no other crane, is attained simply by varying the position of the reversing levers. Whenever any reversing lever is in its mid position, the mechanism controlled by it is at rest ; when the lever is moved from its mid position, the mechanism controlled by it begins to move, the direction and speed of the movement depending respectively on the direction in, and distance through, which the lever is moved by the operator.

One of the great advantages which these cranes possess over all others, is in the facility with which the speed of the load or any other movement may be gradually accelerated or retarded from zero to the highest limit of speed, or vice versa, or moved steadily at any desired rate, in the manner just indicated. This gives great smoothness of action and an accuracy of control never before attained and not attainable with any other type of crane.

By the use of an independent motor for each movement the wear and tear is reduced to a minimum, as it is confined to the parts connected with the particular movement in use, all others being at rest.

When the crane is not being actually used all parts of it are at absolute rest, subject to no deterioration whatever, and consuming no power.

With a crane actuated by one motor, rope or square shaft, the reverse is true, much of the gearing being in motion at all times, except when the machine is entirely out of use.

The hoisting mechanism is provided with patent duplex automatic brakes, so that "racing" or accidental running down of the load is impossible, and its descent is absolutely under the control of the operator by the use of the reversing lever only, no brake lever being required.

The hoisting train on the larger cranes is "back geared," in order to reduce the draft on the generator when handling heavy loads. The back gear clutches are ample in size, very simple in construction, and may be shifted when in motion.

All gears on these cranes are cut from solid blanks, except the main gears on the hoisting drums on the larger cranes, and the pinions meshing therein. All pinions of less than twenty teeth are of steel.

The truck wheels are cast from high grade charcoal iron, have chilled faces, and are ground perfectly true and to the same size for all wheels in each set. This, in conjunction with carefully cut gearing, renders the traverse movements unusually smooth and nearly noiseless.

The girders are built up of steel plates and angles in the very best manner and are of ample strength and rigidity, both vertically and laterally.

The hoisting chains are of the best quality obtainable, and are tested before shipment.

The motors are made especially for this work and are unusually heavy and substantial. They are of the slow-speed type, and run absolutely sparkless at all loads.

All our cranes are provided with lamps, switches, cut-outs, ground detectors, and all other electrical apparatus necessary for their convenient operation.

We build these cranes of any required capacity and span, and for all classes of service. We pay especial attention to cranes for unusually high speeds and for special work and trying situations.

We will submit estimates promptly on receipt of inquiry accompanied by statement of capacity desired, span, height of hoist or distance from floor to under side of roof truss, length of travel, and class of service for which the crane is to be used.

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HAND TRAVELING CRANES.

The mechanism is entirely enclosed within the drum, and is thus protected securely from dirt and dust. The load on the crane is sustained at any point, or it may be lowered slowly by hand chain, or allowed to run down quickly.

A great advantage is in the fact that two or more of these hoists can be used on the same traveling beams. We can furnish hoists of a capacity of one to ten tons.

Prices will be given upon receipt of details, giving height and width of span, and lifting power required.

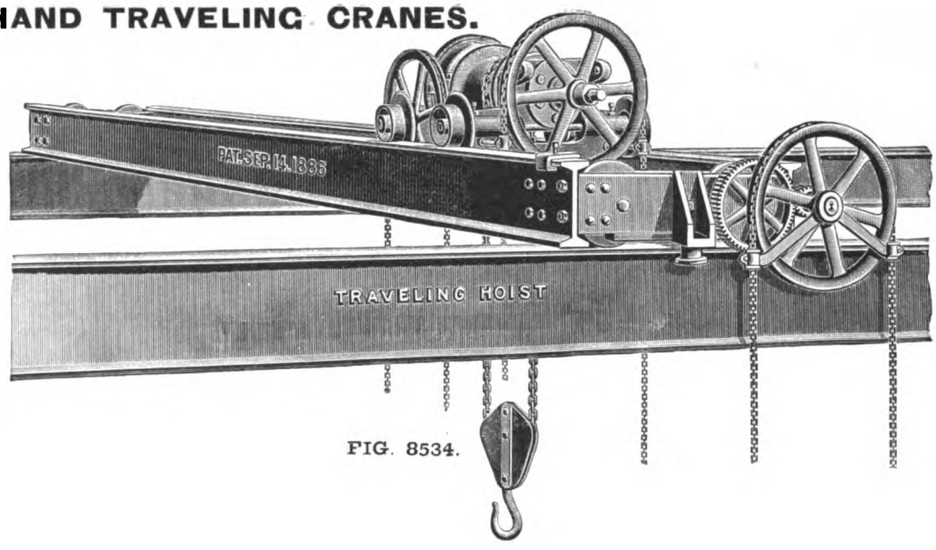


FIG. 8534.

BARNHART'S STEAM SHOVEL AND WRECKING CARS.

STYLE A.

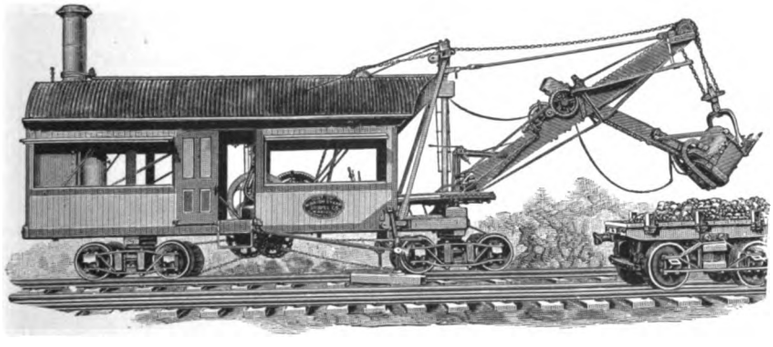


FIG. 8535.

STYLE C.

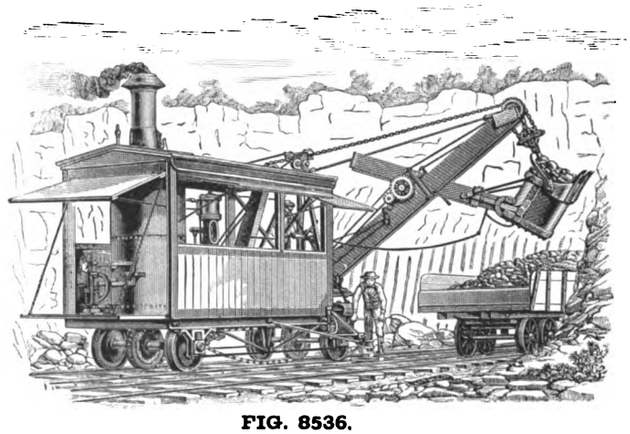


FIG. 8536.

DIMENSIONS, FIGS. 8535 AND 8536.

Style.	Bucket capacity, in cubic yards.	Number of engines.	Horse-power of engines.	Horse-power of boiler.	Lifting capacity.	Weight.	Capacity, in cubic y'ds, per day of ten hours.	Prices.
A	1½	2	32	40	40,000 lbs.	70,000 lbs.	800 to 2,500	$.....
B	1	1	25	35	32,000 "	52,000 "	600 to 1,600	.....
C	¾	1	20	25	20,000 "	32,000 "	400 to 800	.....
D	½	1	16	20	14,000 "	28,000 "	300 to 600	.....
R. R. ditcher.	½	1	16	20	12,000 "	28,000 "	200 to 600	.....
Hand wrecker.	....	....	....	....	18,000 "	12,000 "	....	.....

COMBINED LAND EXCAVATOR AND DERRICK CAR.

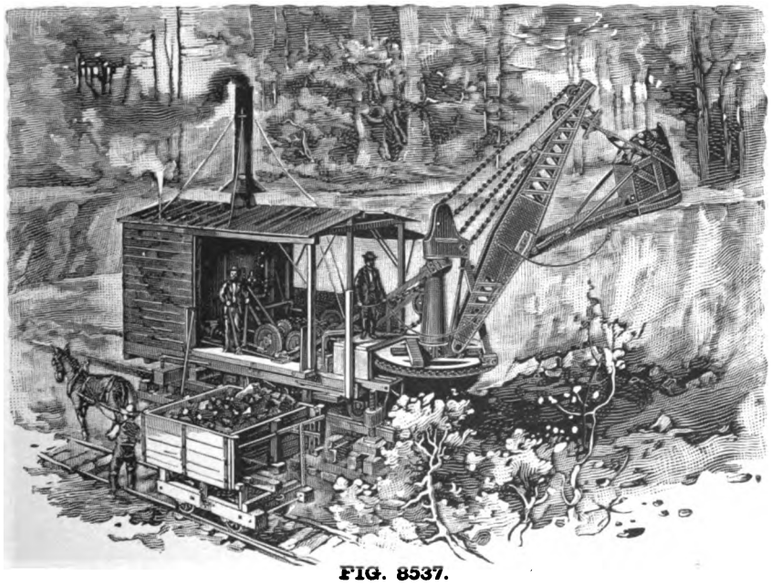


FIG. 8537.

This excavator and derrick car, Fig. 8537, possesses special advantages over all machines of this class now in use, and is so constructed that it can be moved from place to place, on any railroad, through the standard bridge or tunnel, without taking it apart. To get machine ready to move, you have only to lower boom and dipper on to a flat car, an operation requiring about ten minutes, when it can be passed in any train running at a low rate of speed.

As a derrick car it has no equal. To change from an excavator to a derrick, you disconnect dipper by knocking out two pins or bolts. Boom is hinged at the bottom and can be raised or lowered at will, or swung anywhere in a half circle, enabling engineer to get a straight fair pull at any object within a reasonable distance of the derrick that requires to be moved.

SIZES AND PRICES ON APPLICATION.

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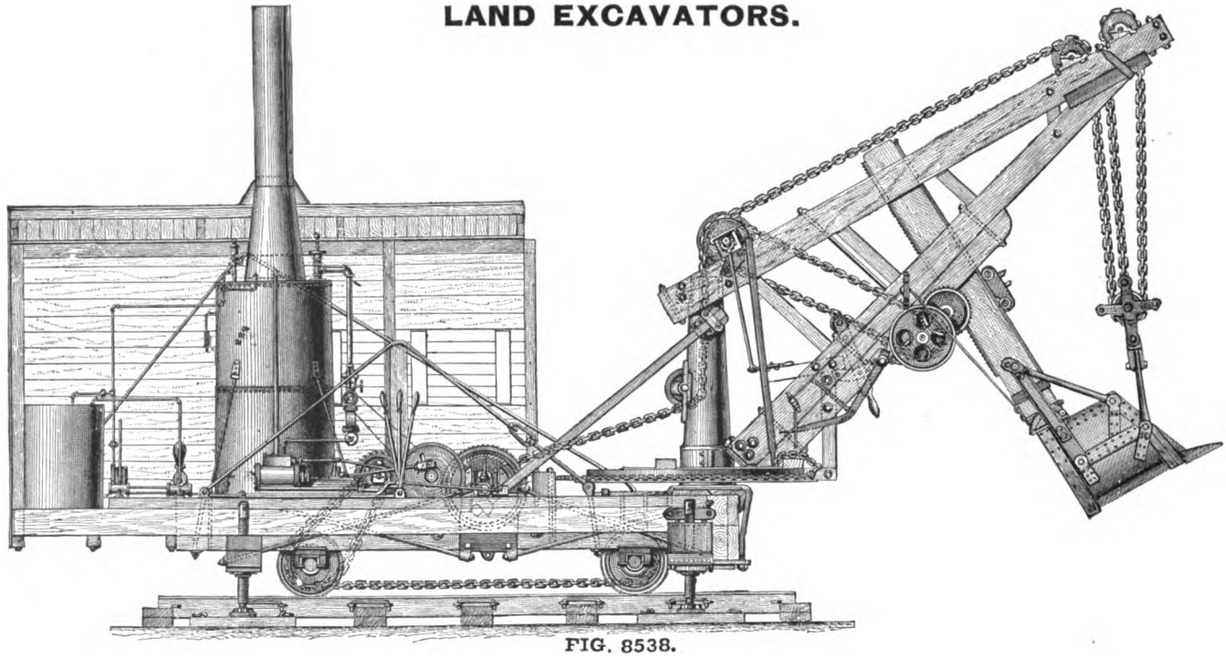


FIG. 8538.

Fig. 8538 represents the machine as we are now building it. Each part is built to a standard template, and all castings are numbered.

The machinery is mounted on a very strong frame made of best quality white Canadian oak, rigidly framed and held together by iron straps, bolts and shoes. The length of the frame, from the rear side of forward jack timber to the rear end of cab, is 26 feet; the width, from outside to outside of main bed timbers, is 7 feet 4 inches, and the extreme width of cab is 11 feet 6 inches. The frame is mounted on axles carrying 30 inch truck wheels, the gauge of which, unless otherwise ordered, is 4 feet 8½ inches. To put the propelling device in operation, it is only necessary to shift a clutch on the swinging shaft. The machine stands, and is moved, on sectional portable track, of which 14 sections accompany each machine.

While at work the wheels are relieved of the weight and strain of the machinery by means of four jack screws. These screws are situated at the end of two jack timbers, one forward and the other back. This not only relieves the axles and wheels of the strains incident to working, but provides the necessary base to insure stability in digging and swinging.

The top of the crane is 22 feet above the track. The main timbers of the crane are 20 feet in length, and the dipper handle timbers are 12 feet in length.

The hoisting chain, which is made of 1⅛ inch iron, extends from the hoisting drum to the inside of the crane post, and from there over suitably arranged sheaves to the dipper.

The dipper handle is moved by racks and pinions, and is provided with a friction thrust for holding the dipper to its work in digging.

The clutches by which the various parts of the machinery are put into operation are of the kind known as "Alger's Expansive Friction." By their use the load is taken hold of gradually, thus obviating the danger of breakage incident to the use of a positive clutch.

The regular boiler is vertical tubular, 54 inches in diameter and 8 feet 6 inches in height, but we furnish a horizontal boiler when desired. The engines are two, of 15 horse power each, geared down so as to insure a lift of 40 tons.

The swinging friction shells, all pinions and gears and the dipper handle racks are of cast steel. The shipping weight of the machine is about 45 tons.

STEAM EXCAVATORS.

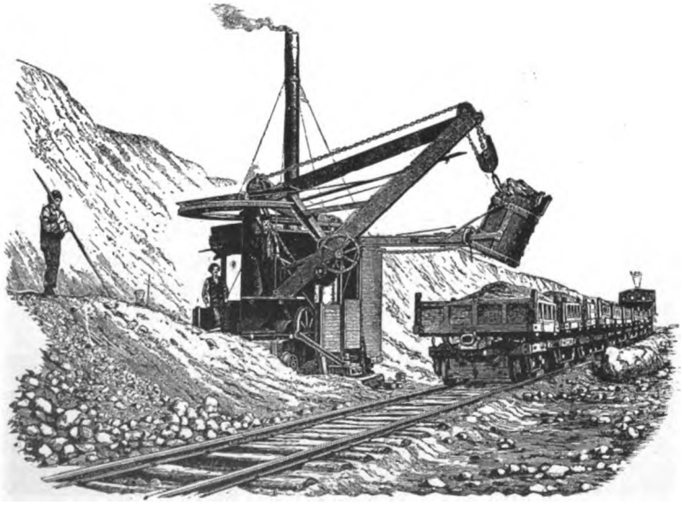


FIG. 8539.

They are necessarily a machine of complicated movement, but constructed in the simplest practicable manner; the machine is complete in itself, comprising an engine and boiler of ample capacity to handle the machinery, having a scoop bucket, or shovel, of capacity adapted for the work it is to be used in, hard or light material, from a 1¼ to a 2 or 2½ cubic yard. It has a double return flue upright dome boiler, 25 horse power, whereby the flues are entirely covered by water and wrought iron dome for dry steam, offers advantages over any other upright boiler. The engine is a high pressure upright, 10 x 12 inches, with fork connecting rod; machinery is geared up to much more than the apparent capacity. The gun iron post, which is the pivot for the crane to swing on, weighs 4,000 pounds.

Frame and crane are of heavy oak timber heavily plated with iron. All castings subject to the most wear are of gun metal. The shafts are of best hammered iron. The machine complete weighs 26 tons, and is portable by means of having trucks of standard gauge.

Machine is operated on portable track of 4 feet lengths, for convenience in handling; as fast as it digs all the material within reach, in a semicircle, the rear section of the track is placed in front and machine moves on to it and is ready for work again. The gauge of trucks is 7 feet 10 inches, and machine is further provided with jack arms extending an entire width of fifteen feet, to allow working the bucket at right angles to machine.

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BOOM EXCAVATOR.

DESCRIPTION, FIG. 8540.

In place of the ordinary crane, a boom is employed, having its lower end attached by a joint to the foot of a short mast to which the turntable is fastened. The upper end of the boom is supported by a chain controlled by the dipper tender. The end of the dipper is firmly attached by a joint to the boom. By raising or lowering the upper end of the boom the position of the dipper is changed. If it be wished to work carefully to a certain grade in light cutting, by lowering the boom as the engineer winds up the dipper chain, the dipper passes over a long distance and leaves the surface uniform, working rapidly and moving no more material than is required to make right grade, as a considerable distance from the body of the machine can be reached—frequent moving is avoided.

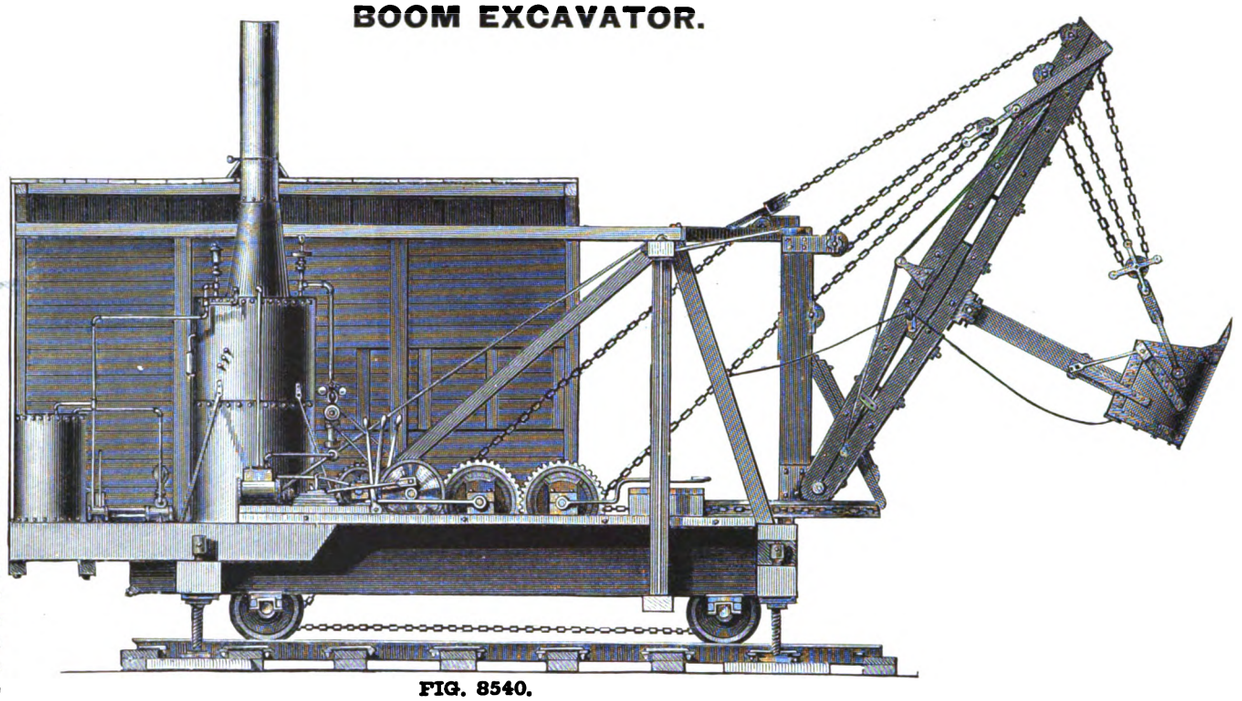


FIG. 8540.

This machine works well in hard material. The forward truck wheels are jacked up slightly from the track, which holds the machine from retreating, and the dipper holds itself against hard banks, and can be governed to cut just the depth the power will carry it through. If the dipper strikes a rock or hidden obstruction that resists removal, the boom is raised and the dipper chain slacked to free it.

LARGE DIPPER DREDGES.

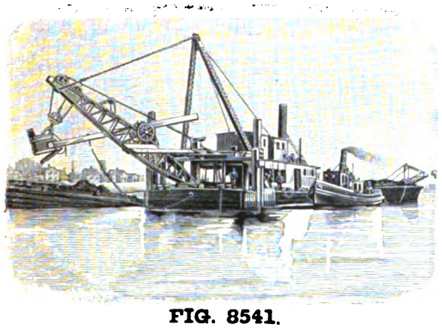


FIG. 8541.

For hard material in deep water.

ELEVATOR DREDGES.

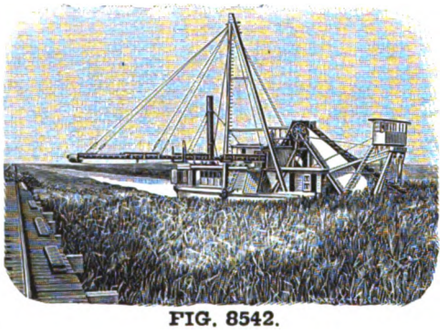


FIG. 8542.

For canal building and embankments.

ELEVATOR DREDGES.

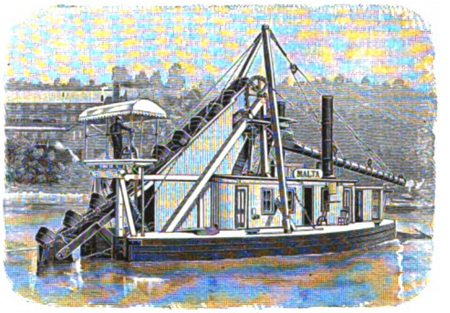


FIG. 8543.

For river improvements.

STEAM SHOVELS.

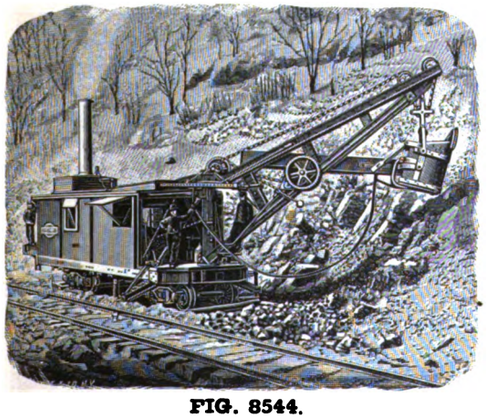


FIG. 8544.

Made in a variety of sizes and for every type of service.

TRACTION EXCAVATOR.

DESCRIPTION, FIG. 8545.

This machine is designed for use by parties having grading or digging contracts, where a heavy steam shovel cannot be used to an advantage, for all kinds of excavating, loading cars or wagons, cutting down embankments, digging canals, or ditches for irrigating, railroad building, side hill, through cut, gravel pit and ballast digging, etc.

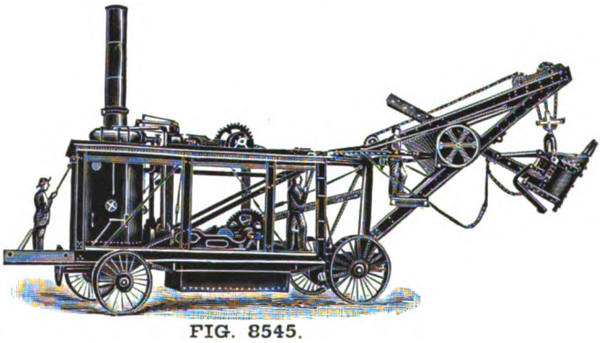


FIG. 8545.

It is so strongly built and powerful that breakage rarely occurs, and expense and damage for repairs and delays are light.

It is portable and self-propelling, and will run on ordinary roads or can be hauled by team at small expense.

Its digging capacity is 300 to 1,600 cubic yards per day, according to kind of material.

It is especially adapted for digging canals or ditches for draining, and irrigating in dry soil, and can be used for dredging by removing axles and wheels and placing machine on flat boat.

PRICES ON APPLICATION.

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FRONT VIEW.

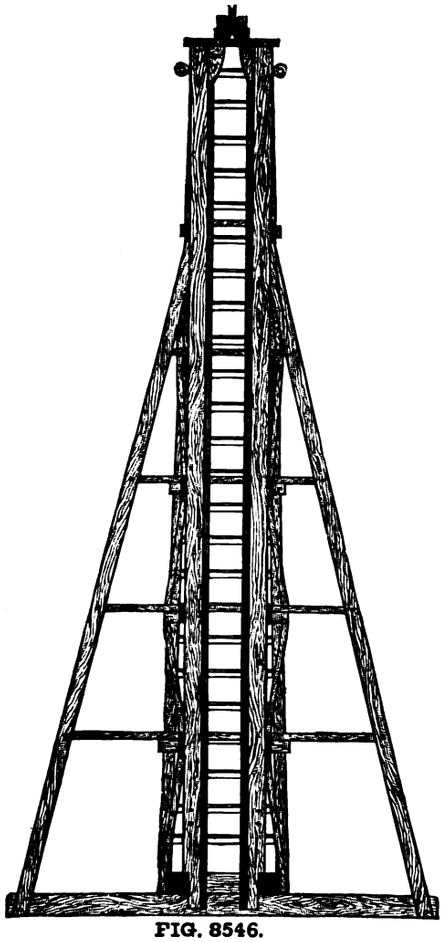


FIG. 8546.

PILE DRIVING DERRICKS.

SIZES AND PRICES.

Complete with sheave wheels ready for use.

25 foot derrick	suitable for	1,000	to	1,200	lbs. hammer	$225.00
30 "	"	1,200	"	1,500	"	250.00
35 "	"	1,500	"	1,800	"	325.00
40 "	"	1,800	"	2,500	"	350.00
45 "	"	2,500	"	3,000	"	375.00
50 "	"	3,000	"	3,500	"	425.00
55 "	"	3,000	"	4,000	"	500.00
60 "	"	3,500	"	5,000	"	550.00

In ordering, specify the size of pile, diameter and length, for which derrick is intended. Iron work complete for pile driving frames made to order. Represents improved pile driving derrick, which was designed specially to meet the demands for a substantial and thoroughly well-made machine. They are made in the most complete manner of well-seasoned wood, which is fitted and bolted together securely. They can be taken apart for shipment and easily put together again.

PILE DRIVING HAMMERS.

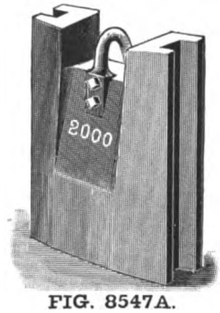


FIG. 8547A.

We make all sizes of pile driving hammers to order, to suit the above derricks, of a superior quality of iron, at a uniform price of 5 cents per pound, finished.

Special sizes of derricks and hammers made to order.

SIDE VIEW.

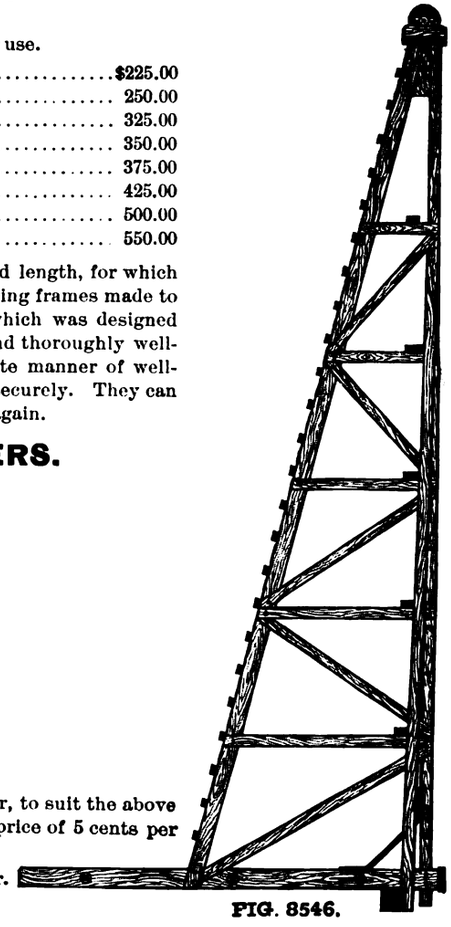


FIG. 8546.

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

DESCRIPTION, FIG. 8547.

The center ballast unloader is constructed with front and rear guide, hinged to the plow so as to adjust itself to the center of the car, and is guided by stakes in stake pockets. Thus no preparation of the car is needed except the placing of hard wood stakes in stake pockets and the removing of car brakes. When unloaded, the car may be used for any other purpose without alteration, there being no center rail in the way.

When ordering, always give width of cars between stakes.

CHALLENGE CRUSHERS, MOUNTED ON WHEELS.

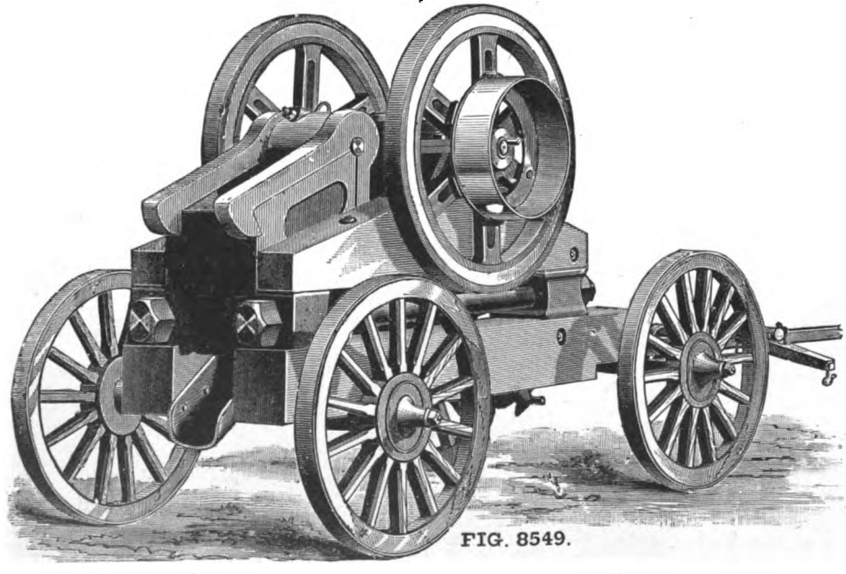


FIG. 8549.

BARNHART'S CENTER BALLAST UNLOADER.

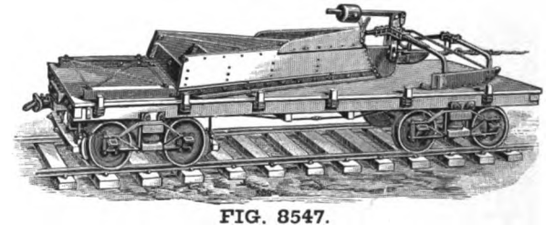


FIG. 8547.

SIDE BALLAST UNLOADER.

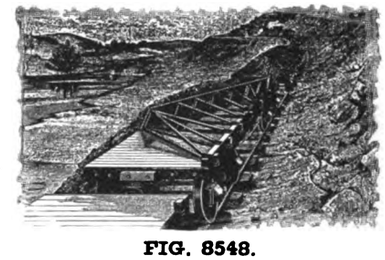


FIG. 8548.

Always give width of cars between stakes and state if right or left hand unloader is required. We invariably ship left hand unless otherwise ordered.

PRICES FOR FIGS. 8547 AND 8548 ON APPLICATION.

Size, or receiving capacity.	Product per hour in cubic yards.	Weight of heaviest piece.	Approx. total weight.	Extreme dimensions of breaker.		Driving pulley.		Proper speed.	Horse power required.	Prices.	Prices, mounted, with engine.
				Length.	Breadth.	Diam.	Face.				
10 x 7	Five.	1,300	8,400	7 0	4 3	20	6	275	5	$	$
15 x 9	Seven.	2,850	14,000	9 0	5 6	24	10	275	9		
15 x 11	Eight.	3,000	16,000	9 2	5 6	24	10	250	9		
15 x 13	Eight.	3,200	17,000	9 4	5 6	30	8	250	10		
20 x 10	Twelve-fifteen.	3,600	18,000	9 0	5 6	30	8	250	10		

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BLAKE CHALLENGE ROCK BREAKERS.

Size or receiving capacity, inches.	Product per hour in cubic yards.	Weight of heaviest piece.	Weight of timber frame.	Total weight.	Extreme dimensions. L'gth. ft.	in.	B'dth ft.	in.	Driving pulley. Diam. inches.	Face, inches.	Proper speed.	Horse power required.	Prices.
3x1¼	..	....	....	125	1	8	1	0	..	..	...	....	$55.00
5x4	1	130	55	750	3	0	1	3	13	4	300	1½	175.00
6x2	..	130	55	750	3	0	1	3	13	4	300	1½	175.00
15x2	..	295	325	2,690	4	6	4	0	16	5	300	3	450.00
10x4	3	300	375	2,850	5	6	3	9	16	5	300	4	450.00
10x7	5	1,175	800	6,750	7	0	4	3	20	6	275	5	750.00
15x5	6	1,070	1,200	8,000	7	0	4	8	24	8	275	8	900.00
15x9	7	2,480	1,400	12,860	9	0	5	0	24	10	275	9	1,200.00
15x11	8	2,600	1,400	13,000	9	0	5	0	24	10	250	9	1,300.00
15x13	8	3,000	1,400	14,000	9	0	5	0	30	8	250	10	1,400.00
30x5	12	2,600	1,200	13,500	9	0	6	3	30	8	275	10	1,500.00
20x10	12	3,125	1,500	15,000	9	0	5	6	30	8	250	10	1,500.00
20x15	15	5,550	1,600	24,000	10	2	7	2	30	10	250	12	2,250.00

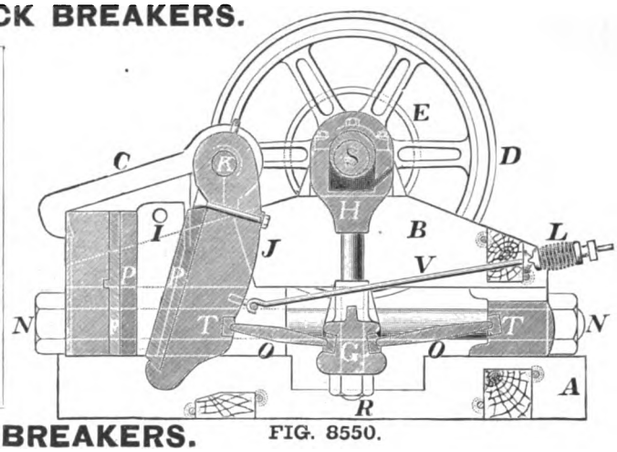


FIG. 8550.

BLAKE STONE AND ORE BREAKERS.

Size of receiving capacity, inches.	Product per hour in cubic yards.*	Weight of heaviest piece.	Total weight.	Extreme dimensions. Length. ft.	in.	B'dth. ft.	in.	H'ght. ft.	in.	Driving pulley. Diam. ft.	in.	Face. in.	Proper speed.	Horse power required.	Prices.
3x 1	....	....	. ..	....		....		....		....		....	...	..	.....
10x 4	3	1,695	4,000	3	11	3	3	3	9	1	8	6	250	4	$275.00
10x 7	5	4,339	8,000	5	3½	3	8	4	5	2	0	7½	250	6	450.00
15x 9	7	6,500	15,000	6	5	5	0	5	11	2	6	9	250	9	750.00
20x12	10 to 12	10,000	21,000	7	0	5	6	6	3	2	6	12	250	15	1,000.00
20x15		8,450	32,600	8	6	5	0	6	7	3	6	10	150	12	
24x18	Coarse or Prelim'ry Breaker.	9,425	37,500	9	10	5	1	6	10	6	0	12	125	12	

* The amount of product depends on the distance the jaws are set apart, and the speed. The product given in the table is due when the jaws are set 1¼ inches open at the bottom, and the machine is run at its proper speed and diligently fed. But it will also vary somewhat with the character of the stone.

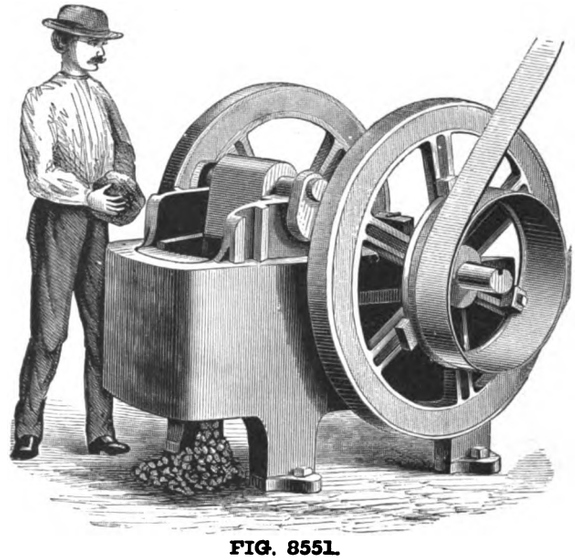


FIG. 8551.

PRICES, FIG. 8552.

Size or receiving capacity, inches.	Approximate product per hour, in tons, to macadam size.	Approximate weight.	Driving pulley. Diam.	Face.	Proper speed.	Horse power required.	Prices.
5 x 20	10 to 12	7,000	21	9	400	8	$ .....
7 x 20	12 to 15	10,000	27	10	350	12 to 15	.....
8 x 25	15 to 20	13,000	30	12	300	15 to 20	.....
10 x 25	20 to 30	16,000	36	12	300	20 to 30	.....
12 x 37	30 to 40	32,000	40	14	300	30 to 40	.....
14 x 48	40 to 50	50,000	48	16	275	40 to 50	.....

BRENNAN ROCK BREAKERS AND ORE CRUSHERS.

It contains many improvements of great value, including among others an entirely new and completely effective principle in the crushing and discharging action.

It has more capacity and range of work than any other crusher in the market.

It will take larger rock—up to 14 x 48 inches—and will give a more uniform product, and more of it, with less power and cost of repairs, than any other crusher.

The range of work of all sizes of this crusher extends from coarsest railroad ballast to the finest that can be produced by the smallest crusher heretofore made, a most valuable advantage to every purchaser. The changes in the size of the product can be made in a few minutes, and while the machine is actually running and breaking stone.

The stroke of the jaw can be adjusted to be more or less at either the upper or the lower ends, or it can have the same amount of stroke throughout.

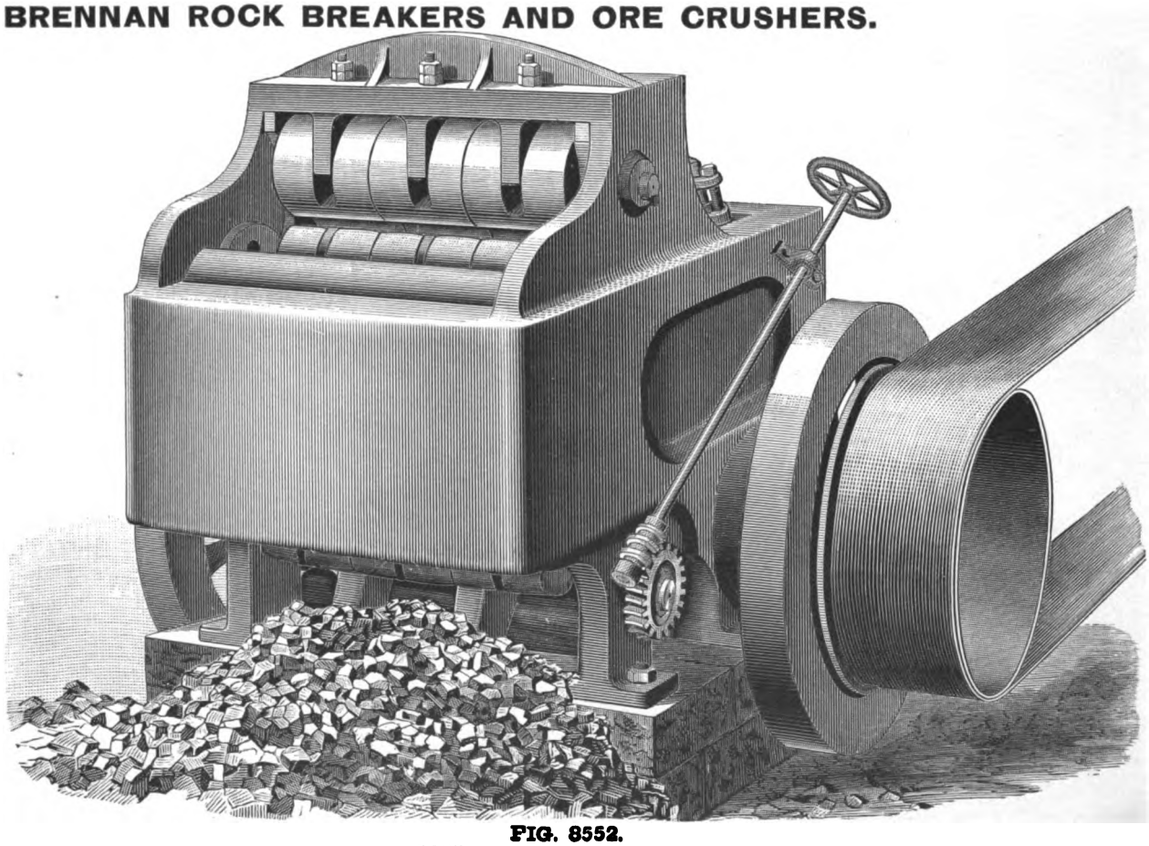


FIG. 8552.

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ROCK AND ORE CRUSHERS.

COMET.



FIG. 8553.

GATES.

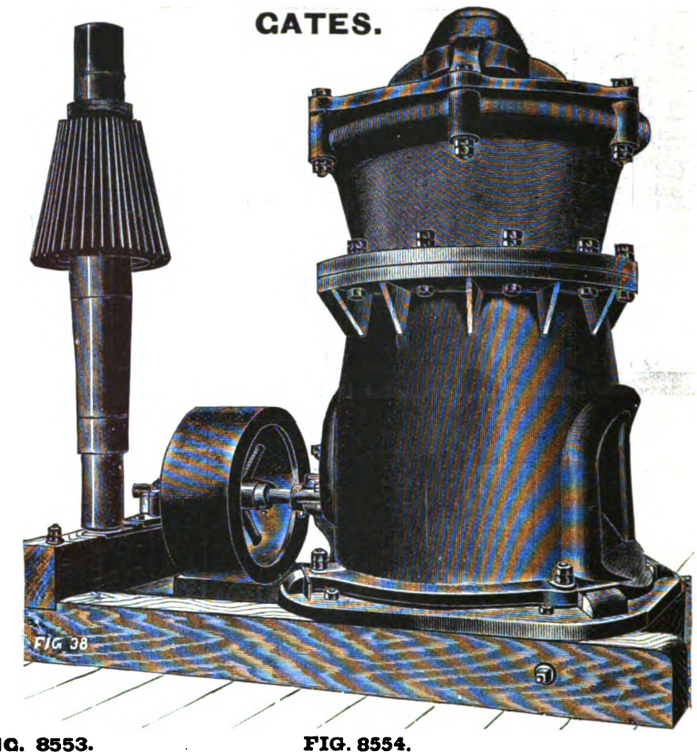


FIG. 8554.

PRICES, FIG. 8553.

Number.	Size of each opening in inches.	Capacity in tons per hour. Size of macadam.	Height of crusher.	Outside dimensions of frames sent with crusher.	Weight of crusher in lbs.	Pulley diam. and face, in inches.	Fly wheel diam.	No. of rev. of pulley per M.	Horse-power required.	Prices.
A	6 x 12	4 to 8	4 ft. 10 in.	6 ft. 1 in. x 2 ft. 9 in.	5,500	24 x 8½	3 ft. 0 in.	400	8	$550.00
B	7 x 14	6 " 10	5 " 5 "	6 " 10 " x 3 " 2 "	7,500	24 x 10½	3 " 0 "	400	12	700.00
C	8½ x 17	14 " 24	6 " 6 "	8 " 0 " x 4 " 0 "	14,000	30 x 10½	4 " 0 "	400	20	1,400.00
D	10 x 20	20 " 30	7 " 8 "	9 " 1 " x 4 " 10 "	24,000	42 x 12½	4 " 6 "	400	35	2,250.00
E	12 x 24	40 " 60	9 " 2 "	10 " 10 " x 5 " 8 "	30,000	40 x 14½	5 " 0 "	400	50	3,000.00

PRICES, FIG. 8554.

Size.	Dimensions of each receiving opening, about inches.	Dimensions of three receiving openings combined, about inches.	Weight of breaker. Lbs.	Capacity per hour, in tons of 2,000 lbs., passing 2½ in. ring, according to character of rock or ore.	Dimensions of driving pulley. Inches.		Space occupied by breaker. Inches.			Diameter of hopper. Inches.	Revolutions of driving pulleys.	†Size engine recommended to drive breaker, elevator and screen. Ind. horse-power.		Prices.
					Diam.	Face.	Height from bottom frame to top hopper.	Width of frame.	Length of frame.			Limestone.	Granite, ore.	
00	2 x 4	2 x 12	500	*———	8	2⅝	24	17	26	13	700	½	½	$125.00
0	4 x 10	4 x 30	3,100	2 to 4	16	6	48	30	73	28	500	4	4	400.00
1	5 x 12	5 x 36	5,500	4 " 8	20	7	54	31	76	37½	475	8	8	600.00
2	6 x 14	6 x 42	7,800	6 " 12	24	8	60	39	90	39½	450	12	15	800.00
3	7 x 15	7 x 45	13,500	10 " 20	28	10	73	48	103	44½	425	20	30	1,200.00
4	8 x 18	8 x 54	20,000	15 " 30	32	12	85	54	114	51	400	30	40	1,900.00
5	10 x 20	10 x 60	27,000	25 " 40	36	14	96	63	123	59	375	40	50	2,500.00
6	11 x 24	11 x 72	36,000	30 " 60	40	16	109	73	139	66	350	50	60	3,500.00
7½	13 x 30	13 x 90	60,000	40 " 75	48	18	116	73	144	120	350	60	75	5,000.00
8	18 x 42	18 x 126	89,000	100 " 150	48	20	156	90	164	132	350	125	150	7,000.00

*The size 00 is intended for laboratory and sampling purposes. When running to full speed, it will break 250 lbs. per hour of any rock or ore down to ⅛ inch, or 500 lbs. to ⅜ inch. Has wheel to run by hand. †The above tabulated estimates are intended to cover the ordinary macadam breaking. For fine breaking add liberally to the power.

PIG IRON BREAKERS.

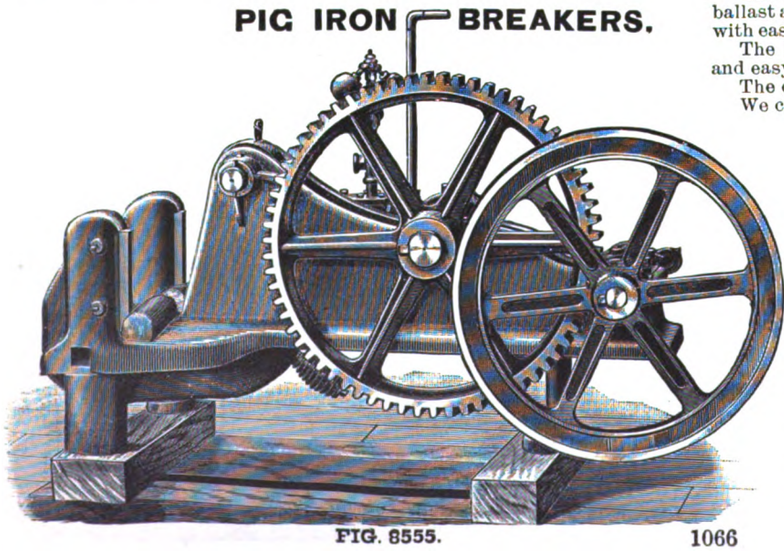


FIG. 8555.

The Comet crusher, Fig. 8553, is particularly adapted to crushing railroad ballast and street macadam, but is designed with sufficient strength to crush, with ease, ores, granite, phosphate rock, corundum, concrete, etc.

The large capacity of this crusher is due to its large receiving capacity and easy motion. A car of rock can be dumped directly into the hopper.

The crusher has put through a ton of rock in a minute.

We can furnish revolving screens, elevators, shafting pulleys and gearing to be used in connection with these machines.

DESCRIPTION, FIG. 8554.

The Gates breaker is adjustable. As head and concaves, or liners, wear, the head can be raised to compensate. In ordering breaker, give size of stone wanted. In sending out a new breaker we put on head and concaves to suit the case. If a product is wanted varying considerably in size, it is best to have on hand an extra set of liners to be put in as required.

In ordering crushers always state what kind of stone is to be crushed; size wanted when crushed? and for what purpose is the stone to be used.

PRICES, FIG. 8555.

It will break "pigs" or "sows" into two pieces as rapidly as they can be fed to it, or at the rate of 300 tons per day of ten hours. The movable jaw is actuated by a toggle-joint. The space into which the pigs are fed being convergent it is adapted to breaking pigs of any size. The pieces fall by gravity from the sides of the machine as soon as the pig is broken.

Belt driven as shown..... $_____
With engine..... _____

MANNING, MAXWELL & MOORE, 111 AND 113 LIBERTY STREET, NEW YORK.

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LOWRY ROCK AND ORE BREAKERS,

ROPE OR BELT DRIVEN.

Size.	Thickness of stone the breaker will receive, in inches.	Weight, about.	Capacity, in tons, per hour, macadam size.	Power required to drive breaker, elevator and screen, according to the material.	Prices of breaker.	Prices of revolving screen, separating two sizes.	Prices of revolving screen, separating three sizes.	Prices of elevator, 24 ft. between centers.
A	2½	450			$125.00			
B	4½	2,500	2 to 5	3 to 4	400.00			
C	5½	5,000	5 to 8	6 to 8	600.00	$200.00	$235.00	$225.00
D	6	7,000	7 to 14	10 to 15	800.00	200.00	235.00	275.00
E	7	12,500	10 to 20	16 to 25	1,200.00	325.00	375.00	325.00
F	8	18,000	15 to 30	25 to 40	1,900.00	325.00	375.00	375.00
G	11	26,000	25 to 45	35 to 50	2,500.00	350.00	400.00	425.00
H	12	38,000	35 to 70	45 to 60	3,500.00	550.00	650.00	475.00
Giant,	20	95,000	125 to 175	100 to 150	7,000.00	700.00	850.00	700.00

Size A is for laboratory and sampling work. Price of screen includes screen complete, mounted on substantial frame, with pulley ready to set in place and belt on to. Price of elevator includes frame complete with driving pulley ready to set in place and belt on to.

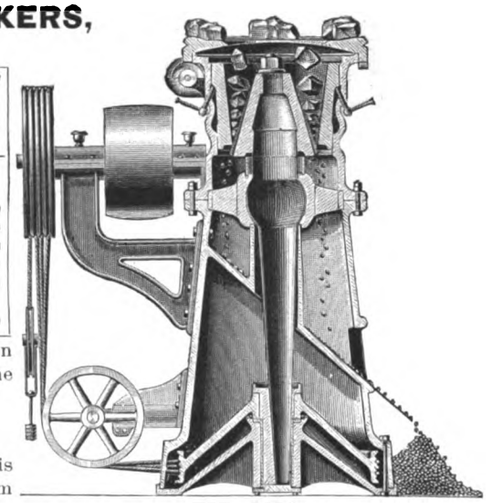


FIG. 8556.

THE ROPE DRIVE,

With sufficient laps around the pulleys and ample provision for adjustment in the tension pulley, is well adapted to the purpose here applied to. It combines speed and elasticity with great power from the large surface contact and long leverage, and easily runs direct from the fly-wheel of the engine.

SPRING CRUSHERS.

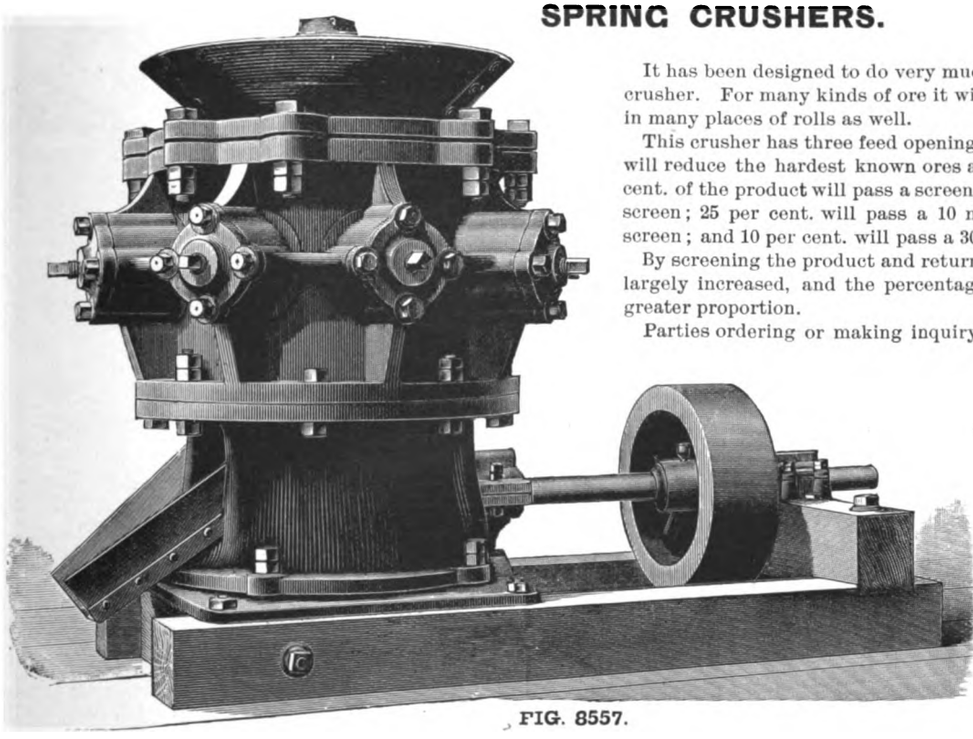


FIG. 8557.

It has been designed to do very much finer work than can be done on other form of crusher. For many kinds of ore it will answer the purpose not only of a crusher, but in many places of rolls as well.

This crusher has three feed openings, and will receive ore 5 inches by 10 inches. It will reduce the hardest known ores at the rate of 2½ tons per hour, so that 98 per cent. of the product will pass a screen of ½ inch mesh; 60 per cent. will pass a ¼ inch screen; 25 per cent. will pass a 10 mesh screen; 15 per cent. will pass a 20 mesh screen; and 10 per cent. will pass a 30 mesh screen.

By screening the product and returning rejections for crushing, the capacity will be largely increased, and the percentage of 10 mesh product also increased in a still greater proportion.

Parties ordering or making inquiry about this machine should be careful to state the kind of material to be operated upon, and also the fineness of product, so that we may give them an approximate estimate of the capacity of the machine on their work.

It is an invaluable machine for preparing ores for the rolls, and on many kinds of ore it will entirely supplant rolls or other reducing machinery. When working at its fullest capacity it does not require more than 10 horse power.

This crusher can also be run on wet ore, using water through it.

This machine weighs 12,000 lbs; with screen, elevator and frame, 15,000 lbs.

PRICES.

Price, including crusher, elevator and screen, $.....

BOCARDUS ECCENTRIC MILLS.

The mills will grind asbestos, bones, black-lead, charcoal, celluloid, clay, cocoa, corn and cob, cork, emery, enamel, fluid, fire-clay, fish, fish scraps, gum, horn, hoofs, india rubber, leather, mustard, mica, old crucibles, oil cake, oyster shells, plaster, printers' ink, paints, sand, shell and slag. The spindle and steps are of hammered steel.

Grinding capacity of No. 2 is about 3 tons per 10 hours; No. 5, about 7 tons per 10 hours.

PRICES.

No. 2 mill, for grinding dry substances; small plates are 13 inches in diameter.....Price,	$175.00
No. 3 mill, for wet substances.....	140.00
No. 4 mill, for wet substances.....	325.00
No. 5 mill, for dry substances.....	425.00
An extra pair of plates are sent with the dry mills.	
Ore plates, for sand or slag.....	4.00
Large.....per pair,	14.00
Bone, black plates, for bones.....	2.50
Large.....per pair,	12.00
Raw bone plates, for woods, roots and leather.....	4.00
Corrugated raw bone.....	4.00
Large.....per pair,	12.00
Coarse feed plates..... "	3.50
Large..... "	12.00
Sugar plates..... "	5.00
Large..... "	16.50
Fire-clay plates..... "	3.50
Coffee plates..... "	5.50
Flax-seed plates..... "	6.50

Persons ordering mills should state the substance to be ground, to avoid sending the wrong plates. Drivers and countershaft extra, at market prices, if ordered.

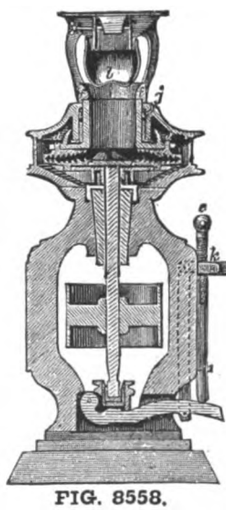


FIG. 8558.

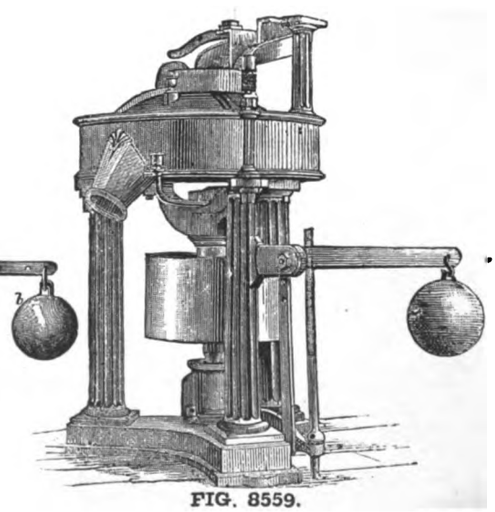


FIG. 8559.

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NAROD DRY PULVERIZERS.

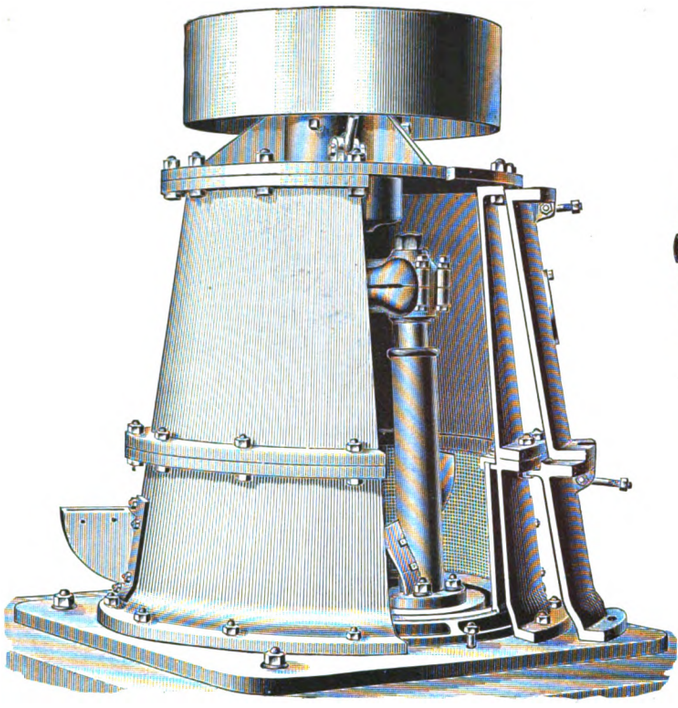


FIG. 8560.

The three solid rolls shown in the cut revolve upon the suspended tripod steel shafts, and by centrifugal action against the ring with a force of 8,000 lbs. pressure.

The shafts do not revolve. A sleeve covers each shaft to the top, where it is capped; the sleeve is firmly secured to the roll and forms a part of it, and also serves as an oil chamber, by means of which the rolls will run one week or longer without replenishing of oil. The flanges are attached to the sleeve, hence the sleeves, flanges and rolls revolve together. The main journal makes 140 revolutions, and the rolls, flanges and sleeves 420 revolutions per minute in the opposite direction. The main shaft, which is conical in shape, tapering downwardly, is hollow and serves as an oil chamber for the main journal, the conical sleeve tapering upwardly.

Capacity of mill varies with the nature of the material and with the fineness of the output. Phosphate, gypsum, marble, etc., about 3½ to 4 tons an hour of 60 mesh; cement, 2 to 3 tons an hour, proportionate to fineness; quartz rock, 2 to 3 tons an hour of 30 to 60 mesh fineness. Size mesh of screen in use in mill determines size mesh of product. Screens quickly changed by removal of upper portion of jacket. No wear or breakage of screens, as only fine particles come in contact. Each screen having eight sections, damage to one section does not affect any other, hence trifling cost for repairs.

Only 15 to 20 horse power required.

ROTARY PAN GRINDING MILLS.

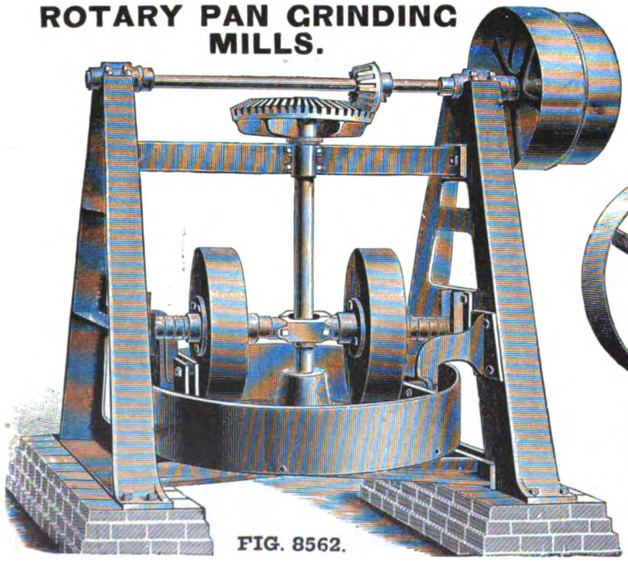


FIG. 8562.

It is for reducing to a powder old fire bricks, saggers, pipe and coal dirt, also mineral phosphate and bones, quartz and feldspar. It has a capacity of from 10 to 25 tons per day, depending on the material to be ground.

4 feet 8 inches, diam. of pan	Weight,	8,000 lbs.	Prices, $	.....
5 " " "	"	12,000 lbs.	"	.....
7 " " "	"	22,000 lbs.	"	.....
8 " " "	"	30,000 lbs.	"	.....

Above dimensions are inside diameter of pan.

FRISBEE-LUCOP BLAST AND SCREEN MILLS.

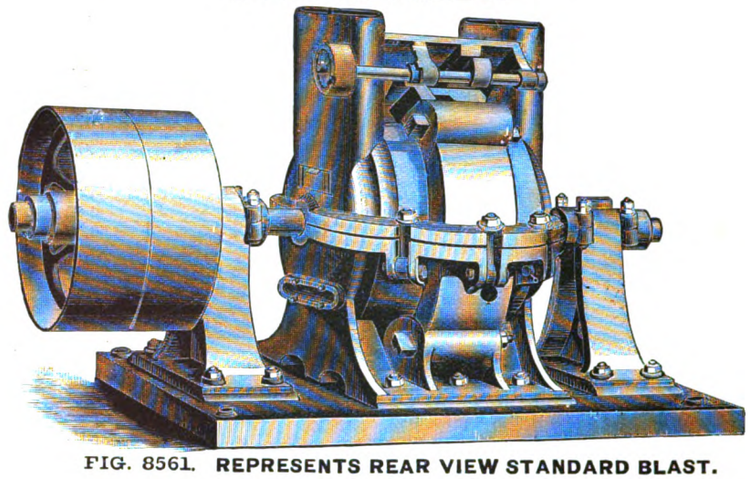


FIG. 8561. REPRESENTS REAR VIEW STANDARD BLAST.

The principle of the blast mill is identical with that of the screen mill. The differences in construction are only such as relate to the extraction of the product from the mill after it has been pulverized. In the blast mills the screens are omitted, and the pulverized material is separated from the coarse by gravity, being drawn from the mill, as generated, through pipes connected with the top of the casing, and carried to chambers prepared for it, by an exhaust fan or other method of causing a current of air to pass through the mill.

THE STANDARD BLAST MILL.

In this mill the automatic feed, the shaft, rolls, rings, etc., etc., are identical with those of the screen mill; the casing and circulating fan alone are different.

We build three sizes of screen mills, the 24 inch, 20 inch and 16 inch, these dimensions being the inner diameter of the rings. The 24 inch and 20 inch mill are nearly identical in construction, differing in dimension of the parts; the latter has not the outboard bearing.

PRICES, DRY MILLS.

24 inch screen mill	$1,500.00
24 " blast, standard phosphate mill	1,500.00
20 " screen mill	1,000.00
16 " special, screen or blast	500.00
The Frisbee wet mill	$3,000.00

	24 inch dry mill.	20 inch mill.
Shipping weight	6,500 lbs.	3,800 lbs.
Speed	300 revolutions.	500 revolutions.
H. P. required	15 to 18 H. P.	6 to 9 H. P.
Space "	8 x 4 x 4 feet.	6 x 3½ x 4 feet.
Size driving pulley	28 inch D. x 8 inch face.	20 inch D. x 7 inch face.
Size bed plate	7 ft. 7. in. x 3 ft. 6 in.	4 ft. 6 in. x 3 ft.
Capacity	1 to 3 tons per hour.	½ to 1½ tons per hour.

CONCRETE MIXERS.

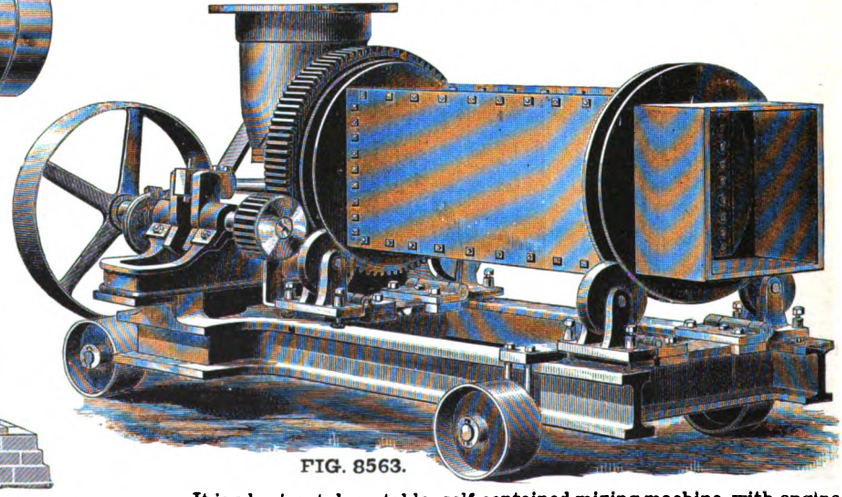


FIG. 8563.

It is a horizontal, portable, self-contained mixing machine, with engine attached, which does not require skilled workmen to operate. On the outer end of the crank-shaft of the engine a pulley is provided from which a revolving screen can be driven, if so desired. If engine is not desired, a pulley of suitable size will be provided with the necessary gearing so that machine can be run from independent portable engine or line shaft.

PRICES ON APPLICATION.

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REVOLVING SCREENS.

PRICES ON APPLICATION.

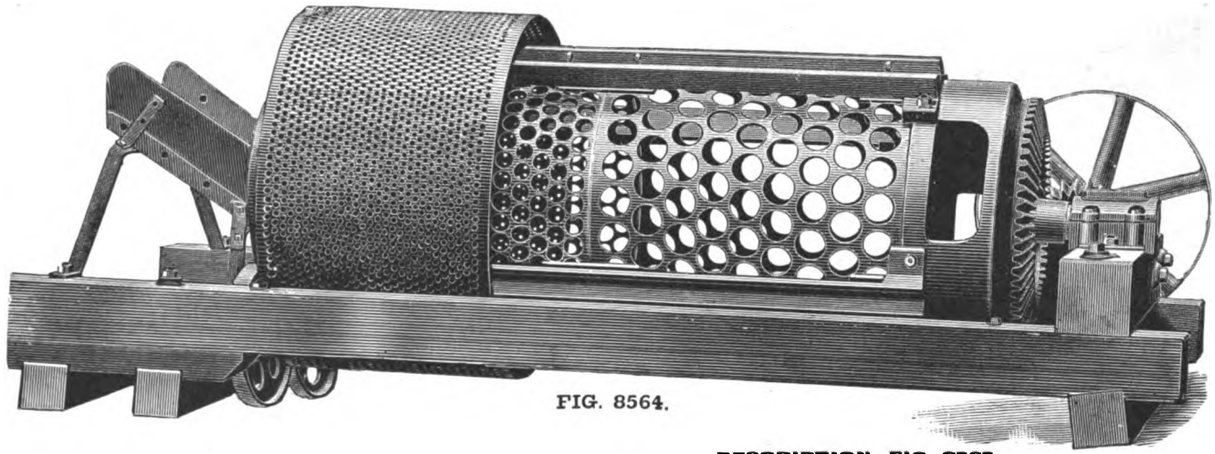


FIG. 8564.

CORNISH ROLLS.

FOR FINE OR COARSE CRUSHING OF ALL KINDS OF MINERALS.

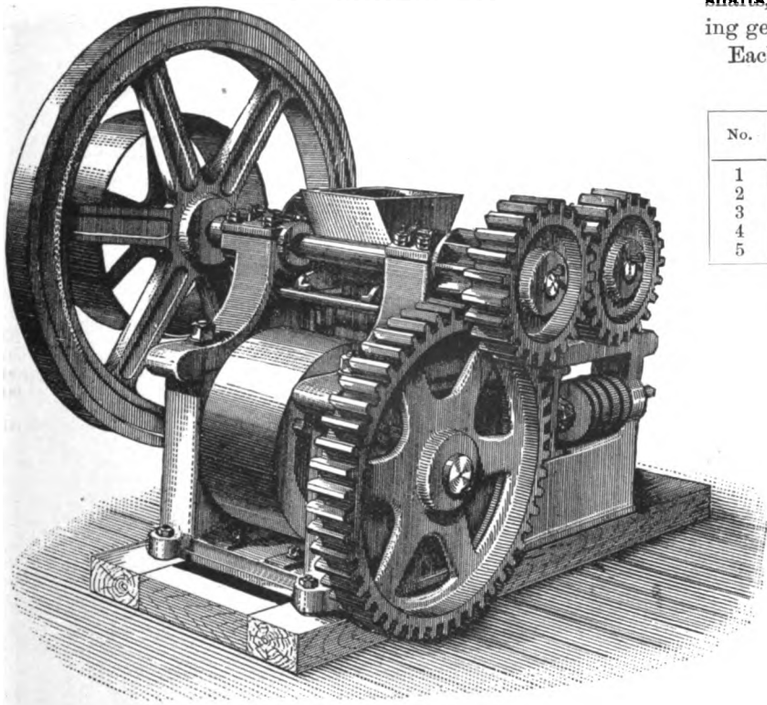


FIG. 8565.

DESCRIPTION, FIG. 8566.

It is strongly and substantially built, with heavy iron rails, and fitted with a large crown gear and heavy top plate, which supports the main shaft and keeps the gears in line.

The crown gear is driven by a bevel pinion fitted on a three-inch wrought iron shaft. This shaft is key-seated to receive a spur gear coupling or pulley, as may be desired.

To work the power brick machine satisfactorily, we advise the use of an engine of ten-horse-power capacity.

A fifteen-horse-power engine will run two machines.

A twenty-horse-power engine will run four machines.

The capacity of the steam power machine is from 25,000 to 35,000 bricks per day; it is limited only by the facilities for feeding clay to the machine and taking care of the brick when made.

WEIGHT 7,600 LBS.

PRICES ON APPLICATION.

DESCRIPTION, FIG. 8565.

These rolls are an improved style, each roll having its own gear and pinion, and driven by connecting gears, as shown on separate shafts, thus avoiding the wear and tear caused by using the connecting gears on the roll shafts direct.

Each roll has removable shells made of the best chilled iron.

PRICES.

No.	Diam., inches.	Face, inches.	Capacity in tons, per hour.	Weight.	Rev's per minute of pulley.	Diam. pulley, inches.	Face of pulley, inches.	Prices.
1	12	7	1 to 2	2,500	350	24	5	$400.00
2	18	10	2 to 4	6,000	350	24	7	600.00
3	24	12	4 to 6	9,600	300	24	8	850.00
4	30	15	8 to 10	15,000	250	30	10	1,250.00
5	36	17	10 to 12	20,500	200	36	10	1,600.00

MARTIN STEAM POWER BRICK MACHINES.

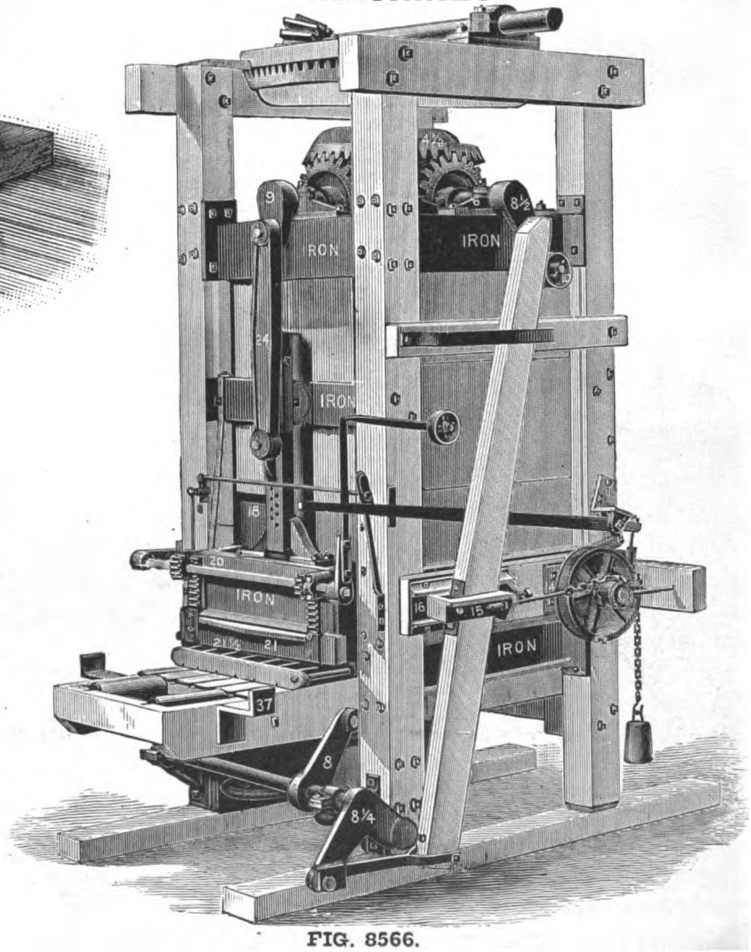


FIG. 8566.

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SOFT CLAY PUG MILL.

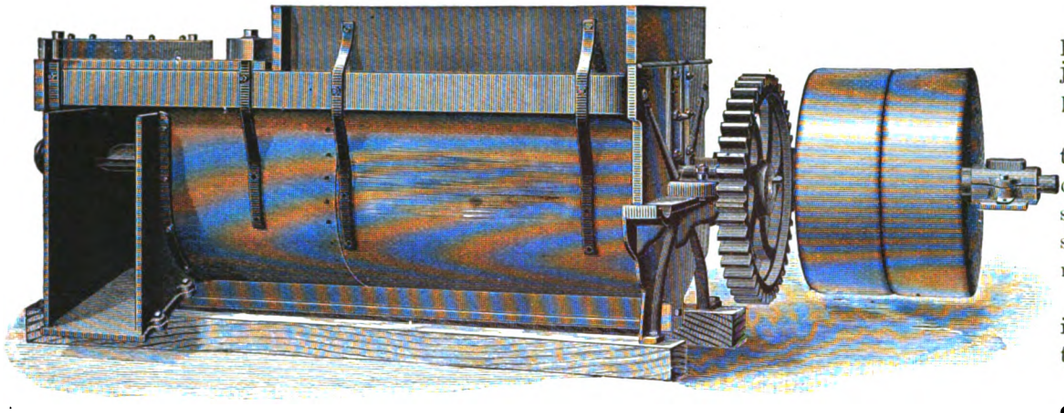


FIG. 8567.

The cut represents a soft clay pug mill, which is a valuable ad junct to any yard where additional pugging or tempering is desired.

The main shaft is 3 in. square, the mud knives and mud wing are cored out square and slip over the shaft, no keys or pins being necessary to hold them in position. The mud wing is double.

The tub is made of boiler plate, is 7 ft. long and 2 ft. 4 in. wide at the top.

We furnish this pug mill for either right or left hand delivery. The cut shows the mill arranged for right hand delivery.

It is provided with tight and loose pulleys, 42 in. dia. x 3 in. face. Speed, 60 to 80 revolutions per minute.

ESTIMATED WEIGHT, 2,500 LBS. PRICE, $250.00.

MARTIN 2 HORSE POWER BRICK MACHINES.

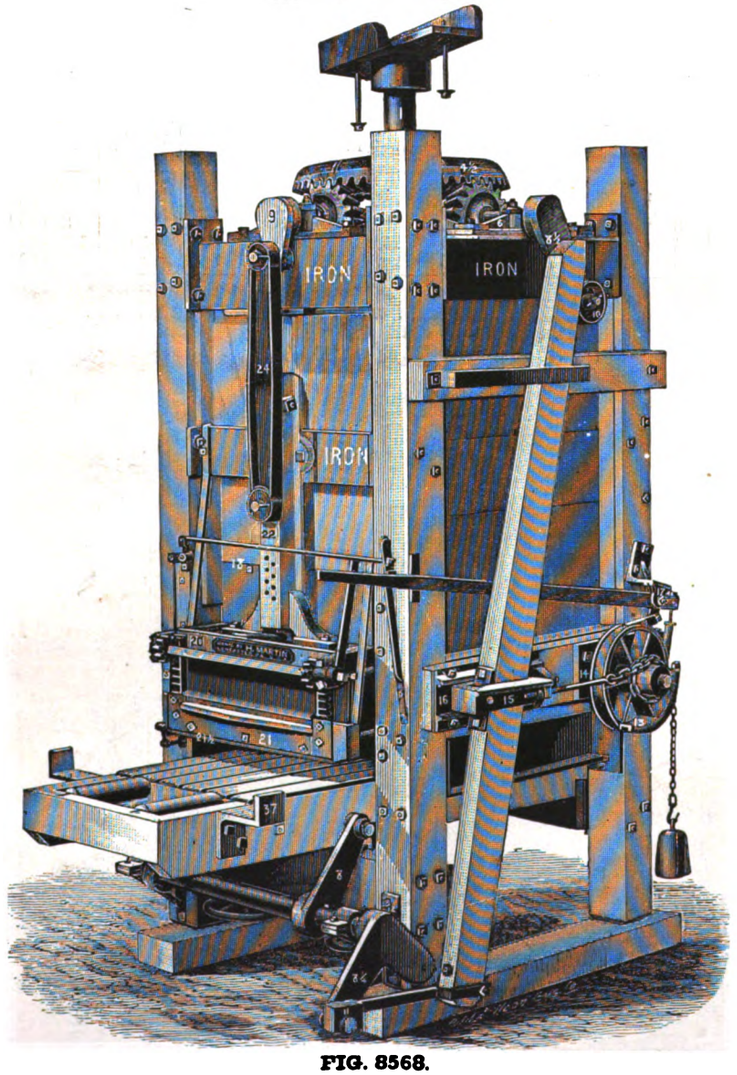


FIG. 8568.

Any length of sweep can be used. The longer the sweep the easier the draught, but the slower the speed. For moulding the clay stiff the draught should be 20 feet from the center of machine to the end of the sweep. The speed of the horses will regulate the speed of the machine. Horses traveling 2½ miles an hour will make 110 revolutions. The machine makes 18 brick at each revolution—which will give 2,000 brick per hour.

WEIGHT, 5,200 LBS. PRICES ON APPLICATION.

THREE-ROLL KENTUCKY CANE MILL.

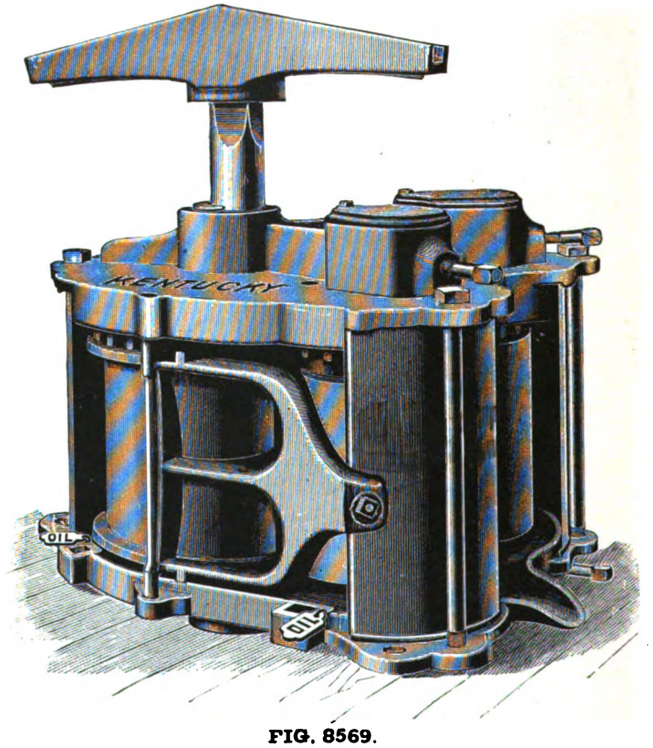


FIG. 8569.

They are adapted for sorghum and sugar cane.

PRICES.

No.	Size.	Estimated capacity, per hour.	Height of rolls.	Diameter, large rolls.	Diameter, small roll.	Weight.	Prices, with wrench and bolts.
		Galls.	Inches.	Inches.	Inches.	Lbs.	
0	One horse.	40	5½	10⅛	6⅛	400	$30.00
1	Regular one horse.	60	6 3/16	11⅜	6¾	500	40.00
2	Two horse.....	80	7½	13½	7⅛	725	60.00
3	Regular two horse.	100	9¾	14 13/16	8	900	80.00
4	Heavy two horse..	120	12	16	9 1/16	1,200	100.00

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DOUBLE GEARED HORIZONTAL CANE MILLS FOR STEAM OR WATER POWER.

DESCRIPTION, FIG. 8570.

This mill is one of the strongest, lightest running cane mills for the price on the market.

The shafts are of steel. The adjusting screws and bolts are of steel; the gearing is heavy and strong, and works smoothly and without friction.

Driving pulley is 30 inch diameter by 8 inch face, and should make about 106 revolutions per minute.

PRICES.

Length of rolls.		Diameter of rolls.		Weight.	Price.
Large. Bet. flange.	Small.	Large.	Small.		Double geared.
14 in.	13⅞ in.	11½ in.	7¼ in.	1,400 lbs.	$160.00

Fig. 8571 gives an illustration of the Cook's pan for brick or stone arches. These we build for Nos. 4 and 5, with a gate and one high ledge, as shown in cut; larger pans for brick or stone arches, Nos. 6 and 7, with two gates and two high ledges.

An evaporator means pan, furnace, grate and chimney. When only a pan is wanted, order pan.

When pan is wanted for stationary arches, please so state. Unless so ordered, will send regular pan.

PRICES, FIG. 8571. COMPLETE, PAN AND FURNACES.

No.	Size.		Capacity per day in gallons syrup.	Weight.		Prices.	
	Width. Inches.	Length. Inches.		Steel. Lbs.	Copper. Lbs.	Galv. steel.	Copper.
1	44	66	25 to 35	225	....	$38.00	....
2	44	72	35 to 50	250	270	45.00	$75.00
3	44	90	50 to 70	275	285	55.00	90.00
4	44	108	65 to 100	300	315	65.00	105.00
5	44	126	75 to 125	350	365	75.00	125.00

PRICES, FIG. 8571. WITHOUT FURNACES.

No.	Size.		Capacity per day in gallons syrup.	Weight.		Prices.	
	Width. Inches.	Length.		Steel. Lbs.	Copper. Lbs.	Galv. steel.	Copper.
		In. Ft.					
1	44	66 or 5½	25 to 35	60	....	$18.00	....
2	44	72 or 6	35 to 50	80	100	20.00	$50.00
3	44	90 or 7½	50 to 70	100	110	25.00	60.00
4	44	108 or 9	65 to 100	120	135	30.00	70.00
5	44	126 or 10½	75 to 125	135	150	40.00	85.00
6	44	144 or 12	125 to 175	150	175	50.00	100.00
7	44	180 or 15	150 to 200	175	200	60.00	125.00

PRICES, FIG. 8572. COMPLETE, PAN AND FURNACES.

No.	Size.		Capacity per day in gallons syrup.	Weight.		Prices.	
	Width. Inches.	Length. Inches.		Steel. Lbs.	Copper. Lbs.	Galv. steel.	Copper.
1	44	66	25 to 35	250	285	$40.00	....
2	44	72	35 to 50	275	310	50.00	$85.00
3	44	90	50 to 70	300	345	60.00	100.00
4	44	108	65 to 100	325	390	70.00	115.00
5	44	126	75 to 125	350	450	80.00	130.00

PRICES, FIG. 8572. WITHOUT FURNACES.

No.	Size.		Capacity per day in gallons syrup.	Weight.		Prices.	
	Width. Inches.	Length. Inches.		Steel. Lbs.	Copper. Lbs.	Galv. steel.	Copper.
1	44	66	25 to 35	90	....	$20.00	....
2	44	72	35 to 50	100	110	25.00	$60.00
3	44	90	50 to 70	110	120	30.00	70.00
4	44	108	65 to 100	130	140	35.00	80.00
5	44	126	75 to 125	160	170	40.00	90.00
6	44	144	125 to 175	175	200	50.00	110.00
7	44	180	150 to 200	200	250	60.00	140.00

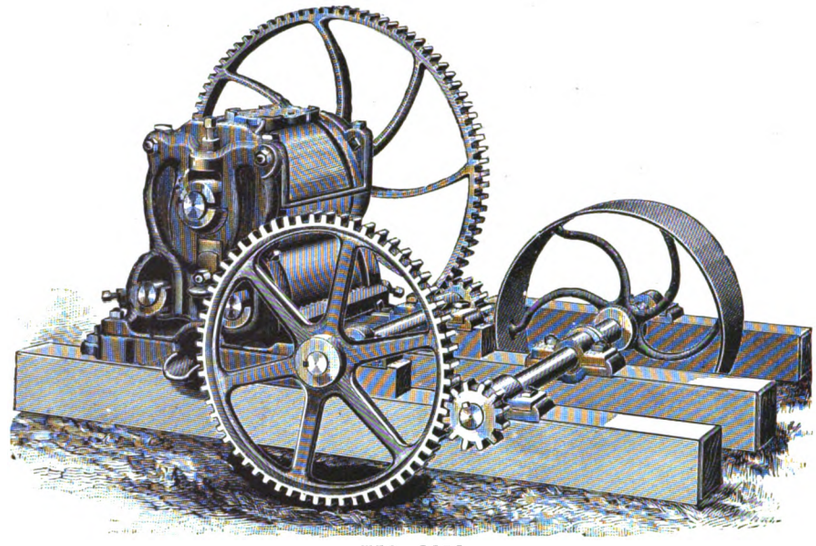


FIG. 8570.

SUGAR PANS FOR STATIONARY ARCHES.

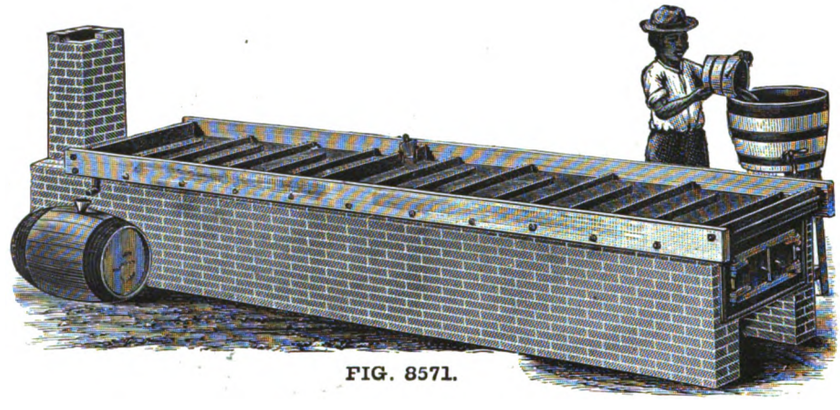


FIG. 8571.

SELF-SKIMMING EVAPORATORS.



FIG. 8572.

The self-skimming evaporators are made entirely seamless, and no solder is used on the bottoms; a little is used on the fenders attached to the skimmers and on the gate holes, where the molasses passes from one section to another, and none at all where the fire can get near it.

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